

**Environmental and Social Impact Assessment Report**

 TOTAL eren



Solar Technology Advisors

# **Development of PV Plant in Tutly, Uzbekistan**

**Prepared by STA (Spain) and NBT (Uzbekistan)  
for the Total Eren**

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**Solutions with a new bright touch**

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## List of Abbreviations

ADB	– Asian Development Bank
BMP	Biodiversity Management Plan
EIA	– Environmental Impact Assessment
EIB	European Investment Bank
EMP	– Environmental Management Plan
EMR	– Environmental Monitoring Report
ESIA	– Environmental and Social Impact Assessment
ESMS	Environmental and Social Management System
CM	– Cabinet of Ministers
CNR	– Construction Norms and Rules
CSES	– Centre for Sanitary and Epidemiological Supervision
DCM	– Decree of Cabinet Ministers
EIA	– Environmental Impact Assessment
EMP	– Environmental Management Plan
EPZ	– Emergency Planning Zone
GRM	– Grievance Redress Mechanism
GAP	– Gender Action Plan
GDP	– Gross Domestic Product
HDPE	– High-Density Polyethylene
ICWC	– Interstate Commission for Water Coordination
JSC	– Joint Stock Companies
MH	– Ministry of Health
MAC	– Maximal Allowable Concentrations
MAD	– Maximal Allowable Discharge
MAE	– Maximal Allowable Emissions
MSW	– Municipal Solid Wastes
MHCS	– Ministry of Housing and Communal Services
MSPD	– Main Scientific-Production Department
NGO	– Non-Governmental Organization
OM	– Oliy Majlis
O&M	– Operations and Maintenance
PE	– Prefabricated
PCU	– Project Coordination Unit
PMC	– Project Management Consultant
PMU	– Project Management Unit
PPP	– Public-Private Partnership
PSEI	– Preliminary Statement of Environmental Impact
RUz	– Republic of Uzbekistan
RES	– Renewable Energy Sources
RCM	– Resolution of the Cabinet of Ministries of the RUz
SEE	– State Environmental Expertise
SEI	– Statement of the Environmental Impact
SES	– Sanitary and Epidemiological Services
SSP	– Safeguard Statement Policy
SUE	– State Unitary Enterprise
SCEEP	– State Committee on Ecology and Environmental Protection
TA	– Technical Assistance
TP	– Treatment Plant
TWt	– Terawatt
WB	– World Bank

## GLOSSARY

<b>Glavgosexpertisa</b>	State Department responsible for Conducting Environmental Expertise Under SNPC
<b>Goskomecologiya</b>	The State Committee for Ecology and Environmental Protection
<b>Goskomgeologia</b>	State Committee for Geology and Mineral Resources
<b>Khokim</b>	Governor of administrative unit
<b>Khokimiyat</b>	Regional government authority
<b>KMK</b>	National acronym for Construction norms and regulations
<b>Makhalla</b>	A community of neighbours, which is based on full independence and self-governance.
<b>OVOS</b>	National acronym for EIA assessment process
<b>PZVOS</b>	National acronym for Concept Statement on Environmental Impact
<b>SanR&amp;N</b>	Sanitary - epidemiological norms and regulations
<b>Som</b>	Local currency
<b>SNiP</b>	Set of basic regulatory requirements and regulations governing the design and construction in all sectors of national economy of Uzbekistan
<b>Sanoatgeokontekh -nazorat</b>	State Inspectorate for Exploration Supervision, Operations Safety Supervision of Industry, Mining and Utilities Sector
<b>T.o.e.</b>	Ton of oil equivalent
<b>Uzbekenergo</b>	Managerial body in the electric power and coal industries, which are major structural components of the national economy
<b>Uzhydromet</b>	State governing body specially authorized for the solution of tasks in the field of hydrometeorology in the Republic of Uzbekistan and in its activities it is accountable to Cabinet of Ministers
<b>ZVOS</b>	National acronym for Statement on Environmental impact
<b>ZEP</b>	National acronym for Statement on Environmental Consequences

## **1 Introduction**

In August 2019, agreements between the Government of Uzbekistan and “TOTAL Eren” (France) was established and signed for the construction of 100 MW solar PV solar plant in Samarqand province, Nurabad district and purchase of the associated generated electricity.

For construction of the plant, a full Feasibility Study is being prepared and as part of study the Environmental and Social Impact Assessment was conducted. This report presents results of assessment, identified potential impacts and proposed mitigation measures.

### **1.1 Scope of the ESIA**

This ESIA report has been developed in line with international best practices and includes the following:

- description of the local policies and legal framework and international standards applicable to the proposed project;
- description of the proposed Project including its objectives, design concepts and use of resources;
- description of the baseline conditions in the Project area covering the physical location, environmental settings, social and economic issues;
- assessment of the anticipated impacts on the surrounding environment and socio-economics;
- identification of appropriate prevention and mitigation measures;
- a framework Environmental and Social Management and Monitoring Plan (ESMMP) for the management of the identified E&S impacts
- summary of the Stakeholders Engagement and Public Consultation process undertaken for the Project.

This ESIA identifies impacts resulting from the proposed Project, based on the baseline conditions and project design information provided by TOTAL Eren, and has been prepared based on the following key steps.

- Document Review
- Site Visit
- Detailed ESIA Activities
- Public Consultations.

### **1.2 Renewable Energy in Uzbekistan**

Being abundant in natural resources Uzbekistan has one of the biggest energy markets in Central Asia with its installed capacity of over 14.1 million kW, of which Thermal Power Plants

constitute 85% of installed capacities<sup>1</sup>. Fossil fuels have been the primary energy resources; especially natural gas is utilized to supply the country with electricity<sup>2</sup>.

In addition to its abundance in natural resources, Uzbekistan is considered one of the richest countries in terms of renewable energy sources<sup>3</sup>. Uzbekistan has the potential to produce 50 billion ton of oil equivalent (t.o.e.) based on solar energy, with current technology it would be possible to generate 175 million t.o.e, more than triple the amount of fossil fuel the country produces annually<sup>4</sup>. There are more than 320 sunny days in Uzbekistan during a year. It is calculated that Uzbekistan will be able to produce renewable energy in the amount of more than 182 million tons of oil equivalent (t.o.e) per year. This is almost three times the amount of energy currently consumed in the country.

According to study conducted by WB team, solar energy capacity of Uzbekistan is estimated as 2058 terawatt (TWt) which offers the biggest potential amongst the sources of renewable energy.

**Table 1: Approximate technical potential of Renewable Energy Sources (RES) of the Republic of Uzbekistan in the generation sector, TW \* per year**

Name of resources	Terawatt
Solar power	2058
Hydroelectric power station	5.9
Wind energy	4.7
Biomass	1.5

The distribution of the solar energy within the country is presented in Figure below.

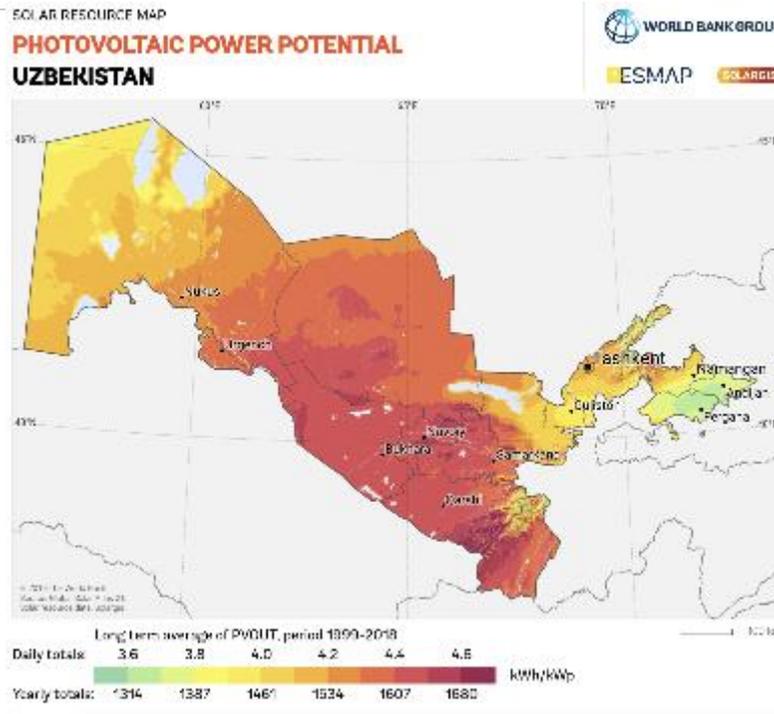
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1 <http://uzbekenergo.uz/ru/activities/alternative-energy-sources/>

2 <https://cabar.asia/en/barriers-to-renewable-energy-sector-development-in-uzbekistan/>

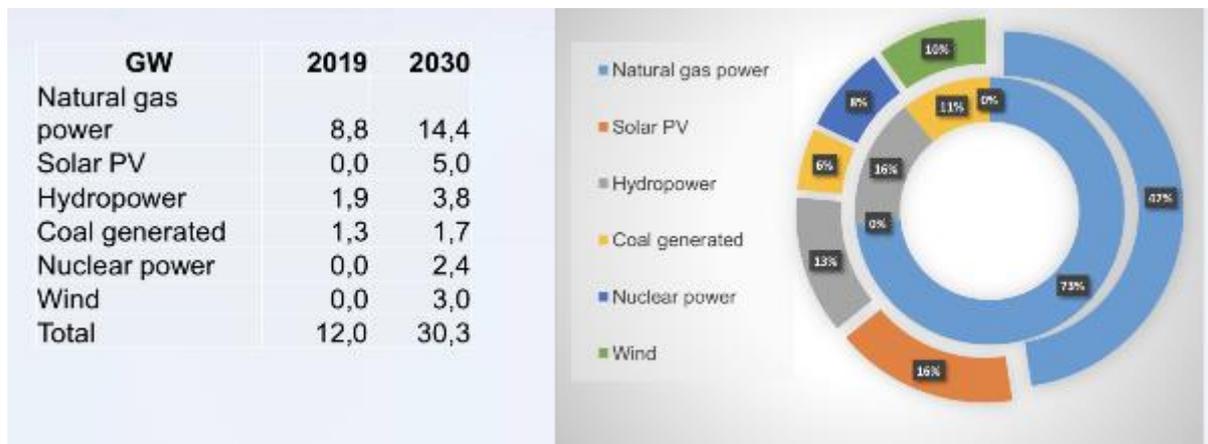
3 <http://uzbekenergo.uz/ru/activities/alternative-energy-sources/>

4 Uzbekistan: Solar Energy Development, Jorge Servert del Rio, Cindy Tiangco, Antonio López, Sultan Suleimanov, Daniel Castella, Eckhard Luepfert



**Figure 1: The potential of solar energy (FSE) in Uzbekistan, kW \* h / kW peak**

The Government plans on development of renewable energy sector shows increasing of production of solar energy by 5 times – 5 GW by 2030.



**Figure 2 : Capacity planning next 10 years<sup>5</sup>**

Realizing the current obstacles for the development of renewable sector in energy market and the need to diversify the generation of energy Uzbekistan has taken steps to mitigate and facilitate the broad introduction and utilization of renewables.

Energy sector priorities to 2027 include increasing generating capacity, improving energy efficiency in the energy, transport and agriculture sectors, and using renewable energy sources more widely.

<sup>5</sup> <http://minenergy.uz/ru/news/view/297>

To expand the use of renewable energy sources, reduce energy intensity of production and implement the Strategy of Actions on Five Priority Directions of Development of the Republic of Uzbekistan in 2017-2021, Presidential Decree No. PP-3012 of 26 May 2017 on the Program of Measures on the Further Development of Renewable Energy and Energy Efficiency in Sectors of the Economy and the Social Sphere for 2017-2021 was adopted. As part of the plan, the government plans to spend 314.1 billion UZS (\$81 million) of its own money and raise 20.5 trillion UZS (\$5.3 billion) from foreign sources to develop hydro, solar and wind power through 2025.

The government is hoping that efficient power use and conversion from fossil fuel to renewables will boost economic competitiveness, raise the standard of living and protect the environment. Hydro currently accounts for 12.7% of all Uzbekistani electricity with plans to raise it to 15.8% by 2025, which includes building of 42 new hydro plants and modernising 32 more by 2021. Solar and wind will account for 2.3% and 1.6% of the country's power by 2025.

According to recently adopted Law on Use of Renewable Energy Sources (May, 2019), President Resolution on Strategy for further Development and Reform of the Electric Power Industry of the Republic of Uzbekistan, the Government is actively attracting the private sector to the sector of renewable energy.

## **2 Legal and Legislative Framework**

### **2.1 National Legislative Requirements**

The Republic of Uzbekistan (RUZ) is an independent democratic republic based upon the 1992 Constitution (as amended on 28 December 1993, 24 April 2003, 11 April 2007, and 18 April 2011). The national environmental and social policy in Uzbekistan is based on the provisions of the country's Constitution. Under the Constitution, all RUZ citizens have equal rights and freedoms and are all equal under the law without distinction as to gender, ethnicity, nationality, language, religion, social background, convictions, personal and social status (Article 18). The Constitution also provides safeguards for human rights and freedoms proclaiming that the state secures rights and freedoms of its citizens (Article 43) and guarantees to everyone juridical protection of rights and freedoms (Article 44), and males and females enjoy equal rights (Article 46).

Uzbekistan is a presidential republic in which the President is the executive head of the state who secures efficient coordination of governmental authorities. The President issues decrees, resolutions and ordinances which shall be binding across Uzbekistan.

The bicameral Supreme Assembly, or 'Oliy Majlis' (OM), comprising the Legislative Chamber and the Parliament, is the legislature with a power to shape laws. In line with the Constitution any law has legal effect provided it is enacted by the Legislative Chamber, approved by the Parliament and signed by the President. OM defines the national environmental and social policies, approves national environmental programs, develops and adopts national environmental and social legislation, coordinates environmental compliance monitoring actions, defines the rates of environmental charges and establishes respective incentives.

The Cabinet of Ministers (CM) is the executive. It comprises the Prime Minister, Deputy Prime Ministers, Ministers, State Committees Chairmen and the Government Executive of the Karakalpakstan Republic. The CM exercises state control of environmental protection and natural resources management along with the State Committee of the Republic of Uzbekistan for Ecology and Environmental Protection (SCEEP) and the local governments. Based on its environmental and social mandate, the CM (i) pursues national environmental and social policy; (ii) regulates natural resources management; (iii) is responsible for natural resources inventory and evaluation; (iv) coordinates the development and implementation of national socio-economic programs; (v) develops mitigation measures; (vi) establishes procedures for collecting environmental charges, pollution and waste disposal fees; (vii) sets up limits for the use of natural resources and waste disposal; (viii) develops environmental education and awareness systems; (ix) identifies zones of special environmental management, environmental protection and management regimes; and (x) develops international environmental relations.

The Councils of People's Deputies, or 'Kengashi', led by governors known as 'khokims', are the representative bodies of government authority in regions, districts, cities and towns (except for towns under regional jurisdiction and city districts). Under the Constitution they address any issues within their mandate and responsibility based on the interests of the state and its citizens. The Kengashi are responsible for (i) law and order; (ii) the security and safety of citizens; (iii) issues of economic, social and cultural development; (iv) local budgets and taxes; (v) local utilities; (vi) environment protection, civil registration; (vii) local standards and regulations, and (viii) enforcement. The term of office for both the Kengashi and the khokim is five years. The khokim is personally responsible for decisions and actions taken by the



Kengash, while decisions of the khokim are binding to all ventures, institutions, organizations, associations as well as public officers and citizens across the respective territory.

The environmental responsibility of regional/local government authorities includes: (i) identification of environmental priorities for the respective territory; (ii) approval of regional (local) environmental programs; (iii) inventory and evaluation of natural resources; (iv) inventory of environmentally hazardous facilities; (v) logistical support to environmental actions; (vi) environmental permitting; (vii) waste management; (viii) the collection of environmental charges; and (ix) environmental control.

The makhalla (community level organization) is an independent local form of self-government in Uzbekistan. Makhalla pursue general initiatives and actions locally, including environment-related ones. Makhallas are responsible for taking decisions on issues of local importance, such as infrastructure improvement and development, arrangements for khashars (voluntary unpaid work on Sunday), and the provision of social aid to low-income families.

Settlements, kishlaks (villages) and auls (mountain villages) are governed by aksakals (chairmen) and their advisors. They are elected by the gathering of citizens for a period of 2.5 years.

### **2.1.1 Environmental Management Regulators**

#### **State Committee for Ecology and Environmental Protection**

The State Committee for Ecology and Environmental Protection (SCEEP or Goskomecologiya) is the primary agency and environmental regulator responsible for implementing the Law on Environmental Protection (1992). The committee reports to the Parliament and is accountable to the Cabinet of Ministers of the Republic of Uzbekistan. The SCEEP is responsible for supervising, coordinating and implementing environmental protection policies and managing the usage and renewal of natural resources at the central, region and district levels.

The main tasks and activities of the SCEEP are:

- State administration in the field of ecology, environmental protection, and the rational use and processing of natural resources;
- Ensuring favourable environmental conditions, the protection of ecological systems, natural complexes and individual objects, and, where possible, improving environmental conditions;
- Implementation of state control over compliance with legislation in the field of solid waste management (SWM), and the organization of an effective system for the collection, transportation, recycling and disposal of waste, in close cooperation with the local authorities and the self-government of citizens;
- State environmental control over compliance with legislation in the field of protection and use of land, mineral resources, water, forests, protected natural areas, flora and fauna, and protection of atmospheric air;
- Coordination of work on ecology and environmental protection, ensuring interdepartmental cooperation in the development and implementation of a unified environmental and resource-saving policy;
- Maintaining a state cadastre in the field of ecology and environmental protection, as well as state registration of nurseries for the breeding and maintenance of wild animals, wild plants, zoological and botanical collections; and
- Organization of environmental education, as well as retraining and advanced training



of specialists in the field of ecology and environmental protection.

The Committee is regulated by President Resolution No. 5024 'On Improving the System of State Management in the sphere of Ecology and Environmental Protection' of 21st April 2017.

The structure of SCEEP takes the form of a central body in Tashkent with regional branches and agencies providing scientific and technical support. Regional environmental authorities are structured similarly to the SCEEP.

The other State agencies that are involved in the regulation and protection of the environment include:

- Ministry of Water Resources;
- Ministry of Agriculture;
- State Committee for Geology and Mineral Resources;
- Centre of Hydro-meteorological Service (Uzhydromet);
- Ministry of Health (MoH RUz);
- State Inspectorate for Exploration Supervision, Operations Safety Supervision of Industry, Mining and Utilities Sector (Sanoatgeokontekhnazorat); and
- Sanitary and Epidemiological Services (SES).

### **Ministry of Water Resources**

The Ministry of Water Resources is responsible for water allocation among different users within the nation. Based on forecasts and limits provided by the Interstate Commission for Water Coordination (ICWC), water is allocated among users with the priority given to the drinking water supply sector.

### **Ministry of Agriculture**

The Ministry of Agriculture is responsible for the implementation of a unified technical policy in agriculture, based on (i) in-depth study and implementation of advanced farming systems; (ii) ensuring stable production of the most important agricultural products; (iii) ensuring the introduction of new farming systems, highly efficient agricultural technologies, modern types of agricultural machinery for agriculture and livestock breeding; (iv) implementation of measures for reclamation of irrigated land; and (v) ensuring the expansion and rational use of forest resources, and monitoring the compliance with forest legislation and others.

### **State Committee for Geology and Mineral Resources**

The State Committee for Geology and Mineral Resources, together with the Geological Survey Services of the neighbouring countries, identify and study the focal points of radioactive and toxic pollution within trans-boundary territories, and prepare geological maps and atlases reflecting among other things, hazardous zones and sections. In accordance with the procedure established by legislation, the committee also exercises control over the protection of geological and mineralogical facilities, as well as groundwater from pollution and depletion.

### **Uzhydromet**

Uzhydromet establishes and maintains the State Hydro-Meteorological Fund of Data, and the State Fund of Data on environment pollution. It is also responsible for (i) the state accounting

of surface waters, (ii) systematic observations of air, soil and surface water, and (iii) the assessment of hydro-meteorological phenomena.

### **Ministry of Health**

The Ministry of Health develops and approves sanitary regulations, rules, and hygienic standards. It also carries out state sanitary supervision functions, including the methodological supervision of the work of the sanitary and epidemiological services, regardless of their departmental subordination.

### **Sanoatgeokontekhnazorat**

The State Inspectorate for Supervision of Subsurface Resources Geological Investigation, Safe Work in Industry, Mining, Utilities and Household Sector (Sanoatgeokontekhnazorat) works together with the SCEEP in the field control of geological investigations, and use and protection of subsurface resources.

### **Sanitary and Epidemiological Services (SES)**

The Sanitary and Epidemiological Services (SES) – monitors the sanitary and hygienic status of environments. It is mandated for example to prohibit the use of stimulants and growth regulators of agricultural plants and animals, pesticides and others in the event of a harmful effect on human health.

## **2.1.2 Renewable Energy Regulators**

In accordance with the Laws of the Republic of Uzbekistan "On Nature Protection" and "On the use of renewable energy sources", state regulation in the field of the use of renewable energy sources, is carried out by the Cabinet of Ministers of the Republic of Uzbekistan, specially authorized state body in the field of the use of renewable energy sources, as well as local governing authorities.

The Cabinet of Ministers of the Republic of Uzbekistan's powers in the field of renewable energy is as follows:

- ensure the implementation of a unified state policy in the field of the use of renewable energy sources;
- approve government programs in the field of the use of renewable energy sources;
- create the conditions for the development of fundamental, applied, innovative research, as well as the promotion of scientific and technological achievements in the field of the use of renewable energy sources;
- coordinate international cooperation in the field of the use of renewable energy sources.

The Cabinet of Ministers of the Republic of Uzbekistan, within its authority, adopts regulatory legal acts in the field of the use of renewable energy sources, establishing:

- rules for connecting to the unified electric power system business entities producing electric energy;
- procedures for state support of renewable energy producers, as well as manufacturers of renewable energy sources;
- pricing and tariff policies that stimulate the formation of a favourable competitive and business environment in the market for energy produced from renewable energy sources;



- procedures for maintaining state accounting of renewable energy resources.

The specially authorized state body in the field of the use of renewable energy sources is the Ministry of Energy of the Republic of Uzbekistan and its duties are presented below:

- implement a unified state policy in the field of the use of renewable energy sources;
- develop and implement state and other programs in the field of the use of renewable energy sources;
- coordinate the activities of state and economic management bodies in the field of the use of renewable energy sources;
- develop and approve, within its authority, technical regulations, norms and rules in the field of the use of renewable energy sources;
- monitor the implementation of state and other programs in the field of the use of renewable energy sources;
- make proposals to the Cabinet of Ministers of the Republic of Uzbekistan on issues of state support for renewable energy producers of energy, as well as manufacturers of renewable energy sources, on pricing and tariff policies on the market for renewable energy sources;
- maintain state accounting of renewable energy resources, energy produced from renewable energy sources, and installations of renewable energy sources;
- promote the implementation of innovative technologies, scientific and technical developments in the field of the use of renewable energy sources, etc.

Local government bodies also:

- participate in the development and implementation of state and other programs in the field of the use of renewable energy sources;
- develop, approve and implement territorial programs in the field of the use of renewable energy sources;
- contribute to the creation and implementation of modern energy-efficient, energy-saving and innovative technologies in the field of use of renewable energy sources, organization of production of installations of renewable energy sources;
- interact with renewable energy producers and manufacturers of renewable energy plants;
- make decisions on the provision of land for the installation of renewable energy sources.

The bodies of state and economic management in cooperation with the Academy of Sciences of the Republic of Uzbekistan carry out scientific, technical and innovative support for the production of renewable energy sources, as well as the use of renewable energy sources.

### **2.1.3 National Natural Resources and Environmental Legislation**

The major emphasis of the environmental policy of Uzbekistan is on environmental safety being regarded as a strategic component of national security, and the most important aspect of protecting the vital interests of the state, society and identity. The environmental safety policy of the country is based on the Constitution, national laws, the National Security Concept of the Republic of Uzbekistan, the principles of the Rio de Janeiro Declaration on Environment and Development, and the Johannesburg Declaration on Health and Sustainable Development, with due regard of national commitments under international conventions and agreements, as well as the legislative experience of leading countries.



The conservation policy of Uzbekistan, supported with mitigation and environmental management measures, is based on the following principles:

- Integration of economic and environmental policy to support conservation and the restoration of the environment as pre-requisites for increasing the society standard of living;
- Transitioning from the protection of individual elements of nature, to the overall and integrated conservation of eco-systems; and
- Ensuring that all members of society are responsible for environment protection, biodiversity conservation, environmental improvement, and securing healthy environmental conditions for the population.

Since independence, Uzbekistan has developed over 100 environmental laws and regulations, and revised old Soviet legislation and policies. A key national objective is to transition to sustainable social and economic development. For this purpose, national environmental legislation has been revised and improved, new environmental laws and regulations enacted, programs and action plans developed to address environmental issues, and the sustainable use of natural resources promoted.

The legal framework in the field of nature protection and management provides citizens the rights and duties specified in the country's Constitution. Specific articles that address environment protection issues within the Constitution are:

- Article 50. All citizens shall protect the environment;
- Article 51. All citizens shall be obliged to pay taxes and local fees established by law;
- Article 54. Any property shall not inflict harm to the environment; and
- Article 55. Land, subsoil, flora and fauna and other natural resources are protected by the state, and considered to be resources of national wealth subject to sustainable use.

Uzbekistan has also enacted several supporting laws and statutes for environmental management and is party to several international and regional environmental agreements and conventions. The key national environmental law is the Law on Nature Protection (1992).

A brief description of this law and the other supporting laws related to environmental protection follows.

### **Law on Nature Protection (1992, last amended 19.04.2018)**

The law "On nature protection" (Law #754-XII, 1992) states the legal, economic, and organizational bases for the conservation of the environment and the rational use of natural resources. Its purpose is to ensure balanced relations between humans and nature, to protect the environmental systems, and to guarantee the rights of the population of a clean environment. According to the legislation, the Cabinet of Ministries of Republic of Uzbekistan, the SCEEP, and the local government bodies are responsible for implementing state laws on environmental protection and management, and the use of natural resources. Article 25 of this law states that State Environmental Expertise (SEE) is a mandatory measure for environmental protection. In addition, Article 25 states that the implementation of a project without a positive conclusion of the SEE is prohibited.

#### **2.1.3.1 Supporting National Legislation**

State environmental control of issues related to the protection of soil and water, air, flora, fauna, and specifically the environmental safety of the population, is exercised through a range of



national environmental laws and regulations. The main national laws applicable to this project are summarized in the following sections.

### **Air Quality and Air Emissions**

The following provides an overview of key legislation relating to air emissions in Uzbekistan, and respective national requirements applicable to the project.

The key regulators responsible for air emissions and ambient air quality are:

- The SCEEP, which develops air quality standards to protect the environment, the climate and the ozone layer; and
- The Ministry of Health, which develops air quality standards (sanitary norms) to protect human health, and oversees compliance with hygienic norms and standards associated with air quality.

The key legislation relating to air emissions and ambient air quality applicable to the project includes the following:

**Table 2 Key Environmental Legislation on Air Quality and Air Emissions**

<b>National Laws</b>
<p>Law of the Republic of Uzbekistan on Atmospheric Air Protection (#353-I of 27.12.1996 (as amended on 14.03.2019)</p> <p>This law describes regulations on atmospheric protection and its objectives. It specifies standards, quality and deleterious effect norms, requirements on fuels and lubricants, production and operation of vehicles and other transport means and equipment, ozone layer protection requirements, obligations of enterprises, institutions and organizations toward atmospheric protection, and compensations for damages from atmospheric pollution. The Cabinet of Ministers, the SCEEP and local government bodies are responsible for implementing the law.</p>
<p>Law of the Republic of Uzbekistan on Sanitary and Epidemiological Welfare of the Population (#393 of 26.08.2015)</p> <p>This law regulates social relations on sanitary-epidemiological well-being and radiation safety, the rights of a person to a healthy environment and others, and the rights and guarantees of their implementation.</p>
<p>Criminal Code, Section 4. Environmental Crimes (approved on 22.09.1994; as amended on 09.07.2019)</p> <p>This code specifies the conception and defines punishment for violations of the norms and requirements of environmental safety, wilful concealment or misrepresentation of environmental pollution, and violations relating to flora and fauna, water, land, subsoil, and protected areas use.</p>
<p>Law of the Republic of Uzbekistan on Environmental Expertise (#73-II of 25.05.2000 (as amended on 2017).</p> <p>This law specifies the purposes, objectives and types of environmental expertise. It defines the qualifications, duties and obligations of environmental experts. The SCEEP has overall responsibility for implementing this legislation through The Departments of Environmental Expertise (Glavgosekoexpertiza and Gosecoexpertisa which are both under the SCEEP) and the Provincial branches of SCEEP.</p>
<b>Decrees</b>
<p>Decree of Oliy Majlis of Uzbekistan on Enactment of the Law on Atmospheric Air Protection (#354-I of 27.12.1996)</p>

Decree of the Cabinet of Ministers of the Republic of Uzbekistan On the Approval of the Regulations On the State Environmental Expertise (#949 of 22.11.2018)
Decree of the Cabinet of Ministers of the Republic of Uzbekistan on Improving the System of Pollution and Waste Disposal Charges in Uzbekistan (#199 of 01.05.2003 (as amended on 02.04.2010)
Decree of the Cabinet of Ministers of Uzbekistan on Measures to Implement the National Strategy for Reducing of Greenhouse Gases Emissions (#389 of 09.10.2000)
<b>Regulations</b>
Instructions on Inventory of Pollution Sources and Rating Pollutant Emissions for Ventures in Uzbekistan enacted by Order of the Chairman of the SCEEP of the Republic of Uzbekistan (#105 of 15.12.2005)
<b>Sanitarian Rules and Norms</b>
SanR&N RUz No.0179-04 - Hygienic norms. List of Maximum Allowable Concentrations (MACs) of pollutants in ambient air of communities in the Republic of Uzbekistan including Annex 1.
SanR&N RUz No.0246-08 - Sanitary norms and requirements to protect ambient air in communities of the Republic of Uzbekistan
SanR&N No 0293-11 - Hygienic Norms. List of Maximum allowed concentration (MAC) of pollutants into the atmosphere air of settlements in Uzbekistan
SanR&N No 0147-04 - Hygienic Norms. List of maximum permissible concentration (MPC)-microorganism-producers in the air of settlement areas

### Water use and discharge

Water resources management, allocation and use in Uzbekistan are under the control of the Ministry of Water Resources, which oversees national, provincial and district departments of agriculture and water resources, and inter-provincial and inter-district canal management authorities.

Legislation related to water resources management, allocation and use within Uzbekistan is summarized as follows:

**Table 3 Key Environmental Legislation on Water Use and Discharge**

<b>National laws</b>
Constitution of the Republic of Uzbekistan (Article 55) “Land, depths, water, flora and fauna and other natural resources are national wealth, should be rationally used and are under state protection”.
Law of the Republic of Uzbekistan on water and water use (#837-XII of 06.05.1993, as last amended on 11.05.2019) This law regulates the water relations and rational use of water by the population and economy. It regulates the protection of waters from pollution and depletion, and the prevention and liquidation of harmful effects of water, improvement of water bodies, and the protection of the rights of enterprises and institutions, organizations and dehqan farms and individuals in the field of water relations. The law also authorizes the State (through authorized agencies) to carry out the management and control of water use and protection. The following special state agencies are authorized to regulate water use: Ministry Water resources management (surface water); State Committee for Geology and Mineral Resources (or Goskomgeologia); State Inspectorate for Exploration Supervision, Operations Safety Supervision of Industry, Mining and Utilities Sector (or Sanoatgeokontekhnazorat).

<p>Land Code of the Republic of Uzbekistan (approved on 30.04.1998, as last amended on 05.04.2019)</p> <p>The code, which came into effect on July 1, 1998, regulates land relations in order to ensure that present and future generations (i) have science-based, sustainable use and conservation of land, (ii) breeding and improvement of soil fertility, (iii) conservation and improvement of the environment and creating conditions for equitable development of all forms of management, and (iv) the protection of individuals and legal entities' right for land, as well as strengthening the rule of law in this area. The law specifies that the system of land use management must be environmentally and resource effective, provide for the conservation of soil, and limit the impact on flora and fauna, geological resources and other components of the environment. Also, according to the Code, the estimate of impact of construction works or implementation of technologies, and the effectiveness of measures envisaged for the use and protection of land, are to be based on environmental impact assessment.</p>
<b>Decrees</b>
<p>Decree of the Cabinet of Ministers of the Republic of Uzbekistan on additional measures to improve environmental activities in communal services (#11 of 03.02.2010, as amended on 26.03.2019)</p>
<p>Decree of the Cabinet of Ministers of the Republic of Uzbekistan on confirming the regulations on water protection areas in water reservoirs and in other water bodies, rivers, main canals and collector, as well as drinking and domestic water supply sources, and for medical and recreation purposes in the Republic of Uzbekistan (#174 of 07.04.1992)</p>
<p>Decree of Cabinet Ministries of Uzbekistan on the procedure of issuing permits for special water use and consumption (#171 of 14.06.2013)</p>
<p>Decree of Cabinet Ministries of Uzbekistan on adoption of order of water use and water consumption in the Republic of Uzbekistan (#82 of 19.03.2013, as last amended on 10.10.2018)</p> <p>This decree defines the order of nationwide water use and consumption, and the state management of water use. It states that several ministries implement control on water use, including (i) local government entities, (ii) State nature protection committee, (iii) State Inspection for geological study of subsoil, safety in industry, mining and domestic sectors of the Cabinet of Ministers, (iv) Ministry of Health, and (v) Ministry of Agriculture and Water Management, in the manner prescribed by law. The decree also regulates trans boundary water bodies use.</p>
<b>Regulations and Standards</b>
<p>Regulation Document on Regulations on rationing discharges of pollutants into water bodies and on the terrain, taking into account technically achievable performance of wastewater treatment (RH 84.3.6:2004)</p>
<p>Regulation Document on Order of endorsement and approval of projects of wastes disposal and limits for its disposal (RH 84.3.22:2006)</p>
<p>O'z DST 951:2011 - Water quality. Sources of centralized household water supply. Hygienic, technical requirements and classification code</p>
<p>O'z DST 950:2011 - Drinking water. Drinking water. Hygienic requirements and quality control</p>
<b>Sanitarian Rules and Norms</b>
<p>Hygiene requirements for the protection of surface waters in Uzbekistan (SanR&amp;N No 0172-04)</p>
<p>Main criteria for hygienic assessment of the level water bodies contamination for health risks population in Uzbekistan (SanR&amp;N No 0255-08)</p>

Sanitarian requirements for development and approval of maximum allowed discharges (MAD) of pollutants discharged into the water bodies with waste waters (SanR&N No 0088-99)
<b>Others</b>
Construction Norms and Rules on Guideline on content, endorsement and approval of design estimates for construction of enterprises, buildings (CNR) 1.03.01-96

All interrelations in water resources within Uzbekistan are based on the above documents and corresponding contracts on water delivery. Water is delivered on a contractual basis to all water consumers, including provincial and district water organizations and separate units. As a rule, the volume of water passing through the border of a neighbouring state is specified in interstate agreements.

### Solid Waste Management

This section provides an overview of the key legislation concerning solid waste management (SWM). The Cabinet of Ministers establishes and approves national policies, strategies, programs and procedures relating to SWM, including the allocation of hazardous waste disposal sites and the adjustment of waste disposal charge rates, as set forth in Article 5 of the Law on Wastes. Local governments are responsible for SWM policies, strategies and procedures at the local level.

**Table 4 Key Environmental Legislation on SWM**

<b>National laws</b>
Constitution of the Republic of Uzbekistan (Article 55) “Land, depths, water, flora and fauna and other natural resources are national wealth, should be rationally used and are under state protection”.
Law on Wastes (#362-II of 05.04.2002 (as last amended on 11.10.2018) The law addresses SWM, exclusive of emissions and air and water pollution, and confers authority to the SCEEP concerning inspections, coordination, ecological expertise and establishing certain parameters with regard to the locations where waste may be processed. It specifies that citizens have the right to a safe and healthy environment, to participate in the discussion of projects, and to compensation for damage to their lives, health or property. Dangerous waste that is transported domestically or internationally must pass ecological certification and be moved by special vehicles. The import of any radioactive waste for storage or burial is strictly forbidden. Although this is not specified in the Law, special privileges are given to persons and enterprises that develop and introduce technologies for reducing or recycling waste. Enterprises are responsible for their waste, but, if they recycle, they may be provided with assistance from the state budget, the National Fund for Nature Protection, or voluntary payments. The principal objective of this law is to prevent negative effects of waste on people’s lives and health, as well as on the environment, reduce waste generation, and encourage the rational use of waste reduction techniques in household activities. The law regulates the procedures for treating solid wastes, and defines the authorities of various institutions involved in SWM. It also stipulates the rules for transporting solid waste and provides market-based incentives for the efficient treatment of solid wastes. The Cabinet of Ministers, the SCEEP, the Ministry of Health, ‘Communkhizmat’, and ‘Sanoatkontekhnazorat’ are responsible for implementing the law.
Law on Radiation Safety (#120-II of 31.08.2000) This law regulates relations related to ensuring radiation safety, protecting life, health and property of citizens as well as the environment from the harmful effects of ionizing radiation.
<b>Decrees</b>

Decree of the Cabinet of Ministers of the Republic of Uzbekistan on the Regulation of the Importation into the Republic of Uzbekistan and the Export from its Territory of Environmentally Hazardous Products and Waste (#151 of 19.04.2000)
Decree of the Cabinet of Ministers of the Republic of Uzbekistan on Approving Provisions on the Procedure for Conducting Separate State Cadasters (#250 of 15.11.2005)
Decree of the Cabinet of Ministers of the Republic of Uzbekistan on Measures to Strengthen Material Incentives for Improvement Workers (#91 of 1.04.2009)
Decree of the Cabinet of Ministers of the Republic of Uzbekistan on Measures to Improve the Organization of Works on the Improvement (landscaping) of the City of Tashkent (#251 of 11.11.2010)
Decree of the Cabinet of Ministers of the Republic of Uzbekistan on measures to improve the organization of work on the improvement (landscaping) of settlements of the Republic (#4 of 10.01.2013)
Decree of the Cabinet of Ministers of the Republic of Uzbekistan on the approval of regulatory legal acts in the field of ecological control (#286 of 08.10.2015)
Decree of the Cabinet of Ministers of the Republic of Uzbekistan on approval of the rules for the provision of public services (#194 of 15.07.2014)
Decree of the Cabinet of Ministers of the Republic of Uzbekistan on Approval of the Regulation on the Procedure for Implementation of State Accounting and Control in the Field of SWM (#295 of 27.10.2014)
Decree of the Cabinet of Ministers of the Republic of Uzbekistan on the Approval of the Provision on the State Committee of the Republic of Uzbekistan on Ecology and Environmental Protection (#29 of 15.01.2019)
Decree of the Cabinet of Ministers of the Republic of Uzbekistan on Approval of the Regulations on the Procedure for the Formation and Use of the Funds of the Ecology, Environmental Protection and Waste Management (#375 of 9.06.2017)
Decree of the Cabinet of Ministers of the Republic of Uzbekistan on Measures to Improve the Procedure for Fixing Territories for Carrying Out Services in the field of sanitary cleaning (#765 of 25.09.2018)
Decree of the Cabinet of Ministers of the Republic of Uzbekistan on Measures for Further Improving the Efficiency of Work in the Area of Municipal Solid Waste Management (#787 of 2.10.2018)
Decree of the Cabinet of Ministers of the Republic of Uzbekistan on Approval of the collection and disposal of used mercury-containing lamps (#266 of 21.09.2011, as last amended on 30.04.2019)
Decree of the Cabinet of Ministers of the Republic of Uzbekistan on Measures for the Further Improvement of Economic Mechanisms for Ensuring Nature Protection (#820 of 11.10.2018)
Decree of the Cabinet of Ministers of the Republic of Uzbekistan on Enhancing the Use and Recycling of Mercury Lamps and Devices (#405 of 23.10.2000)
<b>Orders</b>
<p>Order of disposal of hazardous chemicals and hazardous materials on special landfills, their protection and maintenance, approved by the SCEEP, Ministry of emergency situations, Ministry of Finance, Ministry of Healthcare (#2438 of 20 March 2013).</p> <p>This regulation provides definitions of hazardous chemicals, toxic materials, special landfills and special transportation vehicles. The State organization “Qishloqkimyo” (Agriculture chemicals) is responsible for the transportation, handling and disposal of hazardous materials. Transportation of such materials has to be conducted in accordance with Resolution of Cabinet Ministries of Uzbekistan No. 35 of 16 February 2011 on “Rules of hazardous materials transportation on the territory of Uzbekistan”. The Ministry of Health and the SCEEP are involved into the endorsement of proper completion of works.</p> <p>The following ministries are responsible for conducting the monitoring of special landfills: The SCEEP – reviewing compliance with environmental requirements;</p>

Branches of the Ministry of Health – reviewing compliance with sanitarian norms and rules during the implementation of works with hazardous chemicals, toxic materials and their packages; Ministry of Emergency Situation – conducting works to avoid emergency situations and handling any consequences. Branches of the State Committee on Geology and mineral resources – conducting permanent monitoring of groundwater quality.
Rules for the transportation of household waste (reg. No. 2625 of November 12 2014)
Instructions for the design and operation of landfills for municipal solid waste (reg. No. 2810 of July 14, 2016)
<b>Regulations</b>
RD O'z RH 84.3.15.2005 - Regulation Document on the waste inventory procedure
RD O'z RH 84.3.16.2005 - Regulation Document on Guidelines for setting waste disposal limits
RD O'z RH 84.3.17.2005 - Regulation Document on Production and consumption waste. Procedure for developing the Waste Disposal Limit Document
RD O'z RH 84.3.18.2005 - Regulation Document on Production and consumption waste. Waste Data Sheet
RD O'z RH 84.3.19.2005 - Regulation Document on Production and consumption waste management. Terms and definitions
RD O'z RH 84.3.21.2005 - Regulation Document on Guidelines for setting waste generation
RD O'z RH 84.3.22.2006 - Production and consumption waste. Waste inventory and waste disposal limits approval procedure (issued by the Goskomecologiya of Uzbekistan, 2006)
RD O'z RH 84.3.11.2004 - Requirements for handling mercury and its compounds, mercury-based waste, and mercury containing devices
RD O'z RH 84.3.10.2004 - Regulation on handling mercury-containing products in the Republic of Uzbekistan
RD O'z RH 84.3.8.2004 - Methodology for integrated waste hazard rating
Instruction for hazardous wastes generation, use and storage reporting as per Form No.3 – Hazardous Waste (half-year, annual reporting) (issued by the State Statistics Department of the Republic of Uzbekistan, 1997)
KMK 201.12-96 - A Landfill for burial and land storage of industrial hazardous wastes
Provisional waste norms for cities and regions of Uzbekistan approved by khokimyats
<b>Sanitarian Rules and Norms</b>
SanR&N No. 0127-02 - Sanitarian Rules of inventory, classification, storage and disposal of industrial wastes
SanR&N No. 0128-02 - Hygienic classifier of toxic industrial wastes in the Republic of Uzbekistan
SanR&N No. 0157-04 - Sanitarian requirements on storage and disposal of solid waste in special landfills
SanR&N No. 0158-04 - Sanitarian Rules and Norms on collection, transportation and disposal of wastes contained asbestos in Uzbekistan
SanR&N No. 0168-04 - List of asbestos-cement materials and construction, allowed for using and field of its implementation
SanR&N No. 0297-11 - Sanitary rules and standards for cleaning the territory of populated areas from solid household waste in the conditions of Uzbekistan
SanR&N № 0329-16 - Sanitary rules and standards of maintenance and landscaping of populated areas in the Republic of Uzbekistan
SanR&N no. 0350-17 - Sanitary standards and rules for the protection of atmospheric air in populated areas of the Republic of Uzbekistan
<b>Codes</b>
Code of the Republic of Uzbekistan “On Administrative Responsibility” (1994)
Housing Code of the Republic of Uzbekistan (1998)
Land Code of the Republic of Uzbekistan (1998)

Others
GOST 17.0.0.05-93 - Unified system of standards for environmental protection and rational use of resources. Waste Data Sheet. Composition, content, presentation and amendment procedures
GOST 17.9.0.2-99 Environment protection. Waste management. Waste Data Sheet. Composition, content, presentation and amendment procedures
GOST 17.9.1.1-99 Environment protection. Waste management. Waste classification. Waste definition by the genetic principle and categorization
GOST 30774-2001 Resources saving. Waste management. Waste Hazard Data Sheet. Main provisions
GOST 30775-2001 Resources saving. Waste management. Identification and coding. Main provisions

The Uzbekistan Law on Wastes regulates SWM and requires entities to carry out rating and develop limits of waste disposal in order to ensure the health and safety of both citizens and the environment.

SanR&N RUz - 0157-04 - Sanitary requirements for storage and disposal of municipal solid wastes (MSW) at landfills in Uzbekistan defines that MSW shall be collected through a unified system of specialized utilities, and shall be disposed at MSW landfills.

Municipal solid waste (MSW) may include various items, goods, materials unsuitable for further use, and waste like paper, food waste, wood, metals, textiles, leather, rubber, glass, stones, charcoal and ash, house and street sweeps, fallen leaves, parts and screenings (particles of 15 mm or less).

Hazardous waste in Uzbekistan is defined as waste that contains substances with at least one of the defined hazardous properties (toxicity, infectivity, explosive hazard, fire hazard, high reactivity, radioactivity) and available in such amounts and in such a way as to pose an imminent or potential risk to human life and health, the environment, or both in their current state or when exposed to other substances.

Hazardous waste is classified into four groups known as 'hazard classes'. Waste hazard is assessed based on the provisions of SanR&N - 0128-02 29.07.02 - Hygienic classifier of industrial hazardous waste and SanR&N - 0127-02 29.07.02 – Sanitary procedures for industrial waste inventory, classification, storage and disposal. Waste hazard classes include:

- Class I – extremely hazardous waste;
- Class II – highly hazardous waste;
- Class III – moderately hazardous waste; and
- Class IV – low-hazardous waste.

Hazard classes, physical characteristics and chemical composition of toxic industrial waste are determined by designated process laboratories of companies or research institutes requiring involvement of specialists from Goskomecologiya and the Sanitary Epidemiological Stations (SES).

Permits for the combined landfilling of industrial and municipal waste are granted by the local CSES based on the results of analyses completed by accredited laboratories (SanR&N RUz - 0157-04).

Landfill owners are responsible for the safe storage and disposal of waste to avoid potential impacts to human health and the environment (SanR&N RUz - 0157-04).



## Soil

Issues related to the protection of geology, soils and groundwater in Uzbekistan are regulated by relevant national legislation including:

**Table 5 Key Environmental Legislation of Uzbekistan on Soil, Subsoil and Groundwater**

<b>National laws</b>
<p>Law of the Republic of Uzbekistan on Subsoil (#2018-XII of 23.09.1994) This law aims to ensure sustainable and integrated use of mineral resources to meet the needs of the mineral raw materials and other needs, protection of mineral resources, environment, safety of operations in subsoil use and protection of subsoil users, protecting the interests of individuals, society and state. According to the Law, the monitoring of subsoil, which represents a system of observations of the subsoil to timely detect changes, assess, prevent and redress the negative processes, is established (Article 18). Geological studies are permitted only after obtaining a positive opinion of the state environmental assessment (Article 25). Licenses for construction and operation of underground facilities for the storage and disposal of waste shall be issued by the SCEEP as a result of direct negotiations.</p>
<b>Decrees</b>
<p>Decree of the Cabinet of Ministers of the Republic of Uzbekistan on Approval of Regulatory Documents in Conformity with the Law of Uzbekistan on Subsoil (#19 of 13.01.1997 (as amended on 17.12.2010) Annex No. 2, Regulations on state control and supervision for usage and protection of subsoil, geological survey of subsoil and rational usage of mineral resources</p>
<p>Decree of the Cabinet of Ministers of Uzbekistan on Improving the System of Pollution and Waste Disposal Charges in Uzbekistan (#199 of 01.05.2003 (as amended on 02.04.2010)</p>
<p>Decree of the Cabinet of Ministries of the Republic of Uzbekistan on Regulation on Measures for Ground Water Management, Enhancement of Ground Water Protection against Pollution and Depletion (#179 of 08.04.1992)</p>
<b>Sanitarian Rules and Norms</b>
<p>SanR&amp;N No 0272-09 - Sanitary rules and Norms on Development of hygiene studies to schemes of soil pollution in Uzbekistan</p>
<p>SanR&amp;N No 0212-06 - Sanitary rules and Norms on Hygienic assessment of the contamination level of soils of different land use types in the specific conditions of Uzbekistan</p>
<p>SanR&amp;N No 0183-05 - Hygienic requirements for the quality of the soil in settlements areas in specific natural-climatic conditions of Uzbekistan</p>

## Biodiversity

The national biodiversity policy in Uzbekistan is based on the provisions of the National Constitution of 1992. Article 55 defines that flora and fauna as well as other natural resources are protected by the state and considered to be resources of national wealth subject to sustainable use. Biodiversity management and conservation in Uzbekistan are regulated through a range of national laws and regulations, gathered in Table 5 below.

**Table 6 Key Environmental Legislation of Uzbekistan on Biodiversity**

<b>National laws</b>
<p>Law of the Republic of Uzbekistan on protected natural areas (#710-II of 03.12.2004, as last amended 09.01.2019) This law regulates relations in organization, protection and use of conserved territories, and management of protected nature reserved or territories. In the law are given the categories and management of conserved territories such as integrated (landscape) wildlife preserves, nature parks, state natural objects, areas for protection, conversion and restoration of certain natural and manmade objects and complexes. SCEEP and local government bodies are</p>

<p>responsible for implementing state control and protection of nature conserved territory and its usage.</p>
<p>Law of the Republic of Uzbekistan on Protection and use of flora (#543-I of 26.12.1997; new addition - #409 of 21.09.2016) This law regulates the protection and usage of flora growing in natural conditions, as well as in cultivation, and its reproduction and conservation of the gene pool of wild plants. The Cabinet of Ministers, local government bodies and special authorized agencies implement the law. The SCEEP and the Head Department of Forestry under Ministry for Agricultural and Water Resources Management are the authorized agencies for flora protection and its usage. The Cabinet of Ministers, local government bodies, the SCEEP and Head Department of Forestry are responsible for implementing national level administration of the law.</p>
<p>Law of the Republic of Uzbekistan on protection and use of fauna (#545-I of 26.12.1997; new addition - #408 of 19.09.2016) This law defines the legal relationship aimed at regulating relations in the protection, use, restoration and reproduction of fauna in order to ensure the conditions of its existence, preservation of species diversity, the integrity of natural communities and habitat. The choice of sites for all types of construction, pre-planning, design and project documentation, implementation of which may have impact on the wildlife or its habitat and projects unit hunting and fishing, projects, work on acclimatization and hybridization of animal protection plants, dangerous to wildlife and its habitat is subject to the state environmental assessment.</p>
<p>Law of the Republic of Uzbekistan on Forestry (#770-I of 14.04.1999; new addition - #475 of 16.04.2018) This law describes the main objectives of forest regulations and the state forest fund, and provides the mechanism of state regulations and controls in the fields of forest protection, conservation, use, and reproduction. The law stipulates the order of forest management, its types and cutting conditions of trees and bush plantations. The Cabinet of Ministers, local government bodies, the SCEEP and the Head Department of Forestry under the Ministry for Agricultural are responsible for implementing the law.</p>
<p><b>Decrees</b></p>
<p>Decree of the Cabinet of Ministers of the Republic of Uzbekistan on Approving a Strategy for the Conservation of Biological Diversity in the Republic of Uzbekistan for the Period of 2019-2028 (#484 of 11.06.2019) This Strategy for the conservation of biological diversity for the period 2019-2028 (hereinafter referred to as the Strategy) identifies priority areas, goals and objectives, planning, methods for their effective achievement, as well as the stages of implementation of state policy in the field of formation and development for the long term sustainable system for the conservation and use of biodiversity. The strategy is based on the Constitution of the Republic of Uzbekistan, the laws of the Republic of Uzbekistan “On nature protection”, “On the protection and use of fauna”, “On the protection and use of flora”, “On the protected natural territories” and “On forestry”, as well as Strategies for action in five priority areas of the development of the Republic of Uzbekistan in 2017 - 2021, approved by Decree of the President of the Republic of Uzbekistan dated February 7, 2017 No. UP-4947.</p>
<p>Decree of the Cabinet of Ministers of the Republic of Uzbekistan on the Settlement of the Use of Biological Resources and the Procedure of Permission of the Resolving Procedures in the Field of Nature Use (#290 of 20.10.2014 as last amended 27.05.2019)</p>
<p>Decree of the Cabinet of Ministers of the Republic of Uzbekistan on Measures to Improve the Public Administration System in the Sphere of Protected Natural Territories (#4247 of 20.03.2019)</p>
<p>Decree of the Cabinet of Ministers of the Republic of Uzbekistan on the Approval of the strategy for the preservation of biological diversity in the Republic of Uzbekistan for the period 2019-2028 (#484 of 11.06.2019)</p>

Decree of the Cabinet of Ministers of Uzbekistan About measures on the organization of the preparation, edition and management of the red book of the Republic of Uzbekistan (#1034 of 19.12.2018)
Decree of the Supreme Council of Uzbekistan on Reinforcement of the Protection of Valuable and Endangered Species of Flora and Fauna and Harmonization of their Use (#937- XII of 03.09.1993)
Appendix of the Decree of the Cabinet of Ministers of the Republic of Uzbekistan on Classification of technogenetic, natural and environmental emergencies (#455 of 27.10.1998)

### Cultural Heritage

The preservation of national cultural heritage's objects in Uzbekistan is based on the Constitution of the Republic of Uzbekistan, main Law of the Republic of Uzbekistan on the protection and use of objects of cultural heritage, and several other decrees (Table 6).

**Table 7 Key Environmental Legislation of Uzbekistan on Cultural Heritage**

<b>National laws</b>
Constitution of the Republic of Uzbekistan (Article 49) The Constitution of the Republic of Uzbekistan states that "Concern for the preservation of historical monuments and other cultural values - the chore and duty of citizens of Uzbekistan"
Law of the Republic of Uzbekistan on the protection and use of objects of cultural heritage (#269-II of 30.08.2001, as last amended 19.04.2018) This law regulates relations in the field of protection and usage of objective of archaeological heritages, defines ownership rights of such objectives and responsible entities, and provides a procedure of archaeological investigation of the objectives of archaeological heritage. It states (para 20) that under "saving of cultural heritages is considered their conservation, repairing, rehabilitation, adopting for current usage and conduction related scientific-production research, design and production works". An official permission from the Ministry of Culture needs to be received prior starting of rehabilitation works.
<b>Decrees</b>
Decree of the Cabinet of Ministries of the Republic of Uzbekistan About measures on further development protection and usage the historical heritages (# 269 of 29.06.2002)

The Main Scientific-Production Department (MSPD) on the protection of cultural heritages under the Ministry of Culture is the designated entity responsible for the protection of cultural heritages. The scientific-production workshops and a number of private companies conduct rehabilitation works.

For objects which could be considered as cultural heritage but which have not been registered yet, a full procedure on registration needs to be implemented in accordance with the Resolution of the Cabinet of Ministries of the RUz (RCM) # 269 dated from June 29, 2002 "About measures on further development protection and usage the historical heritages".

Therefore, for any project works related to the rehabilitation of registered cultural heritages or work near to such objects, permission needs to be received from province level branch of Ministry of Culture for the: (i) conduction of works inside heritage sites, and (ii) conduction works which could be located in any buffer zone relating to a heritage site. Such permission needs to be received prior starting construction or rehabilitation works by the project initiator – local hokimiyats.

## Energy Related Regulations

The legislation of the Republic of Uzbekistan contains specific regulations related to the energy sector, including renewable energy. Many of them have been amended in last few years, they are presented below (Table 8).

**Table 8 Key environmental legislation of the RUz on energy sector**

<b>National laws</b>
Law of the Republic of Uzbekistan on the use of renewable energy sources (#539 of 21.05.2019) It regulates relations in the field of renewable energy sources
<b>Decrees</b>
Decree of the Cabinet of Ministries of the Republic of Uzbekistan on approval of the regulation on the Ministry of Energy of the Republic of Uzbekistan (# 108 of 09.02.2019) and its Annex
Decree of the President of the Republic of Uzbekistan About measures for further implementation of modern energy efficient and energy-saving technologies (#PP-3238 of 23.08.2017)
Decree of the President of the Republic of Uzbekistan on About the program of measures for further development of renewable energy, enhancing energy efficiency in the industries and social sphere for 2017-2021 (#PP-3012 of 26.05.2017)
Decree of the President of the Republic of Uzbekistan On the strategy for further development and reform of the electric power industry of the Republic of Uzbekistan (#PP-4249 of 27.03.2019)

### 2.1.4 Land Expropriation Laws

A number of national laws and legislation related to land acquisition and compensation policy help guarantee the rights of project affected people in Uzbekistan; below is a list of the relevant legislation with regards to land acquisition in Uzbekistan:

**Table 9 Key Legislation of Uzbekistan Relevant to Land Acquisition**

<b>National laws</b>
The Constitution of the Republic of Uzbekistan (adopted on 08.12.1992 with latest amended 07.04.2017) The Constitution of the Republic of Uzbekistan stipulates that everyone has the right to own property, an owner at their own discretion shall possess, use and dispose of his property and that the land (i.e. its mineral resources, waters, fauna and flora and other natural resources) is considered national wealth and shall be rationally used and protected by the state. The Constitution guarantees the rights of its citizens and their equality before the law.
Land Code, approved on 30.04.1998 (as amended on 04.01.2011) All land allocation for the Project has been and will be conducted in accordance with the Land Code of the Republic of Uzbekistan. The law specifies that the system of land use management must be environmental, resource effective and provide for conservation of soil, limiting the impact on flora and fauna, geological resources and other components of the environment. The Land Code regulates the allocation, transfer and sale of land plots, as well as defining ownership eligibility and rights to land. The Land Code also defines the terms of termination of rights to land and the land acquisition required for state and public needs.
Civil Code of the Republic of Uzbekistan of 01.03.1997 (as amended 22.09.2010) The Civil Code provides definition of the property, main concepts to property objects, basics of termination of the property rights and the right for compensation payments in view of the property right loss, rights on intellectual property, regulates the contractual and other obligations, as well as other property and related personal non-property relations. The Code

defines general rules of property seizure, determination of property cost and rights for compensation, terms of rights termination.
<b>Orders</b>
Resolution of Cabinet of Ministers № 146 (dated 25.05.2011) This Resolution is aimed to improve the procedure of granting land plots, protect the rights of legal entities and individuals on land, improve the architecture of settlements and the efficient use of their land for construction in accordance with the Land Code and the Town Planning Code. This resolution has approved two Regulations: (i) Regulation on the procedure for granting land for urban development and other non-agricultural purposes; and (ii) Regulation on the procedure of compensation for land possessors, users, tenants and owners, as well as losses of agriculture and forestry.
Resolution of Cabinet of Ministers № 97 (dated 29.05.2006) This resolution stipulates compensation for losses to individuals and legal entities due to seizure of land plots for state and public needs. This resolution is mainly dealing with land plots, houses, building and structures of individuals and legal entities. It determines the procedure for seizure of land or part thereof, as well as the procedure for calculating the amount of compensation to individuals and legal entities for demolished residential, industrial and other buildings, structures and plantings in due to seizure of land for state and public needs.
Resolution of Cabinet of Ministers “On Approval of the Regulations on the Procedure of Assignment and Payment of Social Benefits and Material Assistance to Low-Income Families” This resolution with reference number 44 dated 15 February 2013 determines the procedure for the appointment and payment by Makhalla allowances for families with children under the age of 14 years, allowances for child care until the age of two years and allowance for low income families.
<b>Decrees</b>
Decree №146 dated 25.05.2011 Decree of CM of the Republic of Uzbekistan “About improvement procedures land plots for implementation of urban planning activities and other non-agricultural needs”. The Decree in accordance with the Land Code and the Civil Code of the Republic of Uzbekistan establishes the procedure for determining the amount and compensation for losses of owners, users, tenants and owners of land plots, as well as losses of agricultural and forestry production.
Decree of the President of the Republic of Uzbekistan №3857 (dated 16.07.2018) The decree “On measures to improve the effectiveness of training and realizing projects with participation of international financial institutions and foreign government financial organizations” partly provides that payment of compensation for the land acquisition, demolition of houses and other structures within the framework of projects with the involvement of International Financial Institutions (IFIs).
Decree of the President of the Republic of Uzbekistan №5495 (dated 1.08.2018) Decree “On measures on cardinal improvement of investment climate in the republic of Uzbekistan” partly provides that the adoption of decisions on the acquisition of land for state or public needs is permitted only after an open discussion with interested parties. Compensation is made at market value.

### 2.1.5 Labour Legislation

The Constitution of the Republic of Uzbekistan (adopted on December 8, 1992) includes a chapter on Economic and Social rights of the citizens. According to it everyone is entitled to:

- have the right to work, free choice of work, fair conditions of labour and protection against unemployment in the procedure specified by law. Any forced labour shall be prohibited except for punishment under the sentence of a court or some other instances stipulated by law” (Chapter IX, Article 37);

- the right to rest is included in the Article 38: “Citizens, working on hire, shall be entitled to a paid rest. The number of working hours and paid labour leave shall be specified by law;
- social security in old age in the event of disease, disability, loss of breadwinner and in other cases stipulated under the law (Article 39);
- have the right to skilled medical care (Article 40);
- equal rights of men and women is guaranteed by the law (Article 46).
- have the right, both individually and collectively, to submit applications and proposals, and to lodge complaints with competent state bodies, institutions or public representatives. Applications, proposals and complaints shall be considered in the procedure and within the time-limit specified by law” (Chapter VIII, Article 35).

