# Uzbekistan: Bukhara Region Water Supply and Sewerage (BRWSSP)

**Project No.: 000314**

**Component 1 – Investment in Water Supply Infrastructure**

## Environmental and Social Impact Assessment (ESIA)

## Volume-5 No: BWSP-W20 Karaulbazar District

**August 2023**

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## CURRENCY EQUIVALENTS

(as of May 12, 2023)

| | | |
|---|---|---|
| Currency unit | – | Uzbek Sum (UZS) |
| $1.00 | = | UZS11,465.00 |

## ABBREVIATIONS

| | | |
|---|---|---|
| AIIB | – | Asian Infrastructure Investment Bank |
| amsl | – | above mean sea level |
| ACM | – | asbestos-containing materials |
| BNPZ | – | Russian abbreviation for Bukhara Oil Refinery |
| BOD | – | Biochemical oxygen demand |
| BRWSSP | – | Bukhara Region Water Supply and Sewerage Project |
| BTEX | – | benzene, toluene, ethylbenzene, and xylene |
| CCMP | – | Construction camp management plan |
| CEIU | – | Complaints-resolution, Evaluation, and Integrity Unit |
| Cl | – | Chloride |
| CO | – | Carbon monoxide |
| COD | – | Chemical oxygen demand |
| DD Consultant | – | Detailed Design Consultant |
| DN | – | nominal diameter of the flange, in millimeters |
| EA | – | Executing Agency or Uzsuvtaminot Joint Stock Company |
| EC | – | European Commission |
| EHS | – | Environment, health, and safety |
| ESF | – | Environmental and Social Framework |
| ESIA | – | Environmental and Social Impact Assessment |
| ESMPF | – | Environmental and Social Management Planning Framework |
| ESMP | – | Environmental and Social Management Plan |
| ESS | – | Environmental and Social Standard |
| ESP | – | Environmental and Social Policy |
| EU | – | European Union |
| FAO | – | The Food and Agriculture Organization (FAO) |
| FI | – | Financial Intermediary |
| GAP | – | Gender Action Plan |
| GBV | – | Gender-based Violence |
| GDP | – | Gross Domestic Product |
| GNI | – | Gross National Income |
| GNP | – | Gross National Product |

| | | |
|---|---|---|
| GRC | – | Grievance Redress Committee |
| GRM | – | Grievance Redress Mechanism |
| GoU | – | Government of Uzbekistan |
| HCO3 | – | Bicarbonate |
| HS | – | Health and Safety |
| IA | – | Implementation Agency |
| ILO | – | International Labour Organization |
| JSC | – | Joint Stock Company |
| KMK | – | Uzbek abbreviation of construction standard |
| LAP | – | Land Acquisition Plan |
| LARP | – | Land Acquisition and Resettlement Plan |
| LLC | – | Limited Liability Company |
| LRP | – | Livelihood Restoration Plan |
| MNR | – | Ministry of Natural Resources |
| NaOCl | – | sodium hypochlorite |
| NGOs | – | non-government organizations |
| NSRs | – | noise sensitive receptors |
| OHS | – | Occupational Health and Safety |
| O&M | – | Operation and maintenance |
| OzDSt | – | Uzbek abbreviation for “Uzbek State Standard” |
| PAP | – | Project-affected person |
| PCU | – | Project Coordination Unit |
| PC | – | Project Components |
| PM (2.5/10) | – | Particulate matter |
| PMC | – | Project Management Consultant |
| POW | – | Plan for the Organization of Work |
| PPE | – | Personal Protective Equipment |
| PPM | – | Project-affected People’s Mechanism |
| PPQ | – | Project Processing Query |
| RCR | – | Request for Compliance Review |
| RDR | – | Requests for Dispute Resolution |
| RP | – | Resettlement Plan |
| SAESMR | – | Semi-Annual Environmental and Social Monitoring Report |
| SEAH | | Sexual exploitation, abuse, and harassment |
| SEE | – | State Environmental Expertise |
| SEI | – | Statement of the Environmental Impacts |
| SS | – | suspended solids |

| | | |
|---|---|---|
| SSESMP | – | Site-Specific Environmental and Social Management Plan |
| SO4 | – | sulphate |
| SWEP | – | Site Work Execution Programme |
| TDS | – | total dissolved solids |
| TCPM | – | Copper trichloro phenolate |
| TMTD | – | Tetra-methyl-thiuram disulfide |
| UZS | – | Uzbek Sum |
| VOCs | – | volatile organic compounds |
| WDU | – | Water distribution unit/station |
| WHO | – | World Health Organisation |
| SSESMP | – | Site-Specific Environmental and Social Management Plan |
| SAESMR | – | Semi-Annual Environmental and Social Monitoring Report |

## WEIGHTS AND MEASURES

| | | |
|---|---|---|
| $m^3$ | – | cubic meter |
| dBA/dB | – | decibel audible |
| °C | – | degree Celsius |
| ha | – | hectare |
| km | – | kilometer |
| kph | – | kilometer per hour |
| $kg/cm^2$ | – | kilogram per square centimeter |
| lps | – | liters per second |
| m | | meter |
| mg/l | – | milligram per liter |
| mm | – | millimeter |
| % | – | percent |
| $m^2$ | – | square meter |

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# EXECUTIVE SUMMARY

This Environmental and Social Impact Assessment (ESIA) has been carried out to assess the potentially adverse environmental and social impacts of the proposed water supply works in Karaulbazar district of Bukhara Province. The proposed water supply works in Karaulbazar represent a subproject in the Bukhara Region Water Supply and Sewerage Project[1] (BRWSSP), which is being implemented by the Government of Uzbekistan (GoU) with the financial assistance of the Asian Infrastructure Investment Bank (AIIB).