The Labour Code of the Republic of Uzbekistan introduced on April 1, 1996 treats labour legislation with due account of the interests of the employees, employers and the state and fair and safe labour conditions and the protection of the labour rights and health of the workers. This Code governs employment relationships and other relations, directly related, directed to protection of the rights and freedoms of the parties of employment relationships, establishment of the minimum guarantees of the rights and freedoms in the sphere of work. Article 6 of the Labour Code prohibits discrimination and guarantees that all citizens have equal rights to work; discrimination in labour relations is prohibited. Any differences, non-admission or preference, denial of employment, regardless of nationality, race, gender, language, religion, political beliefs, social status, education, property, leading to a violation of equality of opportunities in the field of labour, are prohibited. A person who considers that he has been subjected to discrimination at work may apply to the court for the elimination of discrimination and compensation for material and moral damage caused to him.

According to Labour Code, labour-management relations should be formalized in a fixed-term or temporary employment contract. The maximum length of a single fixed-term contract is 5 years (with the exception of few specific positions).

The Ministry of Employment and Labour Relations of the Republic of Uzbekistan is the main state institution responsible for labour, employment, and social protection policy making. The ministry is tasked with the development and regulation of labour market and ensuring employment of population, regulation of labour relations and labour protection, provision of social services for population and medical-social rehabilitation of persons with disabilities.

The supervision and monitoring of compliance with Labour Code requirements and protection of labour rights of citizens is implemented by the State Labour Inspection under the Ministry of Employment and Labour Relations, and its territorial subordinate structures according to the Statement on the State Labour Inspection, Attachment #3, Resolution of the Cabinet of Ministers #1066 of 31.12.2018 “On measures to improve the performance of the Ministry of Employment and Labour of Relations of Uzbekistan”.

#### Forced labour and child labour

Uzbekistan has been making recent efforts to address issues of child and forced labour, which are particularly associated with the country’s cotton production sector. National legislation (Article 7 of Labour Code, Administrative Responsibility Code and other acts) strictly prohibits using child and forced labour, with fines imposed for infringement. In addition, Uzbekistan joined/ratified ILO conventions No 29 and No105 on elimination of forced labour and Conventions No 138 and No 182 that relate to abolition of child labour.



Since 2014, the Coordination Council for Child Labour and Forced Labour has been operating in Uzbekistan, comprising representatives of the Federation Council of Trade Unions, the Ministry of Employment and Labour Relations, the Chamber of Commerce and Industry, line ministries and agencies, NGOs. The council develops and implements action plans to abolish child and forced labour in Uzbekistan.

In 2014, the tripartite partners of Uzbekistan (Ministry of Employment and Labour Relations, Council of Federation of Trade Unions, Chamber of Commerce and Industry) and ILO signed Decent Work Country Program for 2014-2016 that was extended up to 2020.

In October 2017, a new Senate Committee on Labour Rights Guarantees was set up for parliamentary and public control and prevention of labour rights' violations by state authorities, institutions and individuals. On May 10<sup>th</sup> 2018 a Cabinet of Ministers Decree "About additional measures to eradicate forced labour in the Republic of Uzbekistan", outlined concrete measures to eradicate and prevent forced labour in all sectors.

Article 7 of the Labour Code states that Forced labour, i.e., forced to perform work under the threat of any punishment (including as a means of labour discipline) is prohibited. The right to work is permitted for persons aged 16 and older. However, for internship, it is allowed to hire students from secondary schools, secondary special, professional educational institutions to perform light work that does not harm their health and moral development, and does not interfere with the learning process, in their free time, when they reach the age of 15 with written consent of one of the parents or their legal guardians (Article 77). No one under the age of 15 is allowed to work under the Labour Code.

Young people aged between 15 and 18 years old have the right to work based on the local legislation, and have the same rights as adult workers with some benefits due to their age (Labour Code, Article 240). People under age of 18 can be employed only after medical examination and further until reaching the age of eighteen are subject to mandatory annual medical examination. People under age of 18 can be employed only for works which have no risk to their health, safety and moral, they are not allowed to lift and move heavy objects (Labour Code Article 241).

Employees aged 15-16 are allowed to work no more than 24 hours a week, and employees aged 16-18 are allowed to work no more than 36 hours a week. Students can be employed only when they are free of study, and their working time may not exceed half of the maximum working time set for the respective age groups, i.e. students aged 15-16 can work only 12 hours a week and students aged 16-18 allowed to work no more than 17.5 hours a week (Article 242).

Articles 49 and 51 of Administrative Code of Uzbekistan impose fines for violation of above-mentioned regulations on forced and child labour. The amended law on 23.08.2019 significantly increases fines for using administrative measures to attract employees to forced labour, which has been practiced previously in the country involving public workers, mostly teachers, health workers and students. The new law imposes fines ranging from 10 to 30 times the minimum wage for using such practices. If the same offence is committed repeatedly, responsible persons will face fines from 30 to 100 times the minimum wage, according to the ministry.

### Wages and deductions

Contracts and collective agreements establish the form and amount of compensation for work performed. It is forbidden to pay in kind, except in cases established by the Government of the

Republic of Uzbekistan (Labour Code Article 153). The Government establishes a minimum wage (Article 155). As of September 2019, the minimum wage level is 223,000 UZS. However, this doesn't mean that the minimum wage in Uzbekistan is 223,000 UZS (or \$23,6). From September 2019, minimum wage payment was introduced, hence being the lowest national wage for a full-time position, cannot be less than 634,880 UZS (or \$67,4). In areas with adverse climatic and living conditions, district coefficients and allowances for wages are established. There is no established minimum wage for seasonal and daily workers (minimum payment for hour of work).

Employers are obligated to pay workers at least once per half-month (Article 161). Compensations for the payment delays can be included in the collective agreement. Employers also must pay for work-related damage to health or property and families are compensated in case of death. Deductions are allowed mainly for taxes and other obligatory payments set by the Government of Uzbekistan, as well as for specific reasons, but may not exceed 50 percent of the amount owed to the employee, and payment after deductions may not be less than the minimum rate determined by the government (Article 164).

### Women

Night time work, overtime work, work on weekends and business trips for pregnant women and women with children under the age of 14 (with disabled children up to 16 years old), are allowed only with their consent. Herewith, recruitment of pregnant women and women with children under 3 years of age for night works is allowed only if there is a medical certificate confirming that such work does not threaten the health of the mother and child (Article 228).

Pursuant to the Presidential Decree No. PP - 4235 of March 7, 2019, men have received the same package of rights related to the childcare since 1 May 2019, only one of the parents (male or female) can decide to take maternity leave. Additionally, the President ordered to revoke the prohibitions on the use of female workers. As a corollary, the list of the professions that excluded the females' presence has gained a recommendatory nature (amendment to Article 225).

### Working hours

The standard work week is 40 hours, with less allowed for those under 18 and for women who have children up to 3 years old. The number of hours per day, and days per week, is established in the contract/agreement between the employer and employee. Employers must provide time off each workday for "rest and food", and also paid time off in case time is needed to cool off, to warm up, or to breastfeed children. Details of time off are established in contracts/agreements.

### Leave

In addition to national holidays, employees have to receive at least 15 working days of paid leave per year, with workers under 18 years of age receiving at least 30 calendar days and disabled employees receiving 30 calendar days (Article 134-135). In addition, those who work in unhealthy and unfavourable working conditions receive an additional seven days and those who work in unfavourable climate conditions receive an additional eight days. Leave without pay may also be taken by certain groups of people and may also be covered in contracts. At termination of employment, employees are paid for unused leave, or they may use the leave as their last days of employment.

Women are provided maternity leave for up to 70 calendar days, and then are provided 56 days leave after giving birth, in case of complications or giving birth to 2 or more children up to 70 days, with benefits paid from the state social insurance (Article 233). Maternity leave is calculated in total and is paid in a lump sum, regardless of the actual number of days off before giving birth. After giving birth, a mother may take additional leave until the child is six months old, again paid by social insurance. She may take unpaid leave until the child is three years of age. Her position is guaranteed upon her return from all these types of leave.

#### Overtime work

Overtime compensation as specified in employment contracts or agreed to with an employee's trade union, which can be implemented in the form of additional pay or leave. The law states that overtime compensation should not be less than 200 percent of the employee's average monthly salary rate (broken down by hours worked). Additional leave time should not be less than the length of actual overtime work (Article 157).

#### Layoffs and Firing

The Labour Code and subordinate labour legislation differentiate between layoffs and firing. Employees can terminate their employment by filing two-week prior written notice, or apply for leave without pay. Layoff or temporary leaves without pay can be initiated by an employer due to worsening of the economic situation as below. For firing (severance), the employer should personally give two months' advance notice in the case of corporate liquidation or optimization, two weeks' advance notice in the case of an employee's incompetence, and three days' advance notice in the case of an employee's malpractice or unacceptable violations. In case of severance caused by corporate liquidation or optimization, an employee should receive compensation, which should not be less than two average monthly salaries paid during their employment plus payment for unused leave (if another form of compensation was not agreed to in the employment contract).

#### Labour disputes

The general court system, where civil and criminal cases are tried, is responsible for resolving labour-related disputes. This can be done on a regional or city level. Formally, workers can file their complaints through the Prosecutor General's Office. The Ministry of Employment and Labour Relations should provide legal support to employees in their labour disputes.

Disputes may be adjudicated by commissions that are created "on a par with employer and agencies representing the interests of employees..." (that is, with equal representation of employee/employees and employer), if such commissions are provided for in labour agreements/contracts (Article 262). Commissions must consider issues within 10 days. If the employer, employee, or their representatives disagree with decisions by a commission, or if the commission does not consider applications within 10 days, any of the parties may appeal to the courts, but that must be within 10 days of the decision (or no decision).

### **2.1.6 National Environmental Permitting**

The national EIA procedure is regulated by the Law "On the Environmental Examination" and the Regulations "On the State Environmental Expertise" (SEE), approved by the Resolution of the Cabinet of Ministers No. 949 dated November 22, 2018. The Resolution specifies the legal requirements for EIA in Uzbekistan. According to the Resolution, SEE is a type of environmental examination carried out by specialized expert divisions to set up the compliance

of the planned activities with the environmental requirements and determination of the permissibility of the environmental examination object implementation.

The special authorized state body in the field of state environmental examination is the State Committee for Environmental Protection. SEE is carried out by the following specialized expert divisions of the State Committee for Environmental Protection:

- The state unitary enterprise "The Centre of the State Environmental Examination" of the State Committee for Environmental Protection, hereinafter referred to as "The Centre of the State Environmental Examination SUE";
- The state unitary enterprise "The Centre of the State Environmental Examination" of the Republic of Karakalpakstan;
- The state unitary enterprises "The Centre of the State Environmental Examination" of regions and Tashkent city.
- "The Centre of the State Environmental Examination SUE" carries out the state environmental examination of EIA of the objects of economic activity classified as the I and II categories of environmental impact (high and medium risk);
- The state unitary enterprises "The Centre of the State Environmental Examination" of the Republic of Karakalpakstan and regions carry out environmental examination of EIA of the objects of economic activity classified as the III and IV categories of environmental impact (low risk and local impact).

The Regulations describes the procedure of arrangement and carrying out of the SEE (Annex 1 to PCM) and the procedure of the SEE carrying out (Annex 2 to PCM). The three stages of the EIA and their required results are summarized as follows:

- Stage I: "A Preliminary Statement of the Environmental Impact ("PSEI") shall be carried out at the planning stage of the proposed project prior to the allocation of funds for development.
- Stage II: "A Statement of the Environmental Impact" ("SEI") shall be prepared in due time, in conclusion, by Glavgosekspertiza / State Environmental Expertise at the stage I, to conduct the required additional studies or analyses. The Conclusion shall be submitted to Glavgosekspertiza / State Environmental Expertise prior to the approval of the Feasibility Study of the project and, therefore, prior to the beginning of the construction.
- Stage III: "State Environmental Consequences" ("EPZ") is the final stage of the SEE process and shall be carried out prior to the start of the project. The report describes in detail the changes in the project made as a result of the analysis of the Glavgosekspertiza / State Environmental Expertise during the first two stages of the EIA process, the comments received during public consultations, the environmental standards applicable to the project, and the environmental monitoring requirements related to the project, as well as the main conclusions.

All types of SEE economic activities are classified into one of four categories:

- Categories I and II are "high and medium risks of environmental impact" (SEE will be within 30 days, all stages of EIA are required);
- Category III is "Low risk of impact" (all stages of EIA are required); and
- Category IV - "local impact" (only the first stage of EIA - PSEI is required).

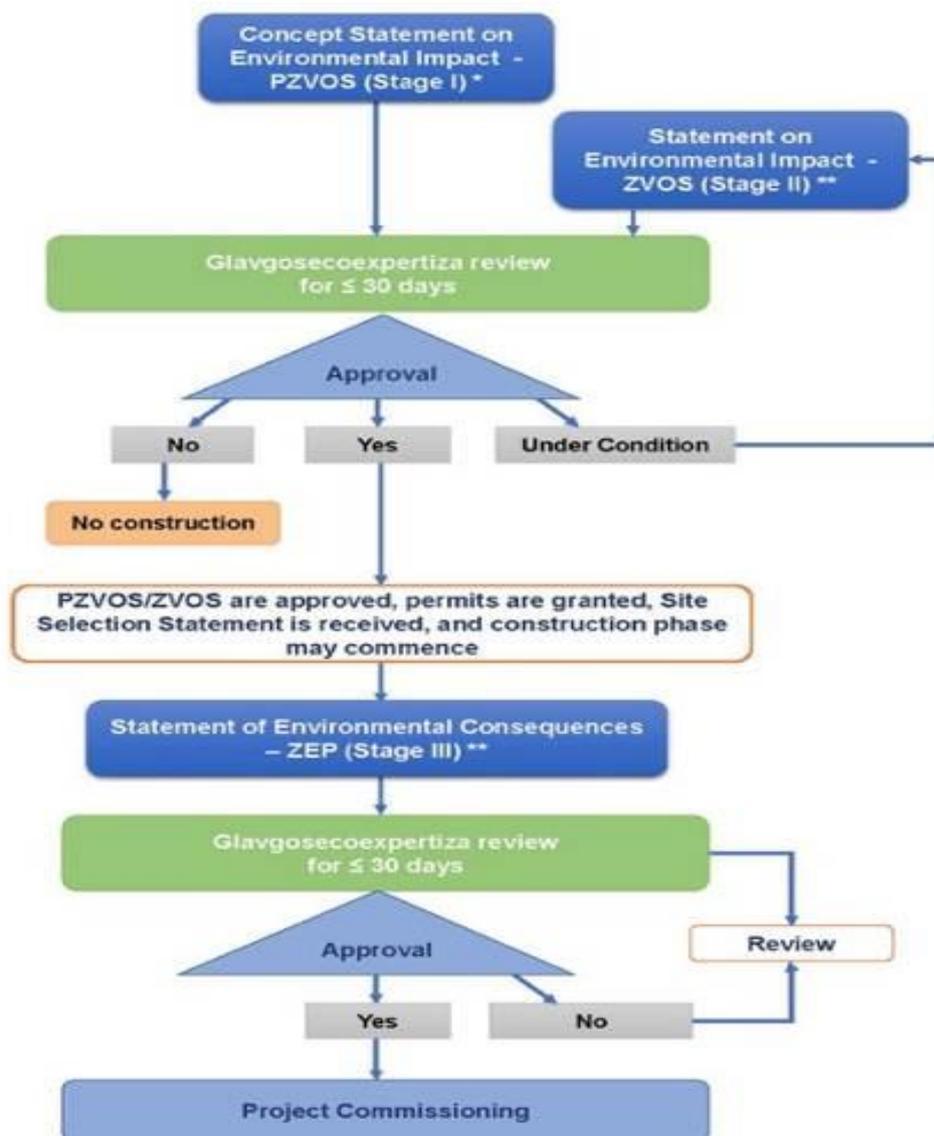
According to paragraph 24 of the "Regulations on SEE", the positive conclusion of SEE is a mandatory document for opening of financing by banks and other credit institutions and



execution of implementation of object of the state environmental examination by legal entities and individuals. The Conclusion of SEE shall be valid for three years from the date of its issuance. If the object is not implemented within three years from the date of issue of the Conclusion EIA report needs to be revised and re-submitted to the Centre of the State Environmental Examination for revision and approval.

The Conclusion of the SEE shall be sent to the relevant regional (city) control inspections in the field of ecology and environmental protection for control. Such inspections under the State Committee for Environmental Protection supervise the compliance with the requirements and conditions specified in the Conclusion of the SEE.

The EIA procedure is presented in the scheme below.



**Figure 3 Uzbek EIA procedure**

\* - Apply for Project Categories I to IV

\*\* - Apply for Project Categories I to III

The national Environmental permission – the Positive Conclusion of State Environmental Expertise has been received for the Project on January 7, 2020 (Attachment 10). The Conclusion states that the Project owner has to conduct of national Environmental Assessment – development of Statement on Environmental Consequences and submit to State Committee on Ecology and Environment Protection before the Project Commissioning.

### 2.1.7 International Treaties and Obligations

The Republic of Uzbekistan has ratified the following international conventions that are part of this environmental examination. These are shown in the Table 8 below. Fulfilment of the terms of these commitments contributes to environmental sustainability, attracts external funding for stabilization and prevention of degradation of natural resources and cultural heritage, and enhances the country's capacity to use its natural and cultural resources as a basis for poverty reduction and socio-economic development.

**Table 10 Uzbek Republic participation in international conventions relevant to the Project**

International Conventions and Treaties	Date of Ratification	Date of coming into force for Uzbekistan	Main objectives
United Nations Framework Convention on Climate Change	20 June 1993 (acceptance)	21 March 1994	Stabilizing greenhouse gas concentrations at a level that would prevent dangerous anthropogenic (human induced) interference with the climate system.
Kyoto Protocol	20 August 1999	16 February 2005	Setting internationally binding emission reduction targets.
United Nations Convention Combat Desertification	31 August 1995	29 January 1996	Reverse and prevent desertification and land degradation in affected areas in order to support poverty reduction and environment sustainability.
United Nations Convention on Biological Diversity	6 May 1995 (accession)	17 October 1995	Conservation of biodiversity, sustainable use of its components and equitable sharing of the benefits.
Convention on the Conservation of the World Cultural and Natural Habitats	22 December 1995	15 June 1996	Protection of natural and cultural heritage.
Convention on International Trade in Endangered Species of Wild Fauna and Flora	25 April 1997 (accession)	8 October 1997	Ensuring that international trade does not threaten wild animals and plants.
Convention on the Conservation of Migratory Species	1 May 1998 (accession)	1 September 1998	Global platform for the conservation and sustainable use of migratory animals and their habitats.

Ramsar Convention on Wetlands of International Importance Especially as Wildlife Habitat	30 August 2001 (accession)	8 February 2002	Conservation and wise use of all wetlands through local and national actions and international cooperation to achieve sustainable development.
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal	22 December 1995 (accession)	7 May 1996	Regulation, reduction and restriction of hazardous wastes transboundary movement.
Stockholm Convention on Persistent Organic Pollutants	22 May 2001	8 May 2019	The Convention is a global treaty to protect human health and the environment from chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of humans and wildlife, and have harmful impacts on human health or on the environment.
Convention on Biodiversity, Cartagena Protocol	29 January 2000	11 October 2019	The objectives of this Convention, to be pursued in accordance with its relevant provisions, are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to

International Labour Organisation (ILO) Convention. Uzbekistan has ratified all eight of the Fundamental ILO Conventions, one out of four of the Governance Conventions and five out of 177 of the Technical Conventions. Out of 14 Conventions ratified by Uzbekistan, of which 14 are in force. ILO Conventions ratified by Uzbekistan are listed as follows:

- Fundamental:
  - C029 - Forced Labour Convention, 1930 (No. 29)
  - C087 - Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87)
  - C098 - Right to Organise and Collective Bargaining Convention, 1949 (No. 98)
  - C100 - Equal Remuneration Convention, 1951 (No. 100)
  - C105 - Abolition of Forced Labour Convention, 1957 (No. 105)
  - C111 - Discrimination (Employment and Occupation) Convention, 1958 (No. 111)
  - C138 - Minimum Age Convention, 1973 (No. 138)

- C182 - Worst Forms of Child Labour Convention, 1999 (No. 182)
- Governance:
  - C122 - Employment Policy Convention, 1964 (No. 122)
- Technical:
  - C047 - Forty-Hour Week Convention, 1935 (No. 47)
  - C052 - Holidays with Pay Convention, 1936 (No. 52)
  - C103 - Maternity Protection Convention (Revised), 1952 (No. 103)
  - C135 - Workers' Representatives Convention, 1971 (No. 135)
  - C154 - Collective Bargaining Convention, 1981 (No. 154).

## 2.2 International Standards

### 2.2.5 International Finance Corporation (IFC)

#### Environmental and Social Sustainability Performance Standards

IFC, a member of the World Bank (WB) Group, has published the most recent Performance Standards (PS) on Environmental and Social Sustainability in 2012 that defines clients' responsibilities for managing their Environmental and Social risks.

IFC uses a process of environmental and social categorization to reflect the magnitude of risk and impacts of the Project, as summarized below:

- Category A: business activities with potential significant adverse environmental or social risks and/or impacts that are diverse, irreversible, or unprecedented;
- Category B: business activities with potential limited adverse environmental or social risks and/or impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures; and
- Category C: business activities with minimal or no adverse environmental or social risks and/or impacts.

The IFC PS are directed towards clients, providing guidance on how to identify risks and impacts, and are designed to help avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable way, including stakeholder engagement and disclosure obligations of the client in relation to project-level activities. In the case of its direct investments (including project and corporate finance provided through financial intermediaries), IFC requires its clients to apply the PS to manage environmental and social risks and impacts so that development opportunities are enhanced.

IFC uses the Sustainability Framework along with other strategies, policies, and initiatives to direct the business activities of the Corporation in order to achieve its overall development objectives. The PS may also be applied by other financial institutions.

The IFC PSs on Environmental and Social Sustainability has eight components, which provide guidance on how to identify risks and impacts, and are designed to help avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable way. The PSs are the standards that the client is to meet throughout the life of an investment. Guidance Notes that serve to explain the means to achieve compliance with the PSs support IFC PSs.

A brief description of each IFC PS is provided below:

#### PS 1: Assessment and Management of Environmental and Social Risks and Impacts

PS 1 establishes the importance of integrated assessment to identify the environmental and social impacts, risks and opportunities of the Project; also for effective community engagement through disclosure. Objectives of PS 1 are:

- To identify and evaluate environmental and social risks and impacts of the Project.
- To adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimize, and, where residual impacts remain, compensate/offset for risks and impacts to workers, Affected Communities, and the environment.
- To promote improved environmental and social performance of clients through the effective use of management systems.
- To ensure that grievances from Affected Communities and external communications from other stakeholders are responded to and managed appropriately.
- To promote and provide means for adequate engagement with Affected Communities throughout the project cycle on issues that could potentially affect them.
- To ensure that relevant environmental and social information is disclosed and disseminated.

#### PS 2: Labour and Working Conditions

PS 2 recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental rights of workers. Objectives of PS 2 are:

- To promote the fair treatment, non-discrimination, and equal opportunity of workers.
- To establish, maintain, and improve the worker-management relationship.
- To promote compliance with national employment and labour laws.
- To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain.
- To promote safe and healthy working conditions, and the health of workers.
- To avoid the use of forced labour.

#### PS 3: Resource Efficiency and Pollution Prevention

PS3 recognizes that increased economic activity and urbanization often generate increased levels of pollution to air, water, and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels. The objectives of PS 3 are:

- To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities.
- To promote more sustainable use of resources, including energy and water.
- To reduce project-related GHG emissions.

#### PS 4: Community Health, Safety and Security

PS 4 recognizes that project activities, equipment and infrastructure can increase community exposure to risks and impacts. The objectives of PS 4 are:

- To anticipate and avoid adverse impacts on the health and safety of the Affected Community during the project life from both routine and non-routine circumstances.



- To ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the Affected Communities.

#### PS 5: Land Acquisition and Involuntary Resettlement

PS 5 recognizes that project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons that use this land. Objectives of PS 5 are:

- To avoid, and when avoidance is not possible, minimize displacement by exploring alternative project designs.
- To avoid forced eviction.
- To anticipate and avoid, or where avoidance is not possible, minimize adverse social and economic impacts from land acquisition or restrictions on land use by (i) providing compensation for loss of assets at replacement cost and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected.
- To improve, or restore, the livelihoods and standards of living of displaced persons.
- To improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure at resettlement sites.

#### PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

Performance Standard 6 recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. The objectives of PS6 are:

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

#### PS 7: Indigenous Peoples

PS 7 recognizes that indigenous people as social groups with identities that are distinct from mainstream groups in national societies, are often among the most marginalized and vulnerable segments of the population and sets objectives to anticipate and avoid adverse impacts of projects on them through ensuring appropriate management and consultation principles.

#### PS 8: Cultural Heritage

Performance Standard 8 recognizes the importance of cultural heritage for current and future generations. The objectives of PS8 are:

- To protect cultural heritage from the adverse impacts of project activities and support its preservation.
- To promote the equitable sharing of benefits from the use of cultural heritage.

In conclusion, PS1 thus establishes the importance of:



- Integrated assessment to identify the environmental and social impacts, risks, and opportunities of projects;
- Effective community engagement through disclosure of project-related information and consultation with local communities on matters that directly affect them; and
- Management of environmental and social performance throughout the life of the project.

PS's from 2 to 8 establish objectives and requirements to avoid, minimize and where residual impacts remain, to compensate for risks and impacts affective on workers, communities and the environment. All IFC PSs and related guidance notes will be applicable to the Project thus have been considered in the scope of the ESIA studies except for PS 7 which is not relevant to the Project, since there are no indigenous people effected by the project or within the project area of influence.

### **IFC Environmental, Health and Safety Guidelines**

The Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP).

The guidelines are developed to be used together with the relevant industry sector EHS guidelines that provide guidance to users on EHS issues in specific industries. The guidelines include performance levels and measures that are generally considered achievable in new facilities by existing technology at reasonable costs. When host country regulations and limits differ from the levels and measures presented in the IFC EHS Guidelines, projects should aim achieving the stricter one.

The applicability of the EHS Guidelines should be tailored to the hazards and risks established for each project on the basis of the results of an environmental assessment in which site-specific variables, such as host country context, assimilative capacity of the environment, and other project factors, are taken into account.

The organization of the IFC General EHS Guidelines are organized as follows:

- Environmental
  - Air Emissions and Ambient Air Quality
  - Energy Conservation
  - Wastewater and Ambient Water Quality
  - Water Conservation
  - Hazardous Materials Management
  - Waste Management
  - Noise
  - Contaminated Land
- Occupational Health and Safety
  - General Facility Design and Operation
  - Communication and Training
  - Physical Hazards
  - Chemical Hazards
  - Biological Hazards
  - Radiological Hazards
  - Personal Protective Equipment (PPE)
  - Special Hazard Environments
  - Monitoring



- Community Health and Safety
  - Water Quality and Availability
  - Structural Safety of Project Infrastructure
  - Life and Fire Safety (L&FS)
  - Traffic Safety
  - Transport of Hazardous Materials
  - Disease Prevention
  - Emergency Preparedness and Response
- Construction and Decommissioning
  - Environment
  - Occupational Health & Safety
  - Community Health & Safety

The General EHS Guidelines contain information on cross-cutting environmental, health, and safety issues potentially applicable to all industry sectors. This document should be used together with the relevant Industry Sector Guideline(s). At present there is no industry specific guidelines for Solar Energy.

### 2.2.6 Equator Principles

Many international lenders are Equator Principles Financial Institutions (EPFI). The Equator Principles (EPs) are a credit risk management framework for determining, assessing and managing environmental and social risk in Project Finance transactions.

First issued in 2006, the Equator Principles (EP) is a risk management framework, adopted by 101 financial institutions (known as Equator Principles Financial Institutions or EPFIs) in 38 countries to support certain investment decisions by applying environmental and social standards to determine, assess and manage environmental and social risks in projects. EP 4 (the fourth iteration of the EPs that was issued and came in to force in November 2019) comprises 10 core principles:

- **Principle 1 - Review and Categorization:** When a Project is proposed for financing, the finance institution will, as part of its internal environmental and social review and due diligence, categorize it based on the magnitude of its potential environmental and social risks and impacts. Such screening is based on the environmental and social categorization process of IFC (Category A, B or C). Using categorization, the finance institutions' environmental and social due diligence is commensurate with the nature, scale and stage of the Project, and with the level of environmental and social risks and impacts.
- **Principle 2 - Environmental and Social Assessment:** For all Category A and Category B Projects, the finance institution will require the client to conduct an Assessment process to address, to the finance institution's satisfaction, the relevant environmental and social risks and impacts of the proposed Project. The Assessment Documentation should propose measures to minimize, mitigate, and offset adverse impacts in a manner relevant and appropriate to the nature and scale of the proposed Project.
- **Principle 3 - Applicable Environmental and Social Standards:** The Assessment process should, in the first instance, address compliance with relevant host country laws, regulations and permits that pertain to environmental and social issues. For Projects located in Non-Designated Countries, compliance with the applicable IFC E&S Performance Standards and the World Bank Group EHS Guidelines.



- **Principle 4 - Environmental and Social Management System and Equator Principles Action Plan:** For all Category A and Category B Projects, the finance institution will require the client to develop or maintain an Environmental and Social Management System (ESMS). Further, an Environmental and Social Management Plan (ESMP) will be prepared by the client to address issues raised in the Assessment process and incorporate actions required to comply with the applicable standards.
- **Principle 5 - Stakeholder Engagement:** For all Category A and Category B Projects, the finance institution will require the client to demonstrate effective Stakeholder Engagement as an ongoing process in a structured and culturally appropriate manner with Affected Communities and, where relevant, Other Stakeholders. For Projects with potentially significant adverse impacts on Affected Communities, the client will conduct an Informed Consultation and Participation process. The client will tailor its consultation process to the risks and impacts of the Project; the Project's phase of development; the language preferences of the Affected Communities; their decision-making processes; and the needs of disadvantaged and vulnerable groups. This process should be free from external manipulation, interference, coercion and intimidation.
- **Principle 6 - Grievance Mechanism:** For all Category A and, as appropriate, Category B Projects, the finance institution will require the client, as part of the ESMS, to establish a grievance mechanism designed to receive and facilitate resolution of concerns and grievances about the Project's environmental and social performance. The grievance mechanism is required to be scaled to the risks and impacts of the Project and have Affected Communities as its primary user.
- **Principle 7 - Independent Review:** For all Category A and, as appropriate, Category B Projects, an Independent Environmental and Social Consultant (IESC), not directly associated with the client, will carry out an Independent Review of the Assessment Documentation including the ESMPs, the ESMS, and the Stakeholder Engagement process documentation in order to assist the finance institution's due diligence, and assess Equator Principles compliance.
- **Principle 8 - Covenants:** An important strength of the Equator Principles is the incorporation of covenants linked to compliance. For all Projects, the client will covenant in the financing documentation to comply with all relevant host country environmental and social laws, regulations and permits in all material respects.
- **Principle 9 - Independent Monitoring and Reporting:** To assess Project compliance with the Equator Principles and ensure ongoing monitoring and reporting after Financial Close and over the life of the loan, the finance institution will, for all Category A and, as appropriate, Category B Projects, require the appointment of an Independent Environmental and Social Consultant, or require that the client retain qualified and experienced external experts to verify its monitoring information which would be shared with the finance institution.
- **Principle 10 - Reporting and Transparency:** For all Category A and, as appropriate, Category B Projects, the client will ensure that, at a minimum, a summary of the ESIA is accessible and available online; and the client will publicly report GHG emission levels during the operational phase for Projects emitting over 100,000 tons of CO<sub>2</sub> equivalent annually.

The EPs apply to the four financial products described below when supporting a new project:

- Project Finance Advisory Services where total project capital costs are US\$10 million or more;
- Project Finance with total project capital costs of US\$10 million or more;



- Project-Related Corporate Loans (including Export Finance in the form of Buyer Credit) where all four of the following criteria are met: (i) the majority of the loan is related to a single project over which the client has Effective Operational Control (either direct or indirect); (ii) the total aggregate loan amount is at least US\$100 million; (iii) the EPFIs' individual commitment (before syndication or sell down) is at least US\$50 million; and (iv) the loan tenor is at least two years; and
- Bridge Loans with a tenor of less than two years that are intended to be refinanced by Project Finance or a Project-Related Corporate Loan that is anticipated to meet the relevant criteria described above.

While the EPs are not intended to be applied retroactively, EPFIs apply them to the expansion or upgrade of an existing project where changes in scale or scope may create significant environmental and social risks and impacts, or significantly change the nature or degree of an existing impact.

### **2.2.7 European Investment Bank (EIB)**

The EIB Statement on Environmental and Social Principles and Standards (2009) sets the policy context for the protection of the environment and human well-being, and EIB's Environmental and Social Standards provides an operational translation of these policies and principles. These Standards were published in 2013 and in 2018 they were published in a stand-alone document, without any modification to the Standards themselves.

The Standards are grouped across 10 thematic areas covering the full scope of environmental, climate and social impacts and issues, as follows:

#### **Standard 1: Assessment and Management of Environmental and Social Impacts and Risks**

The first standard reflects the importance of managing environmental and social impacts and risks throughout the life of a project through the application of the precautionary principle. The overall objective of this Standard is to outline the Sponsor's responsibilities in the process of assessing, managing and monitoring environmental and social impacts and risks associated with the Project. The standard requires the development of an effective environmental and social management and reporting system that is objective and encourages continual improvements and developments.

For projects outside the EU the standard requires the undertaking ESIA consistent with the principles contained in the EU EIA Directive and best international practice. Furthermore, the standard includes requirements for undertaking stakeholder engagement and disclosure throughout the life of the project (see Standard 10), and the development of E&S policies and Environmental and Social Management System (ESMS) / Environmental and Social Management Plan (ESMP).

#### **Standard 2: Pollution Prevention and Abatement**

The objective of the second standard is to avoid and minimise pollution from Projects. It outlines a project-level approach to resource efficiency and pollution prevention and control in line with best available techniques and internationally disseminated practices, and includes the following aspects:

- Pollution Prevention, Energy and Resource Efficiency
- Emissions of Atmospheric Pollution, to Water and Soil
- Noise Emissions



- Ambient Conditions and Environmental Quality Standards
- Waste Management
- Sound Management of Chemicals and Dangerous Substances
- Emergency Prevention, Preparedness and Response
- Pesticide Use and Management.

Projects outside of the EU, Candidate and potential Candidate countries, should be designed and operated in consistency with EU environmental standards and requirements.

### Standard 3: Biodiversity and Ecosystems

This standard outlines the approach and measures the Sponsor has to take to protect and conserve all levels of biodiversity. The standard applies to all habitats (marine and terrestrial) whether or not previously disturbed or legally protected. It focuses on major threats and supports the sustainable use of renewable natural resources and the equitable sharing of benefits from the project's use of natural resources.

Underpinning this Standard is the overall goal of maintaining the integrity of areas important for biodiversity as well as the natural functions, processes, and resilience of ecosystems, with the aim of achieving no net loss or a net gain of biodiversity and ecosystem. All projects should seek to contribute towards this state, avoid or minimise further losses and finally compensate for any residual impact.

The Standard requires projects to follow the mitigation hierarchy to avoid, minimise, restore and as a last resort compensate for adverse impacts on biodiversity and ecosystems. Furthermore, projects should seek opportunities to enhance biodiversity and ecosystems whenever possible.

The Standard requires ESIA's to include an 'Analysis of Alternatives' to demonstrate that there are no alternatives to development affecting natural, semi-natural or critical habitats. Impact assessments should consider the extent to which a proposed project will affect the supply of ecosystem services or the ability of beneficiaries to access them to obtain the values and benefits they depend on.

The Standard also requires the development of a Biodiversity Management Plan (BMP) integrated within the ESMS associated with the Project.

### Standard 4: Climate-Related Standards

Projects should comply with appropriate national legal requirements, including multilateral agreements, related to climate change policy.

For projects emitting more than 100kt CO<sub>2</sub>eq/yr in absolute terms or leading to an emission variation of more than 20kt CO<sub>2</sub>eq/yr, the Standard requires an assessment of the GHG emissions produced as a result of the project.

Furthermore, the Standard requires information on the climate change risks projects face.

### Standard 5: Cultural Heritage

Through its projects, the EIB recognises the central role of cultural heritage within individual and collective identity, in supporting sustainable development and in promoting cultural diversity. Consistent with the applicable international conventions and declarations, this



standard aims at the identification, management and protection of tangible and intangible cultural heritage that may be affected by project activities. It emphasises the need for the implementation of a “chance-find procedure”, which outlines the actions to be taken if previously unknown cultural heritage is encountered.

The Standard requires cultural heritage impact assessment and management to be based on the applicable international conventions and other legal instruments, including:

- The country of operations’ legal framework relating to cultural heritage in the project area of influence, such as: cultural heritage or antiquities laws, planning or building consent laws, conservation area or protected area regulations, other laws and regulations governing the built historic environment, or laws relating to the protection of Indigenous Peoples (see Standard 7), etc.
- Convention concerning the Protection of the World Cultural and Natural Heritage, 1972 (UNESCO World Heritage Convention);
- Convention for the Safeguarding of the Intangible Cultural Heritage, 2003 (UNESCO Intangible Heritage Convention).

#### Standard 6: Involuntary Resettlement

EIB projects sometimes necessitate land acquisition, expropriation and/or restrictions on land use, resulting in the temporary or permanent resettlement of people from their original places of residence or their economic activities or subsistence practices. Standard 6 is rooted in the respect and protection of the rights to property and to adequate housing, and of the standard of living of all affected people and communities. It seeks to mitigate any adverse impacts arising from their loss of assets or restrictions on land use. It also aims to assist all affected persons to improve or at least restore their former livelihoods and living standards and adequately compensate for incurred losses.

The key objective of this Standard is to avoid or, at least minimise, project-induced resettlement (physical or economic) whenever feasible by exploring alternative project designs. Standard 6 contains key obligatory requirements for projects that have a land acquisition and/or resettlement component.

#### Standard 7: Rights and Interests of Vulnerable Groups

The EIB seeks to protect all vulnerable project-affected individuals and groups, whilst seeking that these populations duly benefit from EIB operations. The standard requires that there is full respect for the dignity, human rights, aspiration, cultures and customary livelihoods of vulnerable groups including indigenous peoples. It requires the free, prior and informed consent of affected indigenous groups.

#### Standard 8: Labour Standards

This standard aims at ensuring that projects comply with the core labour standards of the International Labour Organisation (ILO) and with national labour and employment laws. The standard also requires the establishment, maintenance and improvement of worker-management relationships. As with IFC PS2 the Standard covers exploitation of child labour, forced labour, migrant workers, non-discrimination and equality of opportunity, freedom of association and collective bargaining, and requirement for grievance mechanism.

#### Standard 9: Occupational and Public Health, Safety and Security

This Standard requires projects to protect and secure public and occupational health, safety and security and promote the dignity of the affected community in relation to project-related activities, with particular attention to vulnerable groups. The standard also requires projects to adhere to the international norms and relevant human rights principles when using security services.

#### Standard 10: Stakeholder Engagement

Standard 10 requires projects to uphold an open, transparent and accountable dialogue with all project affected communities and relevant stakeholders in an effective and appropriate manner. The value of public participation in the decision-making process is stressed throughout the preparation, implementation and monitoring phases of a project. Projects should establish and maintain a constructive dialogue between themselves, the affected communities and other interested parties throughout the project life cycle. With the right to access to remedy, including through grievance resolution, is actively required.

### **2.2.8 EBRD Requirements**

The European Bank for Reconstruction and Development (EBRD) is committed to promoting “environmentally sound and sustainable development” in the full range of its activities. The Bank recognises that environmental and social sustainability is a fundamental aspect of achieving outcomes consistent with its mandate.

The Environmental and Social Policy (2019) is the key document that guides the EBRD’s commitment to promoting “environmentally sound and sustainable development” in the full range of its investment and technical cooperation activities. It sets out the ways in which they implement this commitment in practice and on projects.

To enable clients and their Projects achieve their E&S Policy requirements, EBRD has defined specific Performance Requirements (PRs) within the E&S Policy for key areas of environmental and social sustainability. EBRD has adopted ten PRs, which are consistent with and mirror the overall structure, approach and issue coverage of the IFC’s 2012 Performance Standards while specifically requiring projects to meet EU environmental standards.

EBRD has adopted a comprehensive set of specific PRs for key areas of environmental and social sustainability that projects are required to meet. Central to the PRs is the application of the mitigation hierarchy and good international practice. As the Project will involve funding from EBRD the Project will also need to meet the following specific PRs defined in EBRD’s E&S Policy:

- PR1 - Assessment and Management of Environmental and Social Impacts and Issues;
- PR2 - Labour and Working condition;
- PR3 - Resource Efficiency and Pollution Prevention and Control;
- PR4 - Health and Safety;
- PR5 - Land Acquisition, Involuntary Resettlement and Economic Displacement;
- PR6 - Biodiversity Conservation and Sustainable Management of Living Natural Resources;
- PR7 - Indigenous Peoples;
- PR8 - Cultural Heritage;



- PR9 - Financial Intermediaries;
- PR10 - Information Disclosure and Stakeholder Engagement.

PR7 - Indigenous Peoples and PR9 - Financial Intermediaries are not applicable to the Project.

A summary of the overall objectives of each of the relevant PRs is summarised below:

#### PR1 - Assessment and Management of Environmental and Social Impacts and Issues

- identify and evaluate environmental and social impacts and issues of the project
- adopt a mitigation hierarchy (avoid, minimise, offset/compensate) approach to address adverse environmental or social impacts and issues to workers, affected communities, and the environment from project activities
- promote improved environmental and social performance of clients through the effective use of management systems
- develop an ESMS tailored to the nature of the project, for assessing and managing environmental and social issues and impacts in a manner consistent with relevant PRs.

#### PR2 - Labour and Working condition

- respect and protect the fundamental principles and rights of workers
- promote the decent work agenda, including fair treatment, non-discrimination and equal opportunities of workers
- establish, maintain and improve a sound worker-management relationship
- promote compliance with any collective agreements to which the client is a party, national labour and employment laws
- protect and promote the safety and health of workers, especially by promoting safe and healthy working conditions
- prevent the use of forced labour and child labour (as defined by the ILO) as it relates to project activities.

#### PR3 - Resource Efficiency and Pollution Prevention and Control

- identify project-related opportunities for energy, water and resource efficiency improvements and waste minimisation
- adopt the mitigation hierarchy approach to addressing adverse impacts on human health and the environment arising from the resource use and pollution released from the project
- promote the reduction of project-related greenhouse gas emissions.

#### PR4 - Health and Safety

- protect and promote the safety and health of workers by ensuring safe and healthy working conditions and implementing a health and safety management system, appropriate to the relevant issues and risks associated with the project.
- anticipate, assess, and prevent or minimise adverse impacts on the health and safety of project-affected communities and consumers during the project life cycle from both routine and non-routine circumstances.

#### PR5 - Land Acquisition, Involuntary Resettlement and Economic Displacement

- avoid or, when unavoidable, minimise, involuntary resettlement by exploring alternative project designs



- mitigate adverse social and economic impacts from land acquisition or restrictions on affected persons' use of and access to assets and land by:
  - providing compensation for loss of assets at replacement cost; and
  - ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation and the informed participation of those affected;
- restore or, where possible, improve the livelihoods and standards of living of displaced persons to pre-displacement levels
- improve living conditions among physically displaced persons through the provision of adequate housing, including security of tenure at resettlement sites.

#### PR6 - Biodiversity Conservation and Sustainable Management of Living Natural Resources

- protect and conserve biodiversity using a precautionary approach
- adopt the mitigation hierarchy (avoid, minimise, offset) approach, with the aim of achieving no net loss of biodiversity, and where appropriate, a net gain of biodiversity
- promote good international practice (GIP) in the sustainable management and use of living natural resources.

#### PR8 - Cultural Heritage

- support the protection and conservation of cultural heritage
- adopt the mitigation hierarchy approach to protecting cultural heritage from adverse impacts arising from the project
- promote the equitable sharing of benefits from the use of cultural heritage in business activities
- promote the awareness and appreciation of cultural heritage where possible.

#### PR10 - Information Disclosure and Stakeholder Engagement

- outline a systematic approach to stakeholder engagement that will help clients build and maintain a constructive relationship with their stakeholders, in particular the directly affected communities
- promote improved environmental and social performance of clients through effective engagement with the project's stakeholders
- promote and provide means for adequate engagement with affected communities throughout the project cycle on issues that could potentially affect them and to ensure that meaningful environmental and social information is disclosed to the project's stakeholders
- ensure that grievances from affected communities and other stakeholders are responded to and managed appropriately.

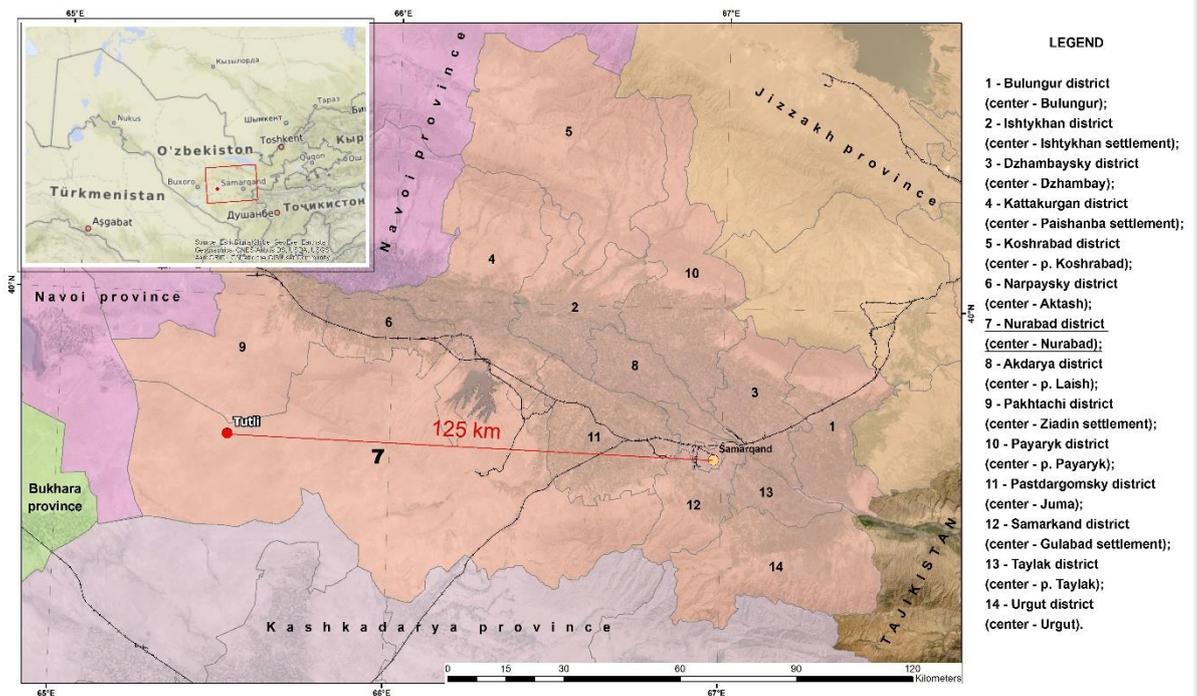
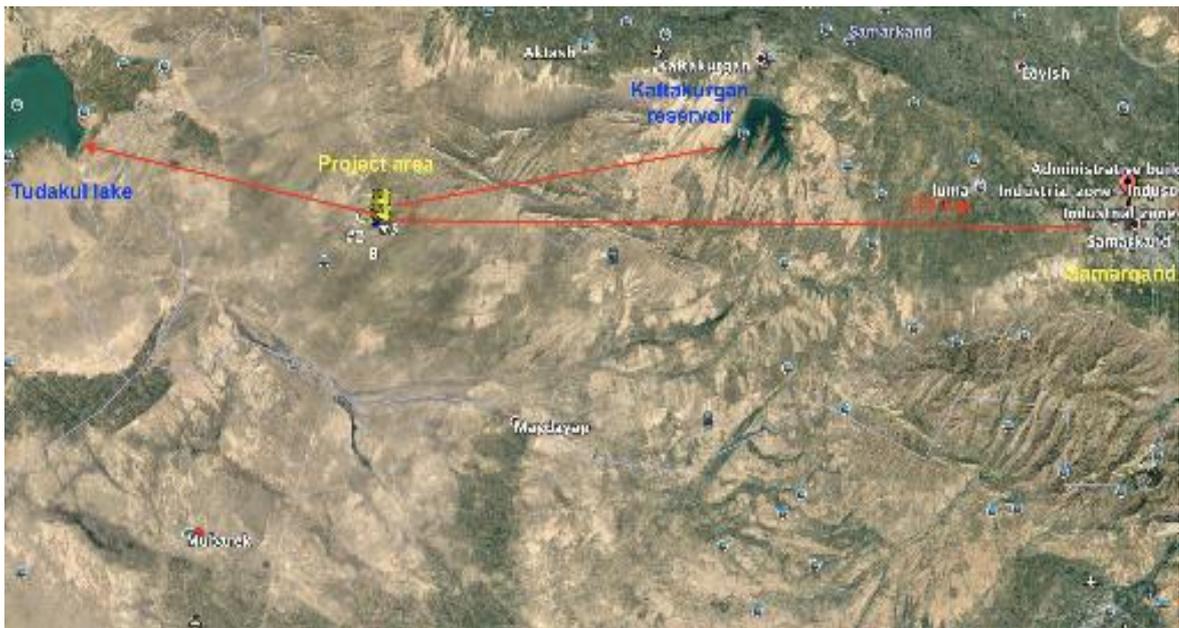


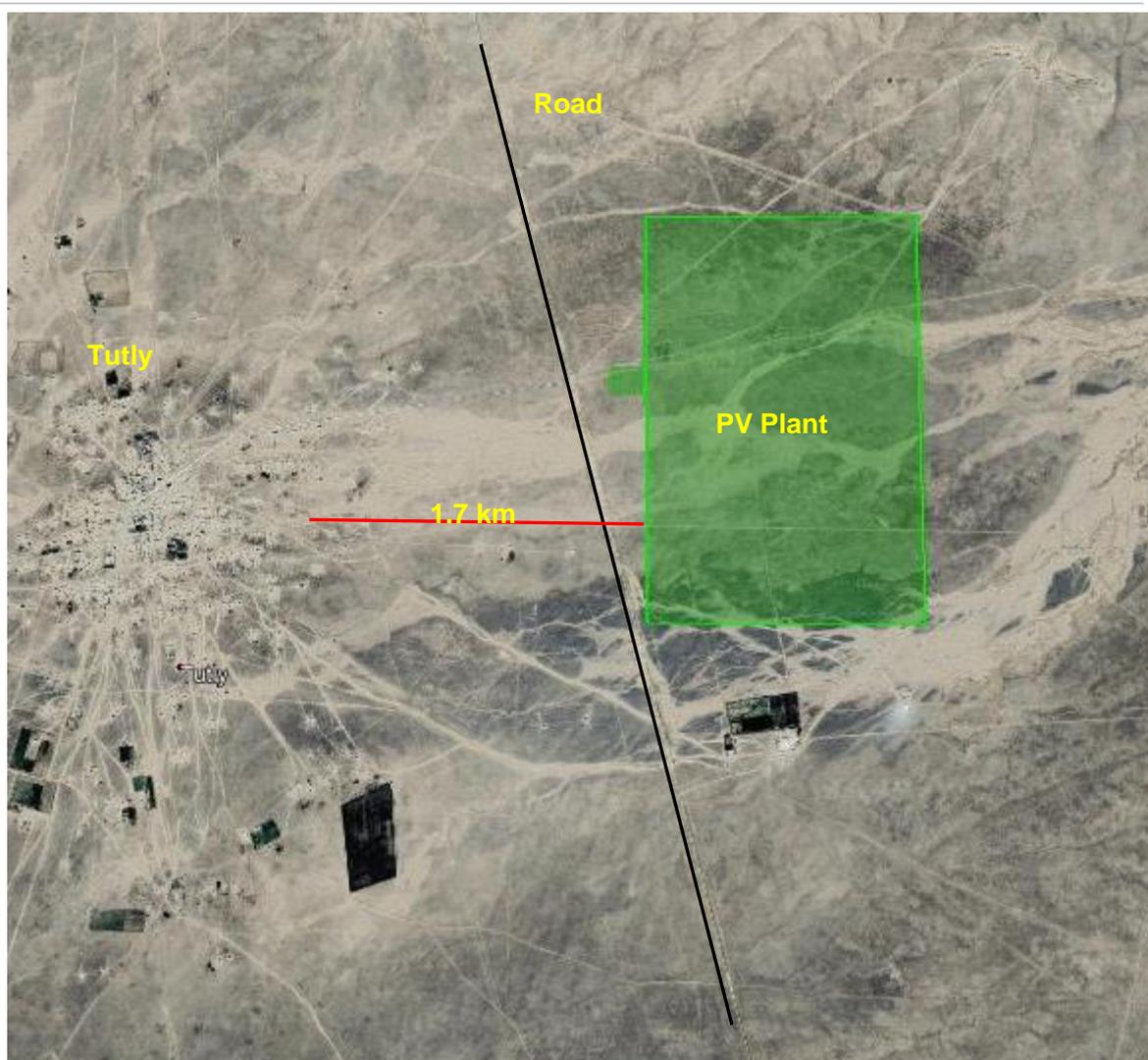
### 3 Project Description

#### 3.1 Project location and Surroundings

The project will be located in Samarqand province, Nurabad district, around 115 km to the west from the Samarkand city. The Kattakkurgan water reservoir lies 49 km to the north west and Tudakul lake 56 km to north west from the project site.

The PV plant comprises of a total reserved area of 350 ha. A paved road lies 70 meters from the project area at its nearest location; the site itself is crossed by two dirt roads with low traffic density. The project area is shown in Figure 4.





**Figure 4 Location of the project site**

The Project area is flat and free of any buildings and structures. The area is currently used for livestock grazing purposes (mainly sheep and goats) due to its proximity to the village and as a shortcut to distant feeding areas. The closest settlement (Tutly village) is located in 1.7 km (until settlement centre) to the west from the project site.

### **3.2 Access to the site**

The site will be accessed from the existing west side public road, as shown in the picture above. Specifically, a new road, about 400m length, will be created on the west side of the site, in order to ensure the access of heavy trucks during construction, as well as O&M personnel during operation.

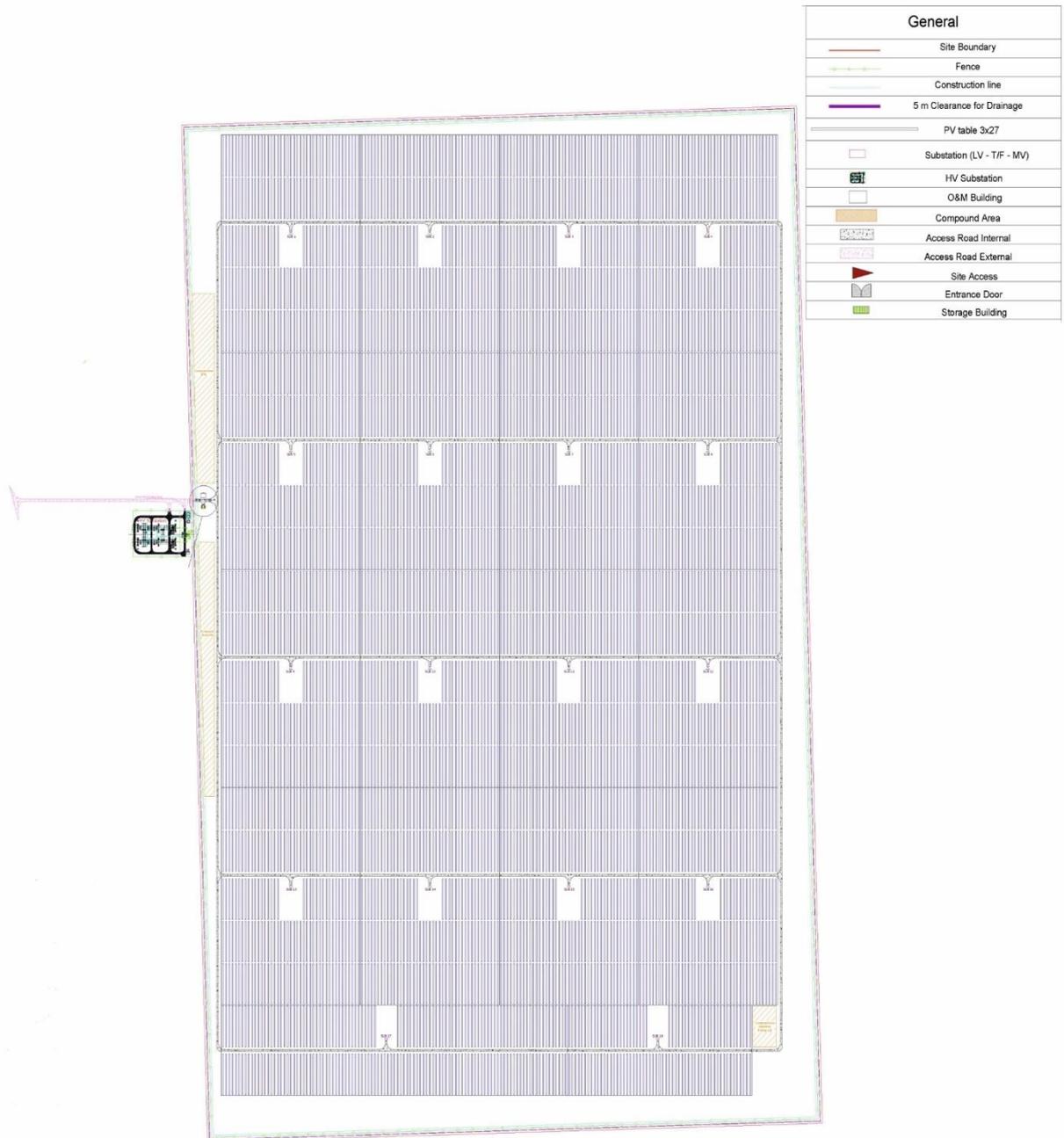
### **3.3 Project Components**

#### **3.2.1. Overview**

The project will use solar photovoltaic (PV) technology to harness solar energy to generate electric power, and will have The installed capacity (sum of PV modules capacity is 131.348 MWp]) and the export capacity (maximum capacity injected in the grid) is 100 MW<sub>AC</sub>, which will be connected to the national grid. The detail technical specification will be defined by the



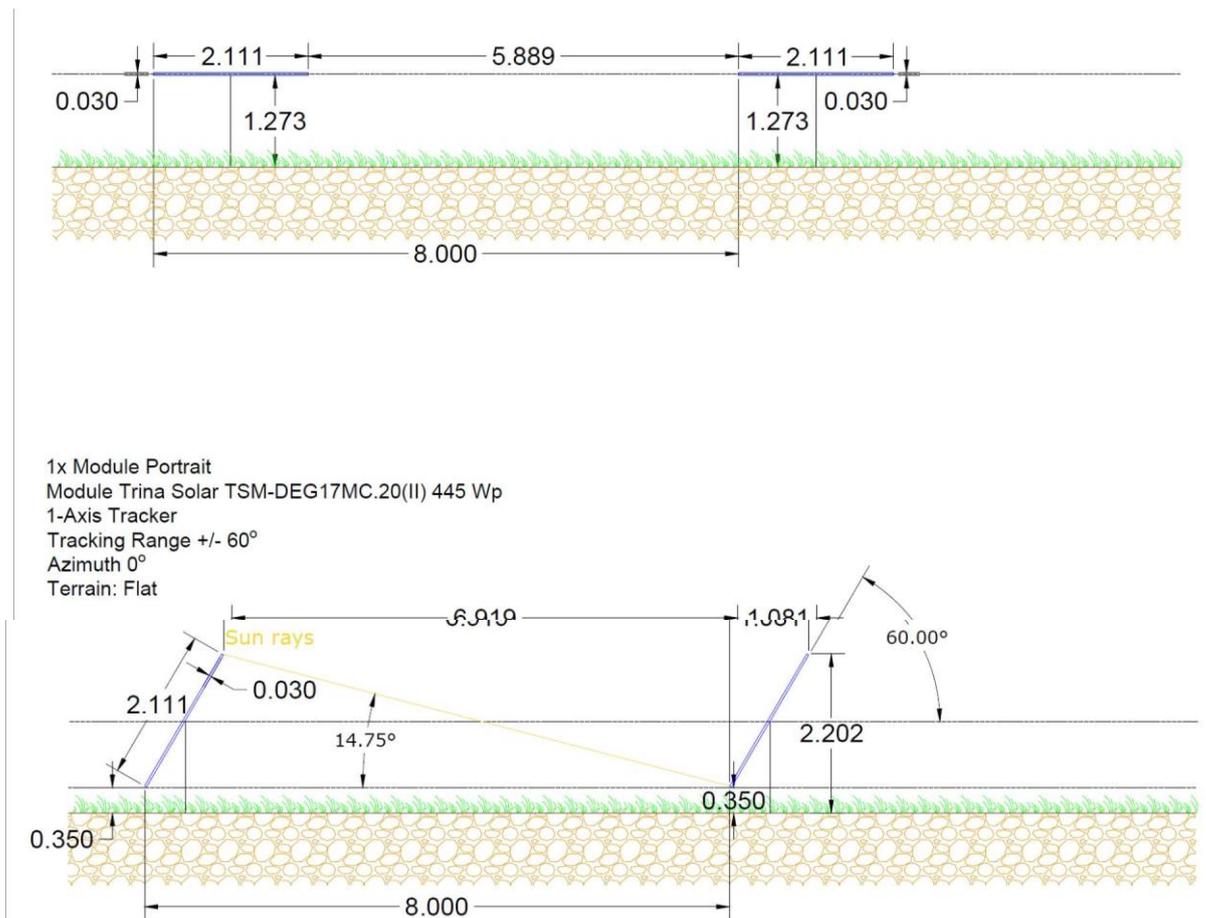
Project Technical Advisor, at the project detail design stage. The below is provided high level technical description of the project. General view of PV Plant is provided on Figure 5.



**Figure 5: PV plant layout. Legend: 1- PV plant, 2 – Substation, 4- Guard house, 3- O&M building, 5- Inverters**

### 3.2.2. Basic Design

The analysis, about the efficiency of the PV installation which was evaluated through PVsyst, was leaned on the following design. The pursuit is to have the PV modules unaffected from external or internal (row by row) shadings. Overall the whole analysis was based on the features that maximize the efficiency of the park and provide sufficient clearances between the modules, the buildings and the roads for sake of operation and maintenance reasons. According to these design features the pitch length is 8 m.



**Figure 5: Shading evolution.**

### 3.2.3. Plant Characteristics

The internal medium voltage level of the solar park will be 35 kV. The DC part of the installation designed at 1500 V DC. The result of this design is a string with 27 modules which covers both the occasion of cold weather conditions (temperatures up to -20°C) as well as the efficient operation zone of the inverters. The total Installed DC capacity of the site is 131,347.980 kWp DC and the export power is 115.625MW AC @ 30°C, 112.5MW AC @ 35°C and 100MW AC @ 50°C, in a 35 kV point of connection. The various components/installations, anticipated to be carried out, such as PV modules, inverters, earthing system, mounting structure, fencing, cabling etc., will be briefly discussed in the following paragraphs.

An analysis of the efficiency of the PV installation was evaluated using PVsyst, which has led to the project design presented in this project description. An important constraint is to limit as much as possible external and internal (row by row) shadings on the PV modules. Overall the PVsyst analysis was based on the features that maximize the efficiency of the project and provide sufficient clearances between the modules, buildings and roads for sake of maintenance and operation reasons.

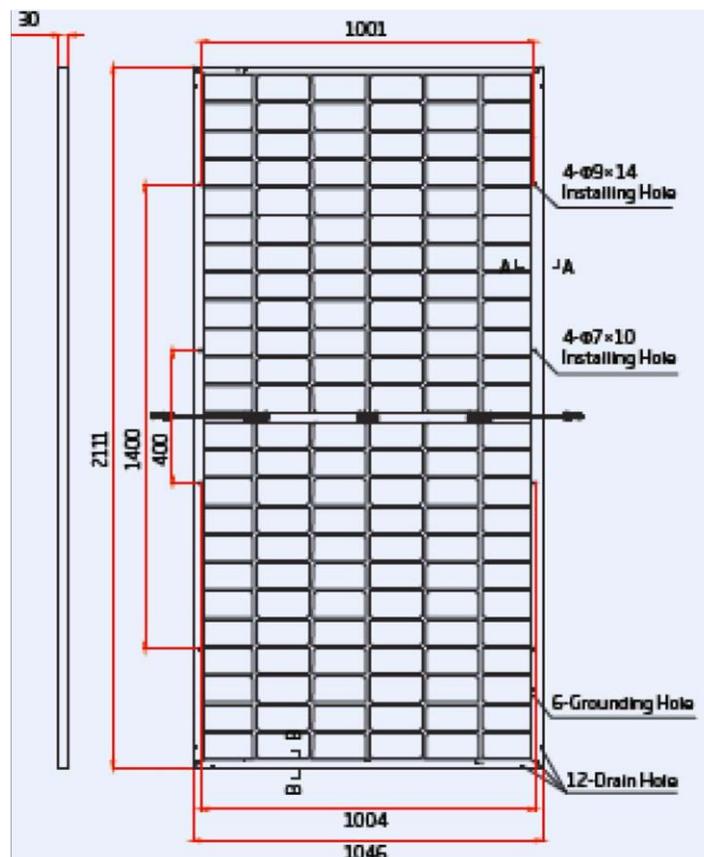
According to these design features the pitch length (distance between rows of panels) is assumed to be 8 m as shown in Figure 6. The final pitch length will be determined at a later stage in order to optimize the design of the project, and may be between 6 and 9m.

### PV models

For the energy production monocrystalline bifacial modules will be used. Specifically, Trina Solar TSM-DEG17MC.20(II) 445 Wp. The module's cells are embedded in anodized aluminum alloy frame 2111 × 1046 × 30mm.

The performance of each panel is mentioned in a name plate, on the back part of it. Each cell is manufactured under the highest technical specifications and all international standards and norms are met and over passed. The cells are shielded in a protective membrane with double highly resistant polyester layer which covers the back part for credible and durable protection from environment factors or thermal distortions. The junction box in the rear part of the solar module, IP67 for long-term weather endurance, is equipped with bypass diodes to avoid overheating of specific cells and secure credible operation of the whole PV system. The PV frames bear Solar type cables in the rear part for panel interconnection.

The panels will be installed in the active surface of the base. The installation will be made with the use of clamps and M8 fasteners, provided by the structure manufacturer, in order to secure total fitting of the elements.



**Figure 7 PV Module Trina Solar TSM-DEG17MC.20(II) details**

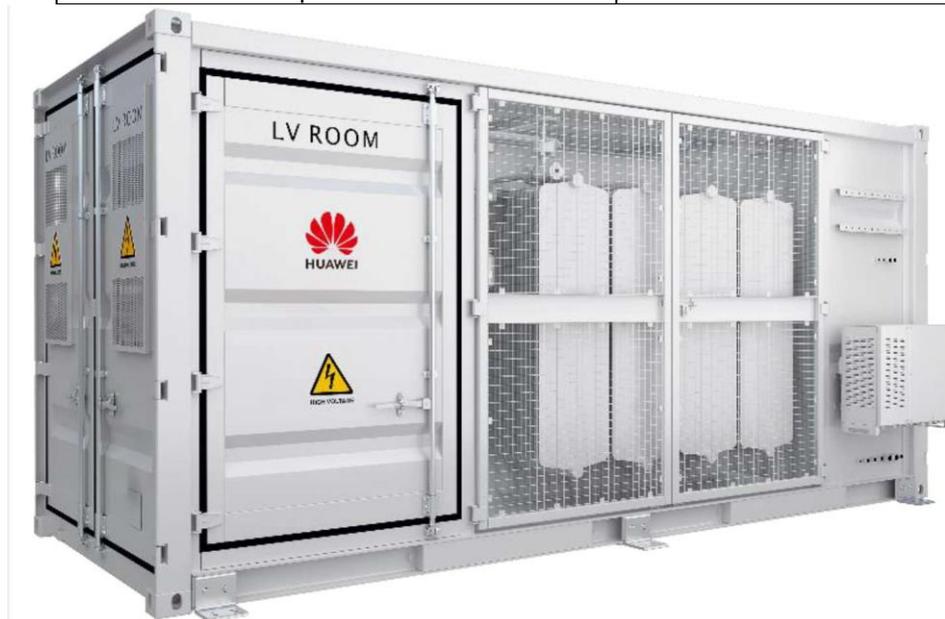
### 3.2.3.1. Production substation

The PV Power Plant consists of 18 Production Substations. Each Production Substation consists of:

- LV Panel room for Huawei Inverters and auxiliary TF and cabinet
- Transformer space area, with Production transformer
- Switchgear room, with RMU unit 35kV

Production Substation is a Turnkey container station solution or skid platform solution with LV room, Transformer and MV room that includes and housing all equipment for Inverter operation, auxiliaries, Production Transformation and RMU for 35kV internal interconnection. The basic characteristics of the inverter can be found below.

Input voltage range of inverters	500V ~ 1500V
Number of inverters per station	36 unit
Production substation output voltage	35kV
Frequency	50Hz
Power	6,300 kVA @40 °C / 5,760 kVA @50 °C
Medium Voltage	35kV
Number of MPPTs per inverter	9



**Figure 8: Huawei STS-6000K-H1**

### 3.2.4. Associated Facilities and utilities

#### Grid Connection and Transmission Lines

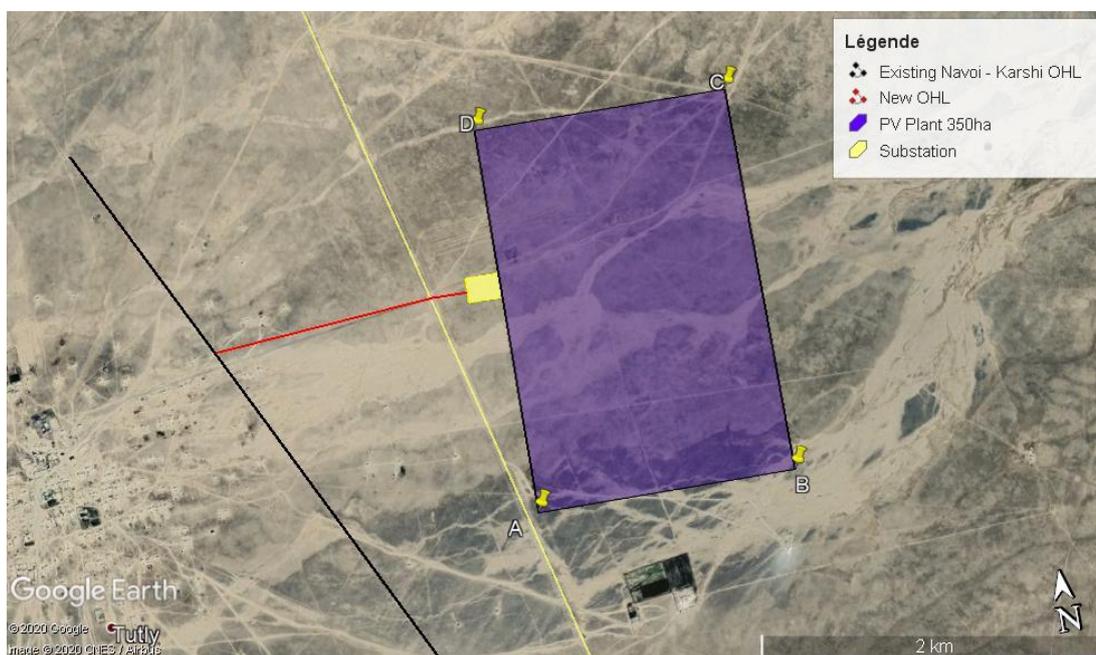
The site will be connected to the electrical grid through a 35/220 kV medium voltage – high - MV-HV) voltage substation and a 220 kV overhead line connecting the MV-HV substation to the existing 220 kV overhead line connecting the Navoi thermal power plant to the Karshi substation.



During the ESIA preparation, several options for connection the PV plant with the grid have been considered :

- Option 1: Connection to Navoi TPP – Karshi Substation 220 kV OHL (length of new OHL : 2 km)
- Option 2 : Connection to Kattakurgan – Khimiya 220 kV OHL (length of new OHL : 31 km)
- Option 3 : Connection to Suvli 10/110/220 kV substation (length of new OHL : 34 km)

Taking into account the economical, technical, environmental and social aspects of each option, the Sponsor and public authorities have elected Option 1 as the preferred grid connection option for the Project.



**Figure 6 Connection of PV plant with existing transmission line**

#### Access road and internal road network

The PV station will be located 1.7 km east of the village of Tutli, 14 km from the city of Karnab, 65 km from the city of Kattakurgan, 45 km from the city of Navoi. 2 km north of the work site is a gypsum stone deposit. Asphalt road is located 70 meters from the closest location to the project area, which is crossed by two unpaved roads Figure 12.

#### Buildings, including onsite substation, connection building, control building, guard cabin, and spare parts storage.

The PV plant will also include HV substation, guard room and O&M room. The buildings will be constructed within the project area.

#### Temporary Facilities (i.e. Worker Camp and Construction Laydown Area)

Approximate number of employees at the station will be 24 people, of which 18 - workers, AUP and engineering - 6 people.



The operating mode is as follows:

- AUP and Engineering - in one shift, 260 working days per year;
- workers - in one shift, 365 days a year.

During construction phase number of workers will reach up to 300 people. At the project preliminarily design several options for accommodation workers are considered: construction labour camps or accommodation in nearest settlements. It is anticipated that for the jobs which are not required specific skills, local population will be hired.

#### Site security, including fencing and CCTV and Stormwater infrastructure and drainage system

The power plant site is located in the foothill area. According to Uzhydromet, the area where the site is located is classified as mudflow hazardous.

Mudflow floods on watercourses are formed mainly due to rainfall. Mudflows are short-term (2-3 hours long) and represent a mud-stone stream, which, falling into sayis (small canals) flowing in the immediate vicinity of the construction site, can cause a rise in water level and lead to overflow of the river bed with emergency risks for the integrity of structures new station.

#### Water supply infrastructure.

The water consumption of the enterprise will consist of the consumption of water for household use, and watering purposes. The source of drinking water supply will be water pumped from ground water deposit located on the depth 150-200 meters or from shallow ground water deposit located on the depth in 15 meters. Water from shallow ground water deposit could be used after pre-treatment, water from ground water deposit are suitable to be used without treatment. The final decision on the source of water (shallow ground water or deep ground water) will be made at the project detail stage.

### **3.3. Overview of Project Phases and Activities**

The general development phases for large scale solar PV project can be categorised as follows:

- Mobilisation/Pre-construction: such as site preparation, mobilisation of equipment and materials to site.
- Construction and Installation: including civil works, electrical works, and equipment installation.
- Operation: Plant operation and routine maintenance.
- Decommissioning: Dismantling of equipment and associated facilities and site restoration.

The proposed total capacity of the PV plant is 100 MW and it is proposed to be built in a single phase. Construction of is planned to commence in Q4 2020 and be in full operations in Q3 2021. Electricity generated from the project will be exported via power lines to the nearby substation for transmission and distribution via the national network, construction of which is planned to occur in parallel to the project.

#### **3.3.1. Mobilisation Phase**

The mobilisation phase must take place before construction and installation work can begin at the project site. The pre-construction phase includes development of detail design,



mobilization and site preparation stages. The project will be implemented through hiring an EPC Contractor under a turnkey contract. The EPC Contractor will be responsible for development of detailed design, construction and commissioning of the plant.

The mobilization phase includes the ordering of materials and equipment, signing contracts with subcontractors and hiring of staff. This phase also involves the mobilization of workers, materials and equipment to site, as well as site preparation which involves clearing and levelling of the site and establishment of on-site facilities, including potentially worker accommodation.

This phase includes preparation of a detailed design for the project, planning and transportation of the project components to the site (e.g. PV modules), and onsite preparation activities for installation of the PV arrays and various other components. Site preparation activities could include excavations, grading, levelling, and land clearing activities.

Heavy-duty and other pieces of equipment will be moved to the project site at the beginning of construction activities for civil work activities and equipment installation. All PV modules, electrical and structural equipment is planned to be shipped by train and then trucked to site via road in “containers”. Besides equipment the project would also require large construction vehicles and equipment, such as bulldozers, excavators, cranes etc. to assemble the facility.

During the site preparation period, the workforce required for site security, manual labour, civil works, transportation of goods and other similar services will most likely be drawn from the local labour pool. During this period each developer will establish a team of workers specific to the tasks required. It is anticipated that this phase will take around 1-2 months.

### **3.3.2. Construction and Installation Phase**

The construction phase of the project will include many activities and phases, such as:

- Construction/improvement of internal access roads
- Levelling of the ground
- Fencing around the site
- Installation of PV Power Units
- Driven piles for mounting structure
- Construction of electrical substation and foundations
- Excavation, trenching and cable laying
- Fixing and wiring of the panels
- Installing CCTV (if applicable) around the fence line and access points
- Installing water tank for staff and O&M activities
- Installation of septic tank
- Construction of buildings
- erection of overhead HV power lines
- testing and commissioning of equipment and the project as a whole
- Site clean-up.

During the construction phase the piles need to be driven into the ground to form the structural base of the PV arrays. Once the PV components have arrived on site, technicians will supervise the assembly of the panels and test the facility. The PV panels will be installed on the galvanized steel structures. There will be a basic dirt road ways layout for the construction activities. A phased approach will be adopted during the Project construction.



A section of the site will be used as a laydown area where shelters, equipment, ablution facilities (portable) and containers will be located. Accommodation may need to be provided through temporary construction camps onsite for non-locals. However, the project will aim to employ unskilled and skilled labour from the surrounding communities for construction where possible.

To provide access to the site from the nearby public road a short access route will need to be prepared to levels that will be acceptable for the transport of equipment, material and people to and from the site. It is estimated that around 5 digger/loaders/bulldozers will be required for land clearing and 5 to 10 trucks with cranes will be required for the construction. Approximately 600-800 x 40-foot container loads would be required to construct the PV solar facility. The need for cut and fill areas and or borrow pits at the PV sites, along roads and at substation/transformer sites, will only be known after the final design has been completed.

The connection route from the PV solar plant to the nearby substation is still to be determined, however the use of overhead power lines guided by pylons/poles will be used as the method of transportation of electricity and the connection of substations.

During this stage construction of all auxiliary building (guard rooms, O&M buildings, water treatment facilities (if needed), installation of the equipment – panels, inverters, transformers, etc. will be undertaken.

It is anticipated that up to 280 workers will work in the busiest period. The expecting duration of construction period are 3 months cleaning/levelling and 12 months construction.

### **3.3.3. Operations Phase**

Once the facility is complete and operational, it is expected that it will have a lifespan of approximately 25 years.

Day to day facility operations will involve both regular on-site preventive and corrective maintenance tasks in order to keep the PV power plant in optimal working order throughout the operational period. The preventive maintenance follows a routine service schedule aimed at preventing faults from occurring and keeping the plant operating at its optimum level. The frequency of the preventive maintenance depends on a number of factors such as the technology selected, environmental conditions of the site, warranty terms and seasonal variances. It contains for example activities like PV module cleaning, inverter servicing, checks on structural integrity of the mounting structure. Corrective maintenance is carried out in response to failures for example, the repair/exchange of damaged or faulty equipment.

Due to the passive nature of solar PV plants, there are no emissions or waste generated during the operation of the project, no significant noise generating equipment or machinery, and limited need for hazardous materials to be stored on site.

One of the key activities during the operation phase is the regular cleaning of PV modules to prevent dust build-up which could affect their performance. This has the potential consume significant quantities of water. In order to reduce the waster demand of the project it is planned that the PV modules will be cleaned monthly using dry cleaning techniques, with wet cleaning (using water) only planned on a quarterly basis. For wet cleaning it is estimated that 3.0 litres of water per PV module is required, which equates to around 886 m<sup>3</sup> of water per wet clean, based on 295,425 PV modules, or 3,500 m<sup>3</sup>/year.



PV modules cleaning will need to be undertaken according to the manufacturer specifications, and water used will need to be demineralized and have a low salt content. The water for cleaning, and potable use, will be sourced from ground water wells which will be drilled on the territory of PV Plant. The population at the closest settlement – Tutly – uses ground water for drinking purposes, pumping water from 20-25 meters depth. The EPC contractor will conduct ground water analysis and, in the case, that purification is required, will provide the necessary water treatment facilities.

It is planned that the building (guard house, O&M buildings) will be heated using electric heaters.

### 3.3.4. Decommissioning Phase

Decommissioning refers to the process of removing all the operating assets of a project after completion of its life cycle from the project site. During decommissioning all infrastructure introduced to the sites for the development of the project will be removed, requiring the following work:

- The **solar panels** will be unscrewed from the mounting frames and packaged either to, send to a solar recycling depot, or if they are still operational, they may be sold as second hand. Panels should always be disposed according to the applicable Regulations at the end of their operational life.
- The **mounting frame** horizontal poles will be removed, and the piles will be pulled from the ground, the dismantled framework will be bundled and taken for recycling.
- The **cable** trenches will be reopened, with the top soil set aside, and the cables and ducts will be removed. As the cables are removed, the trenches will be backfilled with the soil that has been set aside. The cables will be bundled and taken for recycling or sold to a scrap metal yard, and the ducts will be disposed of at an approved landfill.
- The **inverters, transformers, battery and switchgear cabinets / housing** will all be removed from the sites using a crane and HGVs for transportation. They can then be broken down off-site, and any reusable parts salvaged for second hand or scrap metal sale, with the remainder disposed of at an approved landfill. The concrete bases for the cabinets / housing will be broken up and removed, this will either be on-sold to aggregate suppliers or disposed of at an approved landfill. The area where concrete has been removed will then be backfilled with good quality soil.
- The **fencing and CCTV equipment** will be removed from the sites and sold on as second hand for reuse or recycled appropriately. Any holes left by the fence posts and poles will be backfilled with soil.

Following removal of all solar installation infrastructures from the sites and backfilling with soil any areas that may require it. Areas of disturbed ground will be prepared, harrowed and seeded with grass (if applicable). The swales will either be in-filled by new topsoil that will be brought to the sites or retained in place if it is considered it will provide on-going benefit to the land.

There will be no elements of the solar installation left on the sites either above or below ground – all infrastructures will be removed for recycling, reuse, or disposal at an approved landfill

When it has been agreed to decommission the project and shut down the power plant permanently, a comprehensive abandonment, decommissioning and closure plan should be developed, taking into account the most cost-effective and practicable methods, legal



requirements and industry practices at that time. This plan should be at least a year prior to scheduled abandonment and decommissioning.

### 3.4. Project Justification and Need

The favourable geographical and climatic conditions of Uzbekistan make it possible to actively use the energy of the Sun to produce electrical and thermal energy on an industrial scale. This is not only a promising source of renewable energy from a practical application point of view, but also very convenient and easy to use. Now the gross potential of solar energy of the Republic can be estimated at 50973 million tons of oil equivalent, and this is 99.7% of the total gross potential of all renewable energy sources studied in Uzbekistan today, technical potential is 176.8 million tons of oil equivalent. (98.6% of the total technical potential of renewable energy sources).

In absolute value, the annual energy of solar radiation entering the territory of the country exceeds the energy potential of proven reserves of carbon raw materials throughout Uzbekistan. To date, only 0.6 mln. solar power is used.

The proposed Project will bring about a number of benefits, as follows:

- Increase the availability and capacity for electricity generated in country.
- Reduce the carbon intensity of the grid electricity
- Help Uzbekistan achieve its renewable energy targets
- More reliable power supply and reducing electrical supply constraints for further economic developments in the wider Project region.
- Provide job and training opportunities for local communities.
- Improve the capacity, knowledge, experience and resources thereby facilitating and encouraging future renewable energy projects.

#### 3.4.1. Project Alternatives

#### 3.4.2. No-Project Alternative or Do Nothing

Under the ‘Do nothing’ option, the proposed 100 MW solar PV would not be built, therefore no capital investment costs would incur, and any negative environmental and social impacts associated with the construction and operation of the project would be avoided; however the benefits of the Project as outlined above would not be realised.

In a wider context, the ‘Do nothing’ option would not contribute to a reduction in the carbon intensity of the electricity supply in Uzbekistan and potentially discourage the development of other renewable energy projects in the region and country.

#### 3.4.3. Alternative Location and Design

Comparative analysis of anticipated impacts in term of air pollution was conducted under national Feasibility Study. According to data provided in national Environmental Assessment (December 2019) production of 100 MW on Thermo Power Plant (TPP) the following amount of pollutants will be discharged into atmosphere:

**Table 11 TPPs with a capacity of 100 MW.**

Indicator	PV Station	Fuel-burning TPPs
-----------	------------	-------------------

		Gas	Coal	Fuel oil
Fuel consumption	-	117,967 mln.M <sup>3</sup>	110,948 thousand.tons	343,938 thousand.tons
Emissions of harmful substances, t / year, incl.	-	767,75161	22375,0514	4958,7663
Nitrogen dioxide	-	384,545075	322,525212	307,281097
Nitrogen oxide	-	62,4885746	52,4103469	49,9331783
Sulphur dioxide	-	0,88711184	12381,7680	4131,7035
Carbon monoxide	-	319,830849	2025,27874	415,716077
Fuel oil ash	-	-	-	37,5280
Vanadium Pentaoxide	-	-	-	16,6045
Coal ash	-	-	7593,0691	-
Greenhouse gas emissions (CO <sub>2</sub> ), t / year	-	223865,98	499054	341165

It is clear that a large scale sola PV project represents numerous environmental benefits compared to the above conventional thermal power plants, such as reduced pollution levels and zero carbon emissions.

The location of the Project was selected due to the high level of irradiation the area receives, capacity and proximity to grid connection, no physical resettlement is required, limited land use, acceptable impact on biodiversity, and accessibility of the site. There would be no environmental and social benefits in moving the location of the project site within this area, as there are no significantly less sensitive plots in terms of biodiversity and land use in the area, and any alternative locations could in fact increase the risk of physical resettlement of people.

## 4. Baseline Studies

### 4.2. Introduction

This section presents the baseline of the project area under the following headings:

- Physical Environment
  - Climatic conditions
  - Air quality
  - Geology
  - Soils
  - Water Resources
  - Topography and Landscape
  - Geology
- Biological Environment
  - Protected Areas & Habitats
  - Fauna
  - Flora
- Social Environment
  - Administrative Structure
  - Ethnicity & Language
  - Religion
  - Economy and Livelihoods
  - Land Use & Ownership
  - Cultural Heritage.

Baseline data has been collected based on desktop research of available data. Secondary data was collected from various government agencies. Climatic data from Navoi meteo station (the closest to the site) on temperature, wind and extremal weather conditions was obtained from the Centre of Hydrometeorological Service at Cabinet of Ministers of the Republic of Uzbekistan (Uzhydromet).

Data on geological conditions of the project area was provided by Uzgashkliti – State Institute of Engineering Survey on Constructions, Geoinformatics and Urban Planning Cadastre.

Data on Fauna and Flora was provided by Individuals Experts from additional surveys - Roman Kashkarov Ph.D (fauna) and Abdusalom Normatov, Ph.D. (flora).

Presence of Cultural heritages was reviewed jointly by Ministry of Culture and discussed during the meeting with stakeholders in Nurabad district khokimiyat and population of Tutly settlement.

### 4.3. Physical Environment

#### 4.3.1. Climatic conditions

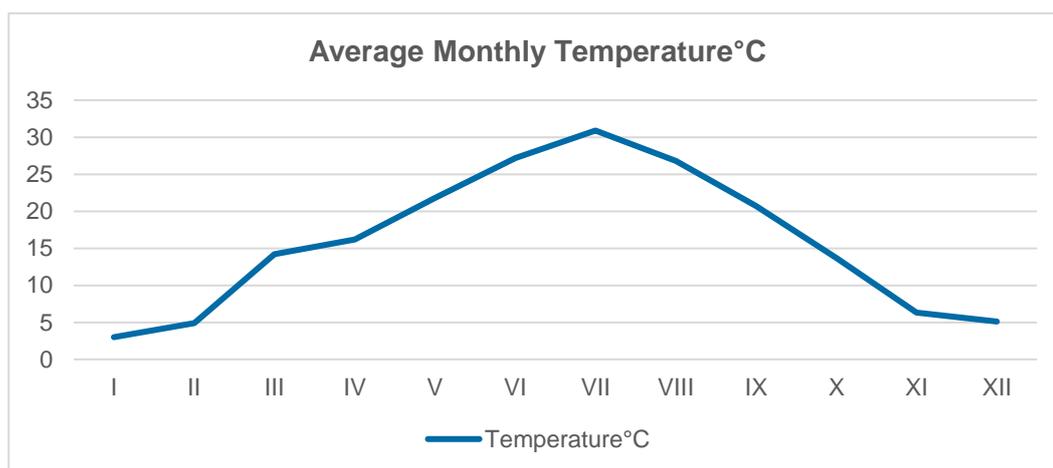
The Nurabad district is located in western part of Samarqand province close to Navoi province. The climate of the Nurabad district is sharply continental, characterized by significant fluctuations in daily and seasonal temperatures, which is determined by its relief and features of atmospheric circulation. The average maximum temperature in July is + 30.9 °C, the average minimum temperature in January is 3.0 °C.

The absolute maximum air temperature in July reaches + 43.5 °C, the absolute minimum air temperature noted in January is minus - 13.0 °C<sup>6</sup>. The annual number of days with an average daily temperature ( $t \leq 0$  °C) is 0. Normative depth of seasonal freezing of soils, possible once in 10 years – 26 cm, once in 50 years – 33 cm<sup>7</sup>.

There is an uneven distribution of precipitation throughout the year. The greatest amount of precipitation, up to 90%, is in the winter - spring period. The summer period is characterized by aridity. Precipitation falls in the form of rain and snow, with snow cover unstable. Sometimes precipitation falls as hail.

One of the most important climatic factors is wind. In the study area during the cold period (January), the winds of the east, north-east, south and south-west directions prevail with wind speeds of 3.5-4.0 m/s, with an average monthly speed in January of 3.9 m/s; maximum wind speed is 30 m/s. In the warm period (July) winds of east and northeast directions prevail with wind speeds of 3.7-5.1 m/s and average monthly speed in July of 3.8 m/s. The number of days when dust storm and drifting dust occurs – 4 days in June and 4 days in October.

Figures 10-13 and table 12 below show the main climatic indicators characterizing the climate of the study area. Below is presented information on temperature, wind and participation observed during 2018 at the Navoi Meteo Station (Appendix 1. Uzhydromet and UzGashkliti)<sup>8</sup>.

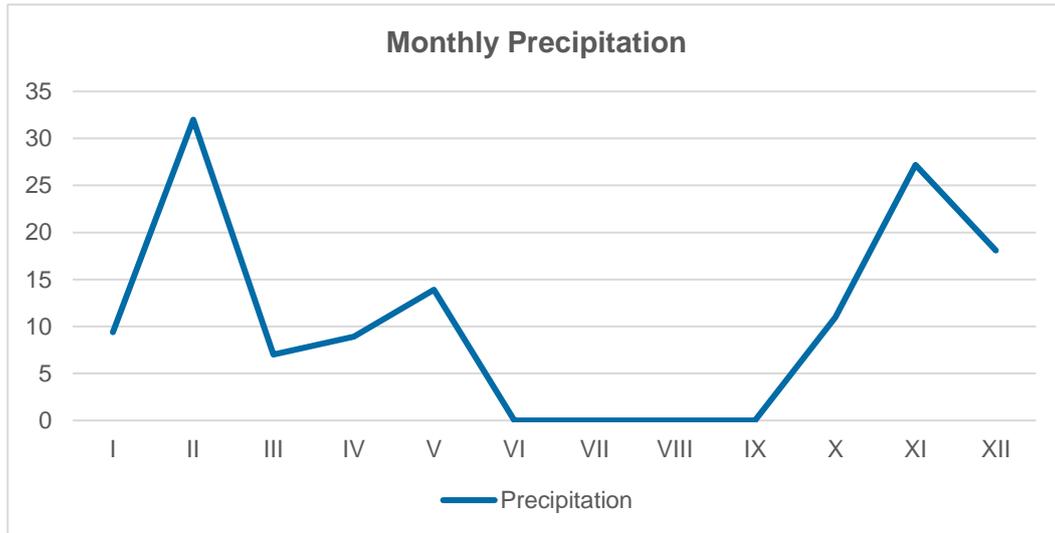


**Figure 10 Average Monthly Temperature (°C)**

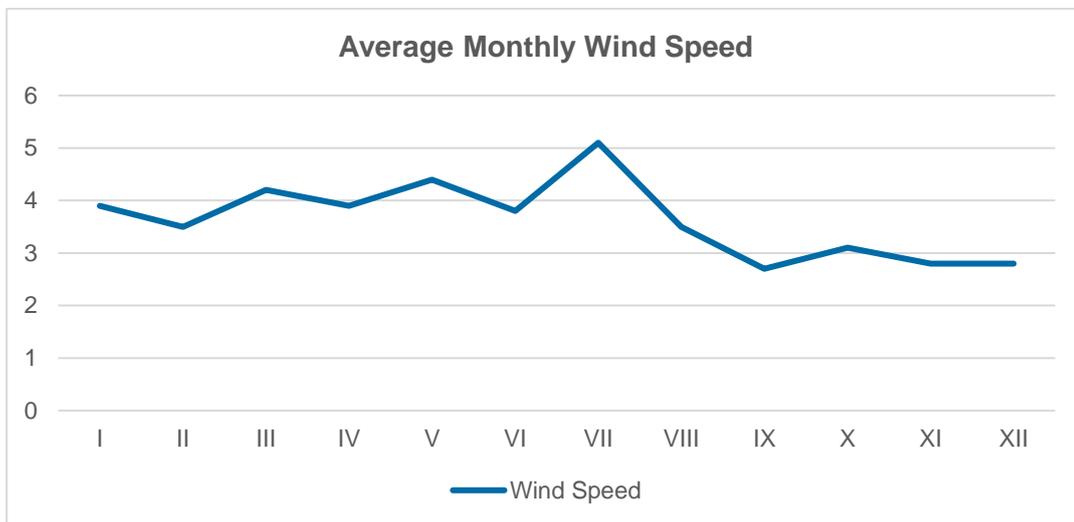
<sup>6</sup> Data provided by Uzhydromet, 2019

<sup>7</sup> Data provided by Uzgashkliti – Geotechnical Survey Result Report, Samarkand Tutly, 2019

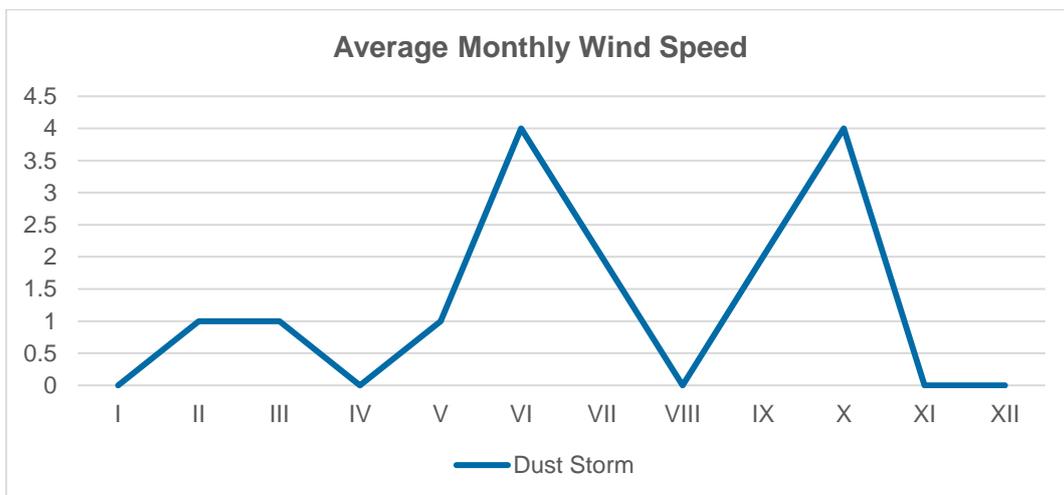
<sup>8</sup> Data provided by Uzhydromet, 2019



**Figure 11 Precipitation (mm)**



**Figure 12 Average Wind Speed (m/s)**



**Figure 13 The number of days with a dust storm (days)**

**Table 12 Soil temperature and depth of soil freezing**

Republic, region, point	Average temperature, °C								Maximum depth (cm) of soil freezing, possible once in	
	In January				In July					
	Ground surface	At depth of			Grou nd surfa ce	At depth of			10 years	50 year s
		20c m	80c m	160c m		20 cm	80 cm	160 cm		
Samarkand city	-0.7	2.0	5.2	9.5	33.7	29.9	26.3	21.5	26	33

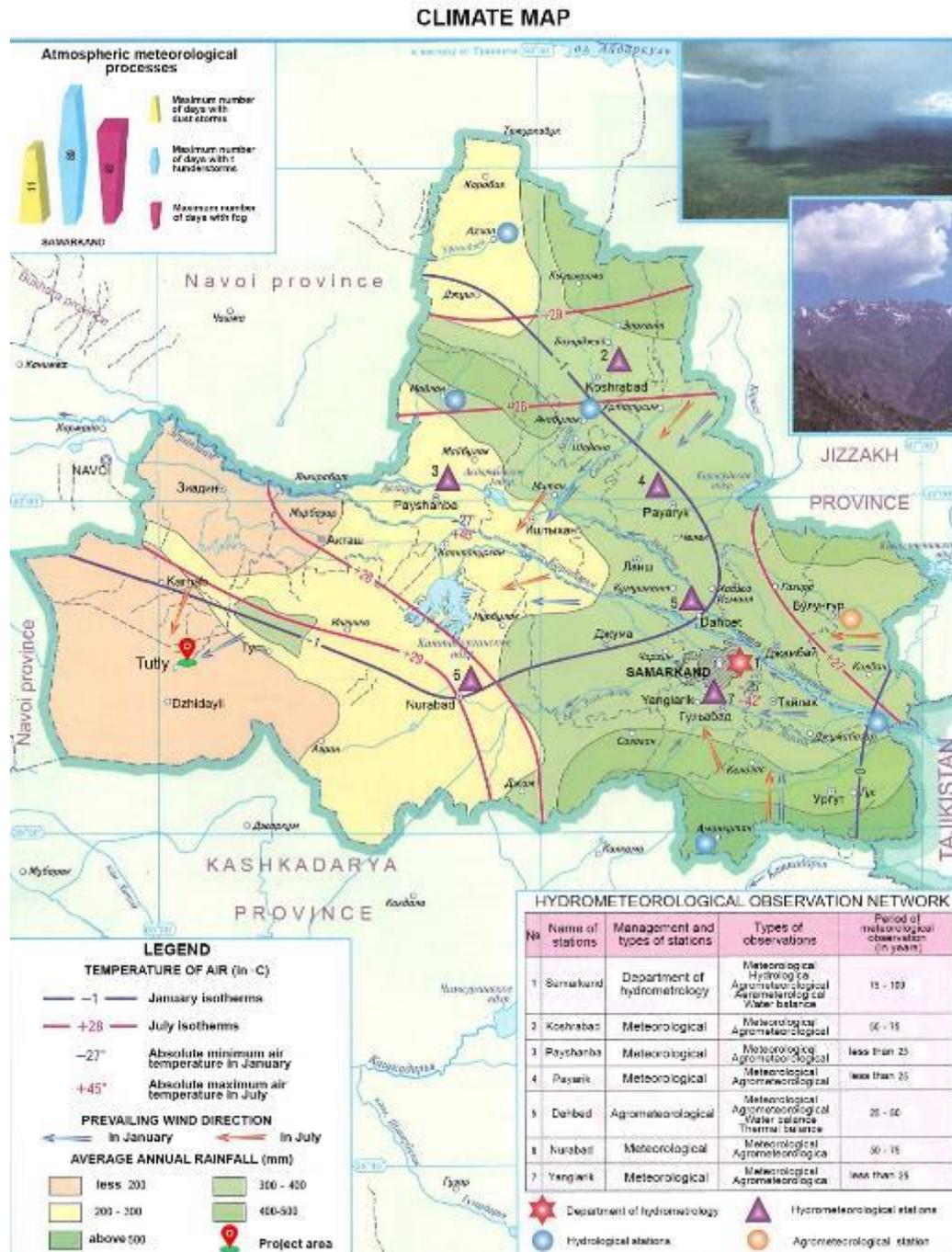


Figure 14 Climate Map<sup>9</sup>

### 4.3.2. Air Quality

Air quality in Nurabad District, Samarkand Province is monitored at two meteorological stations located in Navoi city (Navoi Province) and Kattakurgan City (Samarkand Province). The

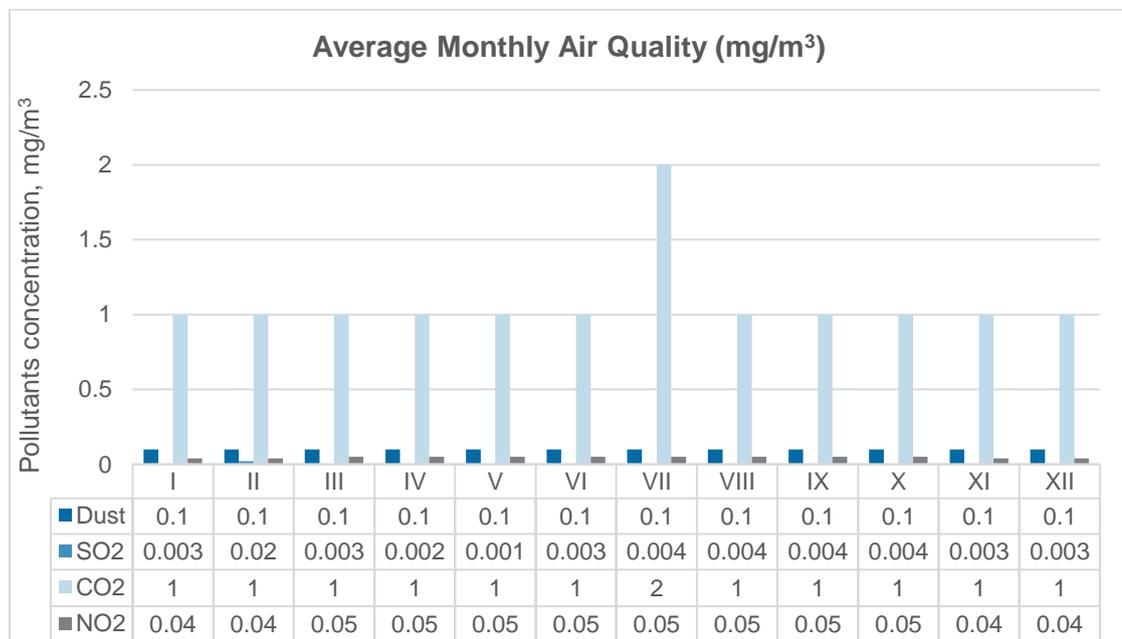
<sup>9</sup> Atlas, Published by Yergoedezkadastr, 2016

nearest meteorological station to Tutly settlement is located in Navoi city (53 km) (Figure 15). In this regard all climatic data are provided from the Navoi meteorological station. The station conducts continuous monitoring of the following parameters: dust, SO<sub>2</sub>, CO<sub>2</sub> and NO<sub>2</sub>. The results of monitoring for 2018 are presented in Figure 16. As shown in the table, NO<sub>2</sub> concentration exceeded local standard of 0.02 mg/m<sup>3</sup> in June (0.06 mg/m<sup>3</sup> actual compared to the standard of 0.02 mg/m<sup>3</sup>). The main source of this pollution is considered to be mainly due to the



chemical plants located in Navoi city. There were no exceedances for the other pollutants monitored.

**Figure 15 Navoi meteorological station**



**Figure 16 Air Quality (mg/m<sup>3</sup>)<sup>10</sup>**

<sup>10</sup> Data provided by Uzhydromet



Soil samples were taken from the project area as part of hydrogeological study (Figure 18). The chemical analysis was conducted by the SIESCGUPC.

According to the content of readily and medium soluble salts, the EGE-1 soil is characterized as highly saline, the gypsum content in the soil is from 8.39 to 39.34%. Sparry gypsum, found in the form of nests and inclusions in the mass of soil. The element soils are not recommended to be used as the foundation of buildings and structures because of the possibility of developing chemical suffusion when soaking Table 13 (Appendix 1. UzGashkliti).

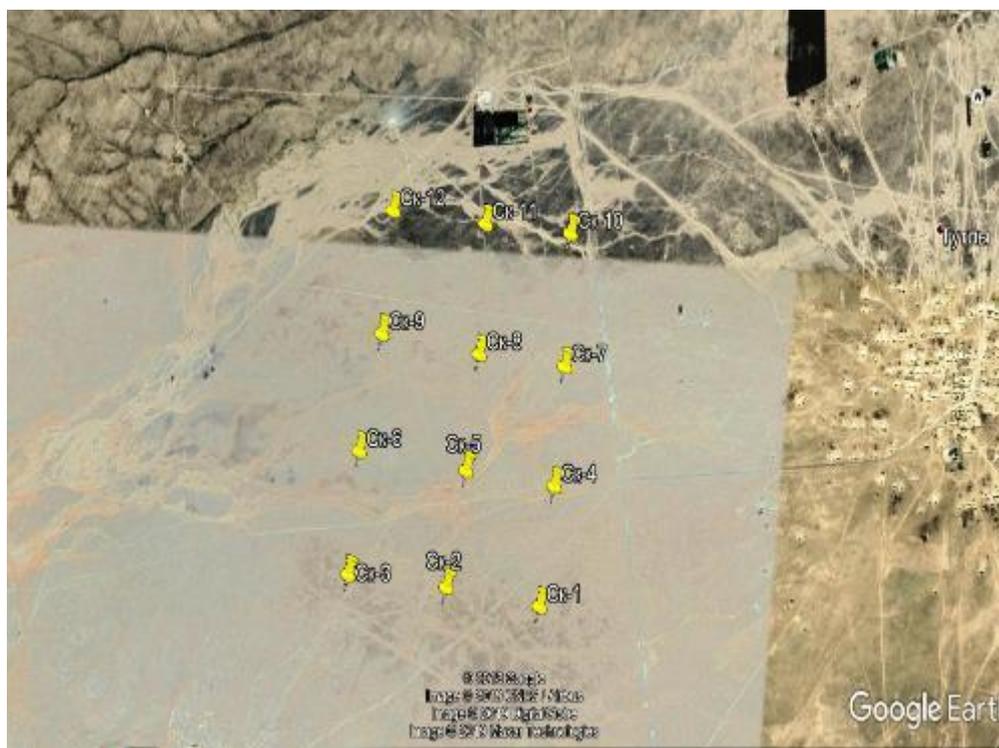


Figure 18 Location of soil sample points

Table 13 Results of soil sample in the Project area

#	Working No.	Sampling depth,m	Dry residue, mg/kg	Ions content, mg/kg						pH	CaSO <sub>4</sub> x 2H <sub>2</sub> O (gypsum, %)	Soil salinity level by GOST 25100-2011	
				HCO <sub>3</sub> <sup>-</sup>	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Na <sup>+</sup> +K <sup>+</sup>			readily soluble salts	medium soluble salts
1	C-1	0,7	13730	230	550	8450	3050	240	540	7,4	26,57	Medium saline	Highly saline
2	C-1	2,5	7360	190	210	4460	1240	140	660	7,4	11,12	Slightly saline	Medium saline
3	C-3	2,0	14290	230	530	8630	2900	50	1140	7,3	8,39	Medium saline	Slightly saline
4	C-4	1,5	6570	220	370	3780	940	250	580	7,4	11,52	Slightly saline	Medium saline

#	Working No.	Sampling depth, m	Dry residue, mg/kg	Ions content, mg/kg						pH	CaSO <sub>4</sub> x 2H <sub>2</sub> O (gypsum, %)	Soil salinity level by GOST 25100-2011	
				HCO <sub>3</sub> <sup>-</sup>	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Na <sup>+</sup> +K <sup>+</sup>			readily soluble salts	medium soluble salts
5	C-5	1,0	10730	230	70	6870	2600	120	210	7,4	18,63	Medium saline	Medium saline
6	C-7	2,8	14350	170	550	8780	2850	150	1070	7,2	39,34	Medium saline	Excessively saline
7	C-8	1,0	11510	320	440	7720	2190	120	230	7,6	20,39	Medium saline	Highly saline
8	C-10	2,0	8690	230	410	5040	1320	200	870	7,3	11,90	Slightly saline	Medium saline
9	C-11	1,0	13620	180	250	8640	3100	210	410	7,1	31,04	Medium saline	Excessively saline

#### 4.3.4. Water Resources

##### 4.3.4.1. Surface Water Resources

The main water course in Samarqand province is Zarafshan river. The Zarafshan River originates near the node of the site of the Turkestan and Gissar ranges at an altitude of about 2,750 m above the sea level of the Zarafshan Glacier. The river stretches from east to west and extends for 750 km. The upper course of the river passes among the mountain ranges; it emerges from the gorges and carries water along a wide multi-channel floodplain. In the middle reaches of the Zarafshan River, it divides into the Akdarya and Karadarya rivers, which again merge, forming the channel of the Zarafshan River.

Within the territory of Uzbekistan, the river has no tributaries. The lower course of the river is lost in the sands in the middle and lower reaches, including in the Samarqand region, the waters of the river are intensively disassembled for irrigation by a network of irrigation canals. The flow of the river within the Zarafshan depression is regulated and greatly changed. More than 60 main canals emanate from large canals such as the Dargom, Bulungur, Narpay, Eski-Angar, Big right-bank, Shakhrud and others. The Siab, Obi-Mashat, Siabcha canals pass through the city of Samarqand.

The chemical composition in the river is under the influence of pollution from industrial facilities discharging wastewaters and sewage in the populated areas, including the city of Samarqand and drainage (returned) water from irrigated fields. In addition, it should be noted the high level of contamination of Zarafshan along the sleeve of the Karadarya and the Siab collector with nitrites (correspondingly registered maximum concentrations of 0.241 mg/l and 0.586 mg/l at annual average values of 0.167 mg/l), as well as copper compounds (1.3 mkg/l) due to discharge of sewage from sewage treatment plants and unorganized city drains. Figure 19 shows the water resources in the area.

### IRRIGATION AND MELIORATION

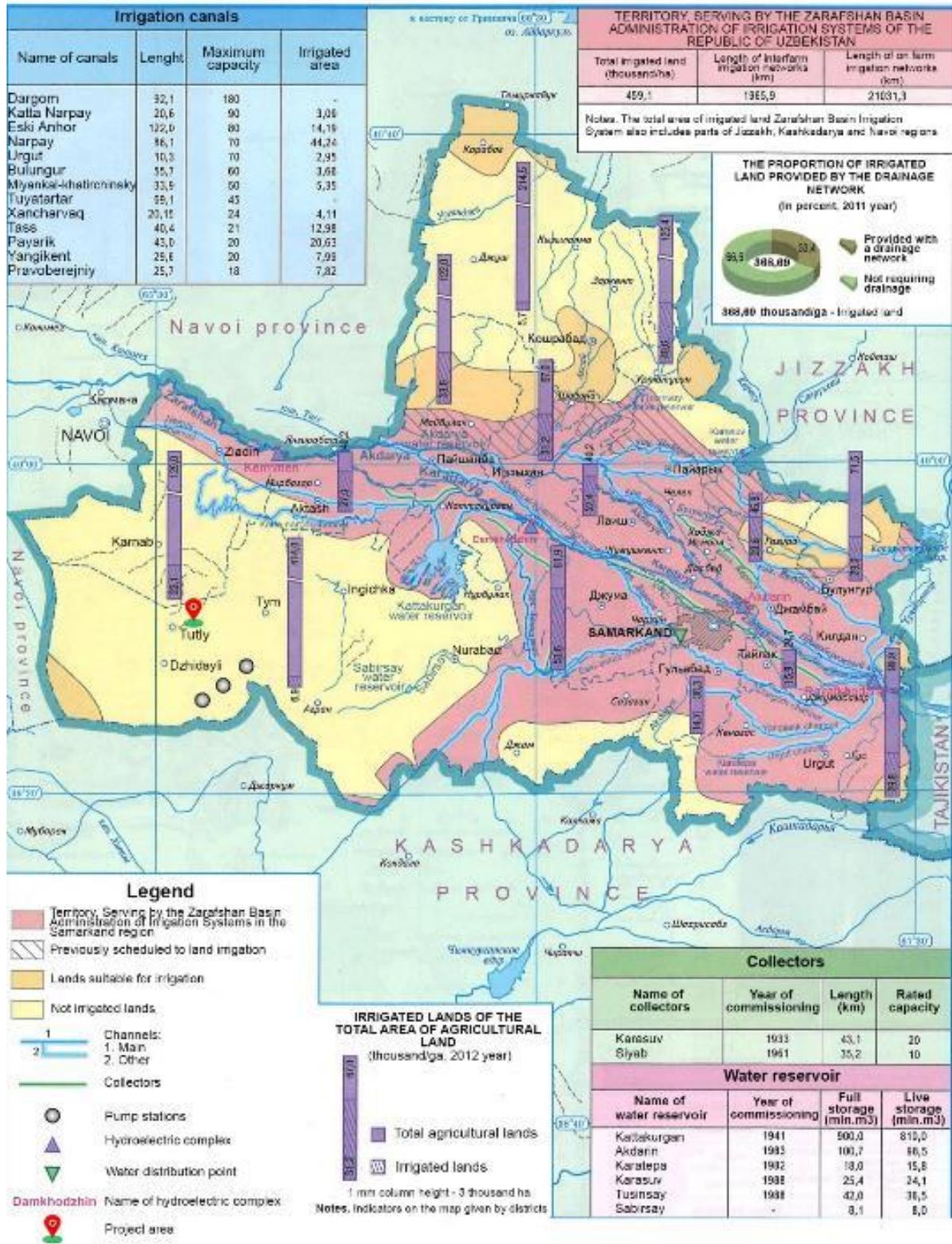
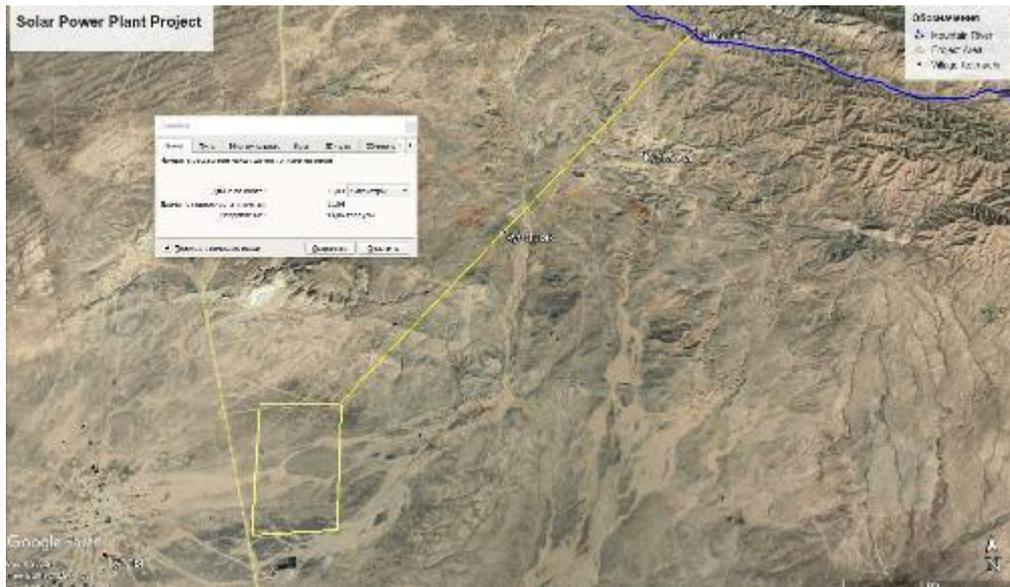


Figure 19 Water resources map (irrigation and melioration)

The closest point of the river to the project area is located 11 km from the plant (Figure 20).



**Figure 20 The closest river to the project site**

### Lakes

There are two water reservoirs near the project area. One is located on territory of the Navoi Province, namely Tudakul and second is located in Samarkand Province namely Kattakurgan; both are used for irrigation purposes. Tudakul water reservoir was built in 1970 and has a capacity of 1,200 mln.m<sup>3</sup> and the distance from the Tudakul water reservoir to the project area is 49 km. Kattakurgan was built in 1954 and has a capacity of 900 mln.m<sup>3</sup> and the distance from the Kattakurgan water reservoir to the project area is 56 km. Figure 21 shows the location of both lakes in relation to the project.



**Figure 21 Location of Lakes**



#### 4.3.4.2. Ground Water Resources

The Project is located on the territory of the Zeravshan hydrogeological basin. This area is characterized by various sometimes very complex hydrogeological conditions. The basin is characterized by the distribution of fresh groundwater of the Quaternary and Paleozoic sediments, brackish waters in sediments of Neogene, Paleogene and Cretaceous.

The aquifer complex has diverse lithological composition. In areas adjacent to mountain ranges coarse clastic material predominates in the section. The conditions for atmospheric precipitation infiltration and groundwater flow are more favourable here than in the peripheral part of the foothill plain, composed mainly of loamy deposits. Therefore, in areas adjacent to the foot of the mountains, the depth of groundwater reaches 70-90 m. With the distance from the foothills, due to lowering the relief, changing the lithological composition, the conditions which complicate the underground flow and cause a decrease in the depth of pressure water to 10-15 m are formed.

Underground water is fresh with a solid residue up to 1 g/l. Hydrocarbonate calcium-magnesium, calcium-sodium and calcium-sodium-magnesium are distinguished here by the nature of mineralization. The specific discharge of wells varies from 0.2 to 1-15 l / s.

The groundwater resources are recharged by precipitation and underground runoff from the mountains and soaking from other aquifers. The aquiferous complex of **Neogene** sediments is represented mainly by sandstones or clays with interlayers of gravelites. Groundwater levels are established at depths of 40 m. Aquifers have relatively good permeability. The specific discharge of wells varies from 0.1 to 1.5 l/s. Fresh or slightly mineralized water with a solid residue of 0.2 to 3 g/l. By the nature of the mineralization of water are characterized as sodium bicarbonate and sodium sulphate.

The aquifer complex of **the Oligocene-Miocene** sediments on the territory of the Ulus settlement is opened at depths of 20 to 250 m. Water-bearing rocks are sandstones, gravelites and limestones. Groundwater level is set at depths of 20-30 m. The specific discharges of wells vary from 0.3 to 1.5 l / s. The waters are brackish, with solid residue up to 2-2.5 g / l. The type of mineralization is sodium bicarbonate-sulphate.

The aquiferous complex of the Upper Cretaceous sediments was discovered by a large number of wells at a depth of up to 300 m. Water-bearing rocks are sandstones and conglomerates. Groundwater is brackish, with a dense residue of up to 1.5 g / l. According to the type of water, sodium chloride-sulphate. The specific flow rates of wells vary from 0.3-0.5 l / s to 1.5 l / s. Their source of supply are Paleozoic fractured waters entering the loose layers, chalk on the areas of direct contact of these rocks.

#### 4.3.5. Topography and Landscape

Samarqand province is located in the central part of Uzbekistan, in the Zarafshan valley. It borders with Djizzak province in the northeast, Tajikistan in the east, Kashkadarya province in the south, and Navoi province in the west and northwest. It covers an area of 16,400 km<sup>2</sup>.

The total project area of 350 hectares is located in Nurabad district of Samarkand region, 1.7 km to the west of Tutly village, 15 km to the south of Karnab village.

Physically and geographically, the project site is located on a vast desert plain, which bears the geographical name "Karshi Steppe", the eastern portion of which has a separate name "Karnabchul Steppe" and is a foothill plain of Zirabulak and Ziadin mountains gently dipping to



the north. The territory is poorly dissected by shallow beds of temporary watercourses and sparsely covered with shrubs. Altitude across the ranges from 200 to 400 m above sea level.

According to the type of terrain and habitats, the territory is a clay and saline desert with elements of sandy loam soils, background subshrubs of wormwood and sparsely covered with shrubs - saltwort and kandym.



**Figure 22 Typical Landscape and Topography**

#### **4.3.6. Geology**

##### **4.3.6.1. Geological and lithological structure and hydrogeological conditions**

The whole complex of engineering and geological surveys was carried out in accordance with the requirements of GOST11, KMK and ShNK, which comply with the applicable rules and regulations of the Republic of Uzbekistan, taking into account the requirements of the Client.

The purpose of the engineering geological survey was:

- assessment of soil conditions and physical and mechanical properties of soils at the base of the designed structure with the determination of normative and design values of the characteristics;
- determination of groundwater table position;
- determination of aggressive impact of soils to concrete, reinforced concrete and metal structures;
- clarification of the seismicity of the construction site;
- evaluation of the construction category of soil on the difficulty of excavation by mechanisms.

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<sup>11</sup> GOST - State standards, KMK – Construction norms and rules, ShNK – urban construction norms and rules



Field engineering and geological surveys are performed by geological engineers of the Central Manufacture of “O’ZGASHKLITI” DUK<sup>12</sup>. Laboratory studies of soil carried out in the soil science chemical laboratory of the Central Manufacture of “O’ZGASHKLITI” DUK.

The processing of field materials, laboratory studies of soils and the compilation of the report were carried out by specialists of SEG and FER department of the Central Manufacture of “O’ZGASHKLITI” DUK under the leadership of the chief specialist of the department Trophimova V.V.

According to the results of geological survey, in the geological structure of the site of the construction site was examined up to depth of 20.0 m. The area is consist of the formation of Cenozoic erathemes, represented by quaternary sediments (Figure 23)<sup>13</sup>.

Quaternary deluvial-proluvial (d-p QIV) sediments are represented by sandy loam in which are contained the subordinate number of lenses and interlayers of landwaste soils with a thickness from 0.9 to 3.2 m. The exposed thickness of the quaternary sediments is 20.0 m. In the roof of the Quaternary deposits is developed soil-vegetative layer with a capacity of 0.3 m.

Groundwater within the site to the survey depth of 20.0 m is not opened. Modern physical and geological processes and phenomena in the area of the project were not observed. The detail information is presented in the Report on Engineering Geological Surveys<sup>14</sup>.

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<sup>12</sup> [www.uzgashkliti.uz](http://www.uzgashkliti.uz) State Institute of Engineering Survey on Constructions, Geoinformatics and Urban Planning Cadastre

<sup>13</sup> Atlas, Published by Yergoedezkadastr, 2016

<sup>14</sup> Report on Engineering Geological Surveys at the Construction Site of Solar Power Plant in Samarkand Region, Tashkent 2019. State Institute of Engineering Survey on Constructions, Geoinformatics and Urban Planning Cadastre



Figure 23 Geological Map<sup>15</sup>

<sup>15</sup> Atlas, Published by Yergoedezkadastr, 2016

#### **4.3.6.2. Seismic Activity**

The seismic activity of the project area was evaluated in accordance with Appendix 1 and 2 of national standards for construction KMK 2.01.03-96. Taking into account the Alteration No. 1, the seismicity of the area is 7-8 points with the earthquake frequency once every 100 years (Karnab).

In accordance with Table 1.1 of KMK 2.01.03-96 in the upper 10-meter thicker, counting from the bottom of the foundations, soils of the third category are found by seismic properties – sandy loams with porosity ratio  $e > 0.8$ , with interlayers and lenses of loams and landwaste soils, which have a total thickness of less than 5 m). Taking this into account, the seismicity of the project site is 8 points on Richter Magnitude Scale. Figure 24<sup>16</sup>.