BRWSSP supports the ongoing efforts of the Government of Uzbekistan towards improving the water supply and sanitation services in the Bukhara Province. The Project is aimed at enhancing service delivery and improving access to safe, reliable, and sustainable water supply services managed on environmentally sound practices in six districts (Bukhara, Romitan, Peshku, Jondor, Kagan, and Karaulbazar districts and the Bukhara and Kagan cities) and sanitation system in Karakul, Alat, Karaulbazar, Romitan, and Gijduvon districts.

Bukhara Region Water Supply and Sewerage Project consists of the following components:

- **Component 1** – Investment in Water Supply Infrastructure: Construction and rehabilitation of intakes, main water lines, water treatment facilities, pumping stations and distribution networks. The water supply component covers the districts of Bukhara, Romitan, Peshku, Jondor Kagan and Karaulbazar.
- **Component 2** – Investment in Sewage Infrastructure: Construction of centralized sewage systems in district centers consisting of collectors, pumping stations and biological sewage treatment plants as well as discharge facilities. The sewage component covers the district centers of Karakul, Alat, Karaulbazar, Romitan and Gijduvon.
- **Component 3** – Project Implementation and Management Support: Project management and implementation support to assist the Implementation Agency (IA) in ensuring seamless coordination, efficient implementation and compliance with the relevant policies.

Despite the BRWSSP comprising three components, this report will reflect the baseline conditions, assessment, and planned activities only concerning Component 1 – Investments in the Water Supply Infrastructure of the Bukhara region (Project). The Project will improve climate resilience, public health, and living conditions and address the current issues with water supply services in the six districts through rehabilitation, expansion, and upgrade of water infrastructure.

Joint Stock Company Uzsuvtaminot is the Executing Agency, and Bukhara Suv Taminoti LLC (the Company or water utility) is Implementing Agency. The Project Coordination Unit (PCU) is responsible for the Project's overall management, implementation, and monitoring. A Project Coordinator was set up in Bukhara city to manage day-to-day project implementation at the subprojects and district levels.

[1] Uzbekistan: Bukhara Region Water Supply and Sewerage Project, Asian Infrastructure Investment Bank (www.aiib.org)

The project consists of the following seven packages:

- Volume-1 No: BWSP-W1-3 Central facilities of water supply systems in Bukhara
- Volume-2 No: BWSP-W4-10 Bukhara city and Bukhara District
- Volume-3 No: BWSP-W11-14 Jondor District
- Volume-4 No: BWSP-W15-19 Kagan and Kagan District
- Volume-5 No: BWSP-W20 Karaulbazar District
- Volume-6 No: BWSP-W21-25 Peshku District
- Volume-7 No: BWSP-W21-25 Romitan District.

Each of the seven packages covers the activities to be done in a particular administrative district of the Bukhara province. The current report provides environmental and social impact assessment (ESIA) under package: Volume-5 No: BWSP-W20 Karaulbazar District (Subproject).

The subproject is consistent with the Asian Infrastructure Investment Bank (AIIB) Environmental and Social Policy, an integral part of the AIIB Environmental and Social Framework (ESF)[2]. The Project Environmental and Social Management Planning Framework (ESMPF) was developed considering that the feasibility study did not specify the particular scope of civil works. Such an approach required conducting environmental and social studies following the AIIB's Environmental and Social Standards (ESS 1 – Environmental and Social Assessment and Management and ESS 2 – Involuntary Resettlement) upon approval of the subproject design. This ESIA has been carried out following the requirements defined in ESMPF. The new subproject design is subject to the national environmental regulator's approval of ecological examination.

**Subproject Scope.** The subproject is formulated to improve water supply service delivery in the Karaulbazar district of Bukhara Province. The project stakeholders agreed upon the new subproject's scope during the detailed design stage. The new subproject design includes rehabilitating and constructing three water-pumping stations in Buzochi, Navbahor, and Jarqoq and their connection to the Karaulbazar water network. The civil works specified in the design are limited to the existing water-pumping stations and their relationship to the network of the Buzochi, Navbahor, Jarqoq, and Tashquduq settlements would be along the current roads and by replacing existing pipes. The scope of the ESIA is to identify the potential environmental and social impacts of the new subproject design, construction and operation/maintenance and evaluate them following the AIIB ESP and relevant Uzbek regulations.

**Categorization.** This document is the Environmental and Social Impact Assessment (ESIA) Report prepared for the subproject "Volume-5 No: BWSP-W20 Karaulbazar District" (Subproject). This ESIA is prepared following the above describes ESMPF and AIIB requirements regarding assessing each subproject for its environmental and social impacts when the particular location and scope of work are determined.

[2] Environmental and Social Framework, 2022 | AIIB (www.aiib.org)

The subproject environmental and social assessment shows no significant adverse environmental and social impacts that are irreversible, diverse, or unprecedented. Potential impacts are unlikely to affect areas larger than the sites or facilities subject to physical work. These impacts are site-specific, and none of them are irreversible. In most cases, mitigation measures can be designed with uncomplicated measures commonly used at construction sites and known to civil works contractors. Therefore, the subproject is classified as Category B per AIIB Environmental and Social Policy (ESP) and ESMPF.

Pursuant to Appendix 1 of the Uzbek Regulation on SEE, No.541[3], the subproject is classified as Category III and requires an environmental impact assessment per national standards. The new SEE approval on the subproject was received on May 03, 2023 for the three-year period.

**Environmental and Social Risks and Impacts**. The subproject is unlikely to cause significant adverse impacts as (i) the components will involve straightforward construction and operation so that impacts will be mainly localized; (ii) careful attention needs to be paid to minimizing disruption to the community; and (iii) predicted impacts are site-specific and likely to be associated with the construction process, involving excavation and earth movements.