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<sup>16</sup> Atlas, Published by Yergoedezkadastr, 2016

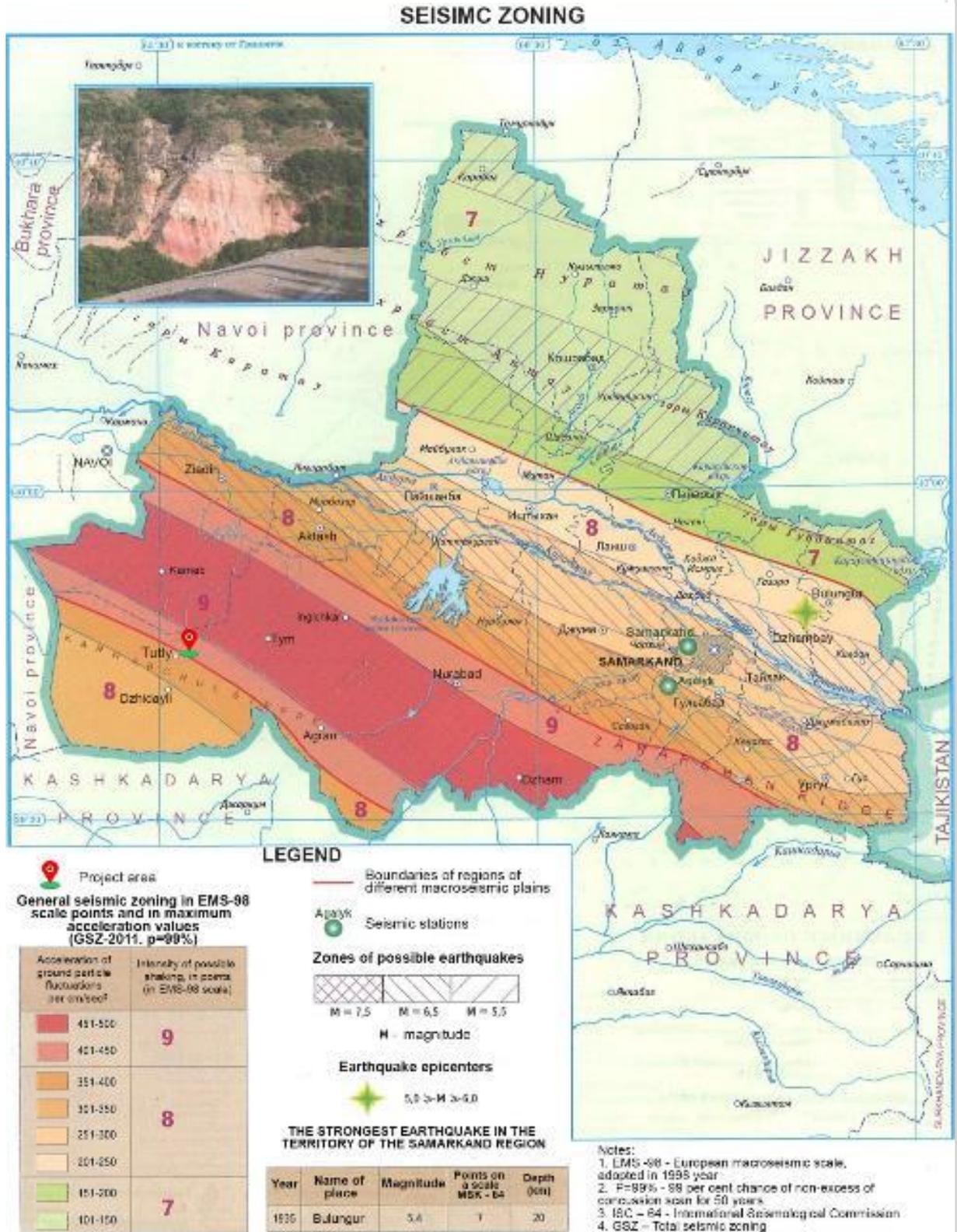


Figure 24 Seismic Map

## 4.4. Biological Environment

### 4.3.1 Protected Areas & Habitats

The project area is located inside an IBA (Important Bird and Biodiversity Area). IBA is a not official protection figure created by the BirdLife International, a non-profit organization devoted to bird conservation. However, IBAs are considered as areas that should be protected by many countries and international institutions as an important tool for wildlife conservation and sustainable development.

Representative wildlife of the area is dominated by larks, sandgrouses, bee-eaters, raptors and houbaras in the group of the birds. The area is occupied by a threatened species called MacQueen's bustard (*Chlamydotis macqueenii*), present as a migrant or dispersed bird from the vicinity breeding population area located west of Tutly (Bukhara area).

Other groups of animals present in the zone are foxes, hares and ground squirrels (mammals) and steppe tortoises (*Testudo horsfieldii*) which are a threatened species.

The project area is included in one of the 52 existing IBAs of Uzbekistan, named Karnabchul Steppe (UZ018), with a total surface of 177,156 ha. The IBA location is represented in Figure 25



Figure 25 The project area is fully enclosed within the Karnabchul Steppe IBA

#### 4.3.1.1 General Habitat Type

The territory within Samarkand province of Uzbekistan includes a fairly wide variety of landscapes with characteristic types of ecosystems. The development of irrigation and drainage in the wider area has led to the formation of artificial water reservoirs and irrigation discharge lakes (IDL) in natural depressions in the landscape, which eventually acquired a



certain social and environmental status, provides well-known environmental (maintenance of biodiversity) and social services (irrigation, drinking water, recreation, hunting, fishing, etc.). These natural and man-made landscape complexes are home to various representatives of flora fauna, including endangered species listed in Red Book of Uzbekistan and the IUCN lists. The forest area in the Samarkand region constitutes 1.78%.

There are no artificial water reservoirs, irrigation and drainage networks within the project area due to lack of surface water. Furthermore, irrigation from ground water is not efficient in the area due to deep location of ground water (more than 100 meters) and high cost of pumping this water. Therefore it is considered that there are no significant ecosystem services within the Project site and there will be no impact on the wider ecosystem services in the area due to the development of the Project.

The Project site itself has been used for intense cattle grazing and has therefore been subject to high human disturbances due to cattle use and proximity to the village of Tutly; therefore, the site can be classified as '*Modified Habitat*' as defined by IFC PS6 and '*semi-natural habitat*' as defined under EIB Standard 3.

#### 4.3.1.2 Protected Areas and Important Habitats

As mentioned above, the project area is included in one of the 52 existing IBAs of Uzbekistan, named Karnabchul Steppe (UZ018), with a total surface of 177,156 ha; the location of the project site within the Karnabchul Steppe IBA location is represented in Figure 26.



**Figure 26. Plot location inside the Karnabchul Steppe IBA**

BirdLife provides an IBA Criteria based on quantitative ornithological data. The IBA criteria is defined as a measurable way to “ensure that the sites selected as IBA have true significance for the international conservation of bird populations, and provide a common currency that all IBAs adhere to, thus creating consistency among, and enabling comparability between, sites



at national, continental and global levels". The IBAs Criteria for Karnabchul Steppe (UZ018) are A1, A3 and A4 (2006) and their description is as follows<sup>17</sup>:

- A1: Presence of globally threatened species (IUCN categories Critically Endangered, Endangered or Vulnerable). If the species present is considered Vulnerable, BirdLife International considers that "the presence of more than threshold number at a site is necessary to trigger selection".
- A3: Biome-restricted species. The site is known or thought to hold a significant component of the group of species whose distributions are largely or wholly confined to one biome.
- A4. Congregations. The site is known or thought to hold congregations of  $\geq 1\%$  of the global population of one or more species on a regular or predictable basis.

As discussed above, only typical steppe species of wildlife are represented in the study area. Considering current land use (intense cattle grazing and high human disturbances due to cattle use and proximity to the village of Tutly), this area is not considered to hold high value for much of the typical bird species that occur in the IBA.

The protected area determined by the State Sanctuaries are considered as the actual areas that are important for the houbara breeding population and for the migrant and dispersed populations. Areas declared by a Government as protected areas are usually prioritized over the IBAs.

Tutly area is not included inside the State Sanctuaries (Figure 25 and 26), so it has a lower conservation value for Mach Queen's bustard than the area included inside the State Sanctuaries. Furthermore, the conditions found in Tutly are not the best for the species: breeding houbara population avoids human disturbances and land used intensively by livestock<sup>18</sup>.

Uzbekistan has two territories which indicated in Ramsar sites list<sup>19</sup>. Names of the sites i) Ayadar -Arnasay Lakes Systems 527,100 ha located in two provinces Jizzakh and Navoiy and ii) Lake Dengizkul 31,300 ha located in Bukhara province .

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<sup>17</sup> BirdLife International Important Bird Areas factsheet: Karnabchul Steppe. Available online:  
<http://datazone.birdlife.org/site/factsheet/karnabchul-steppe-iba-uzbekistan>

<sup>18</sup> Report of Evaluation of possible negative effects to Important Bird and Biodiversity Area (IBA) of Karnabchul Steppe. STA

<sup>19</sup> [https://rsis Ramsar.org/ris-search/?f\[0\]=regionCountry\\_en\\_ss%3AUzbekistan&pagetab=1](https://rsis Ramsar.org/ris-search/?f[0]=regionCountry_en_ss%3AUzbekistan&pagetab=1)



### 4.3.2 Fauna

This section lists the terrestrial vertebrates species occurring (or likely to occur) within the project area and the most important information on their population, distribution and threats. Special attention is paid to the keystone species listed in the national Red Book of Uzbekistan and IUCN (Appendix 1. Evaluation of possible negative effects).

#### **Amphibians and Reptiles**

1 amphibian specie and 15 reptile species occur in the project area. From the Red Book *Agrionemys horsfieldii* (Central Asia tortoise), *Varanus griseus* (Desert Monitor), *Eryx tataricus* (Tatary sand boa), *Naja oxiana* (Central Asian cobra).

The most common reptile species of the project site is the Central Asian tortoise, a vulnerable specie listed in the national and international Red Books (VU). Its population ranges from 3.4 to 16 individuals per 1 ha. Accordingly, from 2 to 10 thousand tortoises can live at the proposed construction site of 350 hectares.

Common widespread species of the project area are 3 species of lizards. Short-term researches of the project site in August 2019 showed that the population of the Rapid Lizard is 5 individuals per 3 km of the route, or about 0.9 individuals per 1 ha. There are 3 Steppe Agamas registered on the same route.

#### **Birds**

The project area is located between Zirabulak and Ziyadin mountains, vast Shorcai saline, Karais upland and Tudakul reservoir. These heterogeneous landscapes determine a sufficiently high species diversity of birds, especially during migration periods. Analysis of multi-year data showed that 106 species of birds can be observed in the project area in different seasons.

For extra-arid flat landscape of the project area and its vicinity certain composition of the ornithofauna is typical. Only 15 out of 106 species of birds are found here throughout the year. They are Western Marsh Harrier and Long-legged Buzzard related to the site nutritionally – they eat small rodents and reptiles. Rock Pigeon, Eurasian Collared-dove and Laughing Dove, Common Myna, Common Magpie, Eurasian Jackdaw, Rook and Eurasian Tree Sparrow nest in the surrounding villages. Black-bellied Sandgrouse, Calandra Lark and Crested Lark, Pied Wheatear and Isabelline Wheatear are ground-nesting inhabitants of the desert landscapes. These are widespread and numerous species, so the loss of 350 hectares of clay desert will not have a negative impact on their populations. Moreover, numerous Crows, Common Starling, Eurasian Jackdaw and Rook can have a negative impact on the condition of the PV modules.

13 species of birds from the above list are rare and listed in the national and international Red Books, as follows: Lesser White-fronted Goose, Lesser Kestrel, Pallid Harrier, Northern Lapwing, Booted Eagle and European Turtle-dove are found here only during the period of spring and autumn migrations. Project activities at the site will not have a tangible impact on these species.

#### **Mammals**

The species composition of mammals in the project area includes 18 species, four of which are listed in the Red Book of Uzbekistan and 1 in the IUCN Red Book: *Vulpes corsac* (Corsac

Fox); *Mustela eversmanni* (Steppe of Asiatic Polecat), *Vormela peregusna* (Marbled Polecat), Caracal (Caracal), Central Asia Tortoise (*Agrionemys horsfieldii*)

As part of the project assessment, short-term studies of the in the vicinity of the village of Tutly were carried out in May and August 2019. As a result, the habitat of 4 species were confirmed directly in the project area, as follows: (i) Large *Citellus*, (ii) Severtzov's *Jerboa*, (iii) Great *Gerbil*, (iv) Libyan Jird (*Meriones libycus*)<sup>20</sup>. Figure 28 shows animals that were observed on the site.

**Figure 28 Animals on the site**



Central Asian Tortoise



Rapid Lizard



Sunwatcher toad-headed agama



Tatary sand boa

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<sup>20</sup> Vertebrate Animals Fauna Assessment of "Construction of 100 MW Solar Power Electric Generation Station" Project site – v. Tutly, Samarkand Province





Isabelline Wheatear



Egyptian Vulture

### 4.3.3 Flora

The largest portion of Samarkand Province area is occupied by mountain forests. The main forest-forming species of sand-desert zones are saxauls - (Haloxylon) black (*H. aphyllum*) and white (*H. persicum*). Also widespread are saltworts (*Salsola*) of two types - Richter saltwort (*S. Richteri*) and Paletzkin saltwort (*S. Paletzkiiana*), kandym (*Calligonum* sp.), and brushwood of tamarisk (*Tamarix* sp.)<sup>21</sup>.

Pastures in the project area and environs were greatly degraded as a result of overgrazing. The species composition of the vegetation is very poor with the plants that remain are those left or poorly eaten by livestock. All well-eaten plants have long been destroyed by cattle as a result of constant eating (plants do not have time to seed). This can explain the single encounters of well-eaten izengia (*Kochiaprostrata*) ordinary species in all steppes of Uzbekistan (Appendix 1. Assessment Report of Flora).

The project area is deserted with little rainfall, and hot dry summers and cold winters. Precipitation falls from mid-autumn to late spring. Groundwater is located deep (more than 30 m) and does not affect vegetation. The number of species of vegetation is poor and uniform in large areas. During the site visit conducted by the biodiversity specialist the following plant species were observed: hare barley (*Hordeumleporinum*), harmala (*Pedanumharmala*), cousin (*Cousinia Bungeana*), wormwood (*Artemisiaterra-alba*), and rare (*Kochiaprostrata*) is rare. In spring, ephemera growth includes: Mortuk (*Eremopyrumbonaepartis*), poppy (*Papaverpavonium*), sagan (*Girgensohnia oppositiflora*), cuyong-rong (*Halocharishispida*), goose onions (*Gageasp*). The whole nature of the vegetation shows that the territory is occupied by highly degraded pastures due to the grazing by livestock Figure 30.

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<sup>21</sup> Description of the Territory Vegetation, Planned for the Construction of the Solar Power Plant. 2019.





Figure 29 Vegetation Map



Sheep



Typical view of the vegetation in the project area



### Figure 30 Livestock on the site and typical view in the project area

No plants included in the international and national Red Book were not found during the field visits; furthermore the desk research of available literature also did not identify any Red Book species within the project area.

#### 4.3.4 Critical Habitat Assessment

##### Standards

##### IFC

IFC PS6 defines Critical Habitats as areas with high biodiversity value, including:

- habitat of significant importance to Critically Endangered and/or Endangered species;
- habitat of significant importance to endemic and/or restricted range species;
- habitat supporting globally significant concentrations of migratory species and/or congregatory species;
- highly threatened and/or unique ecosystems; and/or
- areas associated with key evolutionary processes.

##### EIB

More stringent requirements apply where projects are located in areas or ecosystems that are considered to represent “critical habitat”, including a presumption in favour of avoidance and a requirement to demonstrate positive outcomes (net gain) of biodiversity in cases where projects do take place.

For the purpose of this Standard, an area will be considered “critical” if it supports any of the following features, and is needed to sustain them in a viable state:

- Highly threatened or unique ecosystem;
- Population of critically endangered, endangered or vulnerable species, as defined by the IUCN Red List of threatened species and in relevant national legislation;
- Population, range or distribution of endemic or restricted-range species, or highly distinctive assemblages of species;
- Habitat required for the survival of migratory species and/or congregatory species;
- Biodiversity and/or ecosystem with significant social, economic, or cultural importance to local communities and indigenous groups;
- Habitat of key scientific value and/or associated with key evolutionary processes.

##### Habitat Type, Protection Status and Protected Species

The Project site is not located within a Nationally or Internationally protected area. The site is however within the Karnabchul Steppe (UZ018) IBA (Important Bird and Biodiversity Area), created by the BirdLife International, a non-profit organization devoted to bird conservation. Although an IBA is not afforded official protection status they are considered as areas that should be protected by many countries and international institutions as an important tool for wildlife conservation and sustainable development.

IFC PS6 defines Internationally Recognized Areas as “areas of recognized importance to biodiversity conservation but recognizes that they are not always legally protected. IFC Guidance Note 6 also addresses that internationally recognized areas of high biodiversity

value will often qualify as critical habitat; for instance, areas that meet the criteria of the IUCN's Protected Area Management Categories Ia, Ib and II, or the majority of Key Biodiversity Areas (KBAs), which encompass, among others, Important Bird and Biodiversity Areas (IBAs).

As discussed in the habitat baseline section, Karnabchul Steppe (UZ018) IBA has a total surface of 177,156 ha, and the project area, totalling 350 Ha, only represents a small fraction of this IBA. Furthermore, the habitat of the Project area has been identified as being heavily impacted by grazing and does not represent a unique habitat type in the wider context of the IBA.

There are no Critically Endangered or Endangered species in the project area and is therefore does not trigger Critical Habitat status under IFC definitions. However, the Central Asian Tortoise is defined as a Vulnerable Species under IUCN Red List, and therefore needs to be considered under EIB standards. It is noted that the Central Asian Tortoise is common across the whole region and therefore the habitat within the Project site does not represent a unique habitat important for the survival of this species in the area or globally.

Furthermore, the Desert Monitor was identified as being present in the wider Project area, and their presence within the area is linked to the Central Asian Tortoise as this is a food resource for the Desert Monitor.

Pastures in the project area and environs were greatly degraded as a result of overgrazing. The species composition of the vegetation is very poor with the plants that remain are those left or poorly eaten by livestock.

Small predators - the steppe polecat and marbled polecat - during land surveying will lose their feed base - rodents. However, the abundance of these two Red Book species is naturally low. At the project site no more than a few individuals live, which will move to neighbouring territories. Therefore, in general, building activity will not affect the state of the populations of these species.

Closely related to this territory are rodents. But none of the species living here is rare, for that reason the loss of 600 ha of habitats will not affect the state of their populations.

13 species of birds from the above list are rare and listed in the national and international Red Books. Lesser White-fronted Goose, Lesser Kestrel, Pallid Harrier, Northern Lapwing, Booted Eagle and European Turtle-dove are found here only during the period of spring and autumn migrations. Project activities at the site will not have a tangible impact on these species. Only IUCN Endangered bird species identified in the Project area is the Egyptian Vulture, but only very limited observations of their presence was made during the surveys and the site and during the surveys and the Project site area is not considered to be of specific importance for this species when considering its context in the wider environment.

The endemic plant and mammalian species detected in the biodiversity study area are Least Concern species as per IUCN Red List, widely distributed and were observed outside of the Project site. None of the terrestrial vertebrates and plants are restricted-range species. Also, these species are not expected to be affected by the Project Activities. Considering these facts, none of the endemic species identified at the Biodiversity Study Area triggers critical habitat as per Criterion 1 and 2 of PS6.

### **Conclusion**

The Project site is not considered to hold Critical Habitat status, although given the presence of large numbers of Central Asian Tortoise, an IUNCN Vulnerable species, measures should be identified to reduce the impact on these species during the construction phase of the Project and furthermore, opportunities that support and enhancement the population of this species should be sought. It can also be concluded that:

- There are no features within the Project site that are highly rare, unique, or irreplaceable;
- The project does not lead to measurable adverse impact on the biodiversity value of the IBA for which it was designated, and on the ecological processes supporting those biodiversity values;
- The project does not lead to a net reduction in the global and/or national/regional population of any Critically Endangered or Endangered species; and
- A robust, appropriately designed, and long-term biodiversity monitoring and evaluation program should be integrated into the client’s management program, which should seek to provide positive conservation outcomes (net gain) through appropriate compensation or offset measures for residual impacts to improve the ability of the Central Asian Tortoise to persist in a favourable condition.

## 4.4 Social aspects

### 4.4.1 Administrative Structure

This section describes the administrative structure in Uzbekistan.

Uzbekistan is divided into 12 provinces (viloyats), one autonomous republic Karakalpakstan and one independent city, Tashkent City, which is the capital. The provinces in turn are divided into districts, and Province level cities (subordinate to Province Hokimiyat), and districts that comprise of urban and rural mahallas (or avuls) – local self-governing organisations. Below outlines the administrative structure in Uzbekistan.

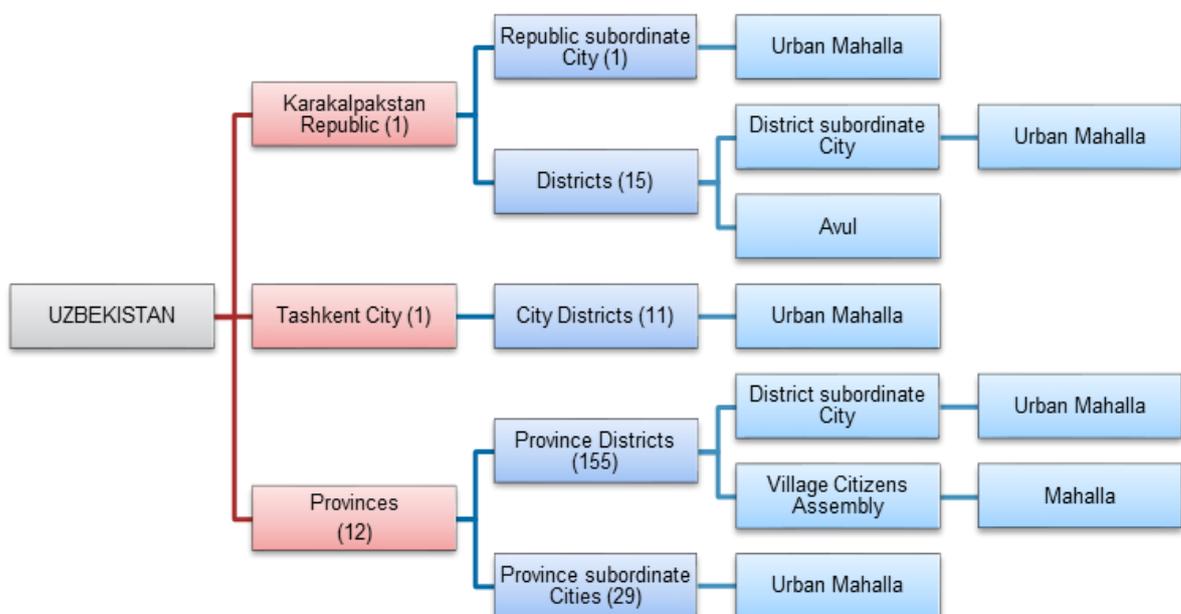


Figure 31 Governmental Administrative Structure of Uzbekistan

In total there are 170 districts and 30 province subordinate cities located in 14 regions of Uzbekistan, with 8,973 mahallas and avuls throughout the Republic. The following section describes the mandates and roles of the main administrative bodies.

#### **4.4.1.1 Regional Administration**

Each Province is headed by a Governor (Hokim) who represents the Government at the Province level. The Hokim is appointed (or dismissed) by the President of Uzbekistan and confirmed by the Counsel of Peoples' Deputies of the respective Province. The executive body at the regional level is the Province Hokimiyats comprising the Hokimiyat apparatus and ministry line departments. The Hokimiyat structure includes the Hokim and four deputies:

- Agriculture and Water Resources
- Construction, Communication and Communal Services
- Economy and Social Issues
- Women.

Usually the first deputy Khokim represents the main economic sector / activity of the Province.

#### **4.4.1.2 District Administration**

The district Hokimiyat is headed by a Hokim who reports to the Province Hokimiyat. The Hokimiyat has a leading role in the public administration of the country. Approval, support and participation of the district Hokimiyat is important for every development activity in the respective rayon. The district Hokimiyat is appointed and dismissed by the Province Hokim and confirmed formally by the appropriate Council of Peoples' Deputies. The apparatus structure of each district consists of district Hokim, 3 deputy Hokims (economic issues, spirituality and enlightenment and women's issues); the main specialists, organisational and control group and chancellery.

#### **4.4.1.3 City Administration**

The role of the city Hokimiyat is the public administration body in the country with a role similar to that of the district Hokimiyat, to which the city Hokimiyat is subordinated. The head of the city Hokimiyat is the Hokim who is the highest official on the territory. City Hokimiyats usually include several urban mahallas.

#### **4.4.1.4 Mahalla Committee**

The mahalla committee is the lowest level of local self-government and the one linked directly to households. The committee is made up of four members: the chairperson who is elected by the mahalla households for 2.5 years, the secretary who is selected by the chairperson, the 'posbon' who is responsible for security and is appointed by the district Department of the Interior, and the women's advisor who is nominated by the District Women's Committee. The mahalla committee is directly accountable to the district Hokimiyat. In urban-type settlements, the mahalla committee is supported by volunteers who have been selected by the local people jointly with the mahalla committee. In each mahalla committee, several sub-committees may be established to support the work of the mahalla committee, such as for youth, crime prevention, municipal / land improvement etc. In practice, committees are established based on the actual needs and priorities of the respective mahalla and usually deal with the resolution of family conflict, pension distribution, resolving women's issues, organising weddings, funerals and other social events.

#### **4.4.1.5 Street Elders**

The street elder / head is a respected person who lives on one of the streets in the neighbourhood. She/he organises the traditional events. These people know all the families on the territory and are able to provide valuable support for example in identifying households who could be in difficulty for the payment of utility bills. They can also play a useful role in organising meetings and disseminating information.

#### **4.4.1.6 Senior Women Counsellors / Female Assistants to Women's Advisor**

Senior women counsellors are selected by the households of the territory together with the mahalla committee from those local women who are the most respected, active and educated. They act as a link between the women of the neighbourhood and the mahalla committee / women's advisor. They focus on solving issues concerning women, children and vulnerable people, organising traditional events, supervision of children and participating in the distribution of social support. They are also involved in informing women about official notices and information.

#### **4.4.2 General information on the Samarkand Province**

Samarkand province is the largest province of Uzbekistan by population with 3,798,700 people<sup>22</sup> living in there. It is located in the centre of the country in the basin of Zarafshan River. It borders with Tajikistan, Navoiy province, Jizzakh and Qashqadaryo provinces. The Samarkand province was established on January 15, 1938. It covers an area of 16,773 km<sup>2</sup> (7th largest province in the country by area. The province is divided into 14 administrative districts: Akdarya, Bulungur, Jomboy, Ishtyhan, Kattakurgan, Koshrabad, Narpay, Nurabad, Pakhtachi, Urgut, Taylak, Payaryk, Pastdargom, and Samarkand districts (Figure 35). The capital is Samarqand (pop. est. 529,900 inhabitants). Other large towns of Samarkand province include Kattakurgan (pop. 88,000), Urgut (pop. 74,600) and Aktash (pop. 43,900). The population density is 226.5 per/km<sup>2</sup>. Average age of the population of Samarkand province is 27.8.

There are 1225 secondary schools, 160 secondary professional colleges, 11 academic lyceum and 8 universities in the province. Medical sector is presented by 79 hospitals and 428 state clinics. There are 4,084 km of roads, 282.9 km railway and international airport in Samarkand province.

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<sup>22</sup> Statistics Committee of Uzbekistan, data as of January 1, 2019

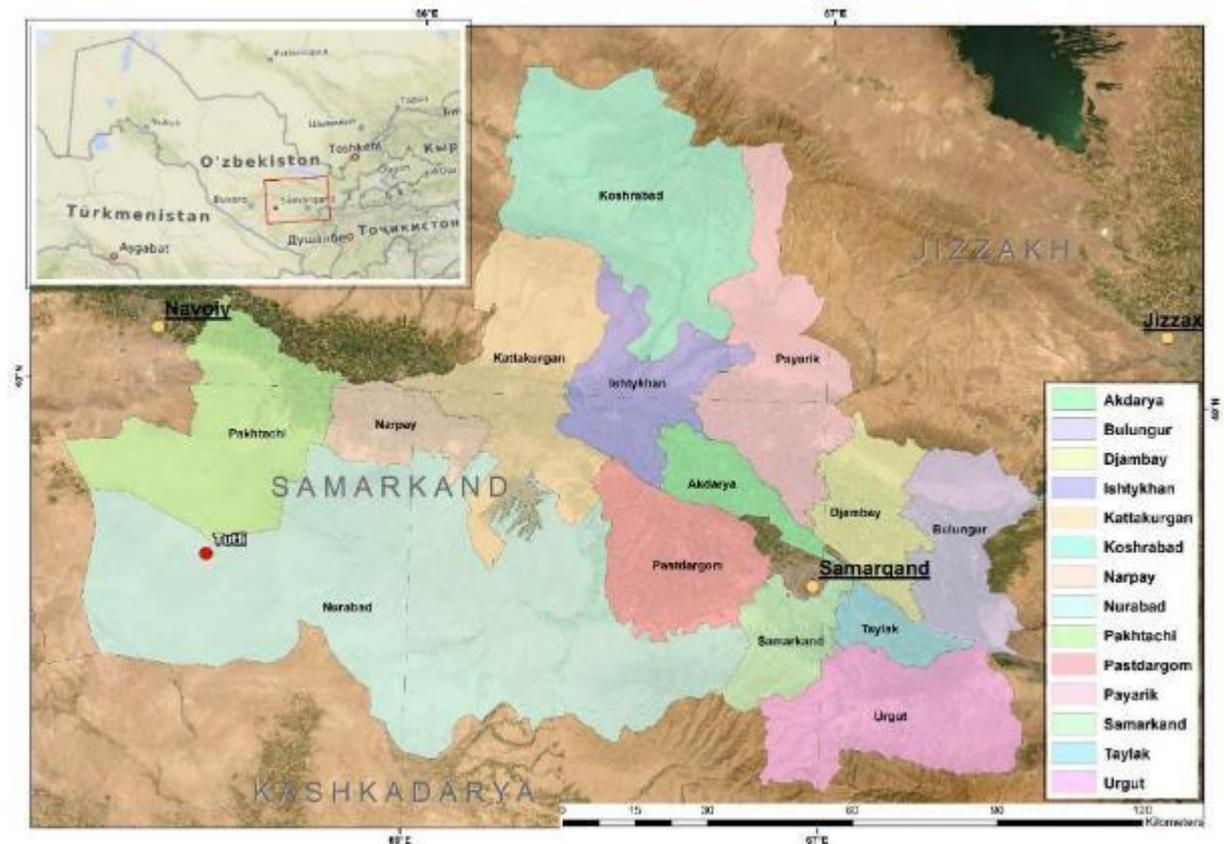


Figure32: Districts in Samarqand province

#### 4.4.2.1 Nurabad District

The Nurabad district was formed on November 26, 1975 as the Sovetabad province and on May 8, 1992 it was renamed the Nurabad district. Total population is 148,100 people, from them 73,700 are women and 74,700 are man. Around 90% of population live in the rural area.

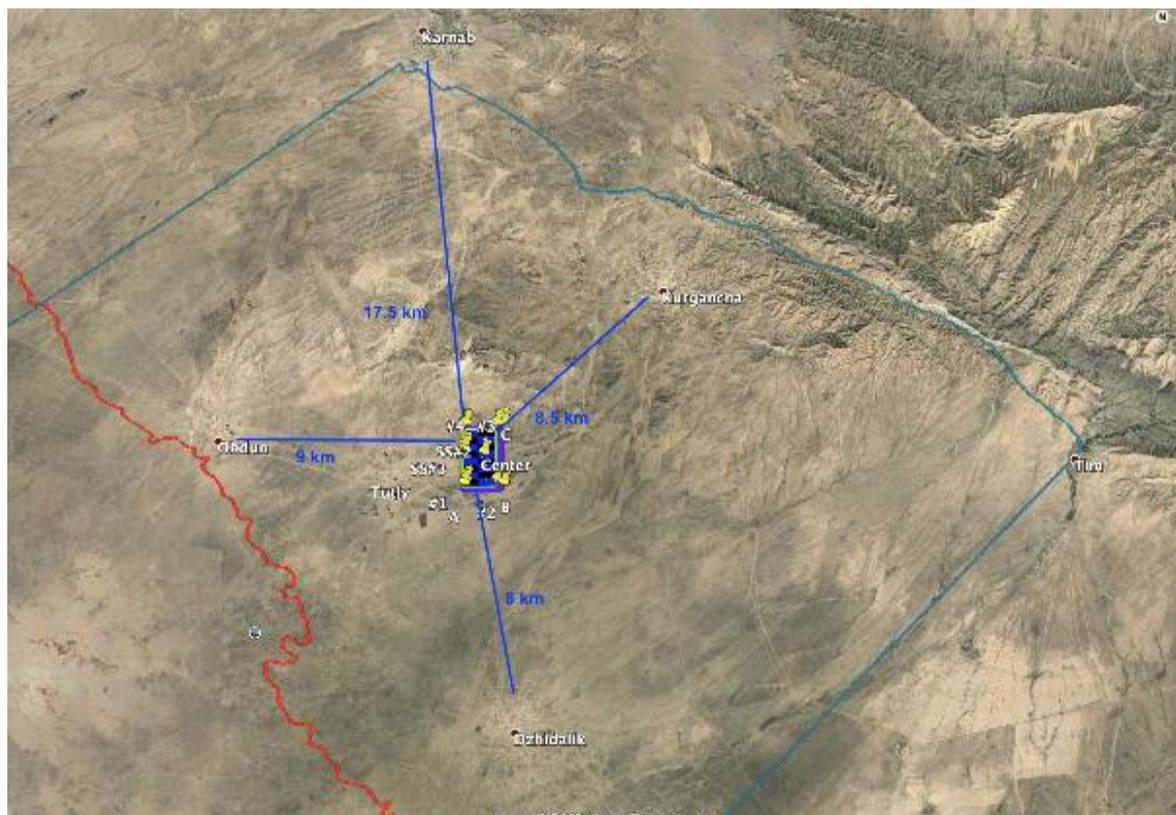
The administrative centre is Nurabad city. Nurabad district consists of 1 city - Nurabad and 7 village community assemblies: Nurдум, Jam, Dzharkuduk, Nurbulak, Tim, Sazogon, Ulus and Tutli. There 75 secondary school and 1 professional college, 1 hospital and 10 polyclinics in the district.

#### 4.4.2.2 Sakhoba mahalla community assembly

Tutly settlement is located in “Sakhoba” mahalla community assembly (MCA), which was established in December 16, 1996. The Sakhoba MCA consists of 3 villages: Gubdin, Tutly and Zhiydali. The total number of population of Sakhoba settlement is 5,413 people. There are 3 secondary school and 2 state clinics in this MCA.

The main agricultural sector is grain farming, but they are also involved in animal husbandry and farming.

Tutly settlement which is administrative part of Sakhoba MCA is located on 1.7 km to the west from the project area. Other settlements are located on the distance more than 17 km away from the project site. They are: Kurgancha (8.5 km), Karnab (17.5 km), Obdun (9.5 km) and Djidalik (8 km). Due to their remote location from the PV plant, impacts are not anticipated.



**Figure 33: Location of closest settlements to the project area**

#### **4.4.3 Ethnicity and Language**

About 93% of the population living in the project area are Uzbeks, the rest are Kazakhs (5%), Tajiks (1.8%), Russians (0.2%) and other minorities. The main language spoken in the district is Uzbek, however some people speak Russian and Tajik too (as second languages).

Samarqand province, and particularly in the project area there are no ethnic or cultural groups which are identified or classified as “indigenous people” according to the IFI’s guidance note.

#### **4.4.4 Religion**

The World Health Organisation (WHO<sup>23</sup>), states that freedom of religious belief was established in 1991. The majority of Uzbeks are Muslims, mainly of the Sunni branch; there are also small groups practising orthodox Christianity and Judaism.

#### **4.4.5 Economy and Livelihoods**

In terms of Gross Domestic Product, Uzbekistan has the second largest economy in Central Asia only after that of Kazakhstan. Although its economy is growing at a rapid pace in recent years, Uzbekistan is still classified as a lower-middle-income economy. External trade is

<sup>23</sup> WHO Uzbekistan: profile [http://www.euro.who.int/data/assets/pdf\\_file/0017/130364/E71959.pdf](http://www.euro.who.int/data/assets/pdf_file/0017/130364/E71959.pdf)



commodity-driven. Major export items are oil/gas and energy products, cotton, and foodstuff while major import items are machinery, chemical products, and foodstuff. Major trade partners are Russian Federation, Kazakhstan, and China for export and Russian Federation, Korea, and China for import.

The GDP figure in 2018 was \$50,485 million<sup>24</sup>, Uzbekistan is number 86 in the ranking of GDP of the 196 countries that published. If we order the countries according to their GDP per capita, Uzbekistan is in 156<sup>th</sup> position. According to this parameter, its population is among the poorest of the 196 countries whose GDP was published.

Agriculture is leading sector in forming of GDP in Samarkand province, at 51.3% of the contribution to GDP, followed by Industry with 13.8%, transportation and communication services make 6.8% of the total GDP, as shown in Figure 32. Samarkand province in total contribute 7,8% to the GDP of Uzbekistan, or 3,746.23 million US dollars in 2018. Details of the GDP structure in Samarkand province are provided in Table 14.

Main types of industrial production in Samarkand province include the following: production of food products, tobacco, car and truck production, textile production, other non-metal goods production, metallurgy, rubber and plastics production, electricity and gas supply, and air conditioning.

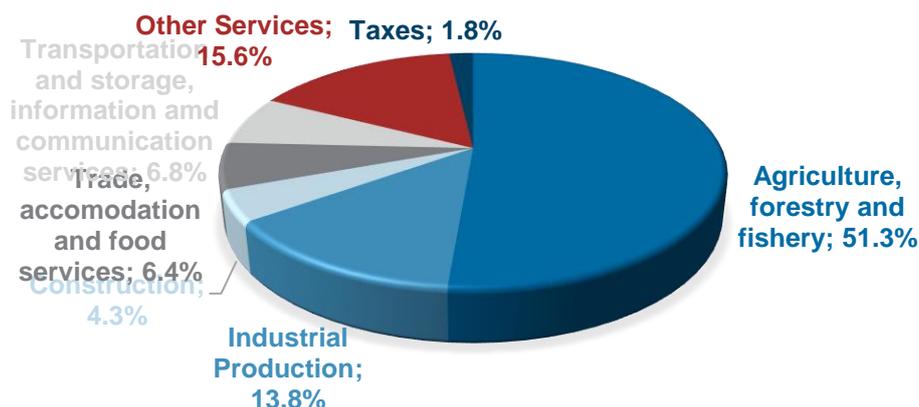


Figure 34 GDP by Sectors in FV in 2018

Table 14 GDP of Samarkand province in 2018<sup>25</sup>

Economic Sector	Samarkand Province	
	(bln. UZS)	(mln.USD)
Agriculture, forestry and fishery	16 008,8	922,98 <sup>1</sup>
Industrial Production	4 296,5	516,10

<sup>24</sup> Statistics Committee of Uzbekistan, data as of January 1, 2019

<sup>25</sup> The Central Bank of Uzbekistan rate of currency as of December 2018 - \$1 = 8,325 UZS

Construction	1 340,1	160,97
Trade, accommodation and food services	1 987,5	238,74
Transportation and storage, information and communication services	2 118,1	254,43
Other Services	4 862,4	584,07
Taxes	574,0	68,95
TOTAL	31 187,4	746,23 <sup>3</sup>

#### 4.4.6 Land Use & Ownership

##### 4.4.6.1 Land Ownership

Land in Uzbekistan is state-owned. The exclusive state ownership of land was first incorporated in the 1992 Constitution. Originally this was to ensure food security and social stability, as well as to ensure the effective operation of the state-run irrigation system.

Farming entities in Uzbekistan possess different rights to land: from long-life inheritable rights of the dehkans (small-scale household farms) to rights limited by 30 to 50 years and defined by lease contracts of the private farmers. The private farmers are monitored by the state and are subject to state interventions, for instance, they have to produce state quotas for cotton and wheat and they are obliged to sell these crops for state-dictated prices.

The project area is government reserve land which is used currently for grazing livestock. To assess current land use and to identify affected households Social Due Diligence (SDD) was conducted. According to the assessment there are no any households impacted by the project. As per the census survey, conducted under SDD it is found that there are not any crops being cultivated which will be affected due to land acquisition.

The project land was transferred to the Project owner – LLC “Tutly Solar” based on Resolution of Samarkand province Khokimiyat’s (provincial administration) # 06-17 – 11745 dated from November 1st, 2019.

##### 4.4.6.2 Land Use

The project area is used for livestock grazing purposes (mainly sheep, goats and cows) due to its proximity to the village and as a shortcut to distant feeding areas. During observation conduct in May 2019 no signs of overgrazing were observed since there was plenty of vegetation in the steppe. There is a total area of 52,000 ha in Tutly available for grazing for a total of 40,000 heads of cattle and sheep. Nearly half of the cattle owners (27 out of 50) are associated to the Tutly Cattle Association. Anticipated impacts on cattle grazing during project construction and operation stages were discussed with head of the Association and with several shepherds. Findings of these consultation is presented in Chapter 7.

It is planned that 350 ha will be used for construction of PV plant. As per discussion with stakeholders – representatives of shepherds, withdrawing of 350 ha will be not impact on grazing activities in the area.



**Figure 35 Arabic sheep and goats grazing in the solar project area.**

Project area is also used for transhumant apiary (bee-keeping) activities during the flowering period of the steppe, lasting for around two months per year (usually in April-May period). Two apiaries were installed at the project area during the visit, as it can be observed Figure 36.



**Figure 36 Apiary activity in the project area.**

#### **4.4.7 Labour and Employment**

Unemployment rate in Uzbekistan was 9.3% in 2018 according to the Ministry of Employment and Labour of Uzbekistan, and is even higher among youth under 30, reaching 15% of economically active population. In Samarqand province people in urban area are mostly employed in local plants and factories or state farming practices. In the rural area close to the project site people are involved in the agricultural production and livestock. During public consultation meetings conducted during the ESIA, local people expressed interest in being able to participate in the construction works for the project.



People living within the project area are mainly involved in the herding cattle and seasonal works in other regions.

#### 4.4.8 Cultural Heritage

Samarkand City is one of the most famous attraction for tourists coming to Uzbekistan. Samarkand, according to the archaeological research, was founded in the VIII century BC. Samarkand was firstly mentioned by Alexander the Great, as Marakanda, during his campaigns in Central Asia. For more than 2,000 years, the city was the main centre of trade on the Silk road route between China and Europe, as well as one of the main centres of science of the medieval East.

In Samarkand province, much attention is paid to the development of certain types of tourist attractions, such as cultural and historical, eco and agro, gastronomic, extreme and other. In particular, ziyorat (religious) tourism occupies a special place. Such pilgrimage sites of Samarkand as Imam al-Bukhari and Shakhi Zinda memorial complexes are considered to be the most visited places.

The distance between the project site and Samarkand city is 125 km. Modern Samarkand differs much from its medieval image: the city has changed but the domes, towers, and magnificent building arches decorated with mosaic patterns. Samarkand – the city-crossroad of cultures - sights and monuments are included into the UNESCO World Cultural Heritage List.

##### Popular Monuments and Landmarks of Samarkand:

- Registan Square ranks among the world's most beautiful squares, it is called the pearl of Central Asia. The square won this fame owing to unique monuments of medieval architecture, surrounding it from three sides, as a part of beautiful architectural ensemble: the Ulugbek madrasah (1417-1420), Sherdor Madrasah (1619-1636) and Tillya-Kari Madrasah (1646-1647).
- The Gur-Emir Mausoleum, the family vault of Amir Timur and his heirs, was built in 1404 in the south-western part of the city. This mausoleum was a prototype for two well-known monuments of world architecture: the Humayun Mausoleum in Delhi and the Tadj Mahal in Agra.
- Rukhabad Mausoleum, built over the tomb of Muslim mystic sheikh Burkhaneddin Sagaradji, who died in the XIV century and was deeply esteemed by Timur's contemporaries, is found to the north from the Gur-Emir shrine.
- Bibi-Khanym Mosque is a cathedral mosque which according to a legend was named after Amir Timur's beloved wife. Majestic blue domes of the Bibi-Khanym Mosque are a striking sight.
- The Shakhi-Zinda Complex, one of Samarkand most mysterious and inimitable architectural monuments, is located not far from the Bibi-Khanym Mosque. The complex is a unique ensemble consisting of eleven shrines.
- Ancient site of Afrasiab (VII-II centuries BC) is located on high hills at the entrance to Samarkand from the north. Interestingly enough, but Afrasiab town, as such, did not exist at that place at all. The locals named this place according to a legend that once there existed a huge city founded by mythical Turan tsar - Afrasiab. In fact, this ancient site belongs to Samarkand of the pre-Mongolian period.

- The Prophet Daniel Mausoleum is located in Afrasiab suburbs. The mausoleum long 5-domed building stretches along a high steep hill, with the Siab River flowing at its foot.
- The Ulugbek Observatory was built on Kukhak hill in Samarkand suburb in 1424—1428, it went down in history as one of the most important observatories of the Middle Ages.
- “Hudjum” is a silk carpet factory where it is possible to watch Samarkand carpet weaving process on site, to enjoy unique examples of carpet products and order one of the.



Night Registan



Gur Emir Mausoleum

**Figure 37 One of the historical places in Samarkand city**

No significant archaeological or cultural heritage assets were identified within the Project site or within its area of influence. Potential presence of historical artifacts was discussed with representatives of Samarqand branch of Ministry of Culture and Central Body. This topic was also discussed during the local public consultations, meetings with stakeholders, makhalla heads, and with district khokimiyat. They confirmed that there are no known cultural heritages within the project area of influence. The Ministry of Cultural has officially confirmed that there are no cultural or archaeological heritage near the PV Plant site (Appendix 8.)



## 5 Impact Assessment

### 5.1 Impact Assessment Methodology

Impact identification and assessment starts with scoping and continues through the remainder of the ESIA Process. Interactions with the potential for significant effects are subjected to a detailed impact assessment. The principal ESIA steps comprise the following:

- **Impact prediction:** to determine what could potentially happen to resources or receptors as a consequence of the Project and its associated activities – potential impacts are identified during the ESIA scoping phase.
- **Impact evaluation:** to evaluate the significance of the predicted impacts by considering their magnitude and likelihood of occurrence, and the sensitivity, value and/or importance of the affected resource or receptor.
- **Mitigation and enhancement:** to identify appropriate and justified measures to mitigate negative impacts and enhance positive impacts.
- **Residual impact evaluation:** to evaluate the significance of impacts assuming effective implementation of mitigation and enhancement measures.

### 5.2 Identification and Characterisation of Impacts

An 'impact' is any change to a resource or receptor caused by the presence of a project component or by a project-related activity. Impacts can be negative or positive and are described in terms of their characteristics, including the impact's type and the impact's spatial and temporal features (namely extent, duration, scale and frequency). Impact characteristics are defined in the subsections below.

#### Type of Impact

- *Direct:* applies to an impact which can be clearly and directly attributed to a particular environmental or social parameter (e.g. dust generation directly affects air quality)
- *Indirect:* applies to impacts which may be associated with or subsequent to a particular impact on a certain environmental or social parameter (e.g. high levels of dust could entail nuisance and health effects to workers on site).
- *Induced:* applies to impacts that result from other activities (which are not part of the Project) that happen as a consequence of the Project.
- *Cumulative:* applies to impacts that arise as a result of an impact and effect from the Project interacting with those from another activity to create an additional impact and effect.

#### Duration of impact

- *Temporary* - applies to impacts whose effects are limited to a period of less than 3 years, or only associated with Project pre-construction or construction phases.
- *Short-term:* applies to impacts whose effects are limited to a five-year period.
- *Long-term:* applies to impacts whose effects last longer than a period of five years, but limited to within the project lifetime.
- *Permanent:* applies to impacts whose effects last longer than the life of project – i.e. irreversible.

#### Extent of impact

- *On-site:* impacts that are limited to the Project site.
- *Local:* impacts that are limited to the Project site and adjacent properties.

- *Regional*: impacts that are experienced at a regional scale.
- *National*: impacts that are experienced at a national scale.
- *Trans-boundary/International*: impacts that are experienced outside of Uzbekistan.

### Scale of impacts

The scale of an impact is a quantitative measure, such as the size of the area damaged / impacted or the fraction of a resource that is lost / affected, etc. It is generally described using numerical values and units rather than assigned fixed designations.

### Frequency of impacts

The frequency of an impact the measure of the constancy or periodicity of an impact, described using numerical values or a qualitative description.

### Likelihood

Likelihood is a measure of the degree to which the unplanned event (e.g. incidents, spills) is expected to occur. The likelihood of an unplanned event occurring is determined qualitatively, or when data is available, semi-quantitatively. Definitions of likelihood as applied in the ESIA are provided as follows:

- *Unlikely*: The event is unlikely but may occur at some time during normal operating conditions
- *Possible*: The event is likely to occur at some time during normal operating conditions.
- *Likely*: The event will occur during normal operating conditions (i.e. it is essentially inevitable).

## 5.3 Evaluation of impacts

A consistent approach to the assessment of impacts will be followed to enable E&S impacts to be broadly compared across the ESIA. A set of generic criteria are used to determine significance and are applied across the various environmental and social parameters.

As far as possible, E&S impacts will be quantified. Where it is not possible to quantify impacts, a qualitative assessment will be conducted using professional judgement, experience and available knowledge, and including the consideration of stakeholder views. Where there are limitations to the data, and/or uncertainties, these will be recorded in the relevant chapters, along with any assumptions made during the assessment.

In order to determine the significance of each impact, two overall factors are considered:

- Magnitude and nature of impacts
- The importance and/or sensitivity of the environmental and social receiving parameter, as determined during the assessment of baseline conditions.

### Magnitude of impacts

Once impacts are characterised (see Section 1.2 above) they are assigned a “*magnitude*”. Magnitude is typically a function of some combination (depending on the resource/receptor in question) of the following impact characteristics:

- extent
- duration
- scale
- frequency

Magnitude (from small to large) is a continuum. Evaluation along the continuum requires professional judgement and experience. Each impact is evaluated on a case-by-case basis and the rationale for each determination is noted. Magnitude designations for negative effects are: negligible, small, medium and large. The magnitude designations themselves are universally consistent, but the definition for the designations varies by issue. In the case of a positive impact, no magnitude designation is assigned as it is considered sufficient for the purpose of the impact assessment to indicate that the Project is expected to result in a positive impact.

Some impacts will result in changes to the environment that may be immeasurable, undetectable or within the range of normal natural variation. Such changes are regarded as having no impact, and characterised as having a negligible magnitude.

In the case of impacts resulting from unplanned events, the same resource/receptor-specific approach to concluding a magnitude designation is used.

The likelihood factor is also considered, together with the other impact characteristics, when assigning a magnitude designation.

For biophysical impacts, the semi-quantitative definitions for the spatial and temporal dimension of the magnitude of impacts used in this assessment are provided as follows:

**High Magnitude Impact** affects an entire area, system (physical), aspect, population or species (biological) and at sufficient magnitude to cause a significant measurable numerical increase in measured concentrations or levels (to be compared with legislated or international limits and standards specific to the receptors) (physical) or a decline in abundance and/ or change in distribution beyond which natural recruitment (reproduction, immigration from unaffected areas) would not return that population or species, or any population or species dependent upon it, to its former level within several generations (physical and biological). A high magnitude impact may also adversely affect the integrity of a site, habitat or ecosystem.

**Moderate Magnitude Impact** affects a portion of an area, system, aspect (physical), population or species (biological) and at sufficient magnitude to cause a measurable numerical increase in measured concentrations or levels (to be compared with legislated or international limits and standards specific to the receptors) (physical) and may bring about a change in abundance and/or distribution over one or more plant/animal generations, but does not threaten the integrity of that population or any population dependent on it (physical and biological). A moderate magnitude impact may also affect the ecological functioning of a site, habitat or ecosystem but without adversely affecting its overall integrity. The area affected may be local or regional.

**Low Magnitude Impact** affects a specific area, system, aspect (physical), group of localised individuals within a population (biological) and at sufficient magnitude to result in a small increase in measured concentrations or levels (to be compared with legislated or international limits and standards specific to the receptors) (physical) over a short time period (one plant/animal generation or less, but does not affect other trophic levels or the population itself), and localised area.

For socioeconomic impacts, the magnitude considers the perspective of those affected by taking into account the likely perceived importance of the impact, the ability of people to manage and adapt to change and the extent to which a human receptor gains or loses access to, or control over socio-economic resources resulting in a positive or negative effect on their well-being. The quantitative elements are included into the assessment through the designation and consideration of scale and extent of the impact.



### Sensitivity of receiving parameter

In addition to characterising the magnitude of impact, the other principal step necessary to assign significance for a given impact is to define the sensitivity of the receptor. There are a range of factors to be taken into account when defining the sensitivity of the receptor, which may be physical, biological, cultural or human. Where the receptor is physical (for example, a water body) its current quality, sensitivity to change, and importance (on a local, national and international scale) are considered. Where the receptor is biological or cultural (i.e. the marine environment or a coral reef), its importance (local, regional, national or international) and sensitivity to the specific type of impact are considered. Where the receptor is human, the vulnerability of the individual, community or wider societal group is considered. As in the case of magnitude, the sensitivity designations themselves are universally consistent, but the definitions for these designations will vary on a resource/receptor basis. The universal sensitivity of receptor is low, medium and high.

For ecological impacts, sensitivity is assigned as low, medium or high based on the conservation importance of habitats and species. For socio-economic impacts, the degree of sensitivity of a receptor is defined as the level of resilience (or capacity to cope) with sudden social and economic changes. Criteria for deciding on the value or sensitivity of biological and socioeconomic receptors are presented as follows:

*High:* For ecological receptors, specifically protected under Uzbek legislation and/or international conventions e.g. For social receptors, those affected will not be able to adapt to changes and continue to maintain pre-impact status.

*Medium:* For ecological receptors, not protected or listed but may be a species common globally but rare in Uzbekistan with little resilience to ecosystem changes, important to ecosystem functions, or one under threat or population decline. For social receptors, those able to adapt with some difficulty and maintain pre-impact status but only with a degree of support.

*Low:* For ecological receptors, not protected or listed as common / abundant; or not critical to other ecosystem functions (e.g. key prey species to other species). For social receptors, those affected are able to adapt with relative ease and maintain pre-impact status.

### Assessing the significance of impacts

In order to assess the significance of an impact, the sensitivity of the receiving environmental or social parameter is considered in association with the magnitude of the impact, according to the matrix shown in Table 15 below.

**Table 15 Impact significance matrix**

Magnitude of impact	Sensitivity of receiving receptor		
	Low	Medium	High
Negligible	Negligible	Negligible	Negligible
Low	Negligible	Minor	Moderate
Medium	Minor	Moderate	Major
High	Moderate	Major	Major

While the above matrix provides a framework for the determination of significance and enables comparison across environmental and social parameters, a degree of professional judgement must be used and some parameter-specific factors considered in making a determination of impact significance.

Below provides additional guidance to the degrees of significance in the ESIA. Positive impacts provide resources or receptors, most often people, with positive benefits. Note that positive impacts are defined, but not rated for significance.

- *Major significance*: an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. An aim of impact assessment (IA) is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long-term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted. An example might be the visual impact of a facility. It is then the function of regulators and stakeholders to weigh such negative factors against the positive ones, such as employment, in coming to a decision on the Project.
- *Moderate significance*: has an impact magnitude that is within applicable standards, but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit. Clearly, to design an activity so that its effects only just avoid breaking a law and/or cause a major impact is not best practice. The emphasis for moderate impacts is therefore on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable. This does not necessarily mean that impacts of moderate significance have to be reduced to minor, but that moderate impacts are being managed effectively and efficiently.
- *Minor significance*: a resource/receptor will experience a noticeable effect, but the impact magnitude is sufficiently small and/or the resource/receptor is of low sensitivity/vulnerability/ importance. In either case, the magnitude should be well within applicable standards.
- *Negligible significance*: a resource/receptor (including people) will essentially not be affected in any way by a particular activity or the predicted effect is deemed to be 'imperceptible' or is indistinguishable from natural background variations.

### **Mitigation Potential and Residual Impacts**

A key objective of an ESIA is to identify and define socially, environmentally and technically acceptable and cost effective measures to manage and mitigate potential impacts as well as actions to enhance positive Project benefits. Mitigation measures are developed to avoid, reduce, remedy or compensate for potential negative impacts, and to enhance potential environmental and social benefits.

The approach taken to defining mitigation measures is based on a typical hierarchy of decisions and measures, as described in Table 16. The priority is to first apply mitigation measures to the source of the impact (i.e. to avoid or reduce the magnitude of the impact from the associated Project activity), and then to address the resultant effect to the resource/receptor via abatement or compensatory measures or offsets (i.e. to reduce the significance of the effect once all reasonably practicable mitigations have been applied to reduce the impact magnitude).

Once mitigation measures are declared, the next step in the impact assessment process is to assign residual impact significance. This is essentially a repeat of the impact assessment steps discussed above.



**Table 16 Mitigation hierarchy**

Avoid / reduce at source: avoiding or reducing at source through the design of the Project (e.g. avoiding by siting or re-routing activity away from sensitive areas or reducing by restricting the working area or changing the time of the activity).
Abate on Site: add something to the design to abate the impact (e.g. pollution control equipment).
Abate at Receptor: if an impact cannot be abated on-site then control measures can be implemented off-site (e.g. traffic measures)
Repair or Remedy: some impacts involve unavoidable damage to a resource (e.g. material storage areas) and these impacts require repair, restoration and reinstatement measures
Compensate in Kind; Compensate Through Other Means where other mitigation approaches are not possible or fully effective, then compensation for loss, damage and disturbance might be appropriate (e.g. financial compensation for degrading agricultural land and impacting crop yields)

Once mitigation measures are declared, the next step in the impact assessment process is to assign residual impact significance. This is essentially a repeat of the impact assessment steps discussed above, considering the assumed implementation of the additional declared mitigation measures.

### **Residual Impact Assessment**

Once mitigation measures are declared, the next step in the impact assessment process is to assign residual impact significance. This is essentially a repeat of the impact assessment steps discussed above, considering the assumed implementation of the additional declared mitigation measures.

### **Cumulative Impacts**

A cumulative impact is one that arises from a result of an impact from the Project interacting with an impact from another activity to create an additional impact. How the impacts and effects are assessed is strongly influenced by the status of the other activities (e.g. already in existence, approved or proposed) and how much data is available to characterise the magnitude of their impacts.

The approach to assessing cumulative impacts is to screen potential interactions with other projects on the basis of:

- Projects that are already in existence and are operating;
- Projects that are approved but not as yet built or operating; and
- Projects that are a realistic proposition but are not yet built.

There is no other existing or planned PV plants, or other large scale infrastructure projects planned, within 30 km radius of the proposed project.



## 5.4 Physical Environment

### 5.4.1 Air Quality

Air quality impacts associated with solar panels are generally restricted to the construction phase, where impacts can arise through the generation of dust and through emissions from Project machinery and construction vehicles.

#### Construction Phase

##### **Potential Impacts**

During the construction of the proposed photovoltaic plant, there will be site preparation / clearance, construction activities, and vehicle movements, all of which have the potential to generate dust.

The principal source of air pollution during construction is the generation of dust. Therefore, effects of these emissions will be localized and they do not cause long-term or wide spread changes to local air quality but their deposition on nearby properties causes soiling and may therefore result in complaints of nuisance.

The main sources of dust during the construction activities include:

- construction vehicle movements and other project related traffic on unpaved roads
- soil excavation, handling, storage, stockpiling
- clearance of vegetation
- site preparation and restoration after completion
- improvement of existing unpaved road.

The majority of the dust emissions are likely to occur during the working hours of construction activity.

The precise behaviour of the dust, its presence in the atmosphere, and the distance it may reach depends upon a number of factors, including wind direction and strength, local topography and the presence of screening structures (buildings, trees etc.) that may intercept dust before it reaches sensitive locations.

The solar plant project comprises a reserved area of 350 ha, located 1.7 km to the east of Tutly. Depending on wind speed and turbulence during construction it is likely that the majority of dust will be deposited in the area immediately surrounding the source (within 200 m away). The nuisance would be temporary, and provided that site specific mitigation measures are implemented, no significant dust effects are predicted.

The potential for impacts on air quality from traffic associated with construction of the proposed project would be limited to the areas adjacent to the principal means of access for construction traffic. A paved road is situated 70 m at the closest point to project site. There are two unpaved roads with low car traffic volume along the proposed site. In construction zones, the dust generated by vehicle movements and air pollutant emissions from vehicles may be temporarily elevated during the busiest periods of construction activity, however no significant local air quality impacts are predicted.

<b>Site clearance and preparation works, excavation and traffic movements</b>					
<b>Type</b>	<b>Duration</b>	<b>Extent</b>	<b>Frequency</b>	<b>Likelihood</b>	<b>Magnitude</b>
Direct	Temporary (weeks)	Local	Daily	Possible	Low

Receptor	Sensitivity
Tutly resident at around 1.5 km of distance of proposed PV plant	Medium
<b>Significance of Impact</b>	
<b>Minor</b>	

### Management and Mitigation

The most effective way to manage and prevent dust generation and vehicular emissions is through effective control of the potential sources; specific mitigation measures to ensure that these sources are minimized are listed below:

- Construction activity to be located away from sensitive land areas and receptors where possible, and ensure that activities are not carried out in high winds;
- minimise open excavation areas;
- Minimise stockpiling of soil and earthen material through coordination of earthworks and excavation activities (excavation, grading, compacting, etc.)
- When there is visible dust being generated by vehicles and other activities, implement dust suppression techniques, such as applying water to dusty areas.
- Minimise vegetation clearance to reduce exposure of bare soil, and revegetate cleared areas as soon as possible.
- For stockpiles left for long periods, apply grass seed or other covers.
- All construction machinery and equipment to be maintained in good working order and not left running when not in use.
- No burning of any material anywhere on construction sites;
- Restrict vehicle speeds on construction sites and all access roads.
- Vehicles carrying aggregate material and workings will be sheeted at all times.
- If any complaints are received from local community, investigate complaint and take action to clean up impacted receptor and take measures to reduce dust generation.

Mitigation of impacts in relation to generation of dust and vehicle / machinery emissions will be managed through the development of the EMP for the construction phase which will specify appropriate measures for the management of site clearance, excavation and construction activities, such as those listed above.

### Residual Impact

Following implementation of mitigation measures described above, the residual impact is considered to be:

**Negligible**

### Operational Phase

#### Potential Impacts

There are no air emissions from an operational PV plant, no excavations are required post construction phase and traffic volumes are minimal, limited to occasional visits to the plant to undertake inspection and maintenance activities. Impacts relating to dust generation and vehicle emissions are therefore not significant. Maintenance vehicles will be required to follow designed access routes.