The project will generate positive socio-economic benefits in Karaulbazar District due to improved water supply facilities. This will significantly improve living conditions, local population health, and the environment. The proposed project activities also might generate various adverse environmental and social impacts. These impacts would be associated with physical and economic displacement, generation of solid wastes, noise, dust, air pollution, wastewater, disturbance to community and traffic, the influx of labor, occupational health and safety, community health and safety issues due to facility siting, civil works, and operation and maintenance.

During construction, impacts will likely arise from the need for soil disposal and the disturbance to residents, businesses, and traffic. These temporary impacts are common for construction activities in populated areas. Traffic management will be necessary during pipe laying. Earthworks will be conducted during the dry season. The stockyards will be located away from watercourses. Precautions will be taken to minimize construction waste. Measures will be provided to prevent wastewater from entering streams, watercourses, or irrigation channels. Open burning of solid waste generated from the construction camp will be strictly prohibited. The mitigation hierarchy used for the above impacts calls for impact avoidance as the most preferred approach; where avoidance is not possible, appropriate measures should be adopted to minimize the impact, and where mitigation is not possible or is not adequate, compensatory measures should be adopted. The mitigation measures will include water sprinkling, employing noise abatement measures, controlling any leakages or spillage of chemicals, fuels, and oils, treating wastewater before releasing, and segregating and appropriately disposing of wastes. For potential impacts such as health and safety concerns for workers and communities, appropriate protection measures will be employed, including using personal protective equipment by the workers, barricading the worksites to prevent unauthorized entrance, and applying safe driving practices inside the villages.

[3] Regulation on Further Development of Procedure for Environmental Impact Assessment

Traffic management will be necessary during pipe laying. Earthworks will be conducted during the dry season. The stockyards will be located away from watercourses. Precautions will be taken to minimize construction waste. Measures will be provided to prevent wastewater from entering streams, watercourses, or irrigation channels. Open burning of solid waste generated from the construction camp will be strictly prohibited. All public utilities and infrastructure, if damaged by the construction activities, would be repaired and restored to pre-project condition or better.

The operation and maintenance manual, including standard operating procedures for the operation and maintenance of three water pumping stations (WDUs), will be developed, imparting necessary training, safety and personal protective equipment (PPE) for workers, and measures to maintain the water supply system effectively. During the water pumping stations' operation, the Company will regularly monitor the drinking water quality and conduct leak management campaigns, if needed.

**Environmental and Social Management.** This (ESIA) report is prepared based on the detailed design and following requirements of AIIB ESP and relevant local legislation. The ESIA includes an environmental and social management plan (ESMP), which describes and addresses the potential impacts and risks identified by the environmental and social assessment, and comprises proposed mitigation measures, environmental monitoring and reporting requirements, and performance indicators. The ESIA and ESMP should be an integral part of the subproject's bidding documents and civil works contract with specific provisions requiring the contractor(s) to (i) comply with all other conditions required by AIIB and GoU; (ii) prepare a site-specific environmental and social management plan (SSESMP); (iii) implement an environmental and social monitoring plan; and (v) have a budget for implementation of the environmental and social management plan. Most mitigation measures require the contractors to adopt good site practices, which are part of their routine procedures and comprise their scope of work. PCU and PMC's supervision and monitoring will be provided as part of their management of the Project. The ESMP implementation costs include costs for environmental monitoring, environmental and social mitigation measures/permissions, staffing, and training delivery.

**Public Consultation and Information Disclosure.** Extensive consultations were carried out during the preparation of the present document. The subproject stakeholders comprise community stakeholders and institutional stakeholders. The community stakeholders were direct beneficiaries and comprise the local population in Buzochi, Navbahor, Jarqoq, and Tashquduq. The institutional stakeholders comprised the local administration, district and province-level line government departments, public health and wellbeing services, water utility, etc.

Stakeholder consultations were carried out in December 2022 and March and May 2023 through focus group discussions, interviews, meetings, and workshops covering the subproject design. Institutional stakeholder consultations included meetings with representatives of the Local Administration of Karaulbazar District, Karaulbazar District Department of Health, Bukhara Province Public Health and Wellbeing Service, public schools and kindergarten representatives, and rural medical stations. Stakeholders shared their concerns related to the water taste and whether water will be better after commissioning of a new water treatment system; they also were interested in if the project will improve the air quality in the district, as Karaulbazar district is industrial, and many industrial enterprises are concentrated here, resulting in a persistent smell

in the air; the residents asked why the new wastewater system will not cover the entire area of the province; they also were concerned about water tariff after new system commissioning.

The subproject communities were visited in December 2022, May 02-05, 2023, and consultations were conducted with the community members within their settlements to encourage and facilitate their participation. Consultations were undertaken in four subproject communities – Buzochi, Navbahor, Jarqoq, and Tashquduq while ensuring that people from various segments of society participated in the consultation to provide proper coverage of possible stakeholder concerns. During consultations, the participants were informed about the subproject design, associated activities, anticipated environmental and social impacts, expected social benefits, and proposed Grievance Redress Mechanism (GRM). Representatives of the participating villages shared their concerns on the second attempt of the government to construct a water supply system, improving the quality of the drinking water as they avoid drinking tap water, employment opportunities during construction and operation phases, etc.

The views expressed by stakeholders were incorporated into the ESIA report. The consultation process will continue during subproject implementation to ensure that stakeholders are fully engaged in the subproject and have the opportunity to participate in its development and implementation.

**Grievance Redress Mechanism.**

GRM will enable stakeholders to raise grievances about the project and seek redress when stakeholders perceive an adverse impact arising from the project activities. The GRM mechanisms (GRM at the community-level, GRM for workers, GRM on GBV, and AIIB's Project-affected People's Mechanism) set out clear systematic steps for affected individuals and communities to submit complaints and feedback and simultaneously for the project to respond to queries, feedback, and complaints received. The GRM will guarantee the project is responsive to any concerns and grievances, particularly from affected stakeholders and communities.