The residual impact is considered to be:

**Negligible**

### **Decommissioning Phase**

Decommissioning activities will give rise to dust generation and vehicle emissions of a similar intensity and duration as during construction; as a result, mitigation measures and residual impacts will be similar to those experienced during the construction phase.

**Minor**

### **Cumulative Impact**

There will be no cumulative impact as a result of construction activities or in relation to the operational phase. Therefore, residual impact will be:

**Negligible**

#### **5.4.2 Soils**

The soils of the investigated area are of grey-loamy loamy loess on loess. The soil is significantly degraded due to overgrazing.

Impacts on soil because of degradation and potential soil pollution can occur during all the phases, especially during Preparation & Construction phases if hazardous substances such as oils, paints, fuel, cleaning agents and other chemicals are spilled in larger quantities, moreover waste generation and waste management are activities that must be considered. The impacts can be easily controlled by good working practices, worker and contractor training and supervision, and overall good site management practices.

### **Mobilization Phase**

During hauling and reception of materials and equipment to the site and storage on site, compaction of the soil result of lorries and vehicles, and waste generation from unpacking and worker activities will occur.

### **Preparation Phase**

During this phase, land levelling and earth works will be necessary prior to installation of the PV structures. Generation of dust and compaction of the soil will arise due to the delivery of equipment and materials to the site.

### **Construction Phase**

Significant quantities of wastewater from sanitary facilities and possibly on-site food production will occur. Unless treated on site (e.g. in small wastewater treatment facilities) this has to be stored in suitable septic tanks and transported off-site. Any facilities, temporary or permanent, will have to comply with sanitary and environmental requirements and have to be controlled by Contractor.

Similarly, other liquid wastes (inclusive of hazardous chemicals) and solid wastes need to be controlled; stored in adequate containers; and disposed of properly according to the applicable legislation. This also requires good working practices and site control and management.

If generators are to be used on site during construction there will be need for fuel transport to the site; for fuel storage; and for regular refuelling of generators. This will have to be handled carefully to avoid any spillages and accidents (e.g. fire hazard). Storage facilities

have to have a concrete base and bunding; spillage protection needs to be in place; spillage clean-up needs to be organized.

### **Operations Phase**

Once completed the site will have comparatively small numbers of workers and contractors on site at any given time. Sanitary wastes and waste from maintenance and food production will occur only in small quantities. Site management practices introduced during construction should be continued (e.g. storage and disposal of wastes; training and supervision of staff and contractors).

Mitigation of impacts relating to soil contamination will be managed through the development of the Project EMP for the operation phase, which will include provision for good working practices in relation to maintenance of vehicles and machinery, use, storage and handling of chemicals and management of wastes.

**Negligible**

### **Decommissioning phase**

High probability of having the mentioned impacts.

Construction activities, excavations, use and storage of fuels and chemicals					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Temporary (weeks)	On-site	Daily	Possible	Low
<b>Receptor</b>					<b>Sensitivity</b>
Local soil					Medium
<b>Significance of Impact</b>					
<b>Minor</b>					

### **Management and Mitigation**

In order to address potential impacts on soil, the top layer of fertile soil should be removed during construction works and stored. Land re-cultivation and restoration will be carried out after works implementation. In addition, after completion of construction all the temporary roads and embankments will be reinstated, lands will be re-cultivated and the micro relief reproduced.

Mitigation of impacts relating to soil contamination will be managed through the development of the Project EMP for the construction phase, which will include provision for good working practices in relation to maintenance of vehicles and machinery, use, storage and handling of chemicals and management of wastes.

### **Residual Impact**

Following implementation of mitigation measures described above, the residual impact is considered to be:

**Minor**

### **Cumulative Impact**

No cumulative impacts are foreseen in relation to geology and soils.

**Negligible**

#### **5.4.3 Water resources**

There are no surface water bodies within radius 15 km. There are two water reservoirs near the project area. One is located in Navoi province, namely Tudakul (49 km from the project site) and second reservoir, Kattakurgan (56 km from the PV plant), in Samarkand province, which are both used for irrigation purposes.

The population of the closest settlement – Tutly, which is 1.7 km from the site, uses for drinking purposes ground water pumping from 200 meters depth. The technical water for plant will be pumped from shallow water located on the 20-25 meters. Therefore, PV plant will use different aquifer for technical purposes. There are two options to get drinking water for PV plant staff: (i) to pump water from 200-250 meters, and (ii) to treat technical water extracted from aquifer located on 20-25 meters depth. Both approaches will not negatively impact on water use by neighbouring settlement.

Tutly settlements is located in the zone of groundwater transit from the mountains to the plain. Because of this, available ground water flow is efficient to meet demands of PV plant without negative impact on water use by Tutly settlements. It was confirmed during consultation with experts from national institute on Hydrogeological research.

EPC contractor will conduct ground water analysis and in case of necessity of additional purification will provide water treatment facilities.

### **Construction Phase**

During construction phase water will be used for domestic use mainly and for watering project site. As mentioned above, water will be used from shallow or depth ground water deposits.

Generated waste water from the construction camp will be collected into the septic tanks with volume in 50 m<sup>3</sup> and disposed into the closest waste water treatment facilities (in Samarqand city). As alternatives, waste water treatment facilities could be constructed on the project site in order to minimize expenses related to transportation of sewage to the municipal waste water treatment facilities.

### **Management and Mitigation**

Mitigation measures include:

- Ensure proper collection and disposal waste water from the project;
- Avoid disposal of non-treated waste water on surface.

### **Operational Phase**

During operation phase water will be used for drinking and housekeeping (domestic) purposes, and for cleaning panels. Amount of water required for domestic purposes was calculated based on number of people which will work on PV plant in accordance with national norms<sup>26</sup>. It was calculated that water that for 24 persons water consumption for

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<sup>26</sup> KMK 2.04.02-97 Water supply. External network and structures

domestic use will be around 190.77 m<sup>3</sup>/year. It is planned that water for domestic use will be pumped from shallow or deep ground water deposits. The EPC will define the source and method of treatment of water in order to meet national standards for water<sup>27</sup>.

For the cleaning procedure for the Project, the O&M Contractor will use the “DAKAR V2 HYDRAULIC ARM Brush” which is fitted on a “JOHN DEERE 5075E TRACTOR”. This technic is called “Truck- Mounted” method.



**Figure 38: Example of cleaning panels with brush**

The water consumption of the cleaning brush is 0,2 L/m<sup>2</sup>. The total surface of the PV modules for the Project is 544,676 m<sup>2</sup>; therefore the total amount of water required for a single wet cleaning cycle is estimated to be 108,935 L.

For manual cleaning the Project will require around 4,500 L/MWp, which equates to 589,500 L which is around 5 times more water than the cleaning by brush. The expected time for a single cleaning cycle is 40 days, with estimated daily water consumption of 2,725 L.

The water for cleaning will be sourced from wells located either on site or from nearby surrounding areas and will be stored on site in a tank (capacity: 10,000 L) located .

The technology installed for the Project is based on Bifacial PV modules (BIFACIAL DUAL GLASS of Trina). Therefore, a back-side module cleaning is also recommended once every two years. Frequency of back side module cleaning depends on site conditions (soil quality and wind) and may be adjusted accordingly. Proposed method of a back-side module cleaning is as per below:

1. Wet Mode – Manual Soft Brush cleaning

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<sup>27</sup> Drinking water. Hygienic requirement and quality control - O'z DST 950:2011;



## 2. Dry Mode – Air Cleaning

For the dust/soil accumulated on the surface of the back-side of the modules, air cleaning (air gun) or soft brush cleaning can be used.

1. Air cleaning: will use cold air sprayed from 10 cm from the surface of the modules using air at a pressure of 0,4-0,7 MPa, and repeated until the back of the module is clean;
2. Soft brush cleaning: will use a soft brush (recommended to use PA612 monofilament soft brush, softness > 70%), which will gently clean the back of the modules carefully to avoid damage;

In order to optimize PV module cleaning process and minimize water consumption, the following approach is proposed:

### **Front Side**

Two wet cleaning cycle per year (“DAKAR V2 HYDRAULIC ARM Brush”). Estimated water consumption of 217,870 L.

Two dry cleaning cycles per year (“DAKAR V2 HYDRAULIC ARM Brush”). Additional dry cleaning cycle may be required depending on site conditions.

### **Back Side**

One dry cleaning cycle every two years (Air cleaning). Additional dry cleaning cycle may be required depending on site conditions.

Due to location of the project site in the area with significant ground water deposits and not significant amount of water withdrawing for PV Plant, impact on water resources is considered as low. Availability of ground water on the project site as whole Karnabchul step was confirmed during consultation with experts from State Research Institute “HydroEngeo” Under State Committee on Geology and Mineral Resources of Uzbekistan.

No chemicals will be added to the water for cleaning therefore the wastewater from cleaning PV panels will only contain dust and therefore will not require collection and treatment.

### **Residual Impact**

Following implementation of mitigation measures described above, the residual impact is considered to be:

**Minor**

### **Decommissioning Phase**

Impacts on hydrology during the decommissioning phase are considered equivalent to those during Project construction.

**Negligible**

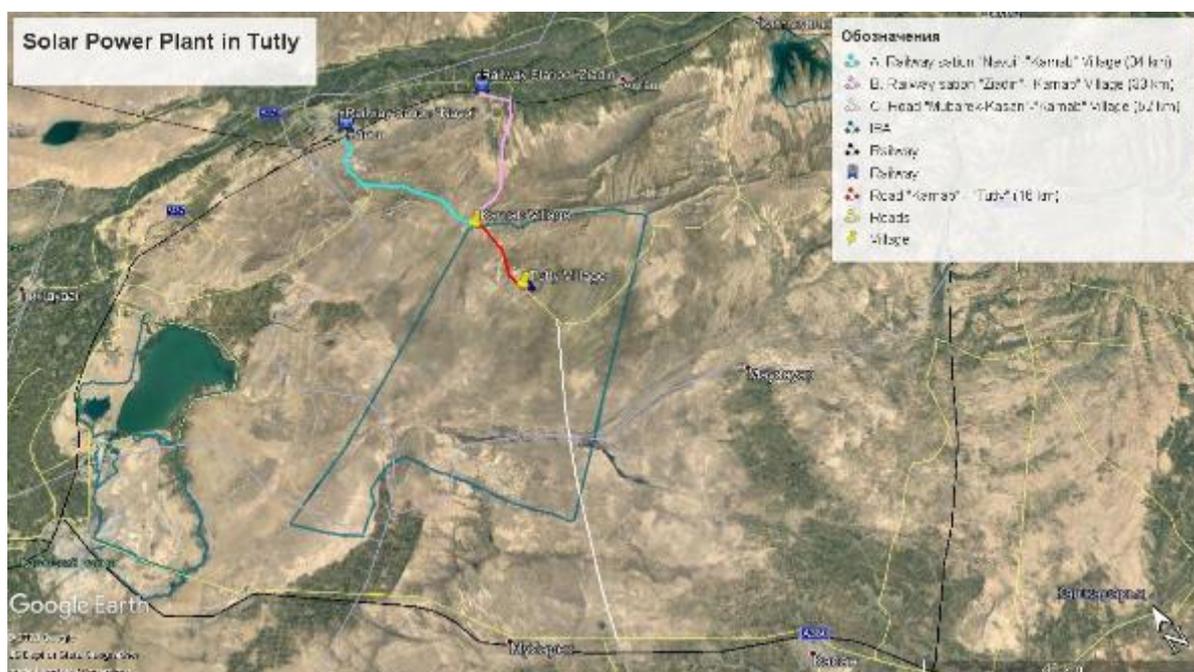
### **Cumulative Impact**

No cumulative impacts are foreseen in relation to hydrology.

**Negligible**

#### 5.4.4 Traffic and Transport

Heavy-duty and other pieces of equipment will be moved to the project site at the beginning of construction activities for civil work activities and equipment installation. All PV, electrical and structural equipment is planned to be shipped by train until Ziadin railway station and then trucked to site via road in “containers”. Besides equipment the project would also require large construction vehicles and equipment, such as bulldozers, excavators, cranes etc. to assemble the facility.



**Figure 39 Traffic and Transport**

At this stage, no specific information is available on the volume of anticipated traffic for construction.

There may be possible pressure on the existing traffic and transportation network associated with construction and operation activities.

#### **Construction Phase**

##### **Potential Impacts**

During the construction phase the traffic will have the potential impact to the local community safety, workforce safety and traffic flow in the Project area. A paved road is situated 70 m at the nearest point to the project area, which is crossed by two unpaved roads with low car traffic density.

Construction works causing increase traffic of the roads					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Short term	On site	Daily	Likely	Medium
<b>Receptor</b>					<b>Sensitivity</b>
Local communities					Medium
Workforce					Low
<b>Significance of Impact</b>					
<b>Moderate</b>					

## Management and Mitigation

A Construction Traffic Management Plan (CTMP) aligning with EHS guidelines<sup>28</sup> will be developed and implemented following the final design. The CTMP will manage the construction transport and logistics and will include details on vehicle movements during the construction phase, proposed routes, proposed locations of access tracks and identify routes, if any, that require improvement works before commencement of transportation activities. The CTMP should be provided to the local police station.

The CTMP will highlight the hazards, and the standard operating practices, which will be adhered to in order to minimize the potential for undesirable incidents on site, and on public roads. Where improvement works will take place, the project will inform the mahallas so that this information can be disseminated to the communities.

Drivers should be trained in safe driving and the code of conduct. The CTMP will need to consider phasing of the works to ensure local access is retained. The CTMP should also include provisions for:

- Transport hazards training
- Communicate transport routes and predicted schedule to communities
- Identify and install all necessary warning signage on public roads
- Driver safety training for drivers and operators
- Set speed limits, particularly in populated areas
- Maintain vehicles and include details on inspections
- Zero tolerance for alcohol and illegal drugs
- Monitoring and evaluation of traffic and transport incidents
- Repairing or restoring road network if damaged by Project vehicles

## Residual Impact

Following implementation of mitigation measures described above, the residual impact is considered to be:

**Minor**

## Operation Phase

Operational traffic would be very light and no significant traffic related effects are predicted on any part of the public road system.

**Negligible**

## Decommissioning Phase

During decommissioning, the CTMP will be implemented as for the construction phase in order to minimise and mitigate impacts to local communities, traffic flow and workforce safety.

**Minor**

## Cumulative Impact

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<sup>28</sup> IFC General EHS Guidelines: Community Health and Safety – 3.4. Traffic Safety (April 30, 2007)

Cumulative impacts may arise if other construction projects commence during the construction phase of the Project. However, as the impact due to the Project is minor following the implementation of the CTMP, and no known construction projects are scheduled for the same period, the cumulative impact is considered minor.

**Minor**

#### **5.4.5 Waste**

During PV plant' life cycle, mainly during the construction phase, the proposed PV plant will create different types and quantities of waste, including municipal waste, packaging waste, waste from construction activities and sanitary waste from worker camps. Additionally, creation of small quantities of certain hazardous wastes (damaged PV panels, paints, varnishes, adhesives, anti-corrosive substances, etc.) is expected.

##### **5.4.5.1 Construction Phase**

#### **Potential Impacts**

During the construction phase, the main source of waste will be from the packaging of materials delivered to site and waste generated by the workforce.

Some quantities of waste will be generated from earth and concrete works, electro-mechanical works etc.; however, the amount of generated will be limited.

Maintenance of construction machinery and vehicles will not be conducted within the construction areas, therefore the creation of associated wastes (used tyres, batteries, oils, etc. from vehicles) is not expected.

Any waste fuels / oils or chemicals that may need to be temporarily stored on site will be contained within solid impermeable bunding with 110% capacity of storage containers, to avoid contamination of soils and groundwater in the event of spillage / leakage.

Hazardous waste generation during construction is expected to be minimal, although small quantities of spent fuel and solvents, excess paint, clean-up soil from spill sites etc. may need to be stored on site for collection and disposal at hazardous waste facilities. These hazardous wastes will also be stored in impermeable bunding. However, it should be noted that it is likely that there will be some damaged PV panels and these are considered as hazardous waste and will require appropriate disposal.

Solid, sanitary and food wastes will be produced by the workers in temporary accommodation camps. These will be collected and disposed of appropriately under license at municipal disposal / treatment facilities. Solid waste streams will be segregated, labelled and covered appropriately for re-use and collection for recycling where feasible.

Poor general housekeeping at construction sites and accommodation camps can result in visual impacts to local communities during the construction phase, especially if uncontained solid wastes such as paper, cardboard and plastic packaging is blown off the site. Poor management of waste foods at accommodation camps can attract vermin and may cause impacts to the health of workers.

Vegetation clearance within the territory of proposed PV plant will generate small amounts of organic wastes. Clearance should be must be carried out extremely carefully, only within the project area without the use of burning and chemicals and taking into account the time of vegetation removal (in the spring and summer there is an ephemeral vegetation growth). These wastes will normally be composed of scrub and small trees unacceptable for timber

processing. They will be retained and redistributed or composted on the site which would allow production of nutrient capital and facilitate natural regeneration. Depending on the site conditions this waste may serve for matting purposes for access roads which will allow shelter to the ground.

Earth and concrete works, electro-mechanical works					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Short term	On site	Daily	Likely	Low
<b>Receptor</b>					<b>Sensitivity</b>
Local communities (visual), workforce (health), Soils, groundwater					Medium Low
<b>Significance of Impact</b>					
<b>Minor (visual, health)</b>					
<b>Negligible (soils, groundwater)</b>					

### Management and Mitigation

The contractor will develop a Waste Management Plan (WMP) in compliance with Uzbek legislation and IFC PSs that will include arrangements for the disposal of hazardous and non-hazardous waste through a licensed waste disposal contractor. The plan will also include measures to ensure:

- Avoidance of refuelling on site to prevent oil spills. If this is not possible procedures will be developed to avoid accidental spillage, like the provision of drip trays and bunding for stores of fuel and waste chemicals
- Responsible storage and disposal of liquid effluents such as sewage from temporary accommodation
- Segregation, reuse and, where feasible, recycling of wastes by registered operator.
- Good general housekeeping
- Covering of solid waste containers to prevent windblown litter across and outside site
- Composting of organic wastes
- Appropriate handling and storage of hazardous waste for licensed collection for responsible disposal by registered operator.

### Residual Impact

Following implementation of mitigation measures described above, the residual impact is considered to be:

**Negligible**

#### 5.4.5.2 Operation Phase

During its operation, the proposed PV plant will create minimal quantities of waste that will result from the activities on the maintenance and control of the installations.

Common types of waste that will be created in the operational phase of the project include mainly domestic wastes from office operation. These items will be removed outside of the project area to a licenced disposal facility, and where available appropriate recycling facilities.

A waste management system shall be established during the operational stage. This system will be in compliance with the legal waste management requirements and will consider possibilities for re-use of obsolete conductors and insulators.

**Negligible**

#### 5.4.5.3 Decommissioning Phase

During decommissioning there will be large quantities of materials that will require appropriate disposal. All materials removed from site should be recycled where possible; for example metal structures, cabling etc. The large number of PV panels will also require appropriate disposal; this could be through reuse, should they still be performing adequately, or disposal through appropriate recycling programmes such as PVCycle, if available. The Project should develop a dedicated waste management plan for decommissioning phase that identifies the appropriate management for the key wastes and follows the waste hierarchy principles of reuse, recycle and disposal; any such plan should be developed at least 6 months prior to decommissioning activities commencing.

**Minor**

#### 5.4.5.4 Cumulative Impact

Cumulative impacts may arise if other construction projects commence during the construction phase of the Project. However, as the impact due to the Project is negligible following the implementation of the WMP, and there are no known construction projects scheduled for the same period, the cumulative impact is considered negligible.

**Negligible**

#### 5.4.6 Landscape and Visual

##### 5.4.6.1 Mobilization and Construction Phase

The construction site with considerable traffic movements during the construction period, clearly visible from the road. Increased dust levels from lorries driving on unpaved roads and from excavation works for foundations of panel frames and buildings are likely. This temporary change in the landscape due to construction will have short-term effect in the area. There are no areas of landscape value, tourist attractions or amenity areas present within the Project Area of influence.

**Negligible**

##### 5.4.6.2 Operations Phase

PV plant structures are low (arrays of panels; single story maintenance and storage buildings), this will not be visually dominant from a long distance.

A potential issue considering PV Solar as a whole, is glare (and glint) caused by sunlight reflected off the PV panel arrays. PV Panels are designed to absorb sunlight (rather than reflect it), and are not usually reflective. Typical panels are designed to reflect only 2% of incoming sunlight. To further minimize nuisance from reflections an anti-reflective coating is commonly added to the surface of PV cells.

Limited glint and glare can be experienced momentarily (as the sun keeps moving) at sunrise and / or sunset. The effect can be described as a 'shine' or 'glow'. At these times the sun is low in the sky and reflection could be at a low level. At other times reflection is upwards, towards the sky. There are no aircraft landing strips in the immediate vicinity.

<b>Construction activities, such as storage areas, foundations, presence of machinery and equipment etc.</b>					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Temporary	Local	Daily (during daylight hours)	Likely	Low
<b>Receptor</b>					<b>Sensitivity</b>
Local residents					Medium
Road users					Low
Landscape and amenity value					Low
<b>Significance of Impact</b>					
<b>Minor (Visual)</b>					
<b>Negligible (Landscape)</b>					

### Residual Impact

Following implementation of mitigation measures described above, the residual impact is considered to be:

<b>Minor (Visual)</b>
<b>Negligible (Landscape)</b>

### 5.4.7 Noise and vibration

There are no close noise sensitive receptors to the Project area. Although background noise levels in these areas are low and the terrain open with no obstacles, meaning that construction noise may be experienced over greater distances than in more populated areas, there are no sensitive receptors in the vicinity of the Project.

National and international noise standards are presented in Table 18. The IFC defines standards noise level for commercial receptors as 70 dB; therefore, the national standards of 60 dB apply. National norms comply with international for both day time (55 dB) and night time (45 dB) for residential areas.

**Table 1812 Noise limits (dB)**

Receiver	National <sup>29</sup>		International <sup>30</sup> (IFC)	
	Day time (7.00 am – 11 pm)	Night time (11.00 pm – 7.00 am)	Day time (7.00 am – 11.00 pm)	Night time (11.00 pm – 7.00 am)
Residential	55	45	55	45

29 Sanitarian Norms and Rules (SanPiN) # 0267 (2007) SanR&N No.0267-09 Admissible noise level into the living area, both inside and outside the buildings

30 IFC EHS Guidelines, General EHS Guidelines: Environmental, Noise, Table 1.7.1

Offices, commercial	60	-	70	70
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#### 5.4.7.1 Construction Phase

##### Discussion of Potential Impacts

During construction phase noise emissions will be generated from operation of machinery associated with the following activities:

- Pile driving for construction
- Earth moving activity
- Vehicles used for material transport
- Access route construction

No noise impacts associated blasting is anticipated. During this stage, various techniques and machinery will work in the same time. As per existing practice, the following machinery could be used during this stage: excavators, bulldozer (dozer), air compressor, truck crane, assembly crane, compactor, vibrators for concrete compaction. Maximum noise levels for this equipment are presented in Table 19.

**Table 19** Noise level form various techniques (at the distance 50 feet <sup>31</sup>)<sup>32</sup>

Noise source	Equivalent noise level, dB
Excavator	81
Dozer (Bulldozer)	82
Compactor (ground)	83
Air Compressor	81
Truck (mobile) crane	83
Vibrator for concrete compaction	76
Backhoe	80
Truck	88

**Source:** WSDOT measured data in FHWA's Roadway Construction Noise Mode Database (2005)

Using Rules on Decibel Addition<sup>33</sup>, it was calculated that maximum level from construction equipment will reach 90 dB. Three noisier equipment were selected – trucks, mobile cranes and compactors. Noise propagation exercise showed the anticipated noise level during (Table 20) conduction the main works. Noise level will be reduced by surface factor. Surface factor (area between construction site and living houses is mostly earth) will reduce noise at least on 1.5 dB on the doubling distance.<sup>34</sup>

<sup>31</sup> One feet is equivalent to 0.348 meters, 25 feet is 8.7 meters, 500 feet is 17.4 meters

<sup>32</sup> Part Two – Construction noise impact assessment, Table 7-4

<sup>33</sup> Construction noise impact assessment, 2012

<sup>34</sup> CRN 2.01.08 Noise protection, Table 29

**Table 20 Noise propagation with distances**

Distance	Noise level (maximum), dB
17.4	89
100	74
300	64
500	60
1000	54
1500	50

Therefore, noise level from construction activities will reach the territory of the settlements with intensity of less than 45 dB which complies with national and WB requirements for noise (Table 20).

Planned construction activities and use of equipment and machinery will also be a source of vibration, although vibrations as a result of construction activities to be undertaken in the Project zone are unlikely. Given the distance of the closest residential or other properties from the construction sites, vibration impacts will not be experienced at these locations.

Project workers will be exposed to noise from construction machinery as well as, potentially, hand-arm vibration from hand-held power tools, or whole-body vibrations from surfaces on which the worker stands or sits. Occupational Noise and Vibration will be managed through the development of a construction Occupational Health and Safety (OHS) Management Plan, which will ensure compliance of the Project with IFC General EHS Guideline in relation to OHS noise and vibration. The Plan will therefore include provision for the active enforcement of the use of ear protection for prolonged exposure to noise levels greater than 85dB, as well as ACGIH<sup>35</sup> vibration limits, if appropriate.

Construction activities, operation of plant, equipment and machinery and traffic					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Temporary (weeks)	On-site	Daily	Likely	Low
Receptor					Sensitivity
Local residents within the Project area					Medium
Project workers					Low
Significance of Impact					
<b>Minor (noise impact on workers)</b>					
<b>Negligible (vibration / occupation noise and vibration)</b>					

### Management and Mitigation

Special noise mitigation measures and monitoring activities during the construction are not required due to the far distance of receptors.

### Residual Impact

Following implementation of mitigation measures described above, the residual impact is considered to be:

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<sup>35</sup> ACGIH Guide to Occupational Exposure Values, 2005

**Negligible**

### **Operation Phase**

No noise other than wind and very limited noise from vehicles used on site are expected during normal operations.

### **Management and Mitigation**

Special noise mitigation measures and monitoring activities during the construction are not required due to the far distance of receptors.

### **Residual Impact**

Following implementation of mitigation measures described above, the residual impact is considered to be:

**Negligible**

### **Decommissioning**

During decommissioning it is anticipated that noise generated by machinery will be very similar to construction phase.

### **Management and Mitigation**

Special noise mitigation measures and monitoring activities during the construction are not required due to the far distance of receptors.

### **Residual Impact**

Following implementation of mitigation measures described above, the residual impact is considered to be:

**Negligible**

## **5.4.8 Climate Change**

### **Introduction**

EP4 and EIB Standards requires projects to consider Climate Change Risk, which can be divided into two categories:

- risks related to the transition to a lower-carbon economy and
- risks related to the physical impacts of climate change.

Task Force on Climate-related Financial Disclosures (TCFD) suggests banks define carbon-related assets as those assets tied to the energy and utilities sectors under the Global Industry Classification Standard, excluding water utilities and independent power and renewable electricity producer industries. Furthermore, the guidelines identify participation in renewable energy programs part of the resilience strategy.

According to Principle 2, projects emitting more than 100,000 t CO<sub>2</sub> eq. per year shall be subject to an alternative assessment to avoid greenhouse gases (GHG). However, given that the proposed project is a renewable energy project and projected annual GHG emissions are below this threshold, no analysis of alternatives is required.

The grid emissions factor for Uzbekistan is 0,000447927 tCO<sub>2</sub>/kWh<sup>36</sup>. And the average annual electricity generation from the Project is estimated to be 273,000 MWh/yr or 273 GWh/yr; therefore the total annual CO<sub>2</sub> emission reduction for the Project is estimated to be 122,300 tonnes per year.

Therefore, only risks related to the physical impacts of climate change are required for renewable energy projects, which basically requires consideration of physical climate risks and of viability of Project operations under changing weather patterns/climatic conditions. Below is a discussion on climate related risks relevant to the proposed project.

### **Projected Impact of Climate Change in Uzbekistan**

Climate Risk Profile Factsheet<sup>37</sup> for Uzbekistan issued by USAID identified the following projected climate changes:

- *“Increased annual mean temperature of 1.3 to 2.1°C by 2030, 1.8 to 3.3°C by 2050, and 2.0 to 5.4°C by 2085.*
- *Increase in annual maximum temperature of 2.1 to 6.3°C and increase in minimum temperature of 2.2 to 5.6°C by 2085.*
- *Long-lasting heat waves are projected to increase in duration by 3 to 9 days by 2030, between 4 and 17 days by 2050, and between 6 and 43 days by 2085.*
- *Anticipated change in total annual precipitation ranges from a decrease of three percent to an increase of 12 percent by 2030, and a decrease of 6 percent to an increase of 18 percent by 2085, with most projections showing an increase.*
- *Likely increased precipitation between November and April, with precipitation in other months remaining stable or decreasing slightly.*
- *Dry spells are expected to grow longer by up to four days by 2085.*
- *Overall increase in arid conditions due to changing precipitation patterns and increased temperatures.*
- *Heavy rain events are projected to increase in intensity by 3 to 11 percent and frequency by 7 to 36 percent by 2030, and in intensity by 7 to 23 percent and frequency by 12 to 74 percent by 2085.”*

The Factsheet goes on to state that:

*“Energy infrastructure is expected to experience particularly high climate risk, particularly due to increasing demand for fuel and energy. Thanks to a rich abundance of hydrocarbon resources, Uzbekistan has built a robust energy sector that accounts for seven percent of the economy’s GDP and has allowed the country to achieve complete energy independence. Increasing temperatures, changing precipitation patterns, and decreased water availability are likely to reduce energy production and transmission, which will have cascading effects on other infrastructure systems that rely on electricity to function. Warming temperatures can not only stress the electrical grid, reducing the reliability of the electrical supply, but also diminish productivity of gas turbines in the country’s thermal power stations. Increasingly frequent and intense drought along with reduced streamflow are likely to both decrease water available for power plant cooling systems and threaten productivity of Uzbekistan’s hydropower stations.”*

With regards to ecosystems changing climate conditions may exacerbate the existing degradation of species and their habitats, mostly due to changing water regimes and

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<sup>36</sup> UNDP Environmental Performance Reporting tool\_Philippine CO (2013)

<sup>37</sup> [https://www.climatelinks.org/sites/default/files/asset/document/Uzbekistan\\_CRP\\_Final.pdf](https://www.climatelinks.org/sites/default/files/asset/document/Uzbekistan_CRP_Final.pdf)

insufficient water resources, with changing precipitation patterns, combined with increased drought, could accelerate land degradation in the already arid country.

### **Discussion of Potential Impacts and mitigation**

Potential impacts due to climate change on the Project relate only to the operational phase of the project and are considered to be limited to weather-related extreme events, such as floods, dust storms, increase in wind speeds, and increase in maximum and minimum temperatures.

In order to mitigate against such impacts the EPC Contractor should consider potential changes in climatic conditions when setting the design conditions for the Project in terms of maximum and minimum temperatures and wind loading. Furthermore, the drainage system and foundations of the buildings should be based on at least 1 in 100 year rain / flood events.

Overall following implementation of the above mitigation measures this impact is considered negligible.

**Negligible**

## **5.5 Biological Environment**

### **5.5.1 Habitats and Protected Areas**

As discussed in the habitat baseline section, the project area, totalling 350 Ha, is included in one of the 52 existing IBAs (Important Bird and Biodiversity Area) of Uzbekistan, named Karnabchul Steppe (UZ018), with a total surface of 177,156 ha. The IBA is not included under official Uzbekistan protected areas but has been created by the BirdLife International, a non-profit organization devoted to bird conservation. However, IBAs are considered as areas that should be protected by many countries and international institutions as an important tool for wildlife conservation and sustainable development.

On the other hand, Uzbekistan government has created three protected areas – state sanctuaries<sup>38</sup> – in these steppes, and they are currently managed by the State Committee for Ecology and Environment Protection. The State Sanctuaries share common land locations with Karnabchul Steppe (UZ018) IBA, and they constitute a total protected area of around 285,000 ha. The creation of the State Reserves was mainly devoted to houbara protection. The state sanctuaries are the following: (i) Nurabad state sanctuaries: (created in 1992), (ii) Mubareksky state sanctuaries (1998), Karnabchul State Reserve (1998).

The protected area determined by the state sanctuaries are considered as the actual areas that are important for the houbara breeding population and for the migrant and dispersed populations. Tutly area is not included inside these protected areas, as the conditions found in Tutly are not the best for the species: breeding houbara population avoids human disturbances and land used intensively by livestock.

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<sup>38</sup> State sanctuaries are equivalent to category IV in accordance with IUCN

To evaluate the project impact two rounds of biodiversity were undertaken within this ESIA. The full report is presented in Appendixes 1.3-1.5,

#### **5.5.1.1 Construction Phase**

##### **Potential Impacts**

The project site is located in the IBA, however, it is outside of national protected areas, and only occupies less than 0.2% of the Karnabchul Steppe IBA area, and furthermore, as mentioned the project area has already been severely impacted and modified due to grazing activities. The construction of PV plant will necessitate the removal of soil and surface vegetation from comparatively small areas of land for installation of panels. The project area is characterized by degraded vegetation due to overgrazing. Clearance activities will involve only the removal of sparse scrub.

The improper disposal of excavation material is a potential factor that may impact on habitats during construction activities, as is poor management of solid waste and waste water generated at temporary construction camps. The relatively small amounts of excavation and waste material that will be generated by the Project during construction activities, in relation to the expanse of largely uniform desert habitat along the majority of the route means that related impacts are minor.

Separate investigation was conducted to study the potential impact of on the Central Asian tortoise' population during construction phase and evaluated for "No-Net Loss". To determine how the project may impact on the tortoise population available references were studied in order to calculate the potential impact for two scenarios: (i) partial impact due to drilling works (considered as the most dangerous activity for tortoises), and (ii) worst scenario assuming the whole population of tortoises that habitat the project site will be affected. The study considered three scales of impact: (i) project site, (ii) landscape level (Karnabchul steppe), and (iii) nation-wide.

In accordance with the latest data, the total population of Central Asian Tortoise in Uzbekistan is not less than 10 million species (R.Kashkarov, TRAFFIC, 2002). This number has been confirmed by studies presented in other references, namely "Distribution of the Central Asian Tortoises *Agrionemys Horsfileldi* (Gray, 1844) in Uzbekistan (Range, Regional and Landscape distribution, population density D. A. Bondarenko, E. A. Peregontsev" (2017). According to this reference the total area suitable as habitat for tortoises in Uzbekistan is 300,000 km<sup>2</sup>, the average density of tortoises is around 3 specimen/ha, with areas that have the most suitable conditions the density could reach 10 species/ha. Calculation also shows that a total population of tortoises is not be less than 10 million.

Site observations conducted by the environmental team for the ESIA in the summer of 2019 showed that average density of tortoises is around 3.4 species per ha. Some scientific studies indicate density of population in this area (Karnabchul steppe) is around  $16 \pm 5.5$  individuals per ha ("Distribution of the Central Asian Tortoises *Agrionemys Horsfileldi* (Gray, 1844) in Uzbekistan (Range, Regional and Landscape distribution, population density)). Taking into consideration that the site survey had been conducted in August when activities of tortoises are less than during their normally active months (some of them already were in hibernation), the average between site observation (3.4 species) and more recent reference ( $16 \pm 5.5$ ) was used to assess impacts.

Report on Modeling of tortoises' mortality (Appendix 7) provides detail calculation of tortoise population density in the project area (22.37 individuals per ha) with a total population of

7,830 species. The calculation of tortoise population within the project site considering actual observations and available data from references is provided in the table below.

**Table 21. Calculation of tortoise number within the project site**

Biological parameters of the Central Asian tortoise	Indicators for the project site	Source	Calculated values for the site (S=350 ha)
Population	Density of tortoises per ha: 3.4 – 16 ± 5.5 individuals/ha, on average, 10 individuals/ha	2, 3	Total population of tortoises: 350 ha X 10 = 3,500
Age structure of the population	Percentage of adult individuals: 85.9 - 93%, on average = 89.4%	4, 5	Number of adult tortoises: 3,500 X 89.4% = 3,129
Sex ratio in the population	The ratio of males and females 1.5 - 1.9♂/1♀, on average 1.7♂/1♀ or 63%♂♂ and 37%♀♀	5, 6	Number of adult females: 3,129 X 37% = 1,158
Reproduction	Number of eggs laid per 1 female: 4 - 6.4, on average 5.5	6, 7, 8, 9, 10	Population growth (number of young tortoises at the site): 1,158 X 5.5 X 68% = 4,330
	% hatching: 60 – 76%, on average 68%	6, 10	
Total at the site:	3,500 adults + 4,330 young tortoises = 7,830 individuals		

Thus, the total number of tortoises currently estimated within the Project site could reach 7,830 individuals, which corresponds to a density of 22.37 individuals per 1 ha.

To quantify the impact of the project on the tortoise population at the scale of project site, Karnabchul steppe (location of project site) and within Uzbekistan as a whole, the total population at each scale and area which could be affected by construction has been calculated.

The total area of Karnabchul steppe is around 171,000 ha with the density of tortoise population varying from 7.9 to 11.5 species/ha (D.A.Bondarenko and others, 2017). The total amount is estimated between 1,350,900 and 1,966,500 individuals.

In accordance with construction work schedule, the following types of works will be implemented:

**From October to December:**

- Construction of roads on a small fraction of the Project site
- Construction of fence (no impact)
- Site levelling with only 5 cm of the topsoil on the whole site will be scraped, and some of the scraped earth will be used to backfill some areas (up to 20cm backfilling on circa 5% of the site).

**From January to March :**

- Piling: approximately 0,06 m<sup>2</sup> cross-section will be rammed at a depth of ~2.5m. 2,500 m<sup>2</sup>, so less than 0,1% of the site.
- Construction of foundations (HV Substation, Production Substation, O&M Building): between 1m and 3m depth, around 2,500 m<sup>2</sup>, so less than 0,1% of the site.
- Trenching between 0,5m and 1,5m depth for a total area of around 40,000 m<sup>2</sup>, so about 1% of the site.

In total, soil on around 5.5 % (19 ha) of whole territory of the project site will be affected in a way which may lead to death of tortoises in hibernation. **This means that losses of tortoises population within the project site is estimated at 123 individuals, which is around 1.6% of total population within the project site, which equates to less than 0.006% of the estimated tortoise population in Karnabchul steppe.**

For the worst case scenario which assumes that project works leads to the death of all tortoises within the project site (350 ha), the total number of tortoises that would be killed is estimated to be between 0.58-0.4% of the total tortoise population in Karnabchul (corresponding to 100% of the tortoises on the site). A summary of anticipated mortality of tortoises in the project site for the two scenarios (normal and worse case) are presented in the Table 21a below.



**Table 21a: Impact of the project works on Central Asia Tortoises' population**

Total population of tortoises, number of species			Density, species/ha			Area of project site affected by construction works, (total 350 ha)		Anticipated mortality of tortoises on the project site, number of species	Percentage of tortoises to total population, %		
Project site	Karnabchul steppe	Whole Uzb.	Project site	Karnabchul steppe	Whole Uzb.	%	ha		Project site	Karnabchul steppe	Whole Uzb.
<b>Normal scenario</b>											
7,830	1,35 mln - 1,97 mln	10 mln	22.37	7.9-11.5	3	5.5	19	123	1.6	0.009-0.006	0.0000123
<b>Worse case scenario</b>											
7,830	1,35 mln-1,97 mln	10 mln	22.37	7.9-11.5	3	100	350	7,830	100	0.58-0.4	0.000783

As shown in Table 21b, even under the worst case scenario, the loss of tortoise population will be less than 1% of the total population within the surrounding Karnabchul steppe, and when assessed against the total tortoise population within the whole of Uzbekistan (10 million) these losses are considered negligible.

Nevertheless, in order minimize such impacts all identified mitigation measures will be developed and implemented during the construction and operation phase of the Project through a dedicated Biodiversity Management Plan that will focus on protecting the tortoise population; this will be developed prior to the commencement of construction works. The Contractor will be responsible for its proper and timely implementation.

Aspect					
Construction activities, such as site clearance and excavation					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Temporary (weeks)	On-site	Daily	Unlikely	Moderate
Receptor					Sensitivity
Habitats within construction site					Moderate
Significance of Impact					
<b>Moderate</b>					

### Management and Mitigation

Mitigation of impacts in relation to habitats and protected areas will be managed through the development of the Construction ESMP which will specify appropriate measures for the management of site clearance and excavation activities, and soil and waste management on the construction site.

### Residual Impact

Following implementation of mitigation measures described above, the residual impact will remain:

<b>Minor</b>
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### 5.5.1.2 Operational Phase

#### Discussion of Potential Impacts

The project territory will be fenced and it will avoid

Aspect					
Maintenance of the OHL					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Long-term	On-site	Intermittent / weather dependent	Unlikely	Negligible
Receptor					Sensitivity
Habitats within construction site					Low
Significance of Impact					
Negligible					

### Management and Mitigation

No specific management / mitigation measures will be implemented in relation to habitats and protected areas during the operational phase. During operation and maintenance activities vehicles will be required to only use the designated access tracks and roads.

### Residual Impact

The residual impact is considered to be:

Negligible
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#### 5.5.1.3 Decommissioning Phase

Decommissioning activities may give rise to excavation material and waste from temporary worker camps; as a result, impacts will be similar to those experienced during the construction phase.

Negligible
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#### 5.5.1.4 Cumulative Impact

There will be no cumulative impact as a result of construction activities or in relation to the operational phase.

Negligible
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### 5.5.2 Flora

The project area is dominated by semi-arid steppe vegetation, characterized by grassland and shrubs like Salsola, Astragalus or Artemisia genus. The project area is used for livestock grazing purposes (mainly sheep and goats) due to its proximity to the village and as a shortcut to distant feeding areas. Pastures in the project area and environs were greatly degraded as a result of overgrazing. The species composition of the vegetation is very poor with the plants that remain are those left or poorly eaten by livestock.

There is a total area of 52,000 ha in Tutly available for grazing for a total of 40,000 heads of cattle and sheep. Nearly half of the cattle owners (27 out of 50) are associated to the Tutly Cattle Association.

Project area is also used for transhumant apiary activities during the flowering period of the steppe, lasting for around two months per year (usually in April-May period). The consultations with several cattle owners were conducted in May 2019 during biodiversity assessment.

### 5.5.2.1 Construction Phase

#### Potential Impacts

Removal of some vegetation will be necessary during excavation works on construction site and laying of access routes, however the numbers of plants removed will not be significant in comparison to the numbers of similar plants in areas surrounding the Project site.

Construction activities, such as site clearance and excavation operation of plant, use of equipment and machinery and traffic					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Temporary (weeks)	On-site	Daily	Possible	Low
Receptor					Sensitivity
Local flora					Low
Significance of Impact					
Negligible					

#### Management and Mitigation

To minimize impact on flora, Contractor will be required to minimise removal of vegetation to only those areas where it is required to be cleared.

In addition, a few specific mitigations of potential impacts on flora is required during the construction phase, although the Construction EHSMP will provide for worker awareness and training sessions in relation to protection of local flora. This may include procedure for the identification of rare and protected species for removal under license if necessary. Furthermore, mitigation of impacts in relation to flora will be managed through the development of the Construction EHSMP which will specify appropriate measures for the management of site clearance and excavation activities, and soil and waste management in the PV plant, as well as for associated infrastructure, such as worker camps, access roads etc.

#### Residual Impact

Following implementation of mitigation measures described above, the residual impact will remain:

**Negligible**

### 5.5.2.2 Operational Phase

#### Discussion of Potential Impacts

Once the PV plant has been constructed, the impacts will relate to vegetation control, operations and maintenance activities.

High of bushes growing on the project area reached 60 cm. Considering the fact that a bottom edge of the panel will on height of 0.5 meters, it may require cutting of bushes in order to avoid PV panels shading. Usage of pesticides and herbicides for their control may negatively impact on biodiversity.

Some impacts may relate to traffic movements and the very infrequent use of paints and chemicals.

Maintenance activities on the PV plant					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Long-term	On-site	n/a	Unlikely	Negligible
<b>Receptor</b>					<b>Sensitivity</b>
Local flora					Low
<b>Significance of Impact</b>					
<b>Negligible</b>					

#### Management and Mitigation

For operation and maintenance of PV plant vegetation management procedure should be developed. To mitigate potential damage to local flora from traffic it shall be ensured that only designated access tracks are used for maintenance traffic and the appropriate handling and use of paints and chemicals.

#### Residual Impact

The residual impacts are considered to be:

**Minor**

### 5.5.2.3 Decommissioning Phase

Impacts on flora during the decommissioning phase are considered less than during Project construction as, although there will be some ground disturbance, the aim of decommissioning is to remove foundations, hardstanding and other Project infrastructure, rather than areas of topsoil and vegetation.

**Negligible**

### 5.5.2.4 Cumulative Impact

No cumulative impacts are foreseen in relation to local flora.

**Negligible**

### 5.5.3 Terrestrial Fauna

In accordance with “Evaluation of possible negative effects to Important Bird and Biodiversity Area (IBA) of Karnabchul Steppe (UZ018)” report, only typical steppe species of wildlife are represented in the study area. Considering current land use (intense cattle grazing and high human disturbances due to cattle use and proximity to the village of Tutly), means that this area does not have significant value for much of the typical bird species that occur in the IBA.

Other groups of animals present in the zone are foxes, hares and ground squirrels (mammals) and steppe tortoises (a threatened species).

#### Potential Impacts

Construction involving clearing of vegetation, excavation of soils, movement of vehicles or equipment over roads and terrain, loading and unloading of materials and other activities can result in injury or mortality of animals. In particular trenches and excavations could present traps to less mobile animals. Such impacts can be significant if they involve large numbers of organisms, occur on a regular basis or affect animal populations that are particularly sensitive, unable to reasonably compensate the losses, or are already low in numbers.

As it was mentioned in section of project description, presence of Red List species Central Asian tortoises was found within the project area. To evaluate the project impact on population of these species, number of consultations with representative of State Committee on Ecology and Environment protection, national NGO were undertaken. Considering a character of project works, when the whole territory of PV plant will not be covered by concrete, earthworks will consist of land levelling (maximum up to 0.5 m depth), and digging basements for panels, specialists expressed the opinion that project works will not impact on tortoises’ population size. Nevertheless, for more detail assessment of impact of project works on these species an exercise on modelling to calculate number of affected tortoises was undertaken with involvement of leading experts in this field – Dr. Kashakrov Roman. The results of assessment are provided in the next chapter.

#### Analysis of the impact of earthworks on the Central Asian tortoises’ population

To assess the impact of the above-mentioned earthworks on the condition of Central Asian tortoises living on the area of 350 hectares of the construction site of a 100 MW Solar PV plant in the vicinity of Tutly village, the following biological parameters and indicators for this species were analysed:

- Number;
- Population structure;
- Seasonal activity;
- Reproduction;

The impacts assessment process consisted of several stages, each of which provides biological parameters, their justified indicators with reference to the source, and final calculations.

The results of calculations showed that by the time of the earthworks commencement (June), at least 3,500 adult tortoises in a state of hibernation and 6,370 eggs laid by tortoises will be in the soil of the site. The depth of adult individuals is 0.4 - 1.5 m from the surface. Eggs are laid by tortoises throughout May at a depth of 8 - 30 cm from the surface. Eggs incubation takes place in the soil under the influence of external temperature during 50 - 80 days. By the beginning of August, taking into account the natural death, 4,330 new-born tortoises will hatch from eggs underground. Without coming to the surface, new born tortoises will burrow into deeper layers of soil and hibernate until April next year (2021).



Thus, the total number of tortoises by August 2020 at the construction site may be 7,830 individuals, which corresponds to a density of 22.37 individuals per 1 ha.

According to the plans of the developer, the noticeable impact on the soil of the site will be made on a total area of 175,000 m<sup>2</sup>, or 17.5 hectares. As a result, the number of dead Central Asian tortoises may be  $22.37 \times 17.5 = 391,475$  individuals (adults and young). This will make up about 1% of the average estimated number of tortoises at this site.

In 2009, the Central Asian tortoise was included in the IUCN Red List with the status of "vulnerable" (VU), and in 2019 - in the Red Book of the Republic of Uzbekistan as a declining Central Asian endemic specie, with the status of 2(VU). In accordance with this, the specie needs strict protection<sup>39</sup>.

To prevent the death of the Central Asian tortoises, it is recommended to collect and relocate the tortoises to other sites with similar habitat conditions, at a distance of 3 to 5 km from the construction site prior to the commencement of the construction of solar electric generating station in the vicinity of Tutly village in the Samarkand region. Simultaneously with relocation, it is necessary to dig a trench with a depth of 0.5 - 0.7 m and a width of 0.5 m along the entire perimeter of the site. This will prevent tortoises from entering the construction area from other parts of the desert.

In this territory, the Central Asian tortoise comes out of hibernation in the middle of March, mass eggs laying is observed in early-mid May, depending on weather conditions. Thus, actions to "remove" the tortoises from the construction area shall begin at the end of March and be completed in early May. The most effective way is to collect tortoises during periods of their maximum activity – in clear weather, in the morning and evening hours, at air temperatures from + 18 to + 28°C.

Construction work will start without prior relocation of the tortoises (after May), this entails the risk of death of a certain number of individuals of the specie listed in the Red Book. In this case, the developer (or management company) shall coordinate its actions with the State Committee of the Republic of Uzbekistan on ecology and environmental protection (Goscomekologiya) and get permission for special use of wildlife objects (including species of the Red Book). Special permits are issued by Goscomekologiya in accordance with the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan dated October 20, 2014 No. 290<sup>40</sup>.

Even tortoises are included into the Red Book, in worse case scenario, portion of affected tortoises will be 1% of population size. It means that earth works will not impact on tortoises' population sustainability. Therefore, impact is considered as moderate.

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<sup>39</sup> Nuridzhanov A.S., Vashhetko E.V., Nuridzhanov D.A., Abdurapov T.V. Central Asian tortoise (*Agrionemys horsfieldii* Gray, 1844) in Uzbekistan: distribution, abundance, conservation and rational use of the species // Tyumen Bulletin State University. Ecology and nature management. 2016. Volume 2. № 1. P. 132-140. [in Russian]

<sup>40</sup> Resolution of the Cabinet of Ministers of the Republic of Uzbekistan dated October 20, 2014 No. 290 "On the regulation of the use of biological resources and on the procedure for licensing procedures in the field of environmental management" <https://lex.uz/docs/2485767> [in Russian]

<b>Construction activities, operation of plant, equipment and machinery and traffic</b>					
<b>Type</b>	<b>Duration</b>	<b>Extent</b>	<b>Frequency</b>	<b>Likelihood</b>	<b>Magnitude</b>
Direct	Temporary (weeks)	On-site	Daily	Possible	Medium
<b>Receptor</b>					<b>Sensitivity</b>
Local fauna					Low
<b>Significance of Impact</b>					
<b>Moderate</b>					

### Management and Mitigation

An important steppe tortoise population was identified in the project area. In order to minimize the impacts, a rescue program should be carried out: rescuing scattered population in the area, being responsible of their maintenance during plant construction and the reintroduction in their habitats at the end of the project (as including special fencing to allow tortoises access to the project area). Other alternatives are available to contribute and support the conservation of these protected species in the area.

Mitigation of potential impacts on fauna will be managed through the development and implementation of the Biodiversity Management Plan (BMP), which should include but not be limited to the following:

- require the presence of a qualified ecologist during major earthworks and piling
- identify measures that mitigate impacts on local biodiversity, and in particular the protection of the Central Asian Tortoise
- Identify post construction rehabilitation measures that seek to enhance the local biodiversity and create habitats that support the local population of protected species, specifically the Central Asian Tortoise
- provide for worker awareness and training sessions in relation to protection of local fauna, and a code of conduct that forbids poaching or deliberate killing of animals listed in baseline studies.
- Temporary worker camps and related technical facilities, such as pits and cement plants shall be arranged, where possible, on the most “anthropogenic” sites, for instance, on the old workings, near the highway or on the levelled sites of the foothill plain.
- Protect against water supply to construction sites against leakage, including regular inspections and repair of leakage sources as required, and ensure no pooling or ponding of water within construction facility areas, as open and available sources of water can attract migratory birds and other animals for watering.
- During the construction activities, identify places where the steppe tortoise is most often crossing the roads and install warning signs for drivers.
- Conduct regular awareness-building campaigns for workers:
  - on the need to conserve the Steppe Tortoise and the Houbara Bustard;
  - on the benefits of the snakes and the rules of conduct when dealing with them.
- Avoid starting construction activities during May-June – tortoises’ breeding season;
- Collect tortoises and move them to the site free from construction activities. Site, located next to construction site could be used for this purpose;

- After completion construction, move tortoises back to the area where they lived before construction;
- Ensure a gap (around 15-20 cm) is provided under the fence around the whole site to ensure that small faunal species can continue to move through the site.
- Ensure that design of power pylons include bird protection devices.
- If earth works start in March, tortoises have to be collected and relocated to other sites with similar habitat conditions, at a distance of 3 to 5 km from the construction site prior to the commencement of the. Simultaneously with relocation, it is necessary to dig a trench with a depth of 0.5 - 0.7 m and a width of 0.5 m along the entire perimeter of the site. This will prevent tortoises from entering the construction area from other parts of the desert.
- If earth works start other season, the special permission from State Committee on Ecology and Environment protection have to be received by Contractors.
- The contractor should be also install a road marker as showed below (Figure 40)



Figure 40: Examples of road markers

### Residual Impact

Following implementation of mitigation measures described above, the residual impact is considered to be:

Minor

#### 5.5.3.1 Operational Phase

##### Discussion of Potential Impacts

Once the PV plant has been constructed, the only impacts relate to operations and maintenance activities, which principally relates to traffic movements and the use of paints and chemicals which are very infrequent and represent minimal risk to local fauna.

However, there is potential risk that transmission lines can increase tortoise mortality during operation phase. Power pylons provide nesting, roosting, and perches for ravens – one of the tortoise's main predators. This risk will be minimized by installation of special devices on transmission lines' pylons.

From other side, researches conducted recently showed that the operation of power plant may improve living conditions for tortoises since more vegetation will grow inside fenced area<sup>41</sup>. The vegetation could be used as shade for all tortoises and as protection from predators for juvenile tortoises who do not have petrified shell yet.

Maintenance activities on the PV plant					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Long-term	On-site	n/a	Unlikely	Negligible
<b>Receptor</b>					<b>Sensitivity</b>
Local terrestrial fauna					Low
<b>Significance of Impact</b>					
<b>Minor (terrestrial fauna)</b>					

### Management and Mitigation

Potential damage to local fauna will be managed by ensuring that only designated access tracks are used for maintenance traffic and the appropriate handling and use of paints and chemicals. These will be managed through the operational ESMP, which will also provide for worker awareness and training sessions in relation to protection of local fauna, and a code of conduct that forbids poaching or deliberate killing of animals listed in baseline studies. Specific mitigation measures for the protection of biodiversity for operation period should include the following measures:

- The Project should develop the Biodiversity Management Plan (BMP) to cover the operational phase of the Project (see Construction Phase mitigation measures above), and includes the identification and implementation of biodiversity enhancement measures.
- Ensure a gap (around 15-20cm) is provided under the fence to ensure that small faunal species can continue to move natural through the site (figure 41).
- Ensure that design of power pylons include bird protection devices.



<sup>41</sup> <https://pv-magazine-usa.com/2020/01/13/a-desert-solar-farm-can-actually-improve-desert-tortoise-habitat/>



**Figure 41 Example of fence with gap for tortoises' movement and facilities for temporary storage of tortoises during operation phase**

### **Residual Impact**

The residual impacts are considered to be:

**Minor**

#### **5.5.3.2 Decommissioning Phase**

Impacts on fauna during the decommissioning phase are considered equivalent to those during Project construction.

**Negligible**

#### **5.5.3.3 Cumulative Impact**

No cumulative impacts are foreseen in relation to local terrestrial fauna

**Negligible**

#### **5.5.4 Avifauna**

As identified in the avifauna baseline section, there are a number of sensitive bird species present in the project area that could be impacted due to the construction and operation of the proposed PV plant.

Representative bird wildlife of the area is dominated by larks, sandgrouses, bee-eaters, raptors and houbaras. The area is occupied by a threatened species called MacQueen's bustard (*Chlamydotis macqueenii*), which is present as a migrant or dispersed bird in the vicinity breeding population area located west of Tutly (closer to Bukhara province area).

Main breeding avifauna species in the area are Alaudidae species – larks –, none of them endangered. Larks are small birds that are used to human and cattle presence. One adult male houbara (*Chlamydotis macqueenii*) was observed in the project area during transect walks. Males disperse from breeding areas after mating ends, so this individual should have

come from breeding areas located to the west of Tutly, where the closest breeding area is located. The Experts have been concluded that the project area may be used occasionally by dispersed or migrant houbaras.

The houbara habitat includes semi-arid, desert and grassland environments and its breeding territories are limited by direct and indirect human disturbances, avoiding areas close to settlements, roads, wells, cattle raising, etc. Considering these habitat requirements for houbara breeding population, solar project area is not a quality habitat for the species due to high human disturbances such as:

- Tutly village is close to the project area (1.7 km)
- the area has an intensive used by cattle
- a road is located nearby the western boundary of the project area
- at least two dirt roads, sometimes used by cars or motorcycles, cross the project area.

However, project area may be used occasionally by dispersed or migrant houbaras, confirmed during the fieldwork survey (one male houbara detected). The project area is significantly smaller than the existing quality habitat for migrant and dispersed individuals (several hundred thousand ha), so solar project is not a significant threat to the species, neither to other protected migrant nor resident birds (bustard, raptors, etc.), as they are highly mobile. The intense human use of this area only allows occasional use of this area by these species.

The solar project area extension is reduced when compared with the total steppe area (600 ha versus hundreds of thousands ha). As a consequence, impacts to migrant birds (such as houbaras) is considered very low and negligible.

#### 5.5.4.1 Construction Phase

##### Discussion of Potential Impacts

There may be a disturbance to birds during construction due to the increased presence of human activity, plant and machinery movement, site clearance, and noise and vibrations from the construction works. However, this impact is likely not to be insignificant as birds are highly mobile.

Construction activities, operation of plant, equipment and machinery and traffic					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Temporary (weeks)	On-site	Daily	Possible	Low
<b>Receptor</b>					<b>Sensitivity</b>
Local avifauna species, especially those listed under IUCN and UzRDB					Low
<b>Significance of Impact</b>					
<b>Minor</b>					

##### Management and Mitigation

Mitigation of potential impacts on avifauna will be managed through the development and implementation of the Construction EMP which will provide for worker awareness and training sessions in relation to protection of local avifauna, and a code of conduct that forbids poaching or deliberate killing of animals listed in baseline studies. Specific mitigation

measures for the protection of biodiversity during construction should include the following measures:

- Develop and implement BMP
- Temporary worker camps and related technical facilities, such as pits and cement plants shall be arranged, where possible, on the most “anthropogenic” sites, for instance, on the old workings, near the highway or on the levelled sites of the foothill plain.
- Protect against water supply to construction sites against leakage, including regular inspections and repair of leakage sources as required, and ensure no pooling or ponding of water within construction facility areas, as open and available sources of water can attract migratory birds and other animals for watering.
- During the construction activities, identify places where the steppe tortoise is most often crossing the roads and install warning signs for drivers.
- Ensure open excavations don’t become traps for less mobile animals, by providing escape routes (shallow slopes).
- Conduct regular awareness-building campaigns for workers on the need to conserve the Steppe Tortoise and the Houbara Bustard;
- Ensure construction site areas and worker camps are kept clean, and that good practice with respect to waste management is applied, to ensure food attraction sources are eliminated.
- Engage suitably qualified biodiversity expert(s) or organizations to undertake the necessary training, awareness raising, and necessary survey work.

### **Residual Impact**

Following implementation of mitigation measures described above, the residual impact will remain:

**Negligible**

#### **5.5.4.2 Operational Phase**

During operational phase impact from Power Plant on Avifauna will be insignificant, due to location far away from migratory birds’ routes. General mitigation measures should be applied operation phase

#### **Management and Mitigation**

- 
- Use visual bird diversion techniques similar to those applied in airports for bird diversion including large scare-eye balloons and Mylar flash tape.
- The use of aluminium-coloured frames for the PV panels as a mitigation measure to reduce impact on birds.

### **5.6 Social Environment**

#### **5.6.1 Land Acquisition & Land Use**

##### **5.6.1.1 Introduction**

As described in the project description and socio-economic baseline sections above, the Project will not require the acquisition of land from individuals or local community bodies, for its activities. The construction site is located on reserve lands belonging to the Government.

In accordance with article # 20 of “Land Code”, 350 ha (344.5 ha pasture, 5.5 ha – roads and 3.0 ha land non-used in agriculture) in Tutly site of massive Sakhoba in Nurabad district was allocated to “Tutly Solar” on rent condition. Appropriate agreement was signed between Khokimyat of Nurabad district and “Tutly Solar” in November 2019.

### 5.6.1.2 Construction Phase

#### Discussion of Potential Impacts

Since land belonged to the Government, there are no official affected persons in the project area. During construction stage all construction activities will be implemented within the territory of allocated land (350 ha) including construction camps. The site is located 70 from the existing road.

Currently the project site is used as pasture. However, the total available land for grazing livestock is around 52,000 ha and therefore the acquisition of 350 ha (0.7%) for the project is not considered to present a significant impact on grazing activities. During consultations with beekeepers and shepherds it was confirmed that withdrawing of 350 ha<sup>42</sup> from available for grazing land will not impact on their activities and income.

The current project design will not affect any private residences or dekhans/ small farms.

The land is not used by any of the key social sensitive receptors and therefore will have no/negligible impacts for land allocation in this area.

Aspect					
Reduced access to land for farmers					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Temporary to permanent	On-site	Constant	Likely	Moderate
Receptor					Sensitivity
Land users (shepherds and beekeepers)					Minor
Significance of Impact					
Minor					

#### Management and Mitigation

Since there are no affected person from land allocation no needs for special mitigation measures. All construction activities have to be implemented within the project site. As a

<sup>42</sup> At stage of conduction public consultation, it was considered that PV plant will occupy the territory in 350 ha. After the decision was made to decrease PV plant area up to 100 ha.

mitigation measures an establishment of grievance redress mechanism and ensure its proper implementation are recommended

### Residual Impact

Following implementation of mitigation measures described above, the residual impact is considered to be:

**Negligible**

### 5.6.1.3 Operation Phase

#### Discussion of Potential Impacts

During the operation of the PV plant, allocated land for permanent use for the project will be used for contract period.