GRM will be available to personnel, workers, project staff, and people living or working in the areas impacted by the project activities. Any affected or concerned person or group about the project activities has the right to participate in the GRM and be encouraged to use it. Moreover, the developed GRM does not replace the public mechanisms for filing complaints and resolving conflicts in the legal system of Uzbekistan but, on the contrary, seeks to minimize its use as much as possible.

**Monitoring and Reporting.** The water utility, PCU, and Project Management Consultant (PMC) will be responsible for environmental and social monitoring. PMC will supervise and guide the contractor in the preparation of quarterly environmental and social monitoring reports. The monitoring and audit findings will be included in quarterly and semi-annual environmental and social monitoring reports (SAESMRs) prepared by PMC for the PCU, water utility, and AIIB.

# 12. INTRODUCTION

The Government of Uzbekistan (GoU) implements the Bukhara Region Water Supply and Sewerage Project (BRWSSP) under the financial assistance from the Asian Infrastructure Investment Bank (AIIB). The proposed water supply works in Karaulbazar District represent a BRWSSP's subproject.

This report is prepared pursuant to the agreement between Detailed Design Consultant (JV Seureca-Tumas) and Global Business Services Ltd appointed to undertake an Environmental and Social Impact Assessment Report (ESIA) in compliance with the Asian Infrastructure Investment Bank (AIIB) Environmental and Social Policy (ESP).

It should be noted the proposed project is classified as Category B per AIIB ESP and classified as Category III per Uzbek Regulation on SEE, No.541, and requires conducting environmental assessment per national standards. The subproject design has been changed significantly in comparison to the feasibility study. Instead of the construction of two water distribution units (WDUs) in the Buzochi and Jarqoq villages, as proposed by the project feasibility study, the detailed design was agreed upon for constructing three water distribution stations in the Buzochi, Navbahor, and Jarqoq settlements and connecting the Buzochi WDU with the Tashquduq settlement's water network. The regulator requested the preparation of new environmental assessment reports for the subproject and each WDU. Four environmental assessment reports covering only water supply activities under the subproject were prepared and submitted to the regulator on April 27, 2023, through www.eco-service.uz. The SEE approval on the subproject design was received on May 03, 2023.

## 12.1. Overview of the Project

Bukhara Region Water Supply and Sewerage Project[4] (BRWSSP) supports the ongoing efforts of the Government of Uzbekistan towards improving the water supply and sanitation services in the Bukhara Province with Asian Infrastructure Investment Bank (AIIB) financing. The Project is aimed at enhancing service delivery and improving access to safe, reliable, and sustainable water supply services managed on environmentally sound practices in six districts (Bukhara, Romitan, Peshku, Jondor Kagan, and Karaulbazar districts and the Bukhara and Kagan cities) and sanitation system in Karakul, Alat, Karaulbazar, Romitan, and Gijduvon districts.

The coverage of water supply services in the Bukhara province is 55.6% according to the Bukhara Province Department of Statistics[5]. To cover the drinking water demand and other utility services in the Bukhara provinces and other regions, the Uzbek Government initiated Obod Qishloq Program. Between 2019 and 2022, 11 districts of the Bukhara provinces became beneficiaries of

4 Uzbekistan: Bukhara Region Water Supply and Sewerage Project, Asian Infrastructure Investment Bank (www.aiib.org)

5 https://www.buxstat.uz/uz/rasmiy-statistika/services-2

this national program. However, the program did not encompass all the scope required to operate water infrastructure in the Bukhara region effectively. In particular, water mains, water treatment facilities, and pumping stations remained as is; they are obsolete and deteriorated due to underfunded maintenance works and a lack of resources, equipment, and technology.

The project feasibility study was prepared in 2018. It was subject to a critical review to match the proposed scope with works completed by Obod Qishloq Program and the current need in 2022-2023. The Project range is provided in Figure 1. Upon agreement of the works to be done under the Water Supply Component, the project scope was divided into the following components – volumes:

- Volume-1 No: BWSP-W1-3 Central facilities of water supply systems in Bukhara
- Volume-2 No: BWSP-W4-10 Bukhara city and Bukhara District
- Volume-3 No: BWSP-W11-14 Jondor District
- Volume-4 No: BWSP-W15-19 Kagan and Kagan District
- Volume-5 No: BWSP-W20 Karaulbazar District
- Volume-6 No: BWSP-W21-25 Peshku District
- Volume-7 No: BWSP-W26-28 Romitan District.

Uzsuvtaminot Joint Stock Company (JSC) is the Executing Agency, and Bukhara Suv Taminoti LLC (the Company or water utility) is Implementing Agency. The PCU is responsible for the Project's overall management, implementation, and monitoring. A Project Coordinator is set up in Bukhara city to manage day-to-day project implementation at the subprojects and district levels.