Aspect					
Reduced access to land for farmers					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Permanent	On-site	Constant	Likely	Low
Receptor					Sensitivity
Land users (shepherds and beekeepers)					Negligible
Significance of Impact					
<b>Negligible</b>					

Once the project is operational, there will be a minor impact for those with permanent loss of land from the PV plant.

#### Management and Mitigation

As the land has been allocated, no further mitigation measures are applicable.

### Residual Impact

Following implementation of mitigation measures described above for the construction phase and that no additional management will be applied through the operational phase, the residual impact is considered to be:

**Negligible**

### 5.6.1.4 Decommissioning Phase

Potential impacts on land acquisition associated with decommissioning of the PV plant will entail temporary access to land. Overall during decommissioning, the impact will be similar to the construction phase.

**Minor**

Following the decommissioning, land will be returned to the land users as pasture and the environment will return to their baseline conditions and livelihoods will continue as before.

**Minor (positive)**

**5.6.1.5 Cumulative Impact**

There will be further land acquisition required for the construction and operation of the associated facilities (transmission line - connection to the grid). It is recommended that any land acquisition processes follow IFC requirements on land acquisition. This will not only ensure that all land acquisition is in line with best international practice and IFIs' requirements, but it will ensure fair compensation and management of potential affected people are treated the same. If potential additional displacement does occur and is managed in line with IFIs, the impact will be minor.

**Minor**

**5.6.2 Employment**

**5.6.2.1 Introduction**

The socio-economic baseline describes how the unemployment rate in Uzbekistan in 2018 was recorded at 9.3%. Although there are no figures from the mahallas of unemployment in their settlements, the ESIA engagement did highlight the desire for employment opportunities with the Project.

**5.6.2.2 Construction Phase**

**Discussion of Potential Impacts**

During the construction phase, it is very likely that the appointed EPC will source skilled and unskilled workers locally. It is anticipated that up to 280 workers will work during construction stage. At the stage of ESIA development it was not clear yet, how many skilled and un-skilled workers will be required. There will opportunities for eligible persons within the affected communities to apply for work, for varying skill levels.

Aspect					
Employment opportunities					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Short term	Local and regional	Transient	Likely	Low
Receptor					Sensitivity
Eligible and able people in the local communities					Medium

Aspect					
Employment opportunities					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
<b>Significance of Impact</b>					
<b>Moderate (positive)</b>					

### Management and Mitigation

A Labour and Employment Management Plan (LEMP) should be developed by the EPC to manage local hire in order to bring some project benefits to the affected communities, in line with IFC PSs.

Include in the EPC's HR Policy indications aimed at increasing the use of local workforce (i.e. workforce coming from the affected mahallas). The LEMP should include specific measures such as:

- Advertising jobs locally
- Encouraging and attracting local workforce to apply for jobs
- Prioritizing the hire of local workforce where reasonable and practical
- Training programs
- Monitor local workforce recruited
- Requirement for all workers to have employment contracts
- Worker Grievance Mechanism.

### Residual Impact

Following implementation of mitigation measures described above, the residual impact is considered to be:

<b>Moderate (positive)</b>
----------------------------

Once the LEMP has been implemented, the impact significance will be a moderate benefit to those of employment age seeking employment in the mahallas.

### 5.6.2.3 Operation Phase

#### Discussion of Potential Impacts

As described in the Project Description Section, information obtained from the feasibility study suggests that up to 25 staff will be required for maintenance during the operation phase. The operator will conduct regular maintenance of panels.

Aspect					
Employment opportunities					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Long term	Local	Part time	Likely	Low
Receptor					Sensitivity
Eligible and able people in the local communities					Medium
Significance of Impact					
Minor (Positive)					

### Management and Mitigation

The LEMP and HR policies will include hiring for the operation phase and in line with the points set out above.

### Residual Impact

Following implementation of mitigation measures described above, the residual impact is considered to be:

**Minor (positive)**

#### 5.6.2.4 Decommissioning Phase

Potential impacts to employment associated with decommissioning of the Power Plant will entail temporary to short-term work. Overall during decommissioning, the impact will be similar to the construction phase.

**Moderate (positive)**

Following the decommissioning, there will be no further employment opportunities and job losses would occur.

**Minor**

#### 5.6.2.5 Cumulative Impact

The additional works required for the construction of the associated facilities should also look to hire locally. If this project can set a precedent and other future projects implement a LEMP, there will be increased employment in the project area. This is a positive impact that can be considered moderate.

**Moderate (positive)**

### 5.6.3 Temporary Worker Accommodation

#### 5.6.3.1 Introduction

The Project Description describes the potential need for some temporary worker camps during preparatory and construction activities. Where possible, the EPC will use local labour, who will reside in their own homes, and for non-locals will seek to house these workers in nearby settlements. Where existing accommodation is not an option, the EPC will use temporary camps for the workers.

#### 5.6.3.2 Construction Phase

##### Discussion of Potential Impacts

During construction phase the workers will be accommodate in construction camp. It is anticipated that up to 280 workers could work on the site at the same time.

Aspect					
Worker accommodation					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Temporary	Local	Transient	Likely	Medium
Receptor					Sensitivity
Construction workers					Medium
Significance of Impact					
<b>Moderate</b>					

##### Management and Mitigation

A Worker Accommodation Management Plan (WAMP) will need to be developed and implemented in line with EBRD and IFC's 'Workers' Accommodation Processes and Standards Guidance Note', in the event that dedicated worker accommodation is required. The guidance note sets out the standards that need to be applied to workers' accommodation for Projects funded by EBRD and IFC. The guidance note provides benchmarks that the project will need to align with, and the standards will include provisions such as:

- Minimum space allocated per person or per
- Supply of safe water in the workers' dwelling in such quantities as to provide for all personal and household uses
- Adequate sewage and garbage disposal systems
- Appropriate protection against heat, cold, damp, noise, fire, and disease-carrying animals, and, in particular, insects
- Adequate sanitary and washing facilities, ventilation, cooking and storage facilities and natural and artificial lighting
- A minimum degree of privacy both between individual persons within the household and for the members of the household against undue disturbance by external factors

- The suitable separation of rooms devoted to living purposes from quarters for animals
- A separate bed for each worker
- Separate gender accommodation
- Adequate sanitary conveniences
- Common dining rooms, canteens, rest and recreation rooms and health facilities, where not otherwise available in the nearest community

### **Residual Impact**

Following implementation of mitigation measures described above, the residual impact is considered to be:

**Minor**

#### **5.6.3.3 Operation Phase**

During the operation phase there will be no temporary worker camps. The personnel hired for the operation and maintenance of the PV plant will be able to reside in their own homes, or where necessary in local accommodation.

**Negligible**

#### **5.6.3.4 Decommissioning Phase**

There may be the need for temporary worker camps for the decommissioning of PV plant. Where possible the EPC will use existing accommodation before constructing temporary camps. Where temporary camps are required, the EPC will follow the WAMP as outlined in the construction phase.

**Minor**

Following decommissioning, there will be no further works that will require accommodation for workers.

#### **5.6.3.5 Cumulative Impact**

It is not finalized yet known what the construction activities proposed associated facilities will be. In operation at the same time as the construction activities of the project. Considering the location of PV plant, it is unlikely they will require temporary worker camps as many workers are likely to be housed locally in existing accommodation. This impact is considered negligible.

**Negligible**

#### **5.6.4 Human Rights**

For companies involved in solar projects the key issue that they are particularly at risk of is the potential abuses of indigenous peoples' rights, including lack of free, prior, and informed consent (FPIC), and causing or contributing to displacement and loss of livelihoods, with specific concern for projects sited in conflict-affected areas. We consider that as the proposed project does not involve physical or economic displacement and there are no identified indigenous peoples in the project area of influence that project human rights risks

are manageable and limited to labour rights, and health and safety of workers involved in the Project and the supply chain.

As discussed in Section 4.4.7, although Uzbekistan has historically been associated with widespread incidence of child and forced labour, particularly in relation to its large cotton production sector, the ILO has reported that child labour is no longer a concern and that most forced labour has now also been eliminated. Also Uzbekistan has ratified all 8 of the ILO Fundamental Conventions (see Section 2.1.5).

The construction phase represents the key relevant phase with regards to the potential human rights impacts due to relatively high numbers of workers involved and also as this also involves the supply chain. Section 5.6.2 above covers impact assessment and mitigation requirements associated with employment and workers. In addition to these measures and the SEP, we also recommend the following additional mitigation steps for managing the potential risks associated with human rights:

- Ensure commitment to human rights through policies: this can be done through a dedicated Human Rights Policy or inclusion of commitment to human rights within other relevant social policy statement.
- Ensure labour rights are included within relevant Project and EPC Policies, as well as the LEMP, in terms of equal opportunities for all workers and non-discriminatory working practices, and includes Fundamental Principles and Rights at Work in line with IFC and EIB standards.
- Supply chain contract – In order to ensure supply chain human rights issues are considered, supply chain contracts should include human rights clause requiring suppliers to acknowledge and commit to compliance with the Project’s Human Rights Policy, as well as to United Nations Guiding Principles on Business and Human Rights (UNGPs).

Overall following implementation of the above mitigation measures this impact is considered minor.

**Minor**

### 5.6.5 Cultural Heritage

As described in the baseline no significant archaeological or cultural heritage assets were identified within the Project site or within its area of influence. The closest significant and popular archaeological and cultural heritage objects are found within and close to ancient city of Samarkand (Samarqand). which is some 125 km from the site. Potential presence of historical artifacts was discussed with representatives of Samarqand branch of Ministry of Culture and Central Body. This topic was also discussed during the local public consultations, meetings with stakeholders, makhalla heads, and with district khokimiyat. They confirmed that there are no known cultural heritages within the project area of influence. The Ministry of Cultural has officially confirmed that there are no cultural or archaeological heritage near the PV Plant site (Appendix 8.)

### 5.6.5.1. Construction Phase

#### Discussion of Potential Impacts

As described, above there is very low potential of presence of cultural heritage in the project area, therefore,

Aspect					
Damage to cultural heritage assets due to construction activities					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Temporary to permanent	Local	N/A	Possible	Low
Receptor					Sensitivity
Cultural heritage assets					Low
Significance of Impact					
Negligible					

#### Management and Mitigation

A Chance Finds Procedure should be prepared by the EPC in case of incidental archaeological discovery.

#### Residual Impact

Following implementation of mitigation measures described above, the residual impact is considered to be:

**Negligible**

### 5.6.5.2. Operation Phase

During operation there will be no excavation work or any other activities that can impact on cultural or archaeological assets.

### 5.6.5.3. Decommissioning Phase

Potential impacts to cultural heritage associated with decommissioning of the PV Plant will entail will be similar to the construction phase.

**Negligible**

### 5.6.5.4. Cumulative Impact

The project EPC shall share with the EPC of the associated facilities any newly discovered and cultural or archaeological objects discovered during construction. Given the existing landscape and known cultural heritage objects, it is unlikely that there will be a cumulative impact, and therefore is considered to be minor.

**Negligible**

## **6 Environmental and Social Management Plan**

This section provides a framework for the effective management of potential environmental and social (E&S) impacts associated with the construction and operation of the proposed 100 MW PV Project, as identified through the ESIA process that has been undertaken, providing an outline for the Environmental and Social Management and Monitoring Plan (ESMMP) for the project,

The principal purpose of an Environmental and Social Management and Monitoring Plan (ESMMP) is to provide a guide for the Project developer – LLC “Tutly Solar” (Project Owner), and its EPC, in the formulation of appropriate management systems, plans and procedures to ensure compliance with national and lender E&S requirements. The requirements set out in this section and subsequent project ESMMP should be included within contractual documentation with the relevant parties, as appropriate, to ensure there is clarity and commitment regarding contractors obligations related to E&S management of the Project.

Management of impacts and opportunities at relevant stages of the Project development should be considered in the ESMMP, from design through to mobilisation and construction and into the operational phase.

The ESMMP provides a framework for the development of a clearly defined and documented Environmental and Social Management System (ESMS) for the Project, and as such describe elements that are key to the effectiveness of this system, as listed below:

- Appointment of appropriate personnel with specific roles and responsibilities covering all aspects of E&S management of the project,
- Establishment of an Environmental, Health and Safety (EHS) training regime for all staff
- Identification of a suite of plans and procedures, providing an outline for the management of specific impact areas.

Overall the EPC Contractor is responsible for the development of an appropriate ESMS, or equivalent, for the management of E&S risks and impacts during the construction phase, meeting the requirements, standards and commitments set out in the ESMMP.

“Tutly Solar” LLC will be responsible for the management of E&S risks and impacts throughout the operation phase of this project meeting the requirements, standards and commitments set out in the ESMMP. “Tutly Solar” LLC will need to ensure that an ESMS for the management of E&S risks associated with the operation and maintenance of all their assets and infrastructure, of which this project will form part, is in place.

By following the framework presented in this section and ESMMP, the project should be able to appropriately manage impacts through the implementation of the mitigation measures identified within the ESIA for the development of the project, and monitor and report to relevant parties on its E&S performance, thereby fulfilling its E&S obligations to the relevant authorities and Lenders.

The EHSSMP will serve to provide a framework for this ESMS and will outline the various aspects of E&S management of the Project as described below:

- Roles and responsibilities of parties and individuals key to the E&S management of the project.
- Plans and procedures that are required for the effective E&S management of the project, outlining the scope of each plan, its schedule and identifying the party responsible for its production; key plans to be included are:

- Stakeholder Engagement Plan (SEP)
  - Labour and Employment Management Plan (LEMP)
  - Occupational Health & Safety Management Plan (OHSMP)
  - Biodiversity Management Plan (BMP)
  - Waste Management Plan (WMP)
  - Worker Accommodation Management Plan (WAMP)
  - Construction Traffic Management Plan (CTMP)
  - Security Management Plan.
- Monitoring and reporting processes required to ensure the appropriate implementation and efficacy of the management plans and procedures. These processes are also necessary to meet national and lender requirements as well as promoting transparency to all project stakeholders.

### 6.1 Project Participants

Environmental and Social management of the project will involve a number of parties, each assuming different levels of responsibility during the lifetime of the project. This section presents the various parties and personnel relevant to the E&S management of the project and provides an outline of the responsibilities of each.

The key parties and their overall responsibilities are described in the table below.

**Table 22 Relevant Parties and Overall Responsibilities**

Party	Overall Responsibility
Tutly Solar, LLC	<p>The owner will assume ultimate responsibility for environmental and social performance and compliance with national regulations, permitting conditions and international standards.</p> <p>Initially, the Owner shall ensure that the selected EPC Contractor has the appropriate experience and resources to adequately manage the E&amp;S risks associated with the project. The owner will then make appropriate contractual provisions with the EPC contractor, to ensure all relevant environmental and social responsibility is appropriately allocated to the contractor, and that through effective monitoring, all contracted responsibilities are upheld. This may be achieved by including the ESMMP within the EPC contract.</p> <p>The owner's project manager will ensure the provision of any E&amp;S records or reporting upon request from the lenders and the appropriate regulatory authorities (Glavgosekoexpertiza, SCEEP).</p>
EPC Contractor	<p>The EPC Contractor will be responsible for the management of any E&amp;S elements of the project impacted by EPC activities on site, as specified in its contract with the owner. As such, it will be responsible for developing and implementing an overarching project ESMS. The EPC will continually review its performance and the performance of its subcontractors in relation to the environmental and social provisions under the EPC contract.</p>
Subcontractors	<p>A number of subcontractors could be engaged by the EPC contractor in activities on site during the construction phase of the project, each of which will be required to comply with project environmental and social requirements. Contractual provision will be required through the EPC Contractor to ensure appropriate compliance. This could be achieved</p>

	by including the Environment, Health and Safety Site Management Plan (EHSSMP) within sub-contracts with EPC.
Supervision Consultant	A Supervision Consultant will be engaged by “Tutly Solar” LLC, and will have appropriate environmental and social responsibility allocated under contractual provision, for example by inclusion of the project Security Management Plan within the contract between the owner and the security contractor.
Regulatory Authorities	Glavgosekoexpertiza is the regulatory authority responsible for review of the national EIA (which takes the form of DSEI, SEI (if necessary) and SEC – see section above) and the issue of environmental authorisation. The Project will be required to comply with all mitigation / monitoring measures included in the state approved EIA, any conditions or restrictions associated with permitting, as well as any pollution limits defined by Goskompriroda during the permitting process.

**Under ESMP implementation “Tutly Solar” LLC staff will responsible for:**

- Approve all decisions regarding environmental procedures
- Approve appointments and contracts
- Stop any construction activity in contravention of the ESMMP.
- Ensure all relevant permits are in place for the construction of the project.
- the development and implementation of relevant E&S plans
- the appointment and management of HSE Supervision Consultant(s), who will undertake on-site HSE management and monitoring duties (see below).
- communicating and liaising the State Committee on Ecology and Environment Protection (SCEEP) for Samarqand Province to ensure adequate monitoring and reporting is provided.
- Review and approve EPC’s ESMS and associated Management Plans.
- Monitor the contractor’s activities for compliance with the various environmental requirements contained in the construction specification and this ESMMP
- Monitor compliance with the environmental permit as issued by SCEEP as well as other relevant environmental legislation
- Organize meetings with the EPC’s HSE Manger and the HSE Coordinators of the subcontractors and the PIU on a minimum of a monthly basis, and follow up the issues identified in these meetings
- Conduct audits of the EPC Contractor’s labour and HSE documents, reviewing training methods and records, payroll and contracts and providing quarterly audit reports.
- Record and report environmental incidents
- Attend site to provide assessment / advice outside audit cycle when required
- Review and approve environmental training programme
- Assist the EPC Contractor in finding appropriate solutions to E&S issues that may arise.

**EPC Contractor**

**Construction Manager**

The EPC’s Construction Manager has overall responsibility at site level for the implementation of the project ESMS and ensuring adherence to the ESMMP. In particular, the Construction Manager’s responsibilities will include the following:

- Ensure there is communication with the HSE Construction Manager and relevant discipline engineers on matters concerning the environment.
- Be fully knowledgeable with the contents of all relevant licences and permits, environmental legislation, contents of ESIA, ESMMP and any conditions of Environmental Authorisation.
- Ensure that no actions are taken which will harm or may indirectly cause harm to the environment, and take steps to prevent pollution on the site.
- Confine activities to the demarcated construction site

### **HSE Construction Manager**

The contractor will appoint an HSE Manager, who will liaise closely with the HSE Supervision Consultant(s) and the “Tutly Solar” LLC. The HSE Manager will provide day-to-day EHS support at the project level during the construction phase, undertaking duties that will include the following:

- Maintain day to day records and prepare Key Performance Indicators (KPI) with respect to EHS, reporting on KPIs to the HSE Supervision Consultant(s) and project manager
- Prepare the EPC’s ESMS and associated Management Plans and ensure they are in place for the start of construction activities.
- Oversee EHS training of site workers on a daily basis, keeping appropriate records
- Monitor the EHS conditions of the workers on site with respect to issues such as staff welfare, training provision, safe working practices, PPE provision and adherence to EHS policy
- Update the grievance log where appropriate
- Organise weekly meetings during construction with “Tutly Solar” responsible for E&S person and hokimiyats to understand the social related concerns and grievances.
- Ensure the proactive and effective implementation and management of environmental protection measures described in this ESMMP and other environmental and social management plans associated with the construction phase.
- Undertake daily site walk rounds and undertake weekly HSE inspections
- Ensure that the corrective actions are implemented in the event of non-compliance identified
- Record and report environmental activities on a weekly and monthly basis
- Record and report of HSE incidents.
- Conduct environmental education and awareness training on key requirements of the ESMMP, environmental safeguards, good housekeeping practices, and general aspects relating to E&S sensitivities etc.

The tables below present the potential impacts of the project and their associated mitigation measures, as identified in the ESIA. Each table corresponds to one of two main phases of the project, preconstruction / construction and operation.



**Table 14 Environmental and Social Components – Construction Phase**

Component	Issues from Project Activities	Potential Impacts	Proposed Mitigation Measures	Impact significance (post mitigation)
Air	Emission of pollutants due to combustion and exhaust emissions generated from the construction equipment, generators, vehicles and Project traffic	Ambient air quality deterioration due to pollutants emissions	Development of the CEMP which will specify appropriate measures for the management of site clearance, excavation and construction activities to minimise generation of dust, including: <ul style="list-style-type: none"> <li>• Construction activity will be located away from sensitive land areas and receptors where possible, and ensure that activities are carried out when wind direction will direct material away from these receptors.</li> <li>• Open excavation areas will be minimized.</li> <li>• Stockpiling of soil and earthen material will be minimized by proper coordination of earthworks and excavation activities (excavation, grading, compacting, etc.)</li> <li>• When there is visible dust being generated by vehicles and other activities, apply water sprinkling measures to reduce dust.</li> <li>• Reduce speeds on unpaved roads and take other measures as needed to reduce emissions if intensive fugitive dust emission occurs, until water sprinkling or other mitigation measures are put in place.</li> <li>• Design all earthworks to allow future successful re-vegetation. For stockpiles left for long periods, apply grass seed or other covers.</li> <li>• Vehicle speeds will be restricted on construction sites and access roads.</li> <li>• All construction machinery and equipment to be maintained in good working order and not left running when not in use.</li> <li>• No burning of any material anywhere on or construction sites</li> </ul>	Negligible
	Generation of dust during construction works and vehicle movement.	Ambient air quality deterioration due to dust emissions		

Component	Issues from Project Activities	Potential Impacts	Proposed Mitigation Measures	Impact significance (post mitigation)
			<ul style="list-style-type: none"> <li>• Vehicles carrying aggregate material and workings will be sheeted at all times.</li> <li>• Observe dust levels and amount of dust settling on properties near (200 m) construction sites and take action to reduce dust generation if there is excessive dust on surfaces.</li> <li>• Project workers should be protected from dust and emissions impacts, for example through requirements for the provision of dust masks when working near dust generating activities.</li> </ul>	
Soil	Excavations for foundations, backfilling and access road construction.	Disturbance of soil layer structure	<ul style="list-style-type: none"> <li>• Minimise the removal of topsoil and limit to only those areas where grading is strictly required for the tracker system</li> <li>• Removal and storage of top layer of fertile soil, followed by land re-cultivation and restoration after works implementation.</li> </ul>	Minor
	Spillage or leakage of oils and fuels from construction vehicles and other machinery, improper storage of waste oils, fuels and other chemicals and poor management of waste and wastewater at worker accommodation compounds	Contamination of soils	<ul style="list-style-type: none"> <li>• Regular maintenance of vehicles and machinery,</li> <li>• Implement good practice in use and storage of chemicals and management of wastes through measures specified in Project CEMP to be developed for the construction phase.</li> </ul>	
Hydrology	Excavations for foundations, spillage	Contamination of surface and	<ul style="list-style-type: none"> <li>• Regular maintenance of vehicles and machinery,</li> </ul>	Negligible

Component	Issues from Project Activities	Potential Impacts	Proposed Mitigation Measures	Impact significance (post mitigation)
	or leakage of oils and fuels from construction vehicles and other machinery, improper storage of waste oils, fuels and other chemicals and poor management of waste and wastewater at worker accommodation compounds	groundwater with runoff from construction sites	<ul style="list-style-type: none"> <li>Implement good practice in management of excavations, use and storage of chemicals and management of wastes through measures specified in Project CEMP to be developed for the construction phase.</li> </ul>	
Landscape and Visual	Temporary storage of construction material, machinery and temporary access roads and construction of PV plant	Temporary change to landscape and visual intrusion	<ul style="list-style-type: none"> <li>Implement good construction management and housekeeping to control activities and maintain clean working areas; this will be achieved through the development of the Project CEMP.</li> <li>Ensure continued consultation with local communities throughout the construction period.</li> </ul>	Minor (visual)
				Negligible (landscape)
Noise	Pile driving for construction Earth moving activity Movement of construction vehicles Access route construction	Noise nuisance	<ul style="list-style-type: none"> <li>Equipment maintenance, and noise emissions monitoring, managed through the development of project CEMP.</li> <li>OHS plan for protection of workers</li> <li>Temporary acoustic screening of required</li> <li>Restriction of construction activities to daytime hours and weekdays</li> </ul>	Moderate

Component	Issues from Project Activities	Potential Impacts	Proposed Mitigation Measures	Impact significance (post mitigation)
Traffic	Generation of construction traffic	Community and workforce safety and local traffic flow	<ul style="list-style-type: none"> <li>• Development of Construction Traffic Management Plan (CTMP)</li> <li>• Implement road improvements where necessary - repair or restore road network if damaged by Project vehicles</li> <li>• Training of drivers in road safety and code of conduct</li> <li>• Consideration of phasing work to ensure local access retained</li> <li>• Communicate transport routes and predicted schedule to communities</li> <li>• Identify and install all necessary warning signage on public roads</li> <li>• Set speed limits</li> <li>• Maintain vehicles and include details on inspections</li> <li>• Zero tolerance for alcohol and illegal drugs</li> <li>• Monitoring and evaluation of traffic and transport incidents</li> <li>• Coordination with local police station</li> </ul>	Moderate
Waste	General construction activities Waste generated by workforce Poor housekeeping	Visual impact of uncontained / windblown waste / litter. Impact on soil and groundwater from poor management / storage of sanitary and hazardous wastes. Attraction of vermin to food wastes.	<ul style="list-style-type: none"> <li>• Avoidance of refuelling on site to prevent oil spills. If this is not possible procedures will be developed to avoid accidental spillage, like the provision of drip trays and bunding for stores of fuel and waste chemicals</li> <li>• Dedicated and appropriate storage of broken / damaged PV panels and identification of licenced disposal facilities.</li> <li>• Responsible storage and disposal of liquid effluents such as sewage from temporary accommodation</li> <li>• Segregation, reuse and, where feasible, recycling of wastes by registered operator.</li> <li>• Good general housekeeping</li> <li>• Covering of solid waste containers to prevent windblown litter across and outside site</li> <li>• Composting of organic wastes</li> </ul>	Negligible

Component	Issues from Project Activities	Potential Impacts	Proposed Mitigation Measures	Impact significance (post mitigation)
		Unnecessary volumes sent to landfill through lack of reuse and recycling.	<ul style="list-style-type: none"> <li>• Appropriate handling and storage of hazardous waste for licensed collection for responsible disposal by registered operator.</li> </ul> <p>These measures will be managed and monitored through the development of a Waste Management Plan for construction phase.</p>	
Habitats and protected areas	<p>Removal of soil and surface vegetation for laying of tower foundations.</p> <p>Improper disposal of excavation material.</p> <p>Poor management of solid waste and waste water generated at temporary construction camps</p>	Potential negative impacts on habitats	<p>Ensure implementation of appropriate measures for the management of site clearance and excavation activities, and soil and waste management both close to the PV plant, as well as for associated infrastructure, such as worker camps, access roads etc.</p> <p>EPC to develop and implement a Biodiversity Management Plan (BMP), covering both the construction and operation phase of the project. The BMP should identify measures that will enhance the local biodiversity and monitoring requirements.</p>	Negligible
Vegetation and flora	Ground clearance at construction sites and during laying of access routes	Impact on local flora, including rare species	<ul style="list-style-type: none"> <li>• Ensure implementation of appropriate measures for the management of site clearance and excavation activities, and soil and waste management in the PV plant, as well as for associated infrastructure, such as worker camps, access roads etc.</li> <li>• Minimise clearance of vegetation to only areas that are required, and only where grading is required for the tracker system.</li> <li>• Worker awareness and training sessions in relation to protection of local flora; this may include procedure for the identification of</li> </ul>	Negligible

Component	Issues from Project Activities	Potential Impacts	Proposed Mitigation Measures	Impact significance (post mitigation)
			rare and protected species for removal under license if necessary.	
Terrestrial fauna	Construction activities involving clearing of vegetation, excavation of soils, movement of vehicles or equipment over roads and terrain, loading and unloading of materials. Poaching, intentional killing of animals.	Injury or mortality of animals	<ul style="list-style-type: none"> <li>• Include ecologist watching brief during major earthworks to oversee activities to protect impacts on Central Asian Tortoises present on the site.</li> <li>• Worker awareness and training sessions in relation to protection of local fauna.</li> <li>• Code of conduct forbidding poaching or deliberate killing of animals</li> <li>• Appropriate management</li> <li>• Ensure excavations don't become traps for animals</li> <li>• The Contractor should prepare the Biodiversity Management Plan (BMP), before earth work.</li> <li>• Ensure a gap (around 15-20 cm) is provided under the fence to allow small faunal species to continue to move across the site.</li> <li>• Ensure that design of power pylons include bird protection devices.</li> <li>• If earth works start in March, tortoises have to be collected and relocated to other sites with similar habitat conditions, at a distance of 3 to 5 km from the construction site prior to the commencement of the. Simultaneously with relocation, it is necessary to dig a trench with a depth of 0.5 - 0.7 m and a width of 0.5 m along the entire perimeter of the site. This will prevent tortoises from entering the construction area from other parts of the desert.</li> <li>• If earth works start other seasons, the special permission from State Committee on Ecology and Environment protection have to be received by Contractors.</li> </ul>	Minor

Component	Issues from Project Activities	Potential Impacts	Proposed Mitigation Measures	Impact significance (post mitigation)
Land Use	Land allocated from the Government reserve land	Impacts to livelihoods – potential loss of income	<ul style="list-style-type: none"> <li>• Ensure that all construction activities are being implemented within allocated land</li> <li>• Establish and ensure proper implementation of grievance redress mechanism</li> <li>• Maintain effective ongoing consultation with grazers in the area, including Tutly Cattle Association</li> </ul>	Minor
Employment	Employment opportunities for construction works	Increased employment opportunities - Positive impact to communities	<ul style="list-style-type: none"> <li>• A Labour and Employment Management Plan (LEMP) should be developed by the EPC to covering both national and IFC/EIB standards, establishing employment contract requirements, Worker Grievance Mechanism and strategy and targets aimed at increasing the use of local workforce, and bring positive benefits to the local communities, including:                             <ul style="list-style-type: none"> <li>– Advertising jobs locally</li> <li>– Encouraging and attracting local workforce to apply for jobs</li> <li>– Prioritising the hire of local workforce where reasonable and practical</li> <li>– Training programs</li> <li>– Monitor local workforce recruited</li> <li>–</li> </ul> </li> </ul>	Moderate positive
Human Rights	Labour rights, and health and safety of workers involved in the Project and the supply chain.	Potential for human rights abuses of project and supply chain workers	<ul style="list-style-type: none"> <li>• The Project should develop and include the following within the relevant management system and documentation:                             <ul style="list-style-type: none"> <li>– OHSMP</li> <li>– Include labour rights within relevant Project and EPC Policies, as well as the LEMP.</li> <li>– Supply chain contracts to include human rights clause requiring suppliers to acknowledge and commit to compliance with the Project’s Human Rights Policy, as well as to United</li> </ul> </li> </ul>	Minor

Component	Issues from Project Activities	Potential Impacts	Proposed Mitigation Measures	Impact significance (post mitigation)
			Nations Guiding Principles on Business and Human Rights (UNGPs).	
Worker Accommodation	Temporary accommodation constructed to house workers where exiting accommodation is not an option	Impacts to workers health safety and wellbeing. Potential impacts to local communities	<ul style="list-style-type: none"> <li>• EPC should consider and implement the followings:                             <ul style="list-style-type: none"> <li>– Minimum space allocated per person or per</li> <li>– Supply of safe water in the workers' dwelling in such quantities as to provide for all personal and household uses</li> <li>– Adequate sewage and garbage disposal systems</li> <li>– Appropriate protection against heat, cold, damp, noise, fire, and disease-carrying animals, and, in particular, insects</li> <li>– Adequate sanitary and washing facilities, ventilation, cooking and storage facilities and natural and artificial lighting</li> <li>– The suitable separation of rooms devoted to living purposes from quarters for animals</li> <li>– A separate bed for each worker</li> <li>– Separate gender accommodation</li> <li>– Adequate sanitary conveniences</li> <li>– Common dining rooms, canteens, rest and recreation rooms and health facilities, where not otherwise available in the nearest community</li> </ul> </li> </ul>	Minor
Cultural Heritage	There are no known potential objects in the Project area of cultural or archaeological significance	Potential damage to cultural or archaeological objects, which are newly discovered	<ul style="list-style-type: none"> <li>• The final design of PV plant as well as all access tracks and potential sites for temporary worker camps will avoid all known cultural and archaeological objects</li> <li>• EPC to develop and implement a Chance Finds Procedure Plan in case of incidental archaeological discovery</li> </ul>	Negligible

Component	Issues from Project Activities	Potential Impacts	Proposed Mitigation Measures	Impact significance (post mitigation)
		during construction groundworks	<ul style="list-style-type: none"> <li>The plan should ensure that any cultural heritage management work undertaken complies with the HSE Policy, national legislations, and IFI's requirements, in order to avoid all potential damages to cultural resources</li> </ul>	

**Table 15 Environmental and Social Components – Operation Phase**

Component	Issues from Project Activities	Potential Impacts	Proposed Mitigation Measures	Impact significance (post mitigation)
Landscape and Visual	Presence of PV panels	Long-term changes to the landscape. Major new visual item in the scenery for small number of local residents. Glare (and glint) caused by sunlight reflected off the PV panel arrays	<ul style="list-style-type: none"> <li>Analyse, during operation of the site, all accidents occurring on this stretch of the road and to establish whether glare could be a cause. If glare is found to be a contributory cause the screening of the site will have to be improved.</li> <li>Assess the potential of glare at the roadside and, if significant, put a screen or a low landscaped wall of local gravel along the highway or along the eastern borders of the solar power plant</li> </ul>	Moderate (visual)
				Negligible (landscape)
Physical receptors (air quality, soil, hydrology)	Occasional visits to the PV plant to undertake inspection and	Dust generation Vehicle emissions	<ul style="list-style-type: none"> <li>Maintenance vehicles will be required to follow designed access routes</li> <li>Development of the Project ESMP for the operation phase, including provision for good working practices in relation to</li> </ul>	Negligible

Component	Issues from Project Activities	Potential Impacts	Proposed Mitigation Measures	Impact significance (post mitigation)
	maintenance activities.	Fuel / oil spills from vehicles or machinery	maintenance of vehicles and machinery, use, storage and handling of chemicals	
Climate Change	N/A	Potential impact on equipment and personnel due to increase in extreme weather event	<ul style="list-style-type: none"> <li>• Ensure potential changes in climatic conditions are considered when setting the design conditions in terms of maximum and minimum temperatures, wind loading, and rain events, with drainage system and foundations of the buildings based on at least 1 in 100 year rain / flood events.</li> </ul>	Negligible
Biological receptors (including avifauna)	Occasional visits to the PV plant to undertake inspection and maintenance activities.	Impact of operation vehicles on local flora and fauna. Potential damage to flora and fauna from chemicals used during maintenance	<ul style="list-style-type: none"> <li>• Use visual bird diversion techniques similar to those applied in airports for bird diversion including large scare-eye balloons and Mylar flash tape</li> <li>• The use of aluminium-coloured frames for the PV panels was previously proposed as a mitigation measure to reduce impact on birds</li> <li>• Include gap under fence (circa 20cm) to allow the free movement of small animals across the site</li> <li>• Allow vegetation cover across the site, with native and appropriate plant species, such as low growing species that do not shade panels.</li> <li>• Ban the use of pesticides and herbicides for management of vegetation on site.</li> <li>• Maintenance vehicles will be required to follow designed access routes</li> <li>• Appropriate handling and use of chemicals</li> <li>• Worker code of conduct forbidding poaching activities</li> <li>• Development of the Project ESMP for the operation phase, including provision worker awareness and training in relation to protection of local flora and fauna.</li> </ul>	Negligible

Component	Issues from Project Activities	Potential Impacts	Proposed Mitigation Measures	Impact significance (post mitigation)
Waste	Occasional maintenance visits. Replacement of faulty, obsolete or damaged equipment.	Generation of electrical and packaging waste	<ul style="list-style-type: none"> <li>• Establish waste management system, considering possibilities for re-use of obsolete conductors and insulators or incorporation into recyclable waste streams of authorised waste contractors.</li> </ul>	Negligible
Employment	Employment opportunities for operation/maintenance works	Increased employment opportunities - Positive impact to communities	<ul style="list-style-type: none"> <li>• Implement HR policies to include local hire in the operation phase</li> <li>• Develop operation phase OHSMP.</li> <li>• Ensure appropriate employment contracts are in place for all workers that meet both national and IFC/EIB standards</li> </ul>	Minor positive

## 6.2 Monitoring and Reporting

This section presents an overview of monitoring and reporting requirements for the project, outlining the procedures for E&S inspection, auditing and reporting and describing systems to be adopted where non-compliance with E&S requirements are identified. These processes are necessary to meet the requirements of environmental authorisation and lender requirements as well as promoting transparency to all project stakeholders.

The owner, through the appointment of qualified expert auditors and inspectors and through contractual provisions made with the EPC, should ensure a thorough and comprehensive monitoring system / plan is implemented throughout the lifespan of the project.

The objectives of the project's monitoring plan are as follows:

- Ensure compliance with the applicable local and IFI's environment and social requirements and guidelines
- Ensure that regulatory standards / limits for parameters of concern are not exceeded
- Monitor changes in existing physical, chemical and biological characteristics of the environment of the Project area
- Determine whether any detected changes in environmental components are caused by the project or by other factors
- Determine the effectiveness of the mitigation measures as well as check mitigation measures are correctly implemented
- Highlight areas of concern undetected during the ESIA study and provide a basis for recommending additional mitigation measures
- Ensure ESMMP's actions are appropriately addressed.

### Health & Safety

The construction activities usually require careful approach and appropriate safety procedures, including:

- Risk Assessment
- Personal Safety
- Site Safety and Security
- Ground Excavation
- Final Clean Up.

A H&S risk assessment based approach should be taken during the construction phase to manage H&S risks to workers. This would involve assessing all the various risks that are involved in each aspect of the job and educating workers on how to manage these risks. The people working around the area should also be warned of the risk involved i.e. warning signs shall be erected for people to see clearly.

All staff, workmen, supplier and sub-contractor working on site should be informed on the need to ensure his/her personal safety and the safety of the people working around him. Every worker will be instructed to always put on personal protective equipment (PPE) whilst on site.

Perimeter fencing will be installed, and appropriate warning signs will be erected and checked each day.

## 7 Stakeholders Engagement and Public Consultation

The public consultation chapter provides information about the key consultation and community engagement activities and their outcomes, in addition to outlining the key aspects to be addressed when holding the consultation activities.

IFIs and national authorities consider stakeholder engagement as an essential part of good business practices and corporate citizenship, and a way of improving the quality of projects. In particular, effective community engagement is central to the successful management of risks and impacts on communities affected by projects, as well as central to achieving enhanced community benefits.

Stakeholder engagement is an ongoing process involving (i) the client's public disclosure of appropriate information so as to enable meaningful consultation with stakeholders, (ii) meaningful consultation with potentially affected parties, and (iii) a procedure or policy by which people can make comments or complaints. This process should begin at the earliest stage of project planning and continue throughout the life of the project.

### 7.2 National legal requirements for stakeholder engagement (Public Consultation)

The Constitution of the Republic of Uzbekistan (arts. 50.55) lays the foundation for the participation of citizens and public associations in environmental management. Law of the Republic of Uzbekistan of 09.12.1992. (updated on 18.04.2018) "On nature protection" in Articles 12-13 regulates the right of citizens to unite in public organizations for nature protection, to request and receive information about the state of the environment and measures taken for its protection, as well as the authority of NGOs established. Legislation in the field of ecology and environmental protection provides for public participation as a) an individual citizen or a group of citizens; b) through citizens' self-governance bodies and c) through non-governmental non-profit organizations.

Direct participation of non-commercial environmental protection organizations is envisaged in the course of EE of documentation for construction of new and reconstruction of existing facilities for management purposes. In particular, Article 27 of the Law of the Republic of Uzbekistan "On Nature Protection". The SEE law enables NGOs and citizens to carry out public EE in any area of activity that needs to be justified by independent groups of specialists at the initiative of the NGOs themselves and at their own expense or on a voluntary basis. The public expertise may be carried out independently of the state ecological expertise. It is prohibited to hinder the implementation of public EE. It is established that the conclusion of the public EE is of a recommendatory nature.

In addition, during the SEE of the organization-customers of its implementation are obliged to publish an announcement of the state environmental impact assessment and information on its results in the media, in cases where the authorized bodies include the object of construction in the list of important objects. This is required only for Category I and II projects.

## **7.3 International legal requirements for stakeholder engagement (Public Consultation)**

### **7.3.1 WB Environmental and Social Framework (2018)**

This Environmental and Social Standard (ESS) # 10 recognizes the importance of open and transparent engagement between the Borrower and project stakeholders as an essential element of good international practice. Effective stakeholder engagement can improve the environmental and social sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and implementation.

Stakeholder engagement is an inclusive process conducted throughout the project life cycle. Where properly designed and implemented, it supports the development of strong, constructive and responsive relationships that are important for successful management of a project's environmental and social risks. Stakeholder engagement is most effective when initiated at an early stage of the project development process, and is an integral part of early project decisions and the assessment, management and monitoring of the project's environmental and social risks and impacts.

### **7.3.2 IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts**

Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts states the following requirements:

Stakeholder engagement is the basis for building strong, constructive, and responsive relationships that are essential for the successful management of a project's environmental and social impacts.

Stakeholder engagement is an ongoing process that may involve, in varying degrees, the following elements: stakeholder analysis and planning, disclosure and dissemination of information, consultation and participation, grievance mechanism, and ongoing reporting to Affected Communities. The nature, frequency, and level of effort of stakeholder engagement may vary considerably and will be commensurate with the project's risks and adverse impacts, and the project's phase of development.

Clients should identify the range of stakeholders that may be interested in their actions and consider how external communications might facilitate a dialog with all stakeholders. Where projects involve specifically identified physical elements, aspects and/or facilities that are likely to generate adverse environmental and social impacts to Affected Communities the client will identify the Affected Communities and will meet the relevant requirements.

The client will develop and implement a Stakeholder Engagement Plan that is scaled to the project risks and impacts and development stage, and be tailored to the characteristics and interests of the Affected Communities.

Where applicable, the Stakeholder Engagement Plan will include differentiated measures to allow the effective participation of those identified as disadvantaged or vulnerable. When the stakeholder engagement process depends substantially on community representatives, the client will make every reasonable effort to verify that such persons do in fact represent the views of Affected Communities and that they can be relied upon to faithfully communicate the results of consultations to their constituents.



### **7.3.3 EIB Standard 10: Stakeholder Engagement**

Environmental and Social Handbook (2013), which represents the Bank statement/policy on Environmental and Social Principles and Standards including the Environmental and Social Standard - ESS 10: Stakeholders Engagement, that outlines a systematic approach to stakeholder engagement that the Sponsor is expected to build and maintain by way of constructive relationship with relevant stakeholders; stakeholder engagement is a iterative process that involves stakeholder analysis and engagement planning, time disclosure and dissemination of/access to information, public consultation and stakeholder participation, and a mechanism ensuring access to grievance and remedy.

The requirements of stakeholder engagement under EIB standards are similar and in line with IFC PS1, discussed above.

### **7.3.4 ADB Safeguards Policy Statement**

ADB is committed to working with borrowers/clients to put meaningful consultation processes into practice. For policy application, meaningful consultation is a process that (i) begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle; (ii) provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people; (iii) is undertaken in an atmosphere free of intimidation or coercion; (iv) is gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups; and (v) enables the incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues. ADB will require borrowers/clients to engage with communities, groups, or people affected by proposed projects, and with civil society through information disclosure, consultation, and informed participation in a manner commensurate with the risks to and impacts on affected communities. For projects with significant adverse environmental, involuntary resettlement, or Indigenous Peoples impacts, ADB project teams will participate in consultation activities to understand the concerns of affected people and ensure that such concerns are addressed in project design and safeguard plans.

## **7.4 Stakeholder Engagement: objectives and methodology**

The objective of the Stakeholder Engagement is to ensure safe and successful Project delivery by:

- Informing stakeholders, including persons or groups who are directly or indirectly affected by a project, as well as those who may have interests in a project and/or the ability to influence its outcome, either positively or negatively;
- listening to their comments, ideas and concerns and recording the same for follow up;
- Avoiding conflict by addressing impacts and issues raised by stakeholders promptly particularly with the communities that will not be served by the project;
- Ensuring that fears and anxieties about the nature, scale and impact of the operation have been properly considered in the development and management of the Project;
- Accessing and making good use of existing local knowledge of the area;
- Avoiding any misconceptions about the project and properly manage expectations;
- Communicating and implementing a viable community feedback mechanism.

Multi-dimensional consultation activities were adopted to make the marginalized, voiceless, youth and women to gain information about the project. As well as, the team managed to collect information about community concerns regarding the project during various implementation phases.

In order to apply comprehensive and meaningful stakeholder engagement activities, the Consultant visited the project area several times. The stakeholders' meetings were conducted in the project site with local population, with specialists located in Samarqand province and various agencies located in Tashkent city.

The official public consultation was conducted for the population of Tutly settlement. The presentation about the project, its social and environmental impacts was done in local language. Information shared with the community was simplified and photos were added in order to visualize the project to illiterate groups.

#### 7.4.1 Stakeholders Identification

For the purposes of this Project, a stakeholder is defined as “any individual or group who is potentially affected by the Project or who has an interest in the Project and its potential impacts”. The objective of stakeholder identification is therefore to establish which organizations and individuals may be directly or indirectly affected (positively and negatively), or have an interest in the Project. Stakeholder identification is an on-going process, requiring regular review and updating as the Project proceeds. Below is a summary of the different Project stakeholders. A full list of stakeholders will be developed in the SEP

**Table 16 Identified Project Stakeholders**

Stakeholders and Types	Connections to the Project
<b>Government</b>	
Ministry of Energy	Main managing institution
National Electric Networks	Implementation agency
Ministry of Labour and Social Security	Dealing with labour protection and OHS issues
Ministry of Health	Data on health issue will be collected from the agencies
Ministry of Culture	Working with archaeological and cultural heritages
State Committee of the Republic of Uzbekistan on Ecology and Environmental Protection	Will issue the environmental permission for construction through revision of national EIA
The State Committee of the Republic of Uzbekistan on Land Resources, Geodesy, Cartography and State Cadastre	Will be directly involved into land acquisition activities.

Samarqand Province Khokimiyat	Province where project will be implemented
<b>Communities</b>	
"Tutly" Makhalla Administration (Rural Citizen Authority)	Located in 1.5 km from the project site and could be impacted by the project activities
Bird protection society	Assist to evaluate project impact on birds in the project area
Private Sector	
"Tutli Qorakul Zamini" LLC – karakul sheep breeding company	Use the territory of the project site as pasture
Beekeepers	Use the project territory during flowering season

#### 7.4.2 Public Consultation

During the ESIA Phase, there has been further engagement, mainly through public consultation and meetings at the community level. Public Consultation Meetings were held in Samarqand Province in Tutly town, Nurabad District, Samarkand Province settlement on December 21, 2019. Total 39 participants attended the meeting. The announcement on planning consultation were distributed among stakeholders and population of Tutly settlement through Head of Makhalla Tutly (Appendixes 4,5).

The purpose of these meetings was to introduce the project to the makhallas and community members. The meetings explained the project activities, the ESIA process, as well as the predicted impacts identified in the ESIA. The meetings sought not only views and opinions on the project and its activities, but also to elicit ideas for potential mitigation measures if possible and to explain the grievance mechanism.

The Meeting Agenda included 2 presentations, as follows:

- Project description and Environmental Impact and Mitigation, made by Sergey Kim –Environment Specialist; and
- Land Acquisition and Resettlement Issues under this project made by Mamanbek Reimov – Resettlement Specialist.

After the presentations, which took about 40 minutes, participants were given time for questions and discussions; on average one meeting lasted about 1 hour.

Following the meetings, the E&S consulting team used the opportunity to meet informally with community members to collect further socio-economic baseline data where possible.

Meeting attendance records and photos from the ESIA engagement can be found in Appendix 4 and 5; below is a summary of the meetings held.

**Table 17 Brief Summary of the Public Consultation**

Questions/Comments	Response
Will Project hire workers from local community for construction and operations phases?	Construction works will be implemented by EPC. They will hire workers. However, we will recommend to hire for non-skilled works labour from local communities
What percentage of the workforce will Total hire from the local community to work on the site? Or How many people will hire by Total?	The detail design will show how many workers will be needed during the construction period. For now it's not clear how many staff in total will be hired from the local makhalla
What kind of impacts will occur during the construction works?	As PPT showed the main impact from the construction we are expecting 1. Dust; 2. Increasing of Transport traffic  ESIA provides mitigation measures to minimize this impact.
As we understood, main impact will be during construction phase, correct? During operation phase PV will not have any impacts	Yes you are correct, during operation phase the impacts will be very negligible
Contractors will provide some help (charity) to Makhalla?	We don't know now. The main help to local community will be potential work places. Besides this, the project will improve access road which is used by local community as well.
The road condition is not good, after construction works road could be deteriorated. Will the project repair road?	First, EPC will improve the road quality to make sure that road is suitable for transportation of PV materials and equipment.  After works completion the EPC will be required to repair road
Will new PV plant connected to our settlement? We often have shortage of the electricity	At this stage we couldn't answer on this questions, since detail design is not ready yet. It will be clarified after hiring EPC.

#### 7.4.3 Grievance Redress Mechanism

Grievances are any complaints or suggestions about the way a project is being implemented. They may take the form of specific complaints for damages / injury, concerns about routine Project activities, or perceived incidents or impacts. Identifying and responding to grievances



supports the development of positive relationships between projects and the communities, and other stakeholders they may affect. Grievance mechanisms therefore provide a formal and ongoing avenue for stakeholders to engage with the company, whilst the monitoring of grievances provides signals of any escalating conflicts or disputes.

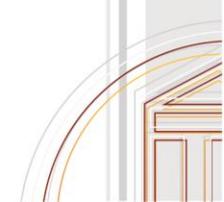
Participation in the grievance mechanism is voluntary, anonymous (where required) and free. The grievance mechanism shall not impede access to the country’s judicial or administrative remedies. An affected person can approach a court of law at any time and independent of the project level grievance redress process. Along with the IFIs requirements on development and approval of grievance mechanism by implementation of investment projects, grievance redress procedure in Uzbekistan is also regulated by the national legislation of Republic of Uzbekistan, in particular by the law “On Citizens’ Applications” and the “Law on the order of submission of appeals of physical and legal entities” (#378, 03 December 2014). According to the “Law on the order of submission of appeals of physical and legal entities”, the application or complaint shall be considered within fifteen days from the date of receipt in the state authority, which is obliged to resolve the issue on the merits, as well as require additional study and (or) check, a request for additional documents - up to one month. The submission procedure for grievances and citizens’ applications has been discussed during the public consultations in the project districts.

The grievance mechanism for the Project takes into account the national legislation, as well as IFIs. The Affected Persons (APs) will have the right to file complaints and queries on any aspect related to PV construction activities and further operation. The owner of the company LLC “Tutly Solar” Implementation Agency – IA) will be responsible for establishment of Grievance Mechanism (GM) and act as the GM secretary to make sure that the GM is operational to effectively handle environmental and social concerns of project affected persons. The proposing GM was discussed with LLC “Tutly Solar” it was presented during the public consultations in Tutly settlement on 21 December 2019. LLC “Tutly Solar” will ensure that grievances and complaints on any aspect of environmental or social issues that may arise, are addressed in a timely and satisfactory manner.

All possible avenues are made available to the APs to resolve their grievances at the project level. Under the proposed project level grievance mechanism, affected households may appeal any decision, practice or activity connected with the assessment or valuation of land or other assets, acquisition and compensation. APs will be made aware of the procedures they can follow to seek redress, including, if necessary resort to the courts through the Government’s grievance mechanism. The project GM will be disseminated via the final leaflet that will be distributed to affected households through the makhalla or village assembly of citizens or farmers councils during the disclosure consultations.

**Table 18 Grievance Mechanism**

Level/Steps	Process
Level 1- local makhalla committee, working office of Contractor and	The aggrieved person applies directly to local makhalla committee or working office of the LLC “Tutly Solar” (IA). Designated officer of IA will be in charge of receiving and registration of complaints and IA will collect information about received complaints from makhalla committee and also from the EPS offices, on weekly basis.



<p>project districts Tutly makhalla</p>	<p>After registration of received complaints, IA's designated specialist will review nature/specificity of the complaint and will forward it to relevant party for resolving. In parallel, IA's designated specialist will inform IA's office in Tashkent about received complaint and further actions undertaken for its solution. Depending on nature of complaint it may go to Contractor, Makhalla or district branch of Nature Protection Committee. At this level, the complaint should be resolved during 2 weeks.</p>
<p>Level 2 – IA's office in Tashkent</p>	<p>If the grievance is not closed out at Level 1, or the applicant is not satisfied with the decision made/solution, they can submit the grievance directly to IA office in Tashkent. In accordance with established procedure, the IA office in Tashkent will review the complaint and will forward complaints to respective department for review and decisions.</p> <p>If the complaint requires more time and resources for investigation and resolution, the IA's office in Tashkent may establish complaint handling team with the following members: representatives from IA's office in Tashkent, district kokimiyat: makhalla or village assembly of Citizens or/and farmer's councils, or/and women association. All complaints will be resolved in 15 days, and in case additional details are required, a maximum of 30 days will be allowed to resolve and close the complaint, with prior notification of complainant.</p>
<p>Level 3- Economic Court</p>	<p>If the issue has not been resolved at Level 2, or the applicant is dissatisfied with the decision/resolution, the aggrieved person may submit their grievance to the Economic Court (Court of Law) where a decision will be made in accordance with relevant national legislation. However, it should be noted that affected people can approach the court of law at any time during the grievance redressed process independent of the grievance mechanism process, and the grievance mechanism should not impede access to the country's judicial or administrative redress.</p>

Typically, most grievances related to land acquisition and displacement issues are redressed at Levels 1-2. All grievances received for the Project will be registered in a logbook which should be available at: the site office of the EPC; and the makhalla committee of Tutly makhalla office. The LLC "Tutly Solar" will collect all grievances from the Project site to record and oversee resolution. Figure 42 below represents the grievance process.

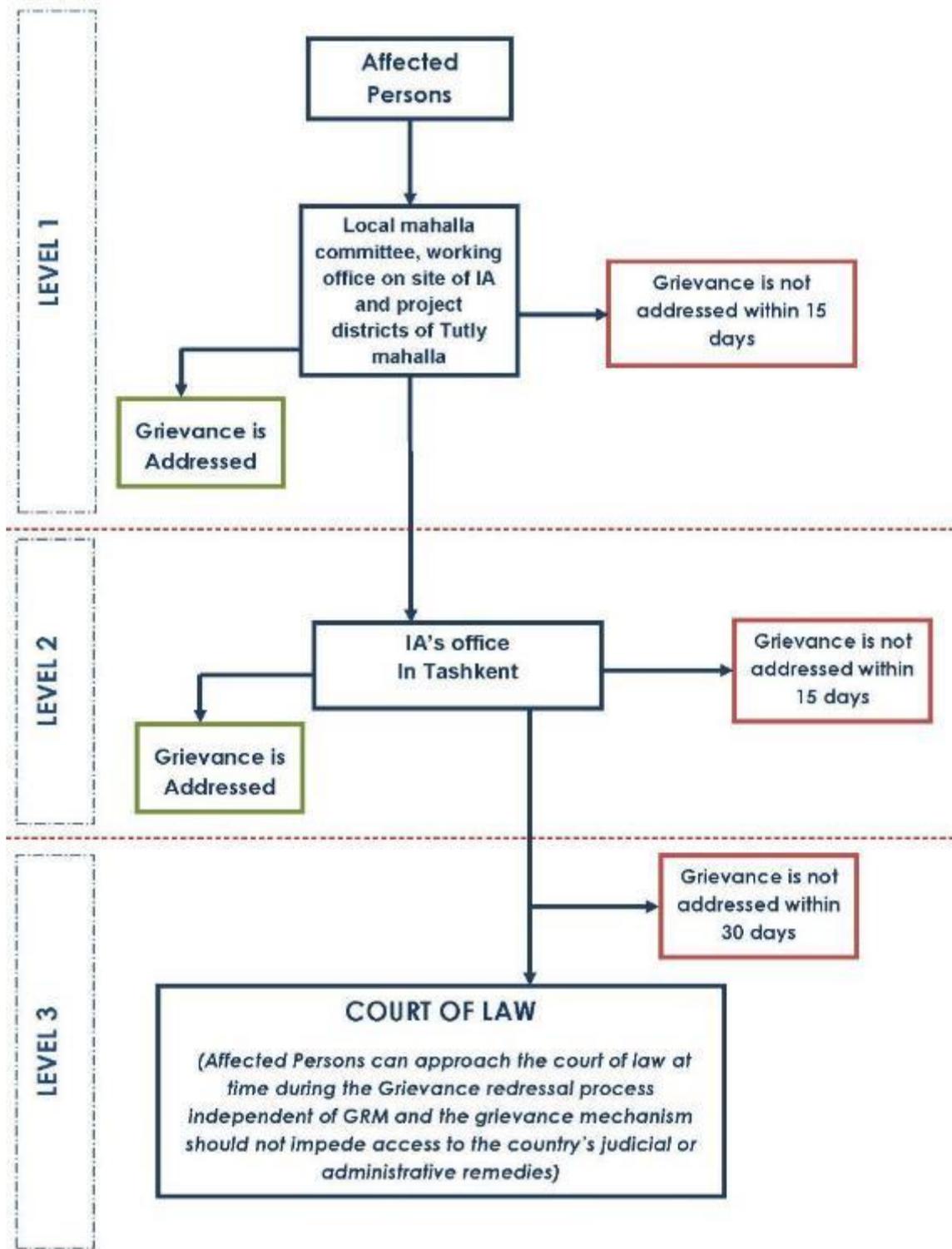


Figure 42 Scheme of grievance redress mechanism

## 8 Conclusions

The ESIA and its consultations established that there are no major impacts, and that those with somewhat moderate impacts can be successfully managed through effective implementation of specific management measures. Overall it is considered that following implementation of the identified mitigation measures the proposed Project will have a minor environmental and social impact. Based on this ESIA an ESMMP and ESMS will be developed for the Project, based on the recommendations within the ESIA, comments of the State Committee of the Republic of Uzbekistan on Ecology and Environmental Protection and any requirements identified by further studies relating the Project and its potential impacts.

The ESIA sought to establish a baseline that describes an environmental and social context for the project, and where possible a benchmark for which the effectiveness of the mitigation measures can be monitored and evaluated against.

The ESIA has identified and assessed the following potential key impacts:

- **Biodiversity:** The project site is located in the Important Bird and Biodiversity Area (IBA) of Karnabchul Steppe, however, it is outside of national protected areas, and occupies less than 0.2% of the IBA area. Furthermore, considering current intensive grazing occurring this area does not have significant value for much of the typical bird species that occur in the IBA. Pastures in the project area and environs were greatly degraded as a result of overgrazing. The species composition of the vegetation is very poor. Only typical steppe species of wildlife are represented in the study area. However, the Central Asian tortoise, a vulnerable species listed in the national and international Red Books, was found extensively within the Project area. The impact on this species is considered moderate but acceptable as under the worst-case scenario less than 0.001% of population size will be affected (in local scale and much less landscape and national wide scale) and therefore construction activity will not impact on tortoises' population sustainability. In order to mitigate this and other potential impacts on local biodiversity the Project will develop and implement a comprehensive Biodiversity Management Plan (BMP) with the overall aim of ensuring that Project achieves a net benefit to local ecology,
- **Land acquisition:** The Project will not require the acquisition of land from individuals or local community bodies, for its activities, and the site is located on reserve lands belonging to the Government. There are no private residences or dekhans/ small farms present within the Project area and therefore there will be no physical resettlement. The site is currently used as pasture, however the total available land for grazing livestock is around 52,000 ha and therefore the acquisition of 350 ha (0.7%) is not considered to present a significant impact on grazing activities. This was confirmed during consultations with beekeepers and shepherds who confirmed that this will not impact on their activities or income.
- **Consultation:** Consultation meetings have been held with local communities, makhalla heads, and local and national government bodies. Their comments have been taken into consideration in the drafting of this ESIA and generally all stakeholders have been supportive to the Project. A stakeholder engagement plan and grievance mechanism has been developed and will be implemented throughout the lifetime of the Project.
- **Employment:** There will be some employment opportunities during construction and limited opportunities during operation. The Project will develop and implement a Labour and Employment Management Plan (LEMP) and HR policies that include

measures aimed at increasing the use of local workforce, and bring positive benefits to the local communities.

- **Worker Accommodation:** Where possible, the EPC will use local labour, who will reside in their own homes, and for non-locals will seek to house these workers in nearby settlements. Where existing accommodation is not an option, the EPC will use temporary camps for the workers. The Project will implement a Worker Accommodation Management Plan (WAMP) that aligns with EBRD / IFC's 'Workers' Accommodation Processes and Standards Guidance Note'.

The findings of this ESIA indicate that the construction and operation of the proposed Project can be considered as justified because:

- Environmental issues related to all stages of the life cycle of the proposed Project are identified and taken into account
- The assessment of the environmental and social impacts is based on best available information and consideration of cumulative impacts
- The identified likely impacts can be prevented, reduced or compensated to acceptable levels and, therefore, the proposed project is not a threat for adverse or irreversible damage to the natural and social environment in the Project area.
- The proposed Project will not cause significant impacts on biodiversity and ecological integrity of the area.

In conclusion the Project will bring a net benefit to Uzbekistan by supporting the decarbonisation of the electricity supply and increasing the reliability of electricity supply for the local businesses and population, whilst not having a significant detrimental impact to the local ecology or society. The Project will also lead to local employment opportunities and lead to knowledge transfer and training in the construction of solar PV projects, as well as operation and maintenance.

The Company, Lenders as well as Competent Authorities of Uzbekistan will monitor the implementation of the Project. A formal grievance mechanism will also allow for stakeholder engagement and feedback to ensure that the Project is developed as planned and E&S impacts mitigated.