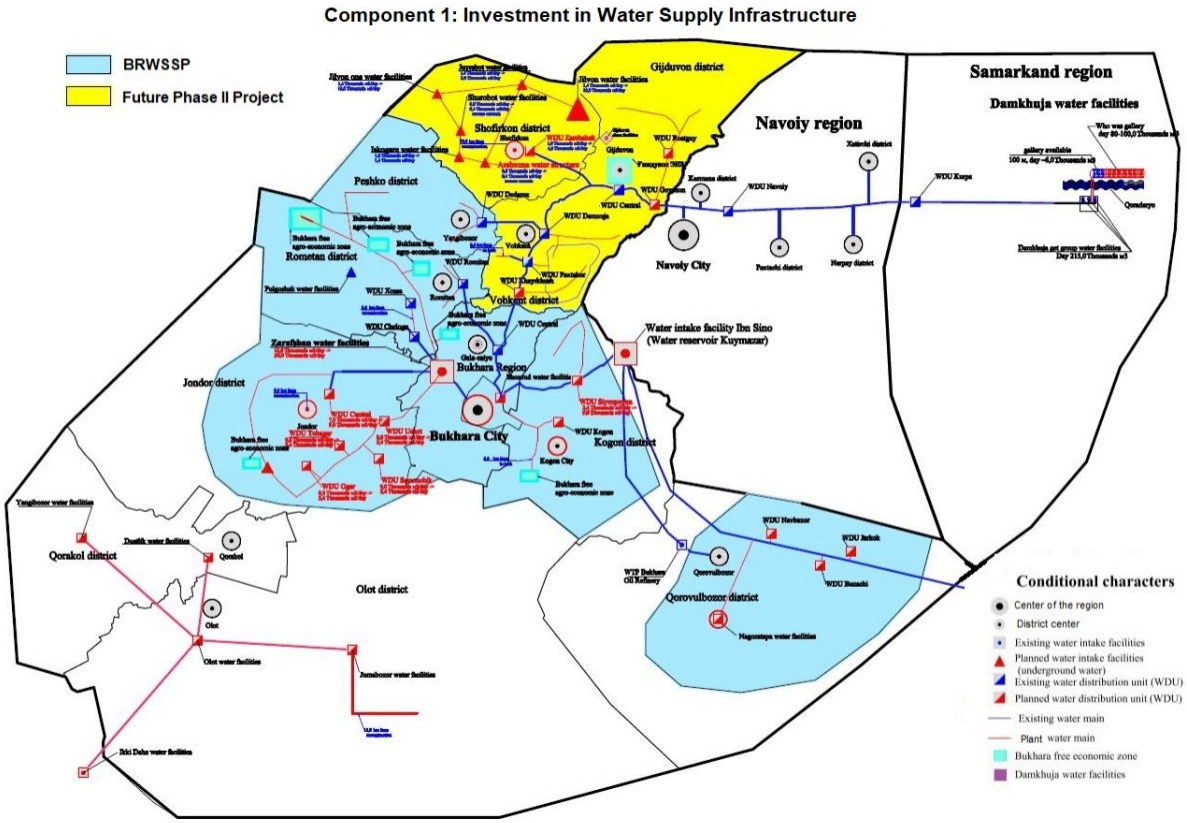


Figure 1: Project Range
(Source: Project Feasibility Study)

## 12.2. ESIA Objectives

This report is prepared for the package No. Volume-5 No: BWSP-W20 Karaulbazar District. The subproject activities include the construction of three water pumping stations in Buzochi, Navbahor, and Jarkok villages and their connection to the intra-settlement networks. Moreover, the project intends to provide drinking water to Tashquduq village by connecting its network with the Buzochi water station. The purpose of the ESIA is to inform the water utility and other project stakeholders of the environmental and social impacts associated with the project, particularly the extent to which the project aligns with the requirements of AIIB ESF and applicable Uzbek regulations.

The main objectives of the environmental and social impact assessment are the following:

- Review of the subproject design, identify sensitive receptors in the subproject area.
- Assessment of the baseline conditions prior to the development of the subproject through the desk study review and surveys.
- Assessment of the subproject environmental and social impacts during the planning, construction, and operation phases.

- Review of regulatory compliance obligations, local and international standards and lender requirements.
- Disclose the project information and study findings to the key project stakeholders and identify project affected persons; to collect information on the local environment and social context and of the subproject area during stakeholder engagement; to get a feedback on the subproject.
- Identify the environmental and social impact mitigation and management measures and setting up monitoring requirements to avoid or minimize the potential impacts.

## 12.3. Study Methodology

EISA methodology comprises baseline studies and impact assessment, where:

- Baseline survey included collection and analysis of information about physical resources (subproject location, climate, topography, geology, groundwater, surface water, air quality, and acoustic environment), biological environment (flora and fauna) and socio-economic condition (economic data, demographics, minority population, education, access to public services, healthcare, land use, and cultural heritage) in the subproject area. This included desktop study and field surveys with physical observations, instrumental measurements, laboratory tests, focus group discussion, and key informant interviews.
- Impact assessment of the subproject was conducted using methodology provided in ESMPF. The significance of the identified impact will be determined step-by-step in the following manner:

  (a) Identification and characterization of environmental and social impacts

  When identifying potential impacts is completed, each impact will be described by relevant characteristics, such as type, scale, duration, extent, and frequency. The impacts would also be specified as direct, indirect, and induced. One more characteristic that pertains only to unplanned events is likelihood, described as unlikely, possible, and likely.

  (b) Assignment of a magnitude to each potential impact

  Magnitude is a function of a combination of such characteristics as extent, duration, scale, frequency, and likelihood where magnitude describes the intensity of the change that is predicted to occur in the receptor as a result of potential impact. The universal magnitude designations will be major, medium, minor, and nominal.

  (c) Assignment of significance of impact.

  Once the value and sensitivity of the receptor and magnitude of the impacts are assessed, the significance of impacts will be designated using the following matrix.

| | Sensitivity of Receptors | | | |
|---|---|---|---|---|
| **Magnitude of Impact** | **Very Severe** | **Severe** | **Mild** | **Low** |
| Major | Critical | High | Moderate | Minimal |
| Medium | High | High | Moderate | Minimal |
| Minor | Moderate | Moderate | Low | Minimal |
| Nominal | Minimal | Minimal | Minimal | Minimal |

Figure 2: Impact Significance Matrix. Retrieve from the Project ESMPF

Once the significance of a potential impact has been characterized, the next stage would be to evaluate what mitigation and enhancement measures are warranted. The mitigation hierarchy is compatible to that applied by AIIB: (a) anticipate and avoid risks and impacts; (b) where avoidance is not feasible, minimize or reduce risks and impacts to acceptable levels; (c) once risks and impacts have been minimized or reduced, mitigate them; and (d) where residual risks or impacts remain, compensate for or offset them, where technically and financially feasible.

Residual impacts would be those that are predicted to remain after the application of all proposed mitigation measures. Residual significant impacts will be carefully monitored and managed during the project implementation. The adverse impacts that cannot be avoided or obliterated should be minimized, and finally, those that remain significant and cannot be reduced further have to be accepted. It may be necessary to provide compensation or offsetting for substantial residual effects. This is where some other aspect of the environment is developed or managed in a manner that offsets unavoidable significant effects.

## 12.4. Study Team

Global Business Services has been engaged in the preparation of local EIA and ESIA for this project. The ESIA team is presented in the following table.

Table 1: Study Team

| Name | Position | Profession | Company |
|---|---|---|---|
| Laly Sattarova | Environmental Engineer / Team Leader | Environmental Engineer | Global Business Services |
| Nosir Muminov | Economist | Economist | Global Business Services |
| Valentina Kim | Social Specialist | Phycologist | Global Business Services |
| Igor Kulgeiko | Water Supply Engineer | Water Supply Engineer | Global Business Services |
| Iskander Mirzabekov | Water Supply Engineer | Water Supply Engineer | Global Business Services |
| Timur Ikramov | Public Consultation Specialist | Economist | Global Business Services |

| Name | Position | Profession | Company |
|---|---|---|---|
| Natalya Shulepina | Public Consultation Specialist | Historian | Global Business Services |
| Kayum Jalilov | Health and Safety Specialist | Health and Safety Specialist | Bukhara Province Public Health and Wellbeing Service |

## 12.5. Document Structure

This ESIA report is organized into 9 chapters. Following this Executive Summary, there are two chapters that provide the information that puts the subproject into context:

- Chapter II (*Description of the subproject*) describes the existing situation in the subproject sites and technical design summary, i.e., works to be done.
- Chapter III (*Policy, legal, and administrative framework*) describes the legal, policy, and requirements lenders applicable to the ESIA process and the subproject design.

The impact of the subproject is assessed on the existing environment. The current status of environmental and social conditions is discussed in the following three chapters:

- Chapter IV (*Baseline environmental and social data*) describes the physical conditions, biological environment, and socio-economic conditions of the subproject area.
- Chapter VI (*Public consultations and information disclosure*) describes consultations undertaken for the subproject and the stakeholder participation plan during the subproject implementation.

The impact assessment is organized in three chapters:

- Chapter V (*Environmental and social risks and impacts*) describes the impacts of the subproject design, construction, and operation on the physical, ecological, and socioeconomic environment of the subproject area.
- Chapter VII (*Grievance redress mechanism*) provides the framework for reporting, recording, and taking actions on complaints from the stakeholders.
- Chapter VIII (*Environmental management plan*) details management and mitigation measures to be carried out during the subproject's design, construction, and operation phases. It also allocates responsibilities for implementing the steps among the critical project stakeholders and lays out the main aspects for monitoring the implementation of management and mitigation measures.

Finally, the outcome of the impact assessment is combined to produce Chapter IX (*Conclusions and recommendations*), which brings together the salient findings of the subproject assessment.

# 13. DESCRIPTION OF THE SUBPROJECT

## 13.1. Project background

Bukhara Region Water Supply and Sewerage Project[6] (BRWSSP) supports the ongoing efforts of the Government of Uzbekistan towards improving the water supply and sanitation services in the Bukhara Province with AIIB financing. The Project is aimed at enhancing service delivery and improving access to safe, reliable, and sustainable water supply services managed on environmentally sound practices in six districts (Bukhara, Romitan, Peshku, Jondor Kagan, and Karaulbazar districts and the Bukhara and Kagan cities) and sanitation system in Karakul, Alat, Karaulbazar, Romitan, and Gijduvon districts.

The coverage of water supply services in the Bukhara province is 55.6% according to the Bukhara Province Department of Statistics[7]. To cover the drinking water demand and other utility services in the Bukhara provinces and other regions, the Uzbek Government initiated Obod Qishloq Program. Between 2019 and 2022, 11 districts of the Bukhara provinces became beneficiaries of this national program. However, the program did not encompass all the scope required to operate water infrastructure in the Bukhara region effectively. In particular, water mains, water treatment facilities, and pumping stations remained as is; they are obsolete and deteriorated due to underfunded maintenance works and a lack of resources, equipment, and technology.

The project feasibility study was prepared in 2018. It was subject to a critical review to match the proposed scope with works completed by Obod Qishloq Program and the current need in 2022-2023. The Project range is provided in Figure 1. Upon agreement of the works to be done under the Water Supply Component, the project scope was divided into the following components – volumes:

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- Volume-3 No: BWSP-W11-14 Jondor District
- Volume-4 No: BWSP-W15-19 Kagan and Kagan District
- Volume-5 No: BWSP-W20 Karaulbazar District
- Volume-6 No: BWSP-W21-25 Peshku District
- Volume-7 No: BWSP-W21-25 Romitan District.

Uzsuvtaminot JSC is the Executing Agency, and Bukhara Suv Taminoti LLC (the Company or water utility) is Implementing Agency. PCU is responsible for the Project's overall management, implementation, and monitoring. A Project Coordinator is set up in Bukhara city to manage day-to-day project implementation at the subprojects and district levels.

6 Uzbekistan: Bukhara Region Water Supply and Sewerage Project, Asian Infrastructure Investment Bank (www.aiib.org)

7 https://www.buxstat.uz/uz/rasmiy-statistika/services-2

## 13.2. Subproject Description

The subproject discussed in this document is the BWSP-W20 Karaulbazar District (Volume 5) and covers the activities in the Karaulbazar district of Bukhara province.

The Karaulbazar district consists of six settlements (Buzochi, Jarqoq, Navbahor, Nagoratepa, Sardoba, and Tashquduq) and one town, Karaulbazar. The existing water supply of the Karaulbazar district is carried out from the Kuyumazar reservoir through Kuyumazar-BNPZ8 and Kuyumazar-Mubarek water mains. The "Kuyumazar-BNPZ" pipeline supplies water to Karaulbazar town, and the "Kuyumazar-Mubarek" pipeline provides water to the villages of the district. Both water mains are underground.