## 9 Appendixes

### Appendix 1 Baseline information

- 1.1. Evaluation of possible negative effects to Important Bird and Biodiversity Area , May, 2019

#### “Solar Energy Development Project in Tutly, Uzbekistan”

Evaluation of possible negative effects to Important Bird and Biodiversity Area (IBA) of Karnabchul Steppe (UZ018)



**May 2019**

Submitted by



Sake Technology Advisers

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## 1. Project Area. Brief Description

The solar plant project is situated nearby Tutly village in Samarkand province, 45 km south of Navoi. The population of Tutly is approximately 2,000 habitants. Tutly main economic activities correspond to primary sector, specially livestock and agriculture, as well as construction sector. Tutly location is shown in Figure 1-1:



Figure 1.1: Tutly Location.

The solar plant project comprises a reserved area of 600 ha, located to the east of Tutly at around 1.5 km of distance. A paved road is situated at 70 meters to the nearest project area location, which is crossed by two dirt roads with low car traffic density. Solar plant project area is shown in Figure 1-2.



Figure 1.2: Solar plant project area.



The project area is dominated by semi-arid steppe vegetation, characterized by grassland and shrubs like *Salsola*, *Astragalus* or *Artemisia* genus. The area showed a good vegetation coverage with good conditions during the site visit since rainy season was not finished. Dry season starts in the upcoming weeks and it will start to dry vegetation as evidenced in some grass species during the visit.

The project area is used for livestock grazing purposes (mainly sheep and goats) due to its proximity to the village and as a shortcut to distant feeding areas. No signs of overgrazing were observed since there was plenty of vegetation in the steppe. There is a total area of 52,000 ha in Tutly available for grazing for a total of 40,000 heads of cattle and sheep<sup>1</sup>. Nearly half of the cattle owners (27 out of 50) are associated to the Tutly Cattle Association.



Figure 1-3: Axabic sheep and goats grazing in the solar project area.

Project area is also used for transhumant apiary activities during the flowering period of the steppe, lasting for around two months per year (usually in April-May period). Two beekeepers were installed at the project area during the visit, as it can be observed in Figure 1-4.

<sup>1</sup> Information was provided by Ravshan Suyanov, Director of the "Tutli Qorakul Zamin" LLC working on breeding in the project area



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Figure 1-4: Aply activity in the project area.

The project area is located inside an IBA (Important Bird and Biodiversity Area). IBA is a not official protection figure created by the BirdLife International, a nonprofit organization devoted to bird conservation. However, IBAs are considered as areas that should be protected by many countries and international institutions as an important tool for wildlife conservation and sustainable development.

Representative wildlife of the area is dominated by larks, sandgrouses, bee eaters, raptors and houbaras in the group of the birds. The area is occupied by a threatened species called MacQueen's bustard (*Chlamydotis macqueeni*), present as a migrant or dispersed bird from the vicinity breeding population area located west of Tutly (Bukhara area).

Other groups of animals present in the zone are foxes, hares and ground squirrels (mammals) and steppe tortoises. Steppe tortoises (*Testudo horsfieldii*) is a threatened species.



## 2. Protected Areas

The project area is included in one of the 52 existing IBAs of Uzbekistan, named Karnabchul Steppe (UZ018), with a total surface of 177,156 ha. The IBA location is represented in Figure 2-1:

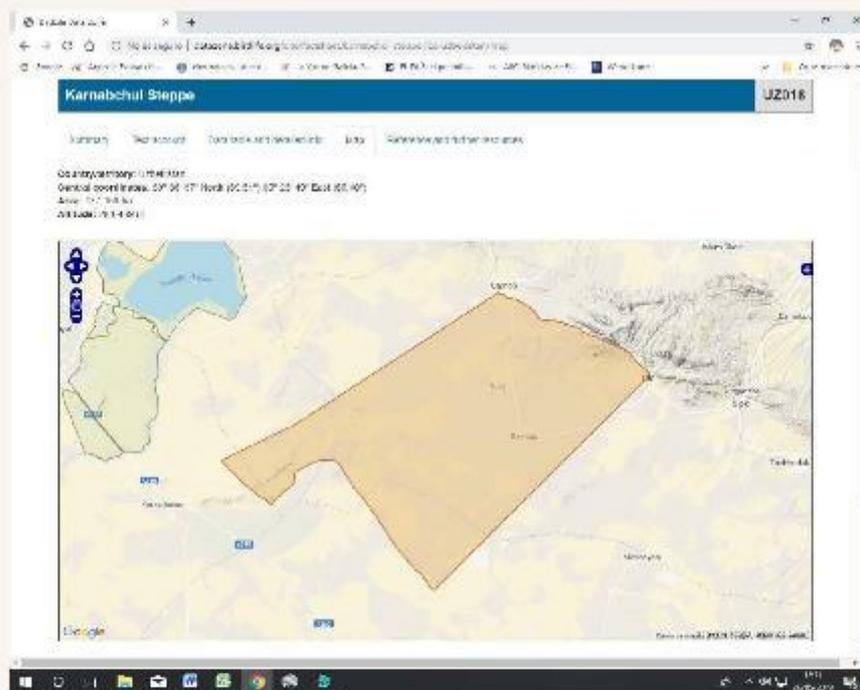


Figure 2-1: Karnabchul Steppe (UZ018) IBA. Source: BirdLife International, 2019, Important Bird Areas factsheet: Karnabchul Steppe.

Figure 2-2 shows that the project area is fully enclosed within the Karnabchul Steppe IBA.



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Figure 2-2 Plot location inside the Karnabchul Steppe IBA. Source: Authors, based on Google Earth, Digital Globe

BirdLife provides an IBA Criteria based on quantitative ornithological data. The IBA criteria is defined as a measurable way to "ensure that the sites selected as IBA have true significance for the international conservation of bird populations, and provide a common currency that all IBAs adhere to, thus creating consistency among, and enabling comparability between, sites at national, continental and global levels". The IBAs Criteria for Karnabchul Steppe (UZ018) are A1, A3 and A4 (2006) and their description is as follows:

- A1: Presence of globally threatened species (IUCN categories Critically Endangered, Endangered or Vulnerable). If the species present is considered Vulnerable, BirdLife International considers that "the presence of more than threshold number at a site is necessary to trigger selection".
- A3: Biome restricted species. The site is known or thought to hold a significant component of the group of species whose distributions are largely or wholly confined to one biome.
- A4. Congregations. The site is known or thought to hold congregations of  $\geq 1\%$  of the global population of one or more species on a regular or predictable basis.

BirdLife International provides the following description of Karnabchul Steppe IBA<sup>2</sup>:

"...The IBA is situated 30 km south of the city of Navoi. Karnabchul is a foothill plain of the Zeravshan ridge, which stretches southwards from Zirabulak and Ziyadin mountains. A mountain stream arising in the Zirabulak Mountains crosses the area; the latter is cut with shallow scours, rivelets, and drying beds of temporary

<sup>2</sup> BirdLife International Important Bird Areas factsheet: Karnabchul Steppe. Available online: <http://datazone.birdlife.org/site/factsheet/karnabchul-steppe-bz-uzbekistan>

streams abounding with small pebbles and crushed stone. There are also salt-marsh depressions and takyrs deprived of any vegetation, and a huge salt marsh named Shorsai. The soil surface mainly consists of loamy-sand and loamy small crushed-stone desert sierozem and gray-brown gypsum soils showing varying levels of salinity...”

The project area has not rivers or streams neither salt-marsh depressions, and is characterized by sandy soils covered by shrubs and grasslands. Since IBA Criteria is only applied for waterbird concentrations or migrant bird concentrations not corresponding to Karnabchul Steppe, the only criteria to be taken into account are A1 and A3.

About the avifauna the Bird life description for Karnabchul Steppe says:

“...The avifauna consists of 90 species, including 51 nesting species. A large number of species use this area for resting and feeding during migration. The most diverse are waterbirds, with 38 species noted - 11 species are Anseriformes; 13 shorebirds; 4 gulls and terns; 4 Rallidae; 5 Ciconiiformes and 2 species of crane. Five species are included in the IUCN Red Data Book: *Falco cherrug*, *Falco naumanni*, *Aegypius monachus*, *Circus macrourus* and *Chlamydotis undulata*. In addition, *Aquila chrysaetos*, *Hieraaetus pennatus*, *Circus gallicus* and *Pterocles alchata* are included in the Red Data Book of Uzbekistan. It is important to emphasize the key role of this site for the protection of *Chlamydotis undulata*. The number in Karnabchul reaches several dozen during the nesting period.

*Non-bird biodiversity: Twenty-seven mammals inhabit the area. The main species are rodents - Citellus fulvus, Spermophilopsis leptodactylus, Allactaga sewertzovi, Allactaga elater, Dipus sagitta, Rattus turkestanicus, Mus musculus, Rhombomys opimus, Meriones leuducus, Ellobius talpinus, Cricetulus migratorius. Also recorded are Lepus tolai, Vulpes corsac, Felis libyca, Vormela peregusna, Crocidura suaveoleus, Erinaceus auritus and Pipistrellus pipistrellus. Reptiles: Teratoscincus scincus, Gemnadactillus bedtschenkoi, Agama sanguinolenta, Phrynocephalus helioscopus, Phrynocephalus interscapularis, Varanus griseus, Eremias lineolata, Eremias grammica, Eryx tataricus, Taphrometapon lineolatum, Coluber karelini, Coluber tyria, Naja oxiana, and Testudo horsfieldi. Two species are included in the IUCN Red List (Varanus griseus and Testudo horsfieldi). Amphibians are represented by two species: Bufo viridis and Rana ridibunda. The vegetation cover is mainly comprised of wormwood and ephemeral formations. The dominant species are Artemisia diffusa, Carex pachystylis and Poo bulbosa...”*

As discussed above, only typical steppe species of wildlife are represented in the study area. Considering current land use (intense cattle grazing and high human disturbances due to cattle use and proximity to the village of Tutly), makes that this area has not a remarkable value for much of the typical bird species that occur in the IBA.

On the other hand, Uzbekistan government has created three protected areas – State Sanctuaries<sup>1</sup> – in these steppes, and they are currently managed by the State Committee for Ecology and Environment Protection. The State Sanctuaries share common land locations with Karnabchul Steppe (UZ018) IBA, and they constitute a total protected area of around 285,000 ha. The creation of the State Sanctuaries was mainly devoted to houbara protection. The State Sanctuaries are the following:

- Nurabad State Sanctuary; Protected since 1992. Protected area: 40,000 ha. It was created to protect the entire natural desert complex and specially houbara population. The reserve fosters a small houbara breeding population and it is also important during houbara migrations.

<sup>1</sup> State sanctuaries are equivalent to category IV in accordance with IUCN

- Mubareksky State Sanctuary: Protected since 1998. Protected area: 219,534 ha. It was created to protect houbara population, their habitats and other wildlife. The area is described as an important area for houbara breeding and during bird migrations. The main value of the reserve is protection of the houbara population and the steppe natural complex, including a large number of tortoises settled in the reserve.
- Karnabchul State Sanctuary: Protected since 1998. Protected area: 25,000 ha. The purpose of its creation is houbara protection. There is a small breeding population and the whole area is important during dispersion and migration. Karnabchul State Reserve is located close to Tutly, but its eastern boundary is located kilometres away from the village in west direction (opposite to solar project location).

The protected area determined by the State Sanctuaries are considered as the actual areas that are important for the houbara breeding population and for the migrant and dispersed populations. Areas declared by a Government as protected areas are usually prioritized over the IBAs.

Tutly area is not included inside the State Sanctuaries, so it has a lower conservation value for MachQueen's bustard than the area included inside the State Sanctuaries. Furthermore, the conditions found in Tutly are not the best for the species: breeding houbara population avoids human disturbances and land used intensively by livestock.



### 3. Fieldwork Survey

A three-day fieldwork survey was conducted in the project area (May 14<sup>th</sup> to May 16<sup>th</sup>, 2019). The objective was to evaluate *in situ* the potential impacts of the project to protected fauna, especially to houbara population.

#### 3.1. Methodology

The existing wildlife and the potential impacts of the solar project has been evaluated according to the following actions:

- Interviews with shepherds in order to obtain information about wildlife of the project area,
- fieldwork surveys to determine wildlife that inhabits the area, focused on houbara detection. These surveys also allow to obtain information of other important species -if present- in the study area. Two different methods, used commonly for houbara census (Koshkin et al, 2016), were followed to detect the existing fauna:

- Observational spots located at elevated points to detect wildlife using binoculars 10x and terrestrial scope 20-60x. Selected time: close to dawn (from dawn until 3 hours after) or dusk (in between dusk and two hours before).

The observational spots are used to detect houbaras or other species during their most active periods, when they can be easily detected (close to dawn or dusk). Observational spots should allow to detect any existing houbara inside a radio of at least 500-600 metres.

- Transect walks: Controlled walks were carried out by two Experts, separated 10 metres and moving together to cover the study area.

Solar project area, corresponding to 600 ha square land (2.5 x 2.5 km) was divided in four square grids of 150 ha (1.25 km x 1.25 km). Transect walks took at least one hour per grid. All the species observed were recorded.

The fieldwork survey methods used in the project area are represented in Figure 3-1.



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Figure 3-1: Study area. Square grid subdivisions (1.25 x 1.25 km) are represented using red lines, and the grid number is represented using red numbers. Observational spots are represented using white circles and transect walks are represented using blue lines. The red point represents the location where the houbara was observed.

### 3.2. Interviews with shepherds

The Experts interviewed four shepherds using a bird field guide to show them the important species and determine if they recognize them. Interviews were made in Uzbek language and later translated into English by local Experts.



Figure 3-2: Indoor interview with one of the shepherds.

All interviewed shepherds seemed to have a low level of knowledge of bird species, but all of them recognized houbaras. They claimed that they had never seen houbaras around Tutly, but all of them replied that there are houbaras in the Bukhara region, to the west of Tutly. None of them recognized the great bustard (that probably has a rare presence during migration) or vultures, except Egyptian vulture that was considered by three of them as rare. None of them were aware of big eagles (golden or imperial eagle, steppe eagle) neither social plover, another endangered species could be found occasionally in this steppe.

Regarding mammals, all of them consider the fox as common species and they claimed that jackals are also occasionally found, but mainly to the west of Tutly, in the Bukhara region.

Regarding tortoises, all of them considered tortoises as very common in the project area and all around Tutly steppe.



Figure 3-3: Field interview with one of the shepherds.

### 3.3. Observational spots

Five observational spots were selected, corresponding to the four corners of the project area and an additional spot inside the project area. The spots were selected with the objective of getting an elevated position –usually a small rise– to increase visibility. The Experts consider that all houbara species located in a range of 600 metres around the spot should have been observed due to:

- good visibility during the afternoon and early morning,
- high activity of birds during these periods,
- long observational effort: –at least 45 minutes per spot, and
- high quality of the optical material used for prospection.

Due to the large range of observation in the selected spots, most of the project area could be prospected by this method.



Solar Energy Development Project in Tutly, Uzbekistan

Evaluation of possible negative effects to Important Bird and Biodiversity Area (IBA) of Karnabchul Steppe (UZ018)



Figure 3-4: Observational spot

No houbara was observed, neither raptors nor other important bird species. The results of the observations are summarized in Table 3-1:

Table 3-1: Summary of observational spots results.

Observational Spot No.	Date	Hour	Results
1	May, 16 <sup>th</sup> , 2019	6:00-6:45	<ul style="list-style-type: none"> <li>No major findings (houbaras not detected).</li> <li>Three herons crossing the study area</li> </ul>
2	May, 14 <sup>th</sup> , 2019	18:00-18:45	<ul style="list-style-type: none"> <li>No major findings (houbaras not detected).</li> <li>Larks</li> <li>Four sheep/goat flocks grazing in the project area (around more than 2,000 heads).</li> <li>10 tortoises observed.</li> </ul>
3	May, 14 <sup>th</sup> , 2019	19:30-20:15	<ul style="list-style-type: none"> <li>No major findings (houbaras not detected).</li> </ul>
4	May, 15 <sup>th</sup> , 2019	19:00-20:00	<ul style="list-style-type: none"> <li>No major findings (houbaras not detected).</li> <li>Four sheep/goat flocks grazing in the project area (more than 2,000 heads).</li> </ul>
5	May, 15 <sup>th</sup> , 2019	18:00-18:45	<ul style="list-style-type: none"> <li>No major findings (houbaras not detected).</li> </ul>

### 3.4. Transect walks

The Experts carried out four transect walks, one per grid. During one of the transect walks, the surroundings of the project area were also investigated (north of grid 2).



Figure 3-5: Transect walks

One houbara (adult male) was observed, flying and perching on the ground a couple hundreds of metres after (UTM: 41 N 717701/4396497, grid four). Many tortoise and larks were observed. The results obtained are summarized in Table 3-2:

Table 3-2: Summary of Transect walks results.

Grid No.	Date	Hour	Results
1	May, 15 <sup>th</sup> , 2019	16:00-17:05	<ul style="list-style-type: none"> <li>• Weather: Sunny, hot. Distance walked: 3.47 km</li> <li>• 13 Tortoises (<i>Testudo horsfieldii</i>) observed (3 young tortoises, probably two year-old)</li> <li>• 1 hare (<i>Lepus tolai</i>)</li> </ul>
2	May, 15 <sup>th</sup> , 2019	15:35-16:40	<ul style="list-style-type: none"> <li>• Weather: Sunny, very hot. Distance walked: 3.64 km</li> <li>• Few tortoises observed (not counted)</li> </ul>
3	May, 16 <sup>th</sup> , 2019	08:00-09:10	<ul style="list-style-type: none"> <li>• Weather: Clouded, warm. Distance walked: 3.94 km</li> <li>• One adult male houbara observed, flying and perching on the ground (UTM: 41 N 717701/4396497, grid four).</li> <li>• 58 Tortoises</li> </ul>
4	May, 16 <sup>th</sup> , 2019	09:40-11:00	<ul style="list-style-type: none"> <li>• Weather: Clouded, warm. Distance walked: 4.51 km</li> <li>• 36 Tortoises observed (4 young tortoises, probably two year old, and a new born one). One recent hatched tortoise egg located.</li> </ul>

## 4. Discussion of Results

Mission objective was the identification of potential negative impacts in wildlife of solar plant project. The project covers around 600 ha to the east of Tutly.

Previous works developed before the mission identified migrant birds as the main concern, specially the houbara (*Chlamydotis macqueenii*). Project area is included in the Karnabchul Steppe IBA, whose extension is 177,156 ha, and it is located close to three State Sanctuaries. These Sanctuaries were established by the Government of Uzbekistan to protect the houbara and steppe habitats. They have a total extension of 285,000 ha and the majority of the IBA protected zone is located inside this protected area. Karnabchul State Sanctuary eastern boundary is located some kilometres away to the west of Tutly. The State Sanctuaries were established to protect the houbara breeding population, therefore no breeding houbaras shall be found outside the State Sanctuaries. The IBA area that is not included in the State Sanctuary should be important just for migrant or dispersed individuals.

The houbara (*Chlamydotis macqueenii*) is considered by IUCN as Vulnerable A2d<sup>1</sup>: population has been reduced at least 30% in the last 10 years or three generations considering that one of the problems is population overharvest. The houbara habitat includes semi-arid, desert and grassland environments and its breeding territories are limited by direct and indirect human disturbances, avoiding areas close to settlements, roads, wells, cattle raising, etc. [Carrascal et al. 2006, 2008; Hingrat et al. 2008; Chammern et al. 2012]. Considering these habitat requirements for houbara breeding population, solar project area is not a quality habitat for the species due to high human disturbances:

- Tutly village is close to the project area (1.5 km)
- the area has an intensive used by cattle
- a road is located nearby the western boundary of the project area
- at least two dirt roads, sometimes used by cars or motorcycles, cross the project area.

However, project area may be used occasionally by dispersed or migrant houbaras, confirmed during the fieldwork survey (one male houbara detected). The project area is significantly smaller than the existing quality habitat for migrant and dispersed individuals (several hundred thousand ha), so solar project is not a significant threat to the species, neither to other protected migrant nor resident birds (bustard, raptors, etc.). The intense human use of this area only allows occasional use of this area by these species.

Nevertheless, the steppe tortoise (*Testudo horsfieldii*) may be found in the area and it is considered as a Vulnerable A2d species by the IUCN Red List<sup>2</sup>. The steppe tortoise is still the most widespread and abundant terrestrial tortoise, but its populations are declining rapidly in recent years due to intense legal or illegal capture [Lagarde et al., 2014; Bondarenko and Peregnotsev, 2017; EFFACE, 2015]. At least 100,000 steppe tortoises are harvested every year in Uzbekistan [Bondarenko and Peregnotsev, 2017].

<sup>1</sup> The IUCN Red List of Threatened Species 2017. Available on-line: <https://www.iucnredlist.org/species/22731/262/11858/2140>

<sup>2</sup> The IUCN Red List of Threatened Species 1996. Available on-line: <https://www.iucnredlist.org/species/2165/1/3306750>

During transect walks, steppe tortoises were observations were recorded and, selected for analysis, just the ones obtained when conditions were the optimal for detection (during early morning or afternoon, when temperatures were not high) as described for tortoise census (Lagarde et al., 2014). Tortoises are active for three months per year only (early March to early June) in the project area. They are inactive during the rest of the year due to inappropriate environmental conditions: there is no food available during summer and autumn, and tortoises hibernate during late autumn and winter due to low temperatures.

The Experts conducted three transect walks for a total distance of 10,25 km with a width prospection band of 30 metres (2 people walking together and separated 10 metres from each other, considering that tortoises should be detected at 10 metres distance to each observer). The Experts detected a total of 104 tortoises during the transect walks. Considering that a surveyed surface of 30.75 ha (10.25 km x 30 metres) the species density is estimated in 3.4 steppe tortoises/ha, so a total of 2,000 tortoises may occupy the project area considering this density value. Actual tortoise population may be even higher if census correction index is applied.



## 5. Proposed Mitigation Measures

1. **Overhead power lines:** Bird species might be affected by collisions with power lines and electrocution (houbara, raptors and other medium-large birds). There are several overhead power lines already nearby the project area (see plates 8 and 9) that constitute a hazard to bird species.



Figure 5-1: Hazardous power lines located around 30 km north of the project area

It is recommended to follow European standards (or similar) during the design to reduce the risk of electrocution and collision of birds. The overhead power lines pathways should be also designed to minimize this impact.

These criteria could be considered as a remarkable conservation action and a start point for the Government of Uzbekistan to modify other overhead powerlines existing in the area. These existing power lines suppose a threat to bird populations and may be a cause of increased mortality rates.

2. **Tortoise rescue program.** An important steppe tortoise population was identified in the project area. In order to minimize the impacts, a rescue program should be carried out: rescuing scattered population in the area, being responsible of their maintenance during plant construction and the reintroduction in their habitats at the end of the project (as including special fencing to allow tortoises access to the project area). Other alternatives are available to contribute and support the conservation of these protected species in the area.



Figure 5-2: Adult steppe tortoise.

## 6. Conclusions

1. The solar plant project area is in the proximity of the village of Tutly (1.5 km east), close to the P-32 road from Navoi to Aman-Semiz and crossed by two dirt roads. Current land use is intensive cattle raising (mainly sheep and goats but also cows and occasionally camels). Therefore, there is an important human presence and high disturbances for avifauna in the area.
2. Despite of presenting a good vegetation coverage with good conditions during the fieldwork survey (14-16 may), intensive cattle grazing reduces the habitat quality for avifauna when wet season ends. Consequently, the wildlife in the area is mostly represented by larks and steppe tortoises.
3. Fieldwork survey included interviews with shepherds, transect walks by foot (15.66 km walked by two people covering 30 meters of detection distance) and observation spots during sunrise and sunset (5 points selected).
4. Main breeding avifauna species in the area are alaudidae species – larks –, none of them endangered. Larks are small birds that are used to human and cattle presence.
5. One adult male houbara (*Chlamydotis macqueenii*) was observed in the project area during transect walks. Males disperse from breeding areas after mating ends, so this individual should have come from breeding areas located to the west of Tutly, where the closest breeding area is located. The Experts have been concluded that the project area may be used occasionally by dispersed or migrant houbaras.
6. The solar project area extension is reduced when compared with the total steppe area (500 ha versus hundreds of thousands ha). As a consequence, impacts to migrant birds (such as houbaras) is considered very low and negligible.
7. An important population of steppe tortoises (*Testudo horsfieldii*) is established at the project area. This species is considered Vulnerable A2d by IUCN. The density estimation of steppe tortoises in the area is 3,4 tortoises/ha, which is considered a high value and represents an important tortoise population that inhabit the project area. This population is estimated at a minimum value of 2,000 individuals, but it may even increase if census correction index is applied. Mitigation measures to preserve this population should be studied.
8. Additional mitigation measures should be evaluated to minimize impacts to wildfauna, specially related to overhead powerlines and tortoise rescue programs.

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## 1.2 Evaluation of possible negative effects to Important Bird and Biodiversity Area, August, 2019 (Kashkarov R.D. Ph.D)

### VERTEBRATE ANIMALS FAUNA ASSESSMENT of "Construction of 100 mW Solar Electric Generating Station" Project site (vicinity of Tutly village, Samarkand region, Uzbekistan)

#### CONTENT

1. BRIEF DESCRIPTION OF THE PROJECT AREA AS TERRESTRIAL VERTEBRATES HABITAT AREA
2. OVERVIEW OF EXISTING DATA ON THE PROJECT SITE'S FAUNA
3. COMPOSITION OF TERRESTRIAL VERTEBRATES FAUNA OF THE PROJECT SITE AND KEYSTONE SPECIES
  - 3.1. Amphibians and Reptiles
  - 3.2. Birds
  - 3.3. Mammals
4. PRELIMINARY RECOMMENDATIONS FOR THE DESIGN AND CONSTRUCTION PERIOD
5. SOURCES OF INFORMATION

#### 1. BRIEF DESCRIPTION OF THE PROJECT AREA AS TERRESTRIAL VERTEBRATES HABITAT AREA

The project territory with a total area of 600 hectares is located in Nurabad district of Samarkand region, 2.5 km to the west of Tutly village, 15 km to the south of Karnab village.

Physically and geographically, the project site is located on a vast desert plain, which bears the geographical name "Karshi Steppe". Its eastern part has a separate name "Karnabchul Steppe" and is a foothill plain of Zirabulak and Ziadin mountains gently dipping to the north. The territory is poorly dissected by shallow beds of temporary watercourses and covered with rare shrubs. Altitude range - from 200 to 400 m above sea level.

According to the type of terrain and habitats, the territory is a clay and saline desert with elements of sandy loam soils, background subshrubs of wormwood and rare shrubs - saltwort and kandym (Fig. 1). There are no natural and artificial reservoirs in the project area. Precipitation in spring and autumn periods can form temporary reservoirs in the natural depressions of the soil.

#### 2. OVERVIEW OF EXISTING DATA ON THE PROJECT SITE'S FAUNA

Up to the middle of 20th century, the information on the fauna of the vast territory of the Kashkadarya Depression, bounded from the east and south by the Hisar and Zeravshan Ranges, and from the west by the Sundukli sands, is found in a number of certain works of H. Louden (1909), D. Caruthers (1910), A.M. Nikolsky (1915, 1916), S.K. Dahl (1936), B.S. Vinogradov (1936, 1952), A.I. Argirovulo and V.G. Geptner (1936), R.N. Meklenburtsev (1936, 1958), N.M. Minin (1938), N.M. Maslow (1947), S.I. Ognev (1928, 1950), M.V. Kaluzhina (1951), I.I. Kolesnikov (1953), O.P. Bogdanov (1953, 1960). Species composition and stateline distribution of rodents of Kashkadarya region was studied by V.P. Lobyzov and E.P. Nayden (1959). However, most of these works relate to the mountains, wetlands or sandy desert areas that are the richest in terms of species.

The first detailed researches of the Karshi Steppe's fauna which include the project area, were arranged by the Institute of Zoology and Parasitology of the Academy of Sciences of the Uzbek SSR. During the period of 1963-1965, integrated researches of the main groups of terrestrial vertebrates of this territory were carried out - 2 species of amphibians, 20 species of reptiles, 162 species of birds, 28 species of mammals. Their territorial distribution, population and economic value have been studied. According to the results of the researches, the collective monograph (Salikhbayev et al., 1967) was published.

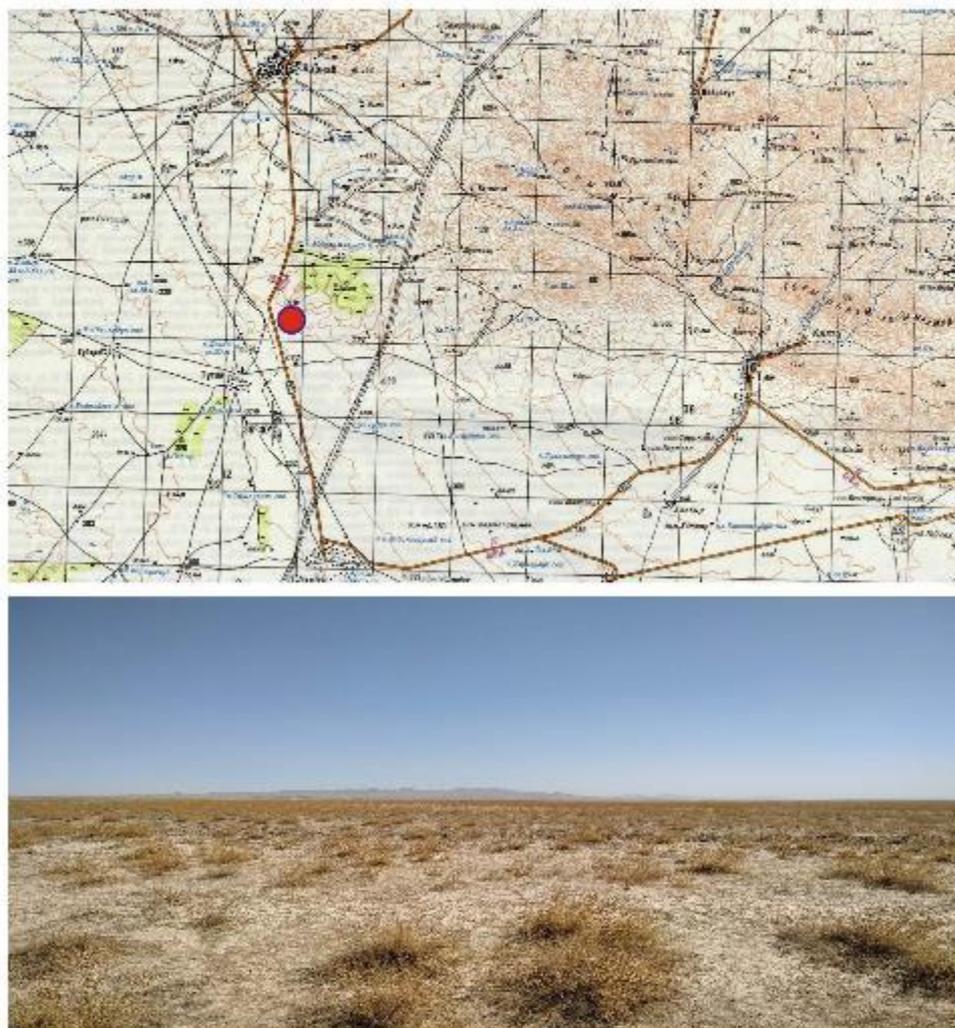


Figure 1: Geographical location and landscape type of the project site

Since the late 1960s up to the late 1990s, we do not find any data on the fauna of the project area in the sources available to us.

Currently rather poor fauna of dry flatted Karnabehul Steppe's sites is unsympathetic for researchers, that leads to the lack of modern data. This creates some difficulties for the modern assessment of fauna within the framework of the construction of solar electric generating station in the vicinity of Tutly village.

Among contemporary researchers, the spatial structure of the reptile population of the Karshi Steppe was studied by D.A. Bondarenko (1994, 2017). In 2011-2012, the ecology and biology of rare reptiles species of the Karnabehul Steppe was studied by a student of Samarkand State University T.V. Abdurupov. His master's thesis work contains data on the findings of the Central Asian cobra *Naja oxiana* and desert monitor *Varanus griseus caspius* in the project area.

Part of these data was published (Abduraupov, Fundukchiev, 2013). Researches of reptiles in various landscapes of the north-western part of the Karnabchul Steppe in 2016-2018 were conducted by an employee of the Institute of Zoology of the Academy of Sciences of the Republic of Uzbekistan F. K. Jumaev. The data on species composition and population of reptiles have been published (Jumaev, Shernazarov, 2016, 2017, 2018, 2019; Jumaev, Shernazarov, 2017).

Within the framework of the BirdLife International program "The most important ornithological territories of Uzbekistan" in May and November 2006, the researches in the wide vicinity of Tutly village were conducted by Samarkand ornithologists S.E. Fundukchiev and I.J. Belyalova. The results were included in the monograph "The most important ornithological territories of Uzbekistan" (2008). More than 50 special studies on the seasonal composition of the ornithofauna of the Karnabchul Steppe were conducted by S.E. Fundukchiev from 2004 to 2013. Some of them have been published (Fundukchiev, 2006).

Information about the location of corsac fox *Vulpes corsac*, marbled polecat *Formela peregusna*, badger *Ateles meles* and Turkmen caracal *Caracal caracal michaelis* in the project area contained in the work of N.V. Marmazinskaya and L.B. Mardonova (2016).

Within the framework of the "Solar Energy Development Project in Tutly, Uzbekistan", on May 14-16, 2019, international expert from Terra Naturalis, Jorge Fernandes Layana and representative of NBT S. Kim conducted short-term researches directly on the site of the proposed construction of the solar electric generating station in the vicinity of Tutly village, the data on the population of some species and photographs were obtained. In August 2019, a fauna expert R.D. Kashkarov also conducted a short-term survey of the construction site of the 100 mW solar electric generating station in the vicinity of Tutly village.

It should be noted that the Karshi Steppe is a part of the natural Kyzylkum autonomous plague focus. In accordance with this, since the late 1950s, the regular monitoring of the population of rodents which are carriers of the plague is performing in this territory by special units of the Bukhara branch of the Republican Center for the prevention of plague, quarantine and especially dangerous infections of the Ministry of Health of the Republic of Uzbekistan.

Information from all of the above sources is used for the assessment of the composition of terrestrial vertebrates fauna of the project site and identification of keystone species for which priority conservation measures should be taken.

### 3. COMPOSITION OF TERRESTRIAL VERTEBRATES FAUNA OF THE PROJECT SITE AND KEYSTONE SPECIES

The construction of a solar electric generating station will have an impact on all the group of terrestrial vertebrates - amphibians, reptiles, birds and mammals living (or occurring) in the area.

This section lists the terrestrial vertebrates species occurring (or likely to be occurred) at the project site and the most important information on their population, distribution and threats. Special attention is paid to the keystone species listed in the national and international Red Books

#### 3.1. Amphibians and Reptiles

1 amphibian specie and 15 reptile species occur in the project area:

	Scientific name	Name in Russian	Name in Uzbek	Name in English	ITCN (2016)	UzRDB (2019)
<b>АМФИБИЯ - АМФИБИИ - АМФИБИЯЛАР - AMPHIBIANS</b>						
<b>Отряд Анига – Бесхвостые амфибии - Думенг Амфибиялар - Anurans</b>						
<b>Семейство Bufonidae – Жабы – Курбакалар - True toads</b>						
1	<i>Bufo viridis</i> (Lacépède, 1768)	Жаба зеленая	Яшил курбака	Green toad		

<b>REPTILIA - ПРЭСЬМЫКАЮЩИЕСЯ - СУДРАТНЬ ЙОРУТЧИЛАР - REPTILIA</b>						
<b>Отряд Testudines – Черепахи – Тошбақалар - Turtles</b>						
<b>Семейство Testudinidae - Сухопутные черепахи - Қуруқлик тошбақалари - Tortoises</b>						
1	<i>Agrotomys horsfieldii</i> (Gray, 1844)	Среднеазиатская черепаха	Ўрта Осиё қуруқ тошбақаси	Central Asian tortoise	VU	3 (VU)
<b>Отряд Squamata – Чешуйчатые – Тапачиқалар - Squamata</b>						
<b>Семейство Gekkonidae – Гекконоиде – Гекконсимонлар - Geckos</b>						
2	<i>Tenuidactylus caspius</i> (Tschwald, 1831)	Тонкопальчатый каспийский геккон	Каспий геккони	Caspian bent-toed gecko		
3	<i>Tenuidactylus fedtschenkoi</i> (Strauch, 1887)	Тонкопальчатый туркестанский геккон	Туркестон геккони	Turkestan bent-toed gecko		
<b>Семейство Agamidae - Агамиде – Тошқалтабасаксимонлар – Agamas</b>						
4	<i>Trapelus sanguinolentus</i> (Pallas, 1814)	Степная агамма	Дашт агаммаси	Steppe Agama		
5	<i>Phrynoscopus helioscopus</i> (Pallas, 1771)	Такларная круглоголова	Такру тўғарақбаси	Sunwatcher toad-headed agama		
<b>Семейство Lacertidae - Настоящие ящерицы - Асл қилқалтабасаксимонлар - Lizards</b>						
6	<i>Ablepharus deserti</i> Strauch, 1876	Пустынный голотел	Ўй такрҳўзати	Desert snake-eyed skink		
7	<i>Eremias arguta</i> Pallas, 1773	Разноцветная ящурка	Рафт-барант вилқалтабасак	Steppe tiscetunner		
8	<i>Eremias intermedia</i> (Strauch, 1976)	Средняя ящурка	Ўртага вилқалтабасак	Aralo-Caspian tiscetunner		
9	<i>Eremias velox</i> (Pallas, 1771)	Быстрая ящурка	Тез вилқалтабасак	Rapid Lizard		
<b>Семейство Varanidae - Вараниде – Эптемарсимонлар – Monitors</b>						
10	<i>Varanus griseus</i> (Pallas, 1803)	Серый варан	Бўёқ эптемар	Desert Monitor		3 (VU:D)
<b>Семейство Boiidae – Улаша - Бўёма илонсимонлар – Boas</b>						
11	<i>Eryx tataricus</i> (Lichtenstein, 1822)	Восточный удав	Шарқ бўёма илони	Toury sand boa		3 (NT)
<b>Семейство Colubridae – Ужалде – Сунқалонсимонлар - Colubrids</b>						
12	<i>Hemorrhois ravergieri</i> Menetries, 1832	Разноцветный полз	Рафт-барант чилор илон	Spotted whip snake		
13	<i>Platyceps karelinii</i> Brandt, 1838	Полперетнополосый полз	Қўндалант-йўли чилор илон	Spotted desert tiscet		
14	<i>Pseudonophis lineolatus</i> (Brandt, 1833)	Стрела эмса	Ўжалтон	Sand racer		
15	<i>Spaliocephalus diademata</i> (Schlegel, 1837)	Чепуслотый полз	Хилор чилор илон	Diadem snake		
<b>Семейство Elapidae - Аспидовые - Аспидсимонлар – Cobras</b>						
16	<i>Naja asoca</i> Fitzinger, 1831	Среднеазиатская cobra	Ўртаоқиёқ cobra	Cobra (Central Asian) cobra	TD	3 (NT)

The red line has showed the species included in The National Red Book

Credentials of D.A. Bondarenko and E.A. Peregontsev (2017), Jorge Fernandes Layana and S. Kim (2019) show that the most common reptile species of the project site is the Central Asian tortoise, a vulnerable specie listed in the national and international Red Books (VU). Its population ranges from 3.4 to 16 individuals per 1 ha. Accordingly, from 2 to 10 thousand turtles can live at the proposed construction site of 600 hectares.

Another rare species of the project area listed in the Red Book of Uzbekistan (2019) with the status of vulnerable, decreasing species (VU:D) is the desert monitor. In 2011-2012, five desert monitors were observed in a wide area surrounding the project site, including was one dead individual on the Sakhoba – Karnab road. The project area is characterized by a high density of the Central Asian tortoise – food item of the desert monitor, and, accordingly, makes it attractive for the habitat of this species.

Another rare species living in the project area and listed in the Red Book of Uzbekistan with the status of near to vulnerable (NT) – Tatary sand boa. The main food of this species are sandlance and small lizards, quite numerous in this territory.

Central Asian cobra - a rare species listed in the Red Book of Uzbekistan with the status of near to vulnerable (NT), can also live on the project site. This is evidenced by the finding of a cobra in 2011 in the vicinity of Tym village on the banks of the dry sai, descending from the Zirabulak mountains.

Extremely rare, listed in the Red Book of Uzbekistan of snake species - Afghan awl-headed snake *Lythorhynchus ridgewayi* was found in 2016, 30 km to the west of the project area, in semi-fixed sands between the Tudakul reservoir and the Dzharvak plateaus, (Jumaev, Shernazarov, 2016). We do not exclude the possibility of habitat of this species in the project area also.

Common widespread species of the project area are 3 species of lizards. Short-term researches of the project site in August 2019 showed that the population of the Rapid Lizard is 5 individuals per 3 km of the route, or about 0.9 individuals per 1 ha. There are 3 Steppe Agamas registered on the same route. In May, Sunwatcher toad-headed agama was photographed here. According to the data of F.K. Jumaev, the population of Steppe Agama and Sunwatcher toad-headed agama here can reach 2.5 individuals per 1 hectare. Thus, the total population of these species at the site of 600 hectares is from 500 to 1,500 individuals.

Based on the specifics of the construction of the designed facility (complete change of soil and vegetation cover, landscaping), representatives of this group will be exposed to the strongest impact, as they are closely related to the substrate and are not able to leave this territory.

### 3.2. Birds

The project area is located between Zirabulak and Ziyadin mountains, vast Shorcai saline, Karais upland and Tudakul reservoir. These heterogeneous landscapes determine a sufficiently high species diversity of birds, especially during migration periods. Analysis of multi-year data showed that 106 species of birds can be observed in the project area in different seasons\*:

	Scientific name	Name in Russian	Name in Uzbek	Name in English	IUCN (2016)	UzRDB (2019)	Season*
<b>АҲЕС / ПҲТШЫ / ҚҲҲҲАҲ / BIRDS</b>							
<b>Отряд Galliformes - Курообразные - Товуқсмонлар - Gallinaceous</b>							
<b>Семейство Phasianidae – Фазановые - Қирғовуллар - Pheasants &amp; Allies</b>							
1	<i>Alectoris chukar</i> (J.E. Gray, 1830)	Кеклик	Киклик	Chukar			Sp
2	<i>Coturnix coturnix</i> (Linnaeus, 1758)	Перепел	Бодама	Common Quail			SpA
<b>Отряд Anseriformes - Гусеобразные - ҒоҲсмонлар - Geese &amp; allies</b>							
<b>Семейство Anatidae - Утиные - Урдақлар - Ducks &amp; Allies</b>							
3	<i>Anas erythrorhynchos</i> (Linnaeus, 1758)	Тиреутика	Чимбарак, АҲс, Қоразма	Lesser White-fronted Goose	VU	2(VU, R)	A
4	<i>Anser anser</i> (Linnaeus, 1758)	Серый гусь	Қўх ғоҲ, ЫлоҲби ғоҲ	Grey-lag Goose			AW
5	<i>Tadorna ferruginea</i> (Pallas, 1764)	Огарь	АнҲарт, Қорак Ҳрдақ	Ruddy Shelduck			SpA
6	<i>Anas penelope</i> Linnaeus, 1758	Сизак	Оларакит	Eurasian Wigeon			AW
7	<i>Anas crecca</i> Linnaeus, 1758	Чирок-сизетунак	Чуррак	Eurasian Teal			SpAW
8	<i>Anas platyrhynchos</i> Linnaeus, 1758	Кряква	ҲлҲфтин Ҳдақ	Mallard			AW
9	<i>Anas cyperna</i> Linnaeus, 1758	Широконозика	Суджун	Northern Shoveler			AW

10	<i>Nycticorax nycticorax</i> (Pallas, 1773)	Крилопестий нырок	Отмабон	Red-crested Pochard			A
<b>Отряд Pelecaniformes – Пелликаноподобные – Куравоёкчилар - Pelicans &amp; allies</b>							
<b>Семейство Pelecanidae Пелликановые – Бирозонлар ёки Мешкопчилар - Pelicans</b>							
11	<i>Pelecanus erythrorhynchos</i> (Linnaeus, 1758)	Большой баклан	Катта қорғоғон	Great Cormorant			AW
<b>Отряд Ciconiiformes – Аистообразные – Даймисмонлар - Storks &amp; Allies</b>							
<b>Семейство Ardeidae Цаплевые – Қарқарилар - Herons</b>							
12	<i>Casmerodius albus</i> (Linnaeus, 1758)	Большая белая цапля	Катта оқ қарқара	Great White Egret			AW
13	<i>Ardea cinerea</i> Linnaeus, 1758	Серая цапля	Қуларан қарқара	Grey Heron			SpW
<b>Отряд Falconiformes – Соколообразные – Лоқиммонлар - Falcons &amp; allies</b>							
<b>Семейство Falconidae – Соколящие – Лоқимлар - Falcons</b>							
14	<i>Falco tinnunculus</i> Gmelin, 1788	Пустельга	Даш ақоқ (бер)	Desert Kestrel		SCNT	Sp
15	<i>Falco tinnunculus</i> Linnaeus, 1758	Пустельга	Муккий	Common Kestrel			SpAW
16	<i>Falco subbuteo</i> Linnaeus, 1758	Чеглок	Жоғатой	Russian Hobby			SpS
<b>Семейство Accipitridae – Ястребные – Қарғайлар</b>							
17	<i>Gyps fulvus</i> (Hubb'd, 1783)	Белоголовый орл	Оғбол қумой	Griffon Vulture		2(VU:D)	A
18	<i>Accipiter tomarchus</i> (Linnaeus, 1766)	Черный гриф	Тоғқара	Black-headed Vulture	NT	SCNT	A
19	<i>Neophron percipitax</i> (Linnaeus, 1758)	Серый гриф	Жуған қал абори	Egyptian Vulture	EN	2(VU:D)	SpS
20	<i>Circus aeruginosus</i> (Linnaeus, 1758)	Болотный луץ	Сол буйларжи	Western Marsh Harrier			SpSAW
21	<i>Circus cyaneus</i> (Linnaeus, 1766)	Полевой луץ	Даш буйларжи	Hen Harrier			Sp
22	<i>Circus macrurus</i> (S.P. Gmelin, 1771)	Степной луץ	Даш буйларжи	Pardal Harrier	NT	SCNT	SpS
23	<i>Accipiter hodus</i> (J.F. Gmelin, 1788)	Тупиак	Тоғқарғиғи	Shikra			Sp
24	<i>Accipiter nisus</i> (Linnaeus, 1758)	Перепелятник	Қарғиғи	Eurasian Sparrowhawk			AW
25	<i>Buteo buteo</i> (Linnaeus, 1758)	Канюк	Сор	Common Buzzard			Sp
26	<i>Buteo rufinus</i> (Statenschmar, 1829)	Курашик	Сарис сор	Long-legged Buzzard			SpSAW
27	<i>Aquila chrysaetos</i> (Linnaeus, 1758)	Беркут	Бургут	Golden Eagle		2(VU:R)	SpA
28	<i>Hieraaetus pennatus</i> (J.F. Gmelin, 1788)	Орел-бврик	Кешк бургут	Booted Eagle		2(VU:D)	Sp
<b>Отряд Gruiformes – Журавлеобразные – Турасмонлар - Cranes, Rails and Relatives</b>							
<b>Семейство Gruidae – Журавлиные – Туралар - Cranes</b>							
29	<i>Anthropoides virgo</i> (Linnaeus, 1758)	Красивка	Кланих турал, гузал турал	Demoiselle Crane			Sp
30	<i>Grus grus</i> (Linnaeus, 1758)	Серый журавль	Қуларан турал	Common Crane			Sp
<b>Семейство Otididae – Дрофиты – Тувалоклар - Bustards</b>							
31	<i>Otus badius</i> Linnaeus, 1758	Дрофа	Тушалок	Great Bustard	VU	(P:R)	W
32	<i>Silvaticus montanus</i> (J.E. Gray, 1832)	Дрофа	Тушалок	Houbara Bustard	VU	2(VU:D)	SpS
<b>Отряд Charadriiformes – Ржанкообразные – Ржанкасмонлар - Shorebirds</b>							

Семейство <i>Burhinidae</i> - Андотки - Ўйлақчиқлар - Stone Curlews						
33	<i>Burhinus oedipus</i> (Linnaeus, 1758)	Андотка	Ўйлақчи	European Stone-curlew		Sp
Семейство <i>Recurvirostridae</i> - Шилок.повковые - Бигизтумшуклар - Stilts						
34	<i>Himantopus himantopus</i> (Linnaeus, 1758)	Ходуличник	Катта кизилпоёқ	Black-winged Stilt		Sp
Семейство <i>Charadriidae</i> - Ржанковые - Ржанкилар - Plovers						
35	<i>Charadrius vanderbilli</i> (Linnaeus, 1758)	Чирок	Кежик	Northern Lapwing	NT	SpA
36	<i>Vanellodietus leucurus</i> (M.H.C. Lichtenstein, 1823)	Белокостная пташка	Сувтороқ	White-tailed Lapwing		A
37	<i>Charadrius dubius</i> Scopoli, 1786	Малый зуек	Кетик қорғай	Little Ringed Plover		Sp
Семейство <i>Scolopacidae</i> - Бекасовые - Лойқураклар - Sandpipers						
38	<i>Tringa ochropus</i> Linnaeus, 1758	Черныш	Қорғайсақ бағайман	Green Sandpiper		Sp
39	<i>Actitis hypoleucos</i> (Linnaeus, 1758)	Пересмех	Чайилақ бағайман	Common Sandpiper		Sp
Семейство <i>Glareolidae</i> - Тиреушковые - Жиктоқлар - Phalaropes						
40	<i>Glareola pratincola</i> (Linnaeus, 1766)	Луговая тиреушка	Ўтлоқ жиктоғи	Collared Pratincole		Sp
Семейство <i>Laridae</i> - Чайковые - Балтиқчилар - Gulls						
41	<i>Larus ridibundus</i> Linnaeus, 1758	Оседлая чайка	Қўл балчиғи	Common Black-headed Gull		SpA
42	<i>Collocalidon nitida</i> (J.F. Gmelin, 1789)	Чайкиная крачка	Балтиқтумпуқ ширғити	Gull-billed Tern		Sp
43	<i>Sterna hirundo</i> Linnaeus, 1758	Ротная крачка	Оддий ширғит	Common Tern		Sp
Отряд <i>Pteroclidiformes</i> - Рыбкообразные - Булдуруқсимонлар - Sandgrouses						
Семейство <i>Pteroclididae</i> - Рыбковые - Булдуруқлар - Sandgrouses						
44	<i>Pterocles alchata</i> (Linnaeus, 1766)	Белокрылый рябок	Қарабур	Pink-bellied Sandgrouse		SpSAW A
45	<i>Pterocles orientalis</i> (Linnaeus, 1758)	Чернокрылый рябок	Қарабур, булдуруқ	Black-bellied Sandgrouse		SpSAW
Отряд <i>Columbiformes</i> - Голубеобразные - Қантарсимонлар - Pigeons						
Семейство <i>Columbidae</i> - Голубиные - Қантарлар - Doves						
46	<i>Columba livia</i> J.F. Gmelin, 1789	Скалай голубь	Қўқ қантар	Rock Pigeon		SpSAW
47	<i>Streptopelia turtur</i> (Linnaeus, 1758)	Горлица	Гурғи	European Turtle-dove	SA	SpSAW SA
48	<i>Streptopelia decaocto</i> (Frisch, 1838)	Кольчатая горлица	Қуғри	Eurasian Collared-dove		SpSAW
49	<i>Streptopelia senegalensis</i> (Linnaeus, 1766)	Малая горлица	Муғма	Laughing Dove		SpSAW
Отряд <i>Cuculiformes</i> - Кукушкинобразные - Каккусимонлар - Cuckoos						
Семейство <i>Cuculidae</i> - Кукушковые - Каккулар - Cuckoos						
50	<i>Cuculus canorus</i> Linnaeus, 1758	Кукушка	Оддий какку	Common Cuckoo		SpS
Отряд <i>Strigiformes</i> - Совообразные - Яйлаққушсимонлар - Owls						
Семейство <i>Strigidae</i> - Совиные - Яйлаққушлар - Owls						
51	<i>Bubo bubo</i> (Linnaeus, 1758)	Фистик	Ўқли	Eurasian Eagle-owl		Sp
52	<i>Athene noctua</i> (Scopoli, 1769)	Демовый сыч	Бойқуш	Little Owl		SpAW

Отряд <i>Apodiformes</i> – Стрижеобразные – Уголкопелы – Swifts						
Семейство <i>Apodidae</i> – Стрижиные – Уголкопелы – Swifts						
53	<i>Apus apus</i> (Linnaeus, 1758)	Черный стриж	Қара ушканот	Common Swift		SpS
Отряд <i>Coraciiformes</i> – Роллеры – Куккарасимонна – Rollers						
Семейство <i>Coraciidae</i> – Сиворожковые – Куккарасимонна – Rollers						
54	<i>Coracias garrulus</i> Linnaeus, 1758	Сиворожка	Кук карас	European Roller		SpS
Семейство <i>Meropidae</i> – Пчурковые – Куркушлар – Bee-Eaters						
55	<i>Merops persicus</i> Pallas, 1773	Зеленая пчурка	Кук куркуш	Blue-checked Bee-eater		SpS
56	<i>Merops apiaster</i> Linnaeus, 1758	Золотистая пчурка	Титла ранг куркуш	European Bee- eater		SpSA
Отряд <i>Cuculiformes</i> – Птицы-носороги – Сассиқоншиқсимонлар – Cuckoos						
Семейство <i>Cuculidae</i> – Удодовые – Сассиқоншиқлар – Cuckoos						
57	<i>Upupa epops</i> Linnaeus, 1758	Удод	Сассиқ поптық	Common Cuckoo		SpSA
Отряд <i>Passeriformes</i> – Воробьиобразные – Чумчуқсимонлар – Passerines						
Семейство <i>Alaudidae</i> – Жаворонковые – Сўфитўрайлар – Larks						
58	<i>Amotuzus deserti</i> (M.H.C. Lichtenstein, 1823)	Пустынный жаворонок	Чўл тўрайи	Desert Lark		A
59	<i>Melanocorypha calandra</i> (Linnaeus, 1766)	Степной жаворонок	Дашт тўрайи	Calandra Lark		SpSAW
60	<i>Calandrella brachydactyla</i> Leisler, 1814)	Малый жаворонок	Кичик тўрай	Greater Short- toed Lark		SpSA
61	<i>Galerida cristata</i> Linnaeus, 1758)	Хохлатый жаворонок	Сўфитўрай	Crested Lark		SpSAW
62	<i>Alauda arvensis</i> Linnaeus, 1758	Полевой жаворонок	Дала тўрайи	European Skylark		A
63	<i>Alauda gulgula</i> Franklin, 1831	Индийский жаворонок	Кичик дала тўрайи	Oriental Skylark		SpSA
Семейство <i>Hirundinidae</i> – Ласточковые – Қалдиғонлар – Swallows, Martin						
64	<i>Hirundo riparia</i> (Linnaeus, 1758)	Береговая ласточка	Қырок қалдиғон	Collared Sand Martin		SpS
65	<i>Hirundo rustica</i> Linnaeus, 1758	Деревенская ласточка	Қашақ қалдиғон	Dam Swallow		SpSA
66	<i>Hirundo daurica</i> (Laxmann, 1769)	Рыбноязычная ласточка	Туз қалдиғон	Red-rumped Swallow		SpS
Семейство <i>Motacillidae</i> – Трещотковые – Жиблақимонлар – Pipits, Wagtails						
67	<i>Actopus campestris</i> (Linnaeus, 1758)	Полевой жибек	Дала йипқитисп	Tawny Pipit		Sp
68	<i>Motacilla feldegg</i> Michelles, 1830	Черноголовая трещотка	Қарабоғи жиблақимон	Black-headed Wagtail		Sp
69	<i>Motacilla alba</i> Linnaeus, 1758	Белая трещотка	Оқ жиблақимон	White Wagtail		SpAW
70	<i>Motacilla personata</i> Gould, 1861	Маскированная трещотка	Шибобли жиблақимон	Masked Wagtail		S
Семейство <i>Turdidae</i> – Дроздовые – Шақтақлар – Thrushes						
71	<i>Eudynamis galactoides</i> (Gemmink, 1820)	Тугайный осоловей	Тўқай булбули	Rufous Scrub- robin		Sp
72	<i>Luscinia svecica</i> Linnaeus, 1758)	Всаракуша		Bluethroat		Sp
73	<i>Saxicola torquatus</i> (Pallas, 1773)	Азиатский черноголовый чехол	Сибир сирғулук	Siberian Stonechat		Sp
74	<i>Saxicola caprata</i>	Черный чехол	Қара	Pied Stonechat		SpA

	Linnaeus, 1766)		сиринчук			
75	<i>Oenanthe pleschanka</i> (Lepelletier, 1770)	Каменца-плетанка	Плетанка тошкентчумчуқ	Pied Wheatear		SpSAW
76	<i>Oenanthe isabellina</i> (Temminck, 1829)	Каменца-плетанка	Уйнока тошкентчумчуқ	Isabelline Wheatear		SpSAW
<b>Семейство Muscipidae - Мухоловковые - Шашыхўрлар - Flycatchers</b>						
77	<i>Muscipapa striata</i> (Pallas, 1764)	Серая мухоловка	Кулрафт пашахўр	Spotted Flycatcher		Sp
<b>Семейство Sylviidae - Славковые - Мойкулар - Warblers</b>						
78	<i>Acrocephalus stenorhynchus</i> (Temminck et Brehm, 1833)	Туркестанская камышевка	Туркестон тўрай чумчуғи	Clamorous Reed-warbler / Indian Reed-warbler		Sp
79	<i>Troglodytes aedon</i> (Sylvester, 1832)	Южная бермолушка	Жалынбай курчалан	Sykes's Warbler		Sp
80	<i>Pipilo erythrophthalmus</i> (Linnæus, 1758)	Индийская пелочка	Хинд пелочка	Sulphur-bellied Warbler		Sp
81	<i>Sylvia curruca</i> (Linnaeus, 1758)	Славка-завирушка	Завирушка мэйкут	Lesser Whitethroat		SpA
82	<i>Sylvia nana</i> (Temminck et Brehm, 1833)	Пустынная славка	Ўй мойкуғи	Asian Desert Warbler		Sp
<b>Семейство Sittidae - Поползневые - Фотгалтумчуқлар - Nuthatches</b>						
83	<i>Sitta tephronota</i> Sharpe, 1872	Большой скальный поползень	Кити қол фотгалтумчуғи	Eastern Rock-nuthatch		Sp
<b>Семейство Laniidae - Сорокоутовые - Қарқуноқлар - Shrikes</b>						
84	<i>Lanius isabellinus</i> Temminck et Brehm, 1833	Буландый жулан	Қатқар қарқуноғи	Isabelline Shrike		Sp
85	<i>Lanius schach</i> Linnaeus, 1758	Длиннохвостый сорокопут	Уzun думал қарқуноғ	Long-tailed Shrike		SpS
86	<i>Lanius minor</i> J.F. Gmelin, 1788	Чернолобий сорокопут	Қоралетпанал қарқуноғ	Lesser Grey Shrike		Sp
87	<i>Lanius ludovicianus excubitorides</i> (Say, 1823)	Пустынный сорокопут	Ўй қарқуноғ	Desert Shrike		SpA
<b>Семейство Oriolidae - Иволговые - Заргалдоқлар - Orioles</b>						
88	<i>Oriolus chinensis</i> (Linnaeus, 1758)	Иволга	Заргалдоқ	Eurasian Golden Oriole		SpS
<b>Семейство Corvidae - Вороновые - Қаргалар - Crows</b>						
89	<i>Pica pica</i> (Linnaeus, 1758)	Сорока	Затқал	Common Magpie		SpSAW
90	<i>Corvus monedula</i> Linnaeus, 1758	Галка	Затқа	Eurasian Jackdaw		SpSAW
91	<i>Corvus frugilegus</i> Linnaeus, 1758	Грач	Гўш қарча	Rook		SpSAW
92	<i>Corvus orientalis</i> Bechstein, 1841	Восточный тёрная ворона	Кера қарча	Oriental Carrion Crow		AW
93	<i>Corvus corax</i> Linnaeus, 1758	Серая ворона	Ола қарча	Hooded Crow		SpAW
94	<i>Corvus ruficollis</i> Lesson, 1831	Пустынный ворон	Ўй қарғаси	Brown-necked Raven		A
95	<i>Acridotheres tristis</i> Linnaeus, 1766)	Майна	Майна	Common Myna		SpSAW
96	<i>Pastor roseus</i> (Linnaeus, 1758)	Розный скворец	Ола тугурчуқ	Rosy Starling		SpS
97	<i>Sturna vulgaris</i> Linnaeus, 1758	Скворец	Ордин тугурчуқ	Common Starling		SpAW

Семейство <i>Passeridae</i> - Воробьиные - Чумчуқлар - Sparrows						
98	<i>Passer indicus</i> Jardine et Selby, 1831	Индийский воробей	Хинд чумчуқи	Indian Sparrow		SpS
99	<i>Passer montanus</i> (Linnaeus, 1758)	Полевой воробей	Дала чумчуқи	Eurasian Tree Sparrow		SpSAW
Семейство <i>Fringillidae</i> - Вьюрковые - Вьюроқлар - Finches						
100	<i>Fringilla coelebs</i> Linnaeus, 1758	Зяблик	Қамалғуш	Chaffinch		AW
101	<i>Fringilla montifringilla</i> Linnaeus, 1758	Юрок		Brambling		AW
102	<i>Rhodospiza absoluta</i> (M. П. С. Lichtenstein, 1823)	Буланый вьюрок	Чўл вьюроғи	Desert Finch		Sp
103	<i>Corpeidacus cybrius</i> (Pallas, 1770)	Чеманга	Оддий кызылбаш чумчуқ	Common Rosefinch		Sp
Семейство <i>Emberizidae</i> - Овсянковые - Дехқончумчуқлар - Buntings						
104	<i>Mihoria calandra</i> (Linnaeus, 1758)	Просянка	Тариксўр деҳқончумчуқ	Corn Bunting		Sp
105	<i>Granotivora hircanica</i> (J.F. Brandt, 1841)	Желчак овсянка	Сирик деҳқончумчуқ	Red-headed Bunting		SpS
106	<i>Schoeniclus schoenichus</i> (Linnaeus, 1758)	Камышовая овсянка	Тўқай дехқон чумчуқи	Reed Bunting		AW

\*Сезон: Sp – весна (Spring); S – лето (Summer); A – осень (Autumn); W – зима (Winter)

The red line has showed the species included in The National Red Book

For extraarid flat landscape of the project area and its vicinity certain composition of the ornithofauna is typical. Only 15 out of 106 species of birds are found here throughout the year. They are Western Marsh Harrier and Long-legged Buzzard related to the site nutritionally – they eat small rodents and reptiles. Rock Pigeon, Eurasian Collared-dove and Laughing Dove, Common Myna, Common Magpie, Eurasian Jackdaw, Rook and Eurasian Tree Sparrow nest in the surrounding villages. Black-bellied Sandarouse, Calandra Lark and Crested Lark, Pied Wheatear and Isabelline Wheatear are ground nestling inhabitants of the desert landscapes. These are widespread and numerous species, so the loss of 600 hectares of clay desert will not have a negative impact on their populations. Moreover, numerous Crows -Common Starling, Eurasian Jackdaw and Rook can have a negative impact on the condition of the equipment of the future solar electric generating station.