Considering that the Uzbek government rehabilitated the intra-village networks within the Obod Qishloq Program and the findings of the critical review of the project feasibility study and engineering assessment of the local water infrastructure in the Karaulbazar district, the project stakeholders agreed upon the following subproject components:

- Construction and rehabilitation of Water Distribution Units (WDU) in Buzochi, Jarqoq, and Navbahor settlements;
- Construction of feeding pipeline from WDUs to the Buzochi, Jarqoq, and Navbahor water network;
- Construction of a pipeline connecting Tashquduq settlement's network with Buzochi WDU.

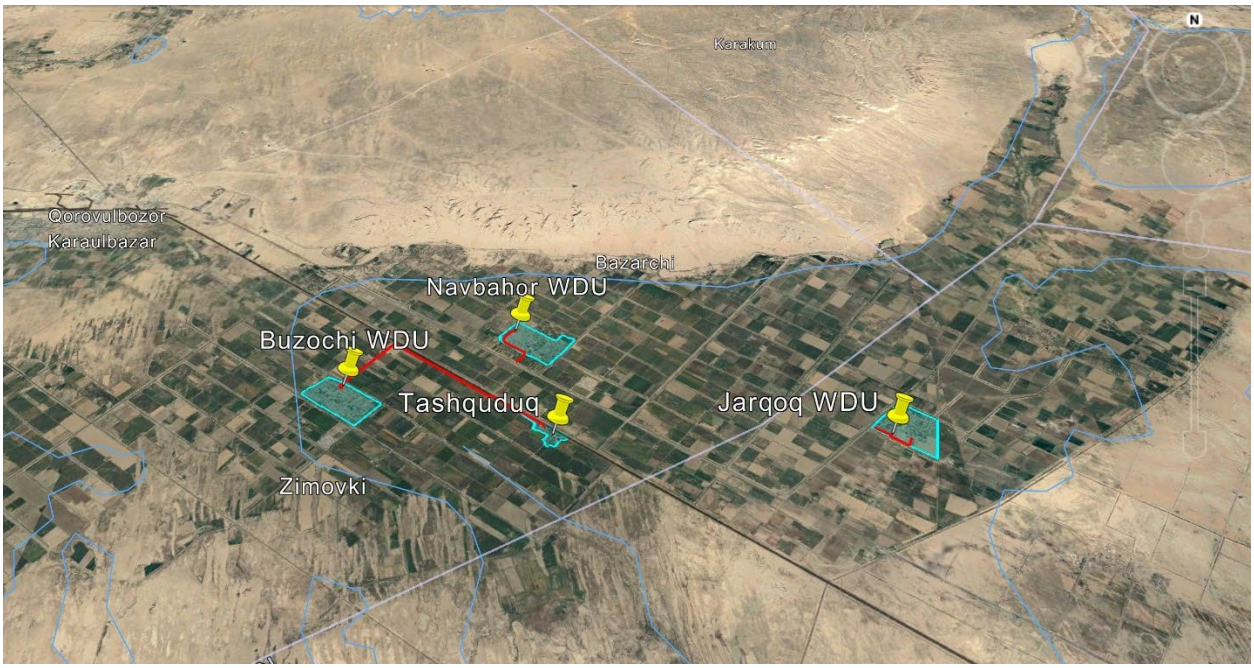



Figure 3: Range of the Subproject
WDU = water distribution unit; Buzochi, Jarqoq, Navbahor, and Tashquduq = subproject settlements; blue lines = the villages border; red lines = feeding pipelines; black line = A 380 highway

8 BNPZ is a Russian abbreviation for Bukhara Oil Refinery.

(Source: Google earth)

Figure 2 overviews the settlements' location within the subproject area. The blue lines specify the border of the villages, and the red lines are new feeding pipelines.

The Buzochi, Jarqoq, and Navbahor WDUs are inside the subproject settlements and nearby the A-380 highway. Most of the subproject activities will be conducted inside the WDUs territory. Buzochi, Jarqoq, and Navbahor WDUs are water utility-owned plots (Figures 2-4). The other work includes feeding pipes laying for connecting WDUs with the intra-settlement network and will be performed along the existing roads; such type of work will take no more than one month. Therefore, no specific land acquisition is required for subproject activities.

The findings of the engineering assessment of the subproject WDUs conducted by Buxoro Neftegaz Montaj LLC (Uzbekistan) are provided in the following Section.

## 13.3. Sites Condition

### 13.3.1. Buzochi WDU

The Buzochi WDU is located in the north of Buzochi settlement (Figure 3) and about 2.7 km from the A-380 highway.