Along with this, 13 species of birds from the above list are rare and listed in the national and international Red Books. Lesser White-fronted Goose, Lesser Kestrel, Pallid Harrier, Northern Lapwing, Booted Eagle and European Turtle-dove are found here only during the period of spring and autumn migrations. Project activities at the site will not have a tangible impact on these species. Large scavenging carnivores - Griffon Vulture and Cinereous Vulture mainly eat cattle breeding waste and usually make forage migrations for grazing cattle. Construction work at the project site will not affect the state of their population. The other two feathered predators, Egyptian Vulture and Golden Eagle, are more closely related to the project area. The Aral yellow souslik, tolai hare and numerous steppe tortoises living here are their basic prey items. Thus, the project activities may affect the state of the food potential of these two species. Houbara Bustard and Pin-tailed Sandgrouse nest in the project area regularly, but in small numbers, which determines the low level of threat to their populations. Great Bustard is found in the area in winter. Artificial landscaping after the construction completion can attract these birds to the project area, that creates certain threats to this extremely rare species. It should be noted that two rare species were recorded during the short-term spring survey on May 15,

2019 - an adult Egyptian Vulture was photographed, and Houbara Bustard was recorded during the morning stationary registration.

Thus, the birds in the project area will experience 3 main types of impacts from the construction: 1 - reduction of food potential, 2 - loss of nesting sites and 3 - threats during wintering (for the Great Bustard). However, these impacts are not critical for the populations of these rare species. They will naturally be leveled due to the territorial redistribution of prey items and predators. Negative impacts can be significantly reduced through preventive measures during the construction process.

The potential threat to birds will be represented by the power transmission lines of medium voltage, which are planned to be built to transport electricity from the electric generating station to the consumer. It is required to provide a pre-construction study of the basic flyways to select the safest option for the location of the power transmission lines in this area.

### 3.3. Mammals

Researches of the Institute of Zoology and Parasitology of the Academy of Sciences of the Uzbek SSR in the period 1963-1965, nowadays they are the only detailed scientific studies to evaluate the mammalian fauna of the project area. The list of species is given by us on the basis of data on the territorial distribution and abundance published in a collective monograph (Salikhbaev et al., 1967). We also used short-term personal observations, up-to-date data on several species of predators (Marmazinskaya, Mardonova, 2016) and rodents (Bukhara branch of the Republican Center for the prevention of plague, quarantine particularly dangerous infections of the Ministry of Health of the Republic of Uzbekistan).

An analysis of these data shows that the species composition of mammals in the project area includes 18 species:

	Шаучное пазватте	Русское пазватте	Узбекское пазватте	Английское пазватте	IUCN (2019)	UzRDB (2019)
<b>МАММАЛА / МЛЕКОПИТАЮЩИЕ / СУҲУМБУЗУВЧИЛАР / MAMMALS</b>						
<b>Отряд <i>Insectivora</i> – Насекомоядные - Хашаротхўрлар - Insectivores</b>						
<b>Семейство <i>Erinacidae</i> – Ёжонлар – Титратикалар - Hedgehogs</b>						
1	<i>Hemiacdonas aotus</i> Gmelin, 1779	Ушкетий ёк	Кўчоқлар титратика	Long-eared Hedgehog		
<b>Семейство <i>Soricidae</i> - Землеройковые - Ёрқозларлар - Shrews</b>						
2	<i>Sorex saxatilis</i> Pallas, 1811	Малая белозубка	Кичик оқтўти сакчил	Lesser White- toothed Shrew		
<b>Отряд <i>Rodentia</i> – Грызуны – Кемирувчилар - Rodents</b>						
<b>Семейство <i>Sciuridae</i> – Белки – Олмақонлар - Squirrels</b>						
3	<i>Spermophilus sibiricus</i> Lichtenstein, 1823	Желтый суслик	Сурик кыроққоник	Large Squirrel		
<b>Семейство <i>Allactagidae</i> – Пятипалые тушканчики - Қатта кўпбўёлар</b>						
4	<i>Allactaga severtzovi</i> Vinogradov, 1925	Тушканчик Северцова	Северцов кўпбўё	Severtzov's Jerboa		
5	<i>Allactaga elater</i> Lichtenstein, 1825	Малый тушканчик	Кичик кўпбўё	Small five-toed Jerboa		
6	<i>Prymnelomys pumilio</i> Kerr, 1792	Тарбаганчик	Тарбаганчик	Lesser five-toed Jerboa		
<b>Семейство <i>Cricetidae</i> – Хомяковые – Олақуржунлар - Hamsters</b>						
7	<i>Cricetulus migratorius</i> Pallas, 1773	Серый хомячок	Кўпратт олақуржун	Migratory, Grey Hamster		
8	<i>Ellobius karej</i> Blasius, 1834	Восточная слепушонка	Оқдўи кўрситқон	Zaisan Mole Vole		
<b>Семейство <i>Muridae</i> – Мышиные – Ситқонлар - Mouse</b>						

9	<i>Mus nasevskus</i> Linnæus, 1758	Домовый мышь	Уй сечкини	House Mouse		
<b>Семейство Gerbillidae – Песчанковые – Қумситқонлар - Gerbils</b>						
10	<i>Meriones libycus</i> Lichtenstein, 1823	Краснохвостая песчанка	Қизил думлик қумситқон	Libyan Jird (Gerbil)		
11	<i>Rhombomys opimus</i> Lichtenstein, 1823	Большая песчанка	Ата қумситқон	Great Gerbil		
<b>Отряд Carnivora – Хищные – Ўртқочлар - Carnivores</b>						
<b>Семейство Canidae – Псовые – Итқочлар - Canids</b>						
12	<i>Vulpes corsacus</i> Linnæus, 1758	Корсак	Қорсак	Corsac Fox		2(VU/D)
13	<i>Vulpes vulpes</i> Linnæus, 1758	Обыкновенная лисица	Тулки	Fox, Red Fox		
<b>Семейство Mustelidae – Кунь – Сусарлар - Mustelids</b>						
14	<i>Mustela sibirica</i> Lessson, 1827	Степной хорек	Сирин олипокуман	Steppe or Asiatic Polecat		2(VU/D)
15	<i>Comela persicus</i> Güldenstädt, 1779	Полёвка	Олақуан	Marbled Polecat	VI	2(VU/D)
16	<i>Martes martes</i> Linnæus, 1758	Барсук	Бўрак	Badger		
<b>Семейство Felidae – Кошачьи – Мушуклар - Cats</b>						
17	<i>Felis libyca</i> Forster, 1780	Степная кошка	Чўл мушуги	Steppe Cat		
18	<i>Caracal caracal</i> Schreber, 1776	Бархан	Қорқовул	Caracal		1(CR)

Red highlighted species listed in the national and international Red Books.

Four species from the list are listed in the Red Book of Uzbekistan and one in the International Red Book.

As part of the project assessment, short-term studies of the site for the proposed construction of a solar power station in the vicinity of the village of Tutly were carried out in May and August 2019. As a result, the habitat of 5 species from the above list was confirmed directly on the project area. This is a large souslik, Severtsov jerboa, large gerbil, libyan jird (gerbil) and steppe polecat. The impact on mammals from the construction side is determined by the biology of the species living here. Large predators – corsac fox, red fox, badger, steppe cat and caracal are naturally not numerous. They only periodically visit a site devoid of vegetation and other natural shelters in search of food. In case of concern, they will move to neighboring similar habitats. Small predators - the steppe polecat and marbled polecat - during land surveying will lose their feed base - rodents. However, the abundance of these two Red Book species is naturally low. At the project site no more than a few individuals live, which will move to neighboring territories. Therefore, in general, building activity will not affect the state of the populations of these species. Closely related to this territory are rodents. But none of the species living here is rare, for that reason the loss of 600 ha of habitats will also not affect the state of their populations. Two types of rodents – the libyan and great gerbils - on the contrary, can be a problem for construction as carriers of especially dangerous natural focal infections and as sources of biodeterioration. Over the past 5 years (2015-2019), the abundance of these species has been observed in the project area: great gerbils - from 0.04 to 1.5 animals per 1 ha; libyan gerbil - less than 1 animal per 1 ha. However, according to the long-term data of the Bukhara branch of the Republican Center for the Prevention of Plague, Quarantine Particularly Dangerous Infections of the Ministry of Health of the Republic of Uzbekistan, the number of these species periodically increases. Thus, the number of large gerbils in this territory can reach 15 animals per 1 ha (Mitropolsky, 1995), and red-tailed gerbils - up to 50 and more animals per 1 ha (Kashkarov, 2003). During such periods, gerbils can populate the project area and create epidemiological and technical problems.

#### 4. PRELIMINARY RECOMMENDATIONS FOR THE DESIGN AND CONSTRUCTION PERIOD

4.1. One of the main impacts on the fauna of the project area is the complete change of soil and vegetation cover planned during the construction process, and landscaping. Representatives of reptiles will be most at risk, closely associated with the substrate and unable to leave this territory. The most numerous and at the same time globally threatened species of the project area is the Central Asian tortoise. Before starting construction during the period of the greatest activity of this species, it is necessary to carry out work to collect the turtles that live on the site and move them to similar habitats. The possible risks of the death of Central Asian turtles living near the project site should also be taken into account. During spring activity, these reptiles move widely (up to 10 km or more) in search of food and partners for mating, they die on roads and access roads.

4.2. Landscaping, as well as the use of water to clean the surface of solar panels will contribute to the development of vegetation in the project area. This, in turn, will attract small migratory, nesting birds, large souslik and Central Asian turtles, as well as feathered predators from neighboring desert territories. It is necessary to carefully plan the location and design of power lines, masts, extensions, etc. to prevent the death of birds from collision with them.

4.3. It is necessary to control the number of rodents - great and libyan gerbils - with the involvement of special services to prevent biodeterioration of equipment and the risk of contingent contamination with especially dangerous infections.

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1.3 Assessment Report of Flora, August, 2019 (Normatov A. Ph.D)

**Development of PV  
Plant in Tutly, Uzbekistan  
Assessment Report of Flora on Project Area**

**Prepared by Abdusalom Normatov, Ph.D. (Flora)**

**August, 2019**

## **Description of the territory vegetation, planned for the construction of a solar power station**

### **1. Flora and vegetation**

#### **1.1. A brief review of the literature on vegetation in the Samarkand province**

In the 30-40s of the last century, large-scale geobotanical studies were conducted in the territory of the Central Asian republics of the USSR, including Uzbekistan. This was associated with collectivization and subsequent concentration of livestock. It was necessary to study the reserve and capacity of pastures, draw up geobotanical maps, and scientifically substantiate the use of pastures.

It was at that time that expeditions of the institute of soil science and geobotany of the CASU (Central Asian State University), the biological institute of the CASU, the Central Asian branch of the All-Union institute of fodder, the Uzbek zonal livestock breeding station, the Tashkent experiment station for horse-breeding, mule-breeding and camel-breeding were organized on the territory of Samarkand and Bukhara provinces.

But the results of these works were in different institutes and scientific institutions in an unsocialized and unsystematized form. Geobotanist M.M.Sovetnik collected all these research results, analyzed and systematized. As a result, the book "Pastures and haymaking of Central Asia" appeared. At the same time worked, such famous scientists as professor E.P. Korovin, author of capital work: "Vegetation of Central Asia and Southern Kazakhstan". Also worked N.K.Alekseeva, V.V.Blagoveshchensky, V.P.Bochantsev, A.Ya.Butkov, M.D.Velichko, P.A.Gomolitsky, I.A.Raikova and many other famous scientists. Owing to their work, by the mid-50s of the twentieth century, geobotanical mapping of Uzbekistan was totally completed.

In recent years, expeditions of the Institute of Botany AN.RUZ worked botanists K.Tozhibayev, N.Yu.Beshko and others compiled a cadastre of vegetation in the Jizzakh and Samarkand provinces. Also, from the 80s of the 20th century,

Red Books of Uzbekistan have been published, the materials of which are regularly updated. Those plants that become rare are listed in the Red Book, and those that are restored are excluded from the Red Book.

## 1.2. Methodology of botanical researches

The main objective of field botanical researchers is to familiarize the totality of plants (flora) of the study area.

To explore this area, a walking route was conducted on an area of 100 hectares (1 km x 1 km), all plant species that were found were recorded. At the same time, not only living plants, but also the remains of plants were taken into account.

Since the terrain is flat and uniform, sample plots of 10x10 m (100m<sup>2</sup>) in size were taken, and the species composition of vegetation was determined at these sites. In this case, not only living plants, but also plant residues were taken into account. Since the study was carried out at the end of summer, spring ephemeral vegetation was absent, only fragments of residues could be found by which species were determined. The whole plant was included in the list, regardless of the stage of development (living plants, only vegetation, flowers, fruits, fragments from which it is possible to determine the species).

Quantitative accounting was carried out according to the Drude method:

1. SOC (Sociales)- the species forms a background, is found in mass, the aerial parts close.
2. COP (Copiosae)- the species is found in large quantities, but does not dominate and does not form a background.
3. Sp (Sparae)- the species is found in small quantities, interspersed in the main background from plants of the previous categories.
4. Sol (solitariae)- the species is found in very small quantities, in single instances.
5. Un (Unicum)- a species that occurs only in a single instance.

### **1.3. Ecological and anthropogenic processes affecting the state of vegetation**

Ecological factors affecting the state of vegetation:

1. Temperature conditions
2. Light conditions
3. Moisture regime
4. Soils
5. Lay of land

All plants of the study area can withstand very high summer temperatures (up to +45) and fairly strong winter colds (up to -30 0C). Without exception, all plants of this territory are photophilous. All plants in this territory are xerophytes (drought tolerant), capable of growing with precipitation from 100 to 300 mm per year. The soils of the project area are serozems with light soil texture and a slightly alkaline reaction, non-saline.

Groundwater occurs at great depths and does not affect vegetation.

Anthropogenic factors affecting the state of vegetation are numerous, but exploration and grazing have shown the strongest influence. On the project area, pastures have traces of soil disturbance, as a result of excavation work carried out during geological exploration.

### **1.4. Description of vegetation on the project area**

Pastures of project areas and environs were greatly degraded as a result of overgrazing. The species composition of the vegetation is very poor and plants represented by non-eaten and poorly eaten by livestock. All well-eaten plants have long been destroyed by cattle as a result of constant eating (plants do not have time to seed). This can explain the single encounters of well-eaten izengia (*Kochiaprostrata*) ordinary species in all steppes of Uzbekistan.

Description of the vegetation of the territory planned for the construction of a solar power station. The area of the object is 100 hectares and is located next to the village of Tutli, Nurabad district, Samarkand province. GPS data \_\_\_\_\_ . The area is deserted with little rainfall, hot dry



summers and cold winters. Precipitation falls from mid-autumn to late spring. Groundwater is located deep (more than 30 m) and does not affect vegetation. The number of species of vegetation is poor and uniform in large areas. When we walked around the area, we found the following plant species: hare barley (*Hordeumleporinum*), harmala (*Pedanunliannala*), cousin (*Cousinia Bungeana*), wormwood (*Artemisiaalerra-alba*), and rare (*Kochiaprostrata*) is rare. In spring, ephemera grow here: Mortuk (*Eremopyrumbonaepartis*), poppy (*Papaverpavonium*), sagan (*Girgensohnia oppositiflora*), cuyong-rong (*Halocharishispida*), goose onions (*Gageasp*). The whole nature of the vegetation shows that the territory is occupied by highly degraded pastures, because most plants in the area are either not eaten or poorly eaten by livestock.

#### **1.5. The presence of plant species included in the Red Book**

Rare plants included in the Red Book were not found. The literature also does not mention Red Book species from the area.

## **2. Conclusion and recommendations**

Since the place planned for the construction of the photovoltaic station is located in the belt of piedmont wormwood semi-deserts, the following factors must be taken into account during the work:

1. The soils of this locality are serozems of light mechanical composition
2. Strong winds constantly blow in this area.
3. Rainfall is low
4. Vegetation communities slowly regenerate (recover)

When carrying out excavation and construction work, one must try to preserve the vegetation cover as much as possible, since places exposed to vegetation quickly undergo wind deflation (erosion). Subsequently, in these places the vegetation cover will very slowly recover. Such places should be reclaimed.

To protect the facility, as well as create a relatively comfortable environment for the employees of the photovoltaic station, it is necessary to create wired forest strips along the perimeter, as well as to green the areas around the buildings. For

landscaping and forest shelterbelts, it is necessary to select the types of trees and shrubs that can grow in a given area without watering, or in conditions of limited watering.

Assortment of trees and shrubs;

A. Can grow without watering

1. Black Saxaul (*Haloxylon aphyllum*)
2. Pistachio (*Pistacia vera*)
3. Bukhara almonds (*Amygdalus bucharica*)
4. Prickly almonds (*Amygdalus spinosissima*)
5. Goloncharov's bean caper (*Zygophyllum gontscharovii*)
6. Paulsen's senna (*Colutea paulsenii*)
7. Calligonum (*Calligonum* sp)

B. Can grow in conditions of limited watering (up to 3 times per season)

1. Semenov's Maple (*Acer semenovii*)
2. Fluffy maple (*Acer pubescens*)
3. Caucasian hackberry (*Celtis caucasica*)
4. Elm tree (*Ulmus pumilia*)
5. Eastern olive (*Elcagnus orientalis*)
6. Wild olive (*Elcagnus angustifolia*)
7. False acacia (*Robinia pseudoacacia*)
8. Soapberry (*Koelreuteria paniculata*)
9. Regel's pear (*Pyrus regelii*)
10. Bukharian pear (*Pyrus bucharica*)
11. Willow shrub (*Vitex angus-castus*)
12. Elm cultivar (*Ulmus densa*)
13. Bitter almond (*Amygdalus communis*)

It is advisable not to plant trees and shrubs that consume a lot of water, in order to avoid depletion of water supplies (since watering will be carried out from wells). Watering is also necessary using the drip irrigation method. The entire

territory of the facility should be fenced, in order to avoid damage to landings by cattle.

### **3. Appendixes**

#### **3.1. Bibliography**

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### 3.2. Pictures of landscape from the project area



## Appendix 2. Template for Site-Specific Construction Traffic Plan

### CONSTRUCTION TRAFFIC MANAGEMENT PLAN

(Template)

#### GENERAL INFORMATION

1. Full postal address of the site
2. Contact details for the person responsible for submitting the Site-Specific Construction Traffic Management Plan (Name, tel., e-mail)
3. Brief description of the work.

#### PROGRAMME/KEY DATES

4. A broad-brush program and total timescale for the project, giving the duration of each major phase of the construction and the anticipated start date if known. There are example of works which could be included in the Table:

#	Type of work	Planning start date	Duration	Completion
1	Mobilization			
2	Demolishing of building			
3	Leveling of the territory			
4	Earth works			
5	Construction of the main buildings			
6	Finishing works			
7	Equipment installation			
8	Site cleaning			

5. Indicate site operation date and hours.

#### ROUTEING OF DEMOLITION, EXCAVATION AND CONSTRUCTION VEHICLE

6. Proposed supply route to and from the site, showing details of links to the strategic road network (A and B roads). – provide a map with indication directions.

#### SITE ACCESS

7. Site plan showing all points of access and where materials, skips and plant will be stored, and how vehicles will access the site.
8. How will vehicles enter and leave the site?
9. Provide plan of site with indication of above mentioned items (para 7 and 8)

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### **VEHICLES ACCESSING THE SITE PER DAY/WEEK**

10. Provide a breakdown of the number, type, size and weight of vehicles accessing the site.
11. Deliveries and collections should generally be restricted to between 9.30am and 4.30pm. Please confirm your acceptance to this condition and describe how it will be enforced.
12. Provide information will vehicle wheel wash facilities be provided or not. If yes, describe who it will be organized.

### **IMPACT ON OTHER ROAD USERS**

13. Site plan showing all points of access and where materials, skips and plant will be stored, and how vehicles will access the site.

### **GENERAL MANAGEMENT**

14. Indicate who will be responsible for overall management of SSCTMP and coordination with local Traffic Police

## Appendix 3: Chance finds procedure

### 1. Purpose

Construction sites could be considered as subject to heritage survey and assessment at the planning stage. These surveys are based on surface indications alone, and it is therefore possible that sites or items of heritage significance will be found in the course of development work. The procedure set out here covers the reporting and management of such finds.

**Scope:** The “chance finds” procedure covers the actions to be taken from the discovery of a heritage site or item, to its investigation and assessment by a trained archaeologist or other appropriately qualified person.

**Compliance:** The “chance finds” procedure is intended to ensure compliance with relevant provisions of the Law of RUZ “On protection and Use of Objective of the Archeological Heritage”(2009). The procedure of reporting set out below must be observed so that heritage remains reported to the Ministry of Archeology are correctly identified in the field.

### 2. Responsibility

**Operators/Workers** - To exercise due caution if archaeological remains are found

**Foreman/construction site manager** - To secure site and advise management timeously

**Contractor’s manager** - To determine safe working boundary and request inspection

**Archaeologist:** To inspect, identify, advise management, and recover remains

### 3. Procedure

MITIGATION/MONITORING ACTION	RESPONSIBILITY	SCHEDULE
Should a heritage site or archaeological site be uncovered or discovered during the construction phase of the project, the “change find” procedure should be applied. The details of this procedure are highlighted below:	Person identifying archaeological or heritage material	When necessary.
<ul style="list-style-type: none"> <li>• If operating machinery or equipment: stop work</li> <li>• Identify the site with flag tape</li> <li>• Determine GPS position if possible</li> <li>• Cease any works in immediate vicinity</li> </ul>	Person identifying archaeological or heritage material	

<ul style="list-style-type: none"> <li>• Report findings to foreman</li> <li>• Report findings, site location and actions taken to superintendent</li> </ul>	<p>Foreman/construction site manager</p>	
<ul style="list-style-type: none"> <li>• Visit site and determine whether work can proceed without damage to findings</li> <li>• Determine and mark exclusion boundary</li> <li>• Site location and details to be added to project GIS for field confirmation by archaeologist</li> </ul>	<p>Contractor's manager</p>	
<ul style="list-style-type: none"> <li>• Inspect site and confirm addition to project GIS</li> <li>• Advise the Ministry of Archeology (MoA) and request written permission to remove findings from work area</li> <li>• Recovery, packaging and labelling of findings for transfer to National Museum</li> </ul>	<p>Archaeologist</p>	
<ul style="list-style-type: none"> <li>• Should human remains be found, the following actions will be required: <ul style="list-style-type: none"> <li>➢ Apply the change find procedure as described above.</li> <li>➢ Schedule a field inspection with an archaeologist to confirm that remains are human.</li> <li>➢ Advise and liaise with the (MoA) and Police</li> <li>➢ Remains will be recovered and removed either to the National Museum or the National Forensic Laboratory.</li> </ul> </li> </ul>	<p>Archaeologist</p> <p>Representatives of Khokimiyat and Ministry of Archeology</p> <p>Police</p>	







c)





## Appendix 5: Registration List

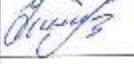
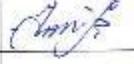
Общественные консультации по проекту «Строительства и эксплуатация солнечной фотоэлектрической станции мощностью 100 МВт» в Нурабадском районе, Самаркандской области

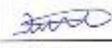
21 декабря 2019, Тутли

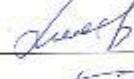
### СПИСОК УЧАСТНИКОВ КОНСУЛЬТАЦИИ

Место проведения: \_\_\_\_\_

#	Организация/Tashkilot	Ф.И.О./ To'liq ismi sharifi	Занимая должность/Lavozim	Номер Телефона/ Telefon raqami	Подпись/Imzo
1		Эгамназоров. Б.	Вакансия ишхон	97 918 3607	
2		Модинаев Сатти	Вакансия ишхон	97.397.72.55	
3		Будимов Манубек	Вакансия ишхон	97 408,8085	
4		Ниримуратов Озгун	Вакансия ишхон	97.4028895	
5		Хушматов Нуриддин	Вакансия ишхон	97,911,6195.	
6		Орамов Сагдор	Вакансия ишхон	99 413-27-08	
7		Ташбердиев Зулристон	Вакансия ишхон	97 366 477 17	
8		Ибрагимов Шириншариф	Вакансия ишхон	97,397-48,78	

#	Организация/Tashkilot	Ф.И.О./ To'liq ismi sharifi	Занимая должность/Lavozim	Номер Телефона/ Telefon raqami	Подпись/Imzo
9		Алисов Ташход	Алисов Ташход	97.378 24 24	
10			Вақтинча ишбх	—	
11		Бекмирзодов Дилком	Вақтинча ишбх	97.320 26 86	
12		Муратов Элбек	Вақтинча ишбх	97.914 33 98	
13		Фуглий Умидош	Вақтинча ишбх	97.797 10 28	
14		Тошмухамедов Худойер	Вақтинча ишбх	97.228 56 25	
15		Исхон Назар	Вақтинча ишбх	97 321-26-26	
16		Маммаданов Шароф	Вақтинча ишбх	97-776-71-94	
17		Улмасов Ш.	ишбх	97 228 19 70	
18		Ризиев Т	пеленгачер	97 320 49 98	
19		Сафаров Ашур	ишбх	97 391 66 76	
20	Қўриқчи қорғоғида Заминчи иш	Сафаров Раҳиман Тошмухамедов	директор	97 287 24 42 91.281 20 12	

#	Организация/Tashkilot	Ф.И.О./ To'liq ismi sharfli	Занимая должность/Lavozim	Номер Телефона/ Telefon raqami	Подпись/Imzo
21	X	Kushiyev Shozafiddin	vaqtinchalik ishchi	34 322,82 62	
22		Eshqiyatov Bobur	vaqtinchalik ishchi	94,9262924	
23		Urolov Sherzod	vaqtinchalik ishchi	943688333	
24		Tangirov Abdullatif	vaqtinchalik ishchi	97 3209578	
25		Qaydarov Azizbek	vaqtinchalik ishchi	-	
26		Ujayev Murodim	vaqtinchalik ishchi	977947011	
27		Shonimozov P	vaqtinchalik ishchi	97 28505,12	
28		Liyodullayev Murodim	vaqtinchalik ishchi	91 352 1424	
29		Kushiyev Shozafiddin	vaqtinchalik ishchi	97,9146195	
30		Kushiyev Shozafiddin	vaqtinchalik ishchi	94,3683234	
31		Saidinova Gulnora	vaqtinchalik ishchi	97,3685599	
32		Tomboev Alexander	Тўшан Ер ресурслари вақтинчалик қаратрувчи бошқари	+94329-10-37	

#	Организация/Tashkilot	Ф.И.О./ To'liq ismi sharifi	Занимая должность/Lavozim	Номер Телефона/ Telefon raqami	Подпись/Imzo
33		Бойлиев Санжорбек	Директор	97 915 83 33	
34		Ахмедов Золду	Инженер	97 558 80 10	
35		Султанов Рудинор	Инженер	97 923 75 73	
36		Туркешев Нуримолла	Инженер	97 758 78 13	
37		Алмурад Мухомед	Инженер	97 320 09 93	
38		Абсаматов Орф	Инженер	93-348-85-91	
39		Зубириев Сайдулла	Инженер	97.926.22.70	
40					
41					
42					
43					
44					







## Appendix 7. Analysis of the impact of earthworks on the Central Asian tortoises' population

### ANALYSIS OF THE IMPACT OF EARTHWORKS

#### on the Central Asian tortoises' population

at the construction site of a 100 mW solar electric generating station

(vicinity of Tutly village, Samarkand region, Uzbekistan)

#### 1. BACKGROUND

Within the framework of the "Solar Energy Development Project in Tutly, Uzbekistan", on May 14-16, 2019, international expert from Terra Naturalis, Jorge Fernandes Layana and representative of NBT S. Kim conducted short-term researches of the site of the proposed construction of the solar electric generating station in the vicinity of Tutly village, the data on the population of some species and photographs were obtained.

In August 2019, fauna expert, R. D. Kashkarov, together with flora and other areas experts, also conducted a short-term survey of this site, and the assessment of the biodiversity of the site of the "Construction of 100 mW solar electric generating station" project [1] was made.

Spring 2019 surveys showed that the most widespread reptile species in the project site is the Central Asian tortoise *Agrionemys horsfieldii* - a declining Central Asian endemic specie listed in the Red book of the Republic of Uzbekistan with the status of 2(VU) and in the IUCN Red List with the status of "vulnerable" (VU). The density of the specie was estimated at 3.4 individuals per 1 ha, which represents about 2,000 tortoises for an area of 600 ha of the project site [2]. According to other researchers, the density of tortoises in this territory can reach  $16 \pm 5.5$  individuals per 1 ha [3]. Accordingly, in general, from 2 to 10 thousand of the Central Asian tortoises can live at the construction site of 600 hectares.

One of the main impacts on the fauna of the project area during construction is a significant change in the soil and vegetation cover through earthworks. On the basis thereof, there was a recommendation in the "Preliminary recommendations for the period of design and construction" [1] to collect the tortoises living at the site and move them to similar habitats outside the construction area prior to the construction commencement, during the period of greatest activity of the Central Asian tortoises.

On April 4, 2020, the Total Company addressed NBT with a number of questions about the recommendations made and received appropriate clarifications from experts:

Questions of the Total Company	NBT expert responses
What does it mean: "The tortoises are active only during three months a year"	Tortoises permanently live at the site. In June, the vegetation is completely burned out and

<p>(since the beginning of March to the beginning of June) in the project area? Are they inactive the rest of the year"?</p> <ul style="list-style-type: none"> <li>- Are there no tortoises at the project area?</li> <li>- Are they in a state of hibernation?</li> <li>- Other?</li> </ul>	<p>the tortoises go into hibernation. They use borrows of the rodents as underground shelters or dig their own borrows. In these holes, they fall into anabiosis and remain there until spring.</p>
<p>The collection of the tortoises cannot be held in March-June, as no activity is planned at the site until June 2020. Please confirm whether it is possible to collect tortoises during hibernation?</p>	<p>Since June, and until the next spring, all the tortoises are underground in a state of anabiosis and do not come to the surface. There is no experience of extracting a large number of tortoises from the ground, and the risk of their damage and death is very high. In addition, the tortoises removed from the ground during hibernation are stressed and unable to re-find shelter and resume hibernation at other sites. Thus, it is not possible to collect and move the tortoises to other areas during the hibernation period.</p>

In accordance with the questions raised, NBT has requested Total for detailed information on the nature, scope and timing of planned earthworks during the construction of 100 mW solar electric generating station in the vicinity of Tutly village.

On April 22, 2020, the information on the breakdown of underground work at the project site was received from Total:

<ul style="list-style-type: none"> <li>• At the first stage, the developer was allocated 350 hectares of the project area.</li> <li>• Work is expected to start in June 2020.</li> <li>• Site levelling (local authority jurisdiction): an area of 100,000 m<sup>2</sup> requires earthworks below &gt; 0.5 m. About 3% of the project site.</li> <li>• Piles: 41,500 piles with a cross section of about 0.06 m<sup>2</sup> will be compacted at a depth of ~ 2.5 m. 2,500 m<sup>2</sup>, i.e. less than 0.1% of the site.</li> <li>• Foundations (high-voltage substation, production substation, O &amp; M building): depth from 1 to 3 meters. About 2,500 m<sup>2</sup>, i.e. less than 0.1% of the site.</li> <li>• Trench: depth from 0.5 to 1.5 m. About 40,000 m<sup>2</sup>, i.e. about 1% of the site.</li> <li>• Thus, in general, less than 5% of the total area of the site will be affected by underground works. Less than 1% of the territory will be affected by underground works to a depth of &gt; 2m.</li> </ul> <p><b>Could you tell us how these figures will be taken into account by biodiversity experts and/or lenders?</b></p>
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## 2. ANALYSIS OF THE IMPACT OF EARTHWORKS ON THE POPULATION OF THE CENTRAL ASIAN TORTOISES

### 2.1. Assessment methods and approaches

To assess the impact of the above-mentioned earthworks on the condition of Central Asian tortoises living on the area of 350 hectares of the construction site of a 100 mW solar electric generating station in the vicinity of Tutly village, the following biological parameters and indicators for this species were analyzed:



- Number;
- Population structure;
- Seasonal activity;
- Reproduction;

Biology of the Central Asian tortoise is sufficiently well studied. However, the indicators of population and other biological parameters vary greatly in different areas of the tortoise's range, as well as depend on weather conditions and other natural factors. We have processed 20 reliable sources of literature containing the necessary information, as well as used the results of our own researches for various periods of time. To achieve the most accurate quantitative assessment of impacts, indicators were used for territories that to the fullest degree coincide with the project site or close to it, whenever possible.

The impacts assessment process consisted of several stages, each of which provides biological parameters, their justified indicators with reference to the source, and final calculations.

## 2.2. Basic results

Biological parameters of the Central Asian tortoise	Indicators for the project site	Source	Calculated values for the site (S=350 ha)
Population	Density of tortoises per 1 ha: 3.4 – 16 ± 5.5 individuals/ha, on average, 10 individuals/ha	2, 3	Total population of tortoises: 350 ha X 10 = 3,500
Age structure of the population	Percentage of adult individuals: 85.9 - 93%, on average = 89.4%	4, 5	Number of adult tortoises: 3,500 X 89.4% = 3,129
Sex ratio in the population	The ratio of males and females 1.5 - 1.9♂/1♀, on average 1.7♂/1♀ or 63%♂♂ and 37%♀♀	5, 6	Number of adult females: 3,129 X 37% = 1,158
Reproduction	Number of eggs laid per 1 female: 4 - 6.4, on average 5.5	6, 7, 8, 9, 10	Population growth (number of young tortoises at the site): 1,158 X 5.5 X 68% = 4,330
	% hatching: 60 – 76%, on average 68%	6, 10	
Total at the site:	3,500 adults + 4,330 young tortoises = 7,830 individuals		

The results of calculations show that by the time of the earthworks commencement (June), at least 3,500 adult tortoises in a state of hibernation and 6,370 eggs laid by tortoises will be in the soil of the site. The depth of adult individuals is 0.4 - 1.5 m from the surface [8,

11, 12]. Eggs are laid by tortoises throughout May at a depth of 8 - 30 cm from the surface. Eggs incubation takes place in the soil under the influence of external temperature during 50 - 80 days. By the beginning of August, taking into account the natural death, 4,330 newborn tortoises will hatch from eggs underground. Without coming to the surface, newborn tortoises will burrow into deeper layers of soil and hibernate until April next year [4-12].

Thus, the total number of tortoises by August 2020 at the construction site may be 7,830 individuals, which corresponds to a density of 22.37 individuals per 1 ha.

## CONCLUSION

According to the plans of the developer, the impact on the soil of the site will be made on a total area of 145,000 m<sup>2</sup>, or 14.5 hectares. As a result, the number of dead Central Asian tortoises may be  $22.37 \times 14.5 = 325$  individuals (adults and young). This will make up about 1% of the average estimated number of tortoises at this site.

In 2009, the Central Asian tortoise was included in the IUCN Red List with the status of "vulnerable" (VU), and in 2019 - in the Red Book of the Republic of Uzbekistan as a declining Central Asian endemic specie, with the status of 2(VU) [13, 14]. In accordance with this, the specie needs strict protection [15].

To prevent the death of the Central Asian tortoises, we recommend to collect and relocate the tortoises to other sites with similar habitat conditions, at a distance of 3 to 5 km from the construction site prior to the commencement of the construction of solar electric generating station in the vicinity of Tutly village in the Samarkand region. Simultaneously with relocation, it is necessary to dig a trench with a depth of 0.5 - 0.7 m and a width of 0.5 m along the entire perimeter of the site. This will prevent tortoises from entering the construction area from other parts of the desert.

In this territory, the Central Asian tortoise comes out of hibernation in the middle of March, mass eggs laying is observed in early-mid May, depending on weather conditions [4, 6, 7, 8, 9, 11]. Thus, actions to "remove" the tortoises from the construction area shall begin at the end of March and be completed in early May. The most effective way is to collect tortoises during periods of their maximum activity – in clear weather, in the morning and evening hours, at air temperatures from + 18 to + 28°C.

If the developer plans to start construction work without prior relocation of the tortoises, this entails the risk of death of a certain number of individuals of the specie listed in the Red Book. In this case, the developer (or management company) shall coordinate its actions with the State Committee of the Republic of Uzbekistan on ecology and environmental protection (Goscomekologiya) and get permission for special use of wildlife objects (including species of the Red Book).

Special permits are issued by Goscomekologiya in accordance with the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan dated October 20, 2014 No. 290 [16]. Goscomekologiya brings in a proposal to the Cabinet of Ministers of the Republic of Uzbekistan for approval on the removal of rare and endangered species of animals listed in the Red Book from the natural environment. The proposal is accompanied by the conclusions of the Academy of Sciences of the Republic of Uzbekistan and the quota approved by the State Committee on ecology and environmental protection. The Cabinet of Ministers of the Republic of Uzbekistan within 10 working days approves the submitted proposal and sends it to

Goskomekologiya. Based on the consent of the Cabinet of Ministers, the State Committee on ecology and environmental protection issues the appropriate permits.

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## Appendix 8. Leaflets and Public Consultation (additional)

### 8.1. Leaflet

#### TOTAL EREN ҚУЁШ ЭЛЕКТРОСТАНЦИЯЛАРИ ҚУРИЛИШИ ЛОЙИХАСИ. БОШЛАНГИЧ ЭКОЛОГИК ВА ИЖТИМОЙ БАҲОЛАШ.

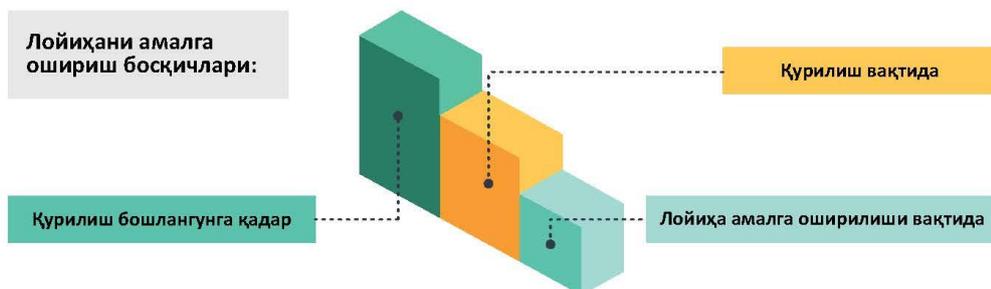
##### ЛОЙИҲА ТЎҒРИСИДА



Экологик ва ижтимоий таъсирларни баҳолаш (ЭИТБ) Европа Тикланиш ва Тараққиёт Банкининг (ЕТТБ) миллий экологик қонунчилиги ҳамда экологик ва ижтимоий сиёсатига мувофиқ амалга оширилади. ЭТИБнинг мақсади қурилиш ва фойдаланиш босқичларида лойиҳа таъсирининг турларини аниқлашдир. Асосий таъсир турлари қуйидагилар:



##### ЛОЙИҲАНИ АТРОФ МУХИТГА ТАЪСИР КЎРСАТИШИ БЎЙИЧА АСОСИЙ КЎРИНИШЛАРИ:



Total Eren

Фуқаролар учун мурожаат телефон номерлари:  
Айзада Сеитниязова, Директор проекта «Tutly Solar LLC»  
Тел: +99890-134-00-34

## TOTAL EREN ҚУЁШ ЭЛЕКТРОСТАНЦИЯЛАРИ ҚУРИЛИШИ ЛОЙИХАСИ. БОШЛАНГИЧ ЭКОЛОГИК ВА ИЖТИМОЙ БАҲОЛАШ.

### ТАЪСИР БЎЛИШИ МУМКИН БЎЛГАН ОБЪЕКТЛАР:



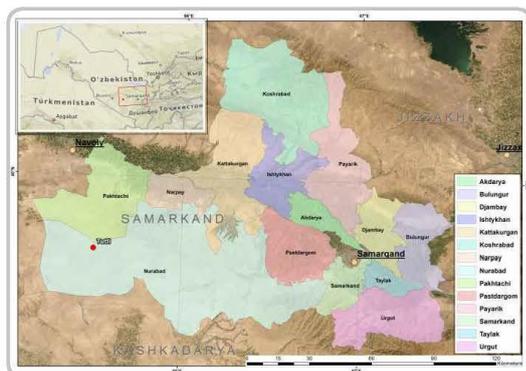
Total Eren

Фуқаролар учун мурожаат телефон номерлари:  
Айзада Сеитниязова, Директор проекта «Tutly Solar LLC»  
Тел: +99890-134-00-34

## TOTAL EREN ҚУЁШ ЭЛЕКТРОСТАНЦИЯЛАРИ ҚУРИЛИШИ ЛОЙИХАСИ. БОШЛАНГИЧ ЭКОЛОГИК ВА ИЖТИМОЙ БАҲОЛАШ.

### ЛОЙИХАНИ АМАЛГА ОШИРИШ ДАВОМИДА ИЖТИМОЙ ҲИМОЯ ТАДБИРЛАРИ

#### Ер ажратиш ва кўчириш лойиҳасининг мақсади:



Ўзбекистон Республикаси қонун ҳужжатлари ва Халқаро молиявий институтларнинг сиёсий-ижтимоий ҳимоя талабларига мувофиқ ер ажратиш ва кўчириш ишларининг тартиб ва механизмларини ишлаб чиқиш.



Лойиҳа доирасида вақтинча ва доимий таъсир қилинувчи ердан фойдаланувчилар сонини аниқлаш ва лойиҳа чизмалари асосида таъсир остига тушуши мумкин бўлган ердан фойдаланувчилар сонини қисқартириш.



#### ЕР АЖРАТИШ ВА КЎЧИРИШ ТАЪСИРИ ТУРЛАРИ:

**1 Доимий таъсир**  
Белгиланган таъсир зоналари мисолида тахминан 1.5 км бўлган ташқи электр таъминоти узатиш линияси ташқи таянч миноралари (башня), тахминан 3 гектар майдонли бир дона таянч подстанциясининг ва 353 гектар майдонга эга қуёш панеллари қурилиши.

**2 Вақтинча таъсир**  
Ташқи электр таъминоти узатиш линияси қурилиши жараёнида давлат захира ерларига етказиладиган таъсир ҳисобланади ва бу ерлар қурилиш ишлари якунлангандан сўнг, давлат захира ерлари балансига яна қайта топширилади.



Total Eren

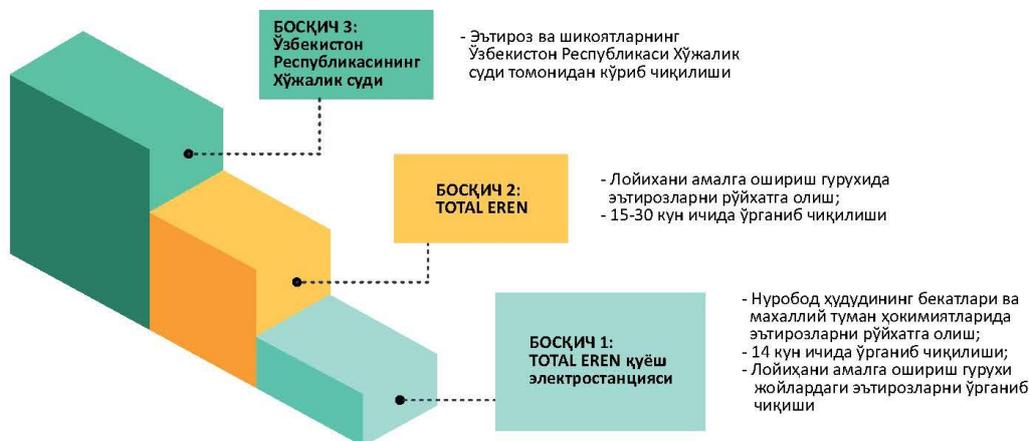
Фуқаролар учун мурожаат телефон номерлари:  
Айзада Сеитниязова, Директор проекта «Tutly Solar LLC»  
Тел: +99890-134-00-34

## TOTAL EREN ҚУЁШ ЭЛЕКТРОСТАНЦИЯЛАРИ ҚУРИЛИШИ ЛОЙИХАСИ. БОШЛАНГИЧ ЭКОЛОГИК ВА ИЖТИМОЙ БАҲОЛАШ.

Таъсир ва йўқотишлар учун зарарлар кимларга тўланади	Зарар қопланадиган таъсир ва йўқотишлар
<ul style="list-style-type: none"> <li>- Доимий ва вақтинчалик таъсир остидаги фермер хўжаликлар;</li> <li>- Экин ва дарахтзорларини йўқотган жисмоний ва юридик шахслар;</li> <li>- Турар ва нотурар жойларини йўқотган жисмоний ва юридик шахслар;</li> <li>- Доимий ва вақтинчалик тижоратини йўқотган бизнес ва ишчи ходимлар.</li> </ul>	<ul style="list-style-type: none"> <li>- Қишлоқ ва ноқишлоқ хўжалиги ерлари;</li> <li>- Турар ва нотурар жойлар;</li> <li>- Экин ва дарахтлар;</li> <li>- Бизнес ва ишчи ходимларга доимий ва вақтинчалик таъсир;</li> <li>- Оила бошлиғи ижтимоий ёрдамга муҳтож (кам таъминланган, боқувчисини йўқотган, ногиронлар ва бола парвариши учун нафақа олувчилар) гуруҳлар учун кўшимча ёрдамлар.</li> </ul>

Лойиҳа доирасида ижтимоий иқтисодий сўровнома ўтказилгандан сўнг, қурилган бино-иншоотлар ёки қўрилган бошқа зарарлар лойиҳа доирасида қопланмайди.

### ЭЪТИРОЗЛАРНИ КЎРИБ ЧИҚИШ МЕХАНИЗМИ:



Total Eren

Фуқаролар учун мурожаат телефон номерлари:  
Айзада Сеитниязова, Директор проекта «Tutly Solar LLC»  
Тел: +99890-134-00-34

8.2. Public Consultation (additional)

24 август 2020  
Тутли, Самарканд вилояти

№	Ф.И.О.	Телефон/мауро
1	Ризузиев боқий	[Signature]
2	Ҳусратов Илоҳ	[Signature]
3	Бутаев Абдураҳим	[Signature]
4	Ҳусратов Олим	[Signature]
5	Тамуров Нормуҳаммад	[Signature]
6	Ҳамроев Шерзод	[Signature]
7	Сатторов Мамажон	[Signature]
8	Муртазов Нормуҳаммад	[Signature]
9	Сейтов Раҳмон	[Signature]
10		





## Appendix 9. Letter from Ministry of Culture. Cultural Heritage Department

The letter confirms absence of cultural heritages on the project site. It is recommended during construction period to involve expert from local department of MoC during construction activities.

**O'ZBEKISTON RESPUBLIKASI  
MADANIYAT VAZIRLIGI  
MADANIY MEROS  
DEPARTAMENTI**



**MINISTRY OF CULTURE OF THE  
REPUBLIC OF UZBEKISTAN  
CULTURAL HERITAGE  
DEPARTMENT**

O'zbekiston, Toshkent, 100027, O'zgarishko'chasi, 18.  
Tel.: (+998 71) 227-05-86, 227-08-21

18, Uzgarishstreet, Tashkent, 100027, Republic of Uzbekistan  
Tel.: (+998 71) 227-05-86, 227-08-21

2020 y. «02» 09 №\_01-04-АЯ/ 535 «\_\_» \_\_\_\_\_ 2020 г.

**Nazar Business and Technology  
MCHJga**

*2020 йил 6 августдаги  
59/20-сонли хатга*

Самарқанд вилояти, Нуробод тумани Тутли қишлоғида қурилиши режалаштирилаётган қуёш электростанцияси учун танланган ер майдони Маданий мерос департаменти Самарқанд вилояти маданий мерос бошқармаси томонидан ўрганиб чиқилди.

Ушбу ўрганиш ишлари натижасида далолатнома тузилган бўлиб, иловага мувофиқ тақдим этилмоқда.

Илова: \_\_ варақ.

**Бошлиқ ўринбосари –  
бош инспектор**



**Ф. Давлатов**

Ижрочи: А. Яркулов  
Тел: 71-245-54-78

ДАЛОЛАТНОМА

"21" август 2020 й.

Нурабоб тум.

Бизлар қуйида имзо чекувчилар:

1. Ш.Келичев - Сов. б.и. нафақий кафе  
доцентлари ва бошқаси;
2. К.Рахимов - Ф.Р.Ф. Илкий археологик марказ  
Финанс ва иқтисодиёт маркази;
3. М.Челпанов - Сов. б.и. нафақий кафе  
Бошқарма ва иқтисодиёт маркази;

"Nazar Business and Technology" ш.и.и. компанияси  
Нурабоб тумани Тўғон кўлидаги қўш  
батари қўраи ушбу таълимга аф  
маркази археологик маркази кафе  
абвас кафе маркази иқтисодиёт  
маркази.

"Nazar Business and Technology" ш.и.и.  
компанияси қўраидаги таълимга қўраидаги  
аф маркази аф қўраи аф қўраи  
Ўзбекистон Республикаси Фанлар Академияси  
Илкий археологик маркази  
Илкий археологик маркази  
олиб боқилган ш.и.и.

1. Ш.Келичев
2. Рахимов К.А
3. М.Челпанов

## Appendix 10. The Positive Conclusion of State Environmental Expertise



### ЎЗБЕКИСТОН РЕСПУБЛИКАСИ ЭКОЛОГИЯ ВА АТРОФ-МУҲИТНИ МУҲОФАЗА ҚИЛИШ ДАВЛАТ ҚЎМИТАСИ

100047, Тошкент ш., Яшнобод т., Той-тепа кўчаси, 2а-уй. тел.: 71 207-11-03, факс: 71 236-02-32  
веб-саҳифа: <http://www.eco.gov.uz>, электрон почта: [info@uznature.uz](mailto:info@uznature.uz)

“4” *сентябрь* 20*20* й.

№ *01-0110-08-52*

Тошкент ш.

## ЗАКЛЮЧЕНИЕ

### Государственной экологической экспертизы

**По объекту:** Оценка воздействия на окружающую среду строительства и эксплуатации солнечной фотоэлектрической станции мощностью 100 МВт в Нурабадском районе Самаркандской области. (Проект ЗВОС).

**Заказчик:** ООО «TUTLY SOLAR».

**ИНН:** 300683194

**Категория:** п.30, прилож.№2 ПКМ РУз №949 от 22.11.2018 г. - II категория

**Разработчик:** ООО «NASAR BUSINESS and TECHNOLOGY».

**Эксперт:** М. Нурламаев

Директору  
ООО «TUTLY SOLAR»  
Айзаде Сеитниязовой

копия: Управлению по экологии и охране  
окружающей среды Самаркандской области

На государственную экологическую экспертизу представлены материалы первого этапа оценки воздействия на окружающую среду строительства и эксплуатации солнечной фотоэлектрической станции мощностью 100 МВт в Нурабадском районе Самаркандской области.

Участок предполагаемого размещения объекта площадью 350,0 га находится возле пос. Тутли Нурабадского района Самаркандской области.

Географические угловые координаты рассматриваемого участка: 1.39°42'8,01"СШ, 65°30'41,09"ВД; 2.39°42'8,01"СШ, 65°31'44,91"ВД; 3.39°40'53,41"СШ, 65°31'44,91"ВД; 4. 39°40'53,41"СШ, 65°30'41,09"ВД.

Территория участка граничит: Ближайший населенный пункт – пос.Тутли располагается с западной стороны на расстоянии 1,5 км от объекта, в 14 км от города Карнаб, в 65 км от г.Каттакурган, 45 км от г.Навои. В 2 км к северу от объекта расположено месторождение гипсового камня. Асфальтированная дорога расположена в 70 м от территории объекта. С южной стороны на расстоянии около 400 м находится в настоящее время не функционирующий коровник со складом, находящийся на балансе хокимията. С восточной стороны возле территории объекта проходит сухое русло временного водотока (селевого).

2021.08.08

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Климат района резко-континентальный, характеризуется значительным колебанием суточных и сезонных температур, что определяется его рельефом и особенностями атмосферной циркуляции.

Средняя максимальная температура воздуха в июле составляет плюс 35,8 °С, средняя минимальная температура в январе – 2,9 м/с. В годовой розе ветров преобладающим является северо-восточное, южное и юго-западных направлений (зимой) со скоростью 2,9 - 3,7 м/с и северного и восточного направления (летом) со скоростью 3,9 - 4,1 м/с.

В геоморфологическом отношении исследуемый участок расположен на слаборасчлененной поверхности равнины Зияятдинских гор, имеющих характер низкогогорья и представляет собой пологую наклоненную в северном направлении поверхность, изрезанную неглубокими суходолами.

В геологическом строении участка на разведанную глубину 20,0 м принимает участие образование кайнозойской эратермы, представленные отложениями четвертичного возраста.

Четвертичные делювиально-пролювиальные отложения представлены толщей супесей, в которых в подчиненном количестве присутствуют линзы и прослойки дресвяных грунтов мощностью от 0,9 до 3,2 м. В кровле четвертичных отложений развит почвенно-растительный слой мощностью 0,3 м.

Грунтовые воды, приуроченные к отложениям Ташкентского и Гололодностепского комплексов, накапливаются за счет потоков, сбрасываемых дождевых и талых воды с горных склонов и за счет атмосферных осадков, выпадающих непосредственно на поверхность долины. Подземные воды в пределах участка до глубины изучения 20,0 м не вскрыты.

Почвы в основном состоят из суглинисто-песчаных и суглинистых мелкощебнистых пустынных сероземов и серо-бурых гипсовых почв различной степени засоленности.

На рассматриваемой территории не располагаются национальные парки или заповедники. Государственный заповедник Карначабул находится на значительном расстоянии от объекта. Представители флоры или фауны, занесенные в «Красную книгу» Узбекистана не встречаются.

На территории объекта преобладает полузасушливая степная растительность, характеризующаяся лугами и кустарниками, такими как солянка, астрагал или польнь. Территория, на которой будет располагаться объект используется для выпаса скота (в основном овец и коз), без признаков чрезмерного выпаса, а также использовалась для проведения пасечных работ около двух месяцев в году. Деревьев, подлежащих вырубке на рассматриваемой территории нет.

Предполагаемая численность работающих на объекте составит 24 человека, из них ИТР – 6 человек. Режим работы односменный, ИТР – 260 рабочих дней в год, рабочий персонал – 365 дней в год.

Согласно проекта на фотоэлектрической станции планируется строительство производственного цеха и вспомогательных помещений, а так же благоустройство территории.

Основную территорию (340 га), отведенного под строительство участка площадью 350 га занимают панели солнечных батарей. Планируемая мощность рассматриваемой фотоэлектрической станции -100МВт.

На основной площадке предполагается расположить следующие здания и сооружения: административно-бытовой корпус, диспетчерская, АТС, помещения инженерных служб, бытовые помещения, склады, КПП, насосную пожаротушения, артезианскую скважину, антисептик. По периметру площадки предусматривается глухое железобетонное ограждение.

При проектировании солнечной электростанции принята технология получения электроэнергии от кристаллических фотоэлектрических модулей с фиксированным наклоном. Фотоэлектрическая станция будет состоять из солнечных модулей: фотоэлектрических кристаллических модулей-панелей, разделенных на секции.

Мощность постоянного тока фотоэлектрической станции составляет около 130 мВт. Участок представляет собой сетку, соединенную с высоковольтной подстанцией 110 кВ через линию ОНЛ до подстанции 33 кВ/110кВ, которая будет расположена к западу от площадки фотоэлектрической станции.

Внутреннее среднее напряжение солнечного парка составляет 33 кВ. Объем ЕРС – до 33 высоковольтных подстанций 110 кВ.

Принятая конфигурация включает в себя инвентарные подстанции Sungrov SG 3125 HV-MV-20 и фотоэлектрические модули Jinko Solar JKM3-DAEA-440 440Wp.

Фотоэлектрическая станция состоит из 30 производственных подстанций производства компании Sungrov. Каждая производственная подстанция среднего напряжения состоит из одного инвентарного Sungrov SG 3125 HV-MV-20, одного трансформатора 3593 кВА и распределительных устройств среднего напряжения (RMU).

Общая установленная мощность постоянного тока для объекта составляет 129987кВт, а экспортная мощность – переменного тока на инверторном терминале с  $pf = 0,95$ .

Для производства электроэнергии на фотоэлектрической станции будут использоваться кремниевые монокристаллические модули типа Jinko Solar JKM3-DAEA-440 440Wp. Ячейки модулей встроены в раму из анодированного алюминиевого сплава 2168x1021x40мм.

Для фотоэлектрических рV панелей используются одноосевые трекары. Инвентары (устройства, преобразующие постоянный ток в переменный) и трансформаторы приняты в контейнерном исполнении со своей системой освещения, управления и пожарной защитой, поставляемых в комплекте.

Фотоэлектростанция периодического действия, выдача электрической мощности в энергосистему составляет 1570 ч/год.

Система самоочистки фотоэлектрических панелей включает датчик, определяющий степень загрязненности поверхности и специальное электролизирующее покрытие. Если управляющий блок получает сигнал от системы датчиков о необходимости проведения очистки панели от пыли, он подает волнообразный импульс, который распространяясь по поверхности панели, сметает до 90% осевшей пыли. Дополнительно 1 - 2 раза в год будут проводить чистку панелей вручную с помощью щеток и обтирочного материала.

Резервным источником питания объекта электричеством будет электросеть. Приготовление пищи на объекте отсутствует.

При эксплуатации сооружений фотоэлектрической станции выбросы загрязняющих веществ отсутствуют.

Водопотребление проектируемого объекта будет складываться из потребления воды на хозяйственно-бытовые, противопожарные нужды и полив усовершенствованных покрытий.

Водоснабжение объекта для хозяйственно-бытовых нужд планируется осуществлять привозной водой. Полив и расход на противопожарные нужды планируется осуществлять от артезианской скважины, которая будет находиться у вспомогательного административного здания в западной части территории участка.

В хозяйственно-бытовых целях вода будет использоваться на хозяйственно-питьевые нужды персонала и мытье полов. Общее прогнозируемое водопотребление фотоэлектрической станции составит 5,552 м<sup>3</sup>/сут или 1990,77 м<sup>3</sup>/год. Всего на хозяйственно-бытовые нужды потребуется 0,552 м<sup>3</sup>/сут., 1090,77 м<sup>3</sup>/год. Прогнозируемый расход воды на полив 5 м<sup>3</sup>/сут., 900 м<sup>3</sup>/год.

Сток, сформированный хозяйственно-бытовыми сточными водами - 0,552 м<sup>3</sup>/сут. или 1090,77 м<sup>3</sup>/год, планируется отводить в гидроизолированную выгребную яму объемом 50 м<sup>3</sup>. Бытовые стоки будут вывозить ассенизационными машинами на очистные сооружения.

Анализ предварительных технических решений, предусмотренных рассматриваемым проектом, показал, что функционирование объекта будет сопровождаться образованием следующих видов отходов: изношенная спецодежда – 0,122 т/год (IV класс); отработанные светодиодные лампы – 20 шт., 0,004 т/год (V класс); макулатура – 0,035 т/год (V класс); ТБО – 1,2 т/год (IV класс) и смет – 137,5 т/год (IV класс). Общее количество образуемых отходов составит 138,861 т/год.

Аварийные ситуации на фотоэлектрической солнечной электростанции после реализации проекта будут минимизированы благодаря применению современной автоматизированной системы управления и контроля технологическим процессом. Системы и участки солнечной электростанции представляют риск с точки зрения опасности возникновения пожара с негативными последствиями для окружающей среды. В качестве противопожарных мероприятий проектом предусмотрены подземные противопожарные резервуары воды 2 x 50 м<sup>3</sup> и наносная станция пожаротушения.

Экологическая экспертиза представленных материалов показала **соответствие** их требованиям природоохранного законодательства к первому этапу оценки воздействия на окружающую среду о допустимости реализации проекта.

Согласно пункта 18 (б) ПКМ РУз. №949 от 21.11.2018 г. «По действующим объектам (действующие предприятия и другие объекты, оказывающие негативное влияние на состояние окружающей среды и здоровье граждан) – проекты экологических нормативов. В случае реконструкции, перепрофилировании, модернизации, **расширения** или передислокации объекта проводится оценка воздействия на окружающую среду».

Государственный комитет Республики Узбекистан по экологии и охране окружающей среды **согласовывает** проект Заявления о воздействии на окружающую среду строительства и эксплуатации солнечной фотоэлектрической станции мощностью 100 мВт в Нурабадском районе Самаркандской области.

Заключение государственной экологической экспертизы о допустимости реализации проекта не подменяет необходимость получения соответствующих документов в установленном законодательством порядке.

**ООО «TUTLY SOLAR» следует:**

- до ввода в эксплуатацию рассматриваемого объекта следует разработать и представить на государственную экологическую экспертизу Заявление об экологических последствиях в установленном законодательном порядке. В документе наряду с разработанными экологическими нормативами следует представить программу мониторинга состояния окружающей среды в районе расположения предприятия.

**Управлению по экологии и охране окружающей среды Самаркандской области,** необходимо взять под контроль выполнение требований природоохранного законодательства, в период проведения строительных и пусконаладочных работ.

Председатель



Б. Кучкаров