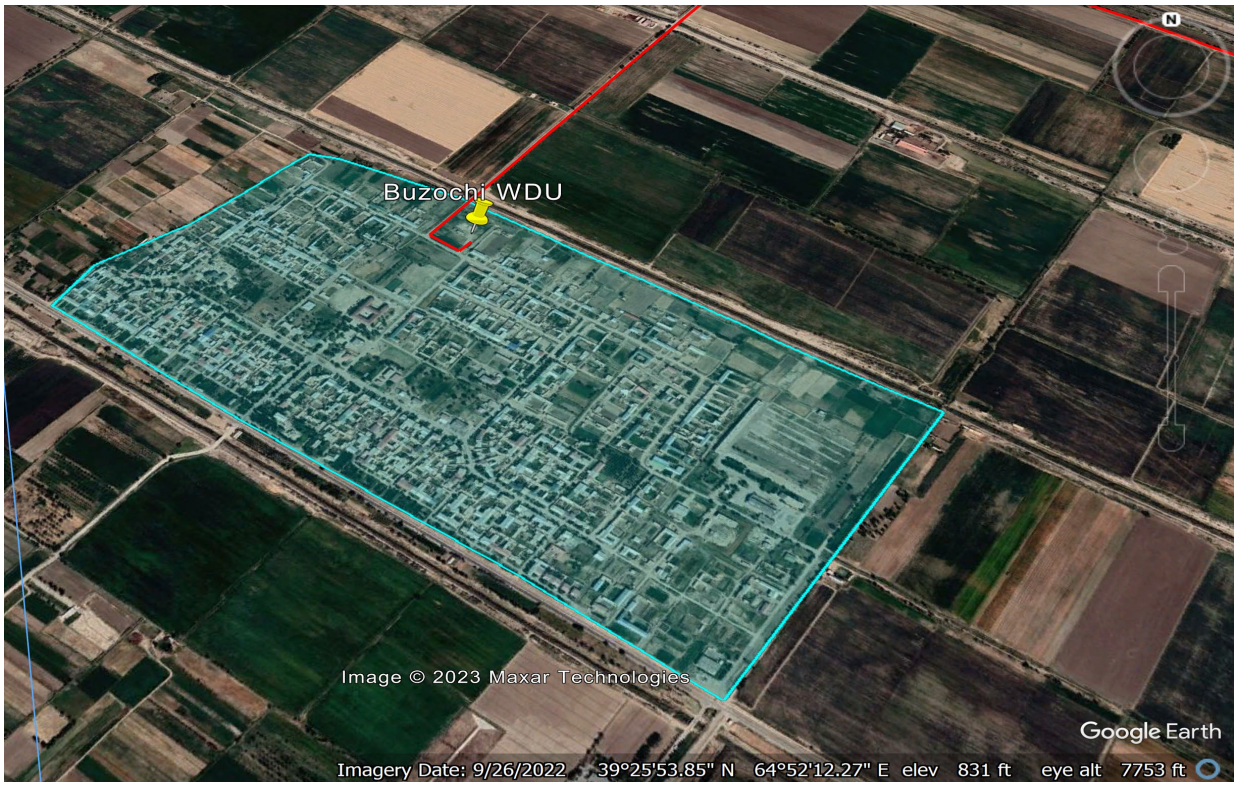



Figure 4: Buzochi settlement area
(Source: Google earth)

Despite being built in 2011, the Buzochi WDU has not been operated since its construction. There is no caretaker or maintenance staff at the station. The WDU has free access to anyone; no one can remember when the lock and gate were demolished (Figure 4). Locals used the WDU buildings as warehouses and cowsheds, while the territory was used for parking agricultural machines (tractor and combine harvesters) and planting crops, vegetables, and trees. There are some spontaneous dumpsites of construction and household waste inside and outside the WDU.

The existing water distribution station comprises the following structures:

(1) Fencing (Figure 5):

The Buzochi WDU is fenced with a precast reinforced concrete wall with an average height of 2.2 m along the perimeter. The reinforced concrete fence is severely destroyed. The wall's vertical position is violated. The racks are covered with rust.

(2) Gates (Figure 6):

There are no gates in the Buzochi WDU. Due to the free access to the station's buildings and lands, the local population actively used the buildings as a warehouse: straw briquettes for livestock were stored in the premises of a pumping station.

(3) Pumping station (Figure 8):

- The station is a one-story rectangular building of 18.0x6.0 m, without a basement, and with walls made of precast reinforced concrete panels 300 mm thick.
- The exterior plaster of the walls and the finishing have become unusable.
- The doors are metal, unstable, covered with rust everywhere, and have no lock.
- The windows are wooden, cracked, askew, and unable to keep heat in winter; in some places there are no windows at all.
- The roof is made of rubberoid and is almost covered by tears, swelling and cracks. There is almost no drain system on the roof.
- The electric and lighting systems in the building are in poor condition.
- There are no heating, water supply and sewerage systems and no fire alarm system in the building.
- There is no concrete pavement or other isolation along the building perimeter, which leads to flooding of the foundations by atmospheric precipitation and meltwater.

(4) Water reservoirs (Figure 9):

There are two water reservoirs of 12.20 x 12.0 m each. The boning of the tanks is made with soil, whereas in some places it has not been made to the full height of the walls, while reinforced concrete columns, roof beams, floor slabs have rust. The joints between the crossbars and columns do not have a protective layer of concrete.

(5) Filtration facilities (Figure 7):

Filtration facilities are in the metallic container.

The findings of the engineering assessment revealed that the water reservoirs and filtration facilities could be used upon rehabilitation. At the same time, the pumping station must be rebuilt

due to the severe deterioration of the building. The engineering assessment did not mention the presence of asbestos-containing materials (ACM) in the WDU facilities.

Figure 5: Buzochi WDU
(Source: Field visit of May 02-05, 2023)

Figure 6: Fencing of the Buzochi WDU
(Source: Field visits of 15-17 December 2022 and May 02-05, 2023)

Figure 7: No gates at the Buzochi WDU
(Source: Field visits of 15-17 December 2022 and May 02-05, 2023)

Figure 8: Filtration facilities at the Buzochi WDU
(Source: Field visits of 15-17 December 2022 and May 02-05, 2023)

Figure 9: Existing state of pumping station at the Buzochi WDU
(Source: Field visit of 15-17 December 2022 and Engineering report by Bukhara Neftegaz LLC)

Figure 10: Existing state of water reservoirs at the Buzochi WDU
(Source: Field visit of 15-17 December 2022 and Engineering report by Bukhara Neftegaz LLC)

### 13.3.2. Navbahor WDU

The water distribution station, Navbahor WDU, is located northwest of the Navbahor settlement (Figure 10), less than one kilometer from the A-380 highway and about six kilometers from the Buzochi WDU. The Navbahor WDU has not been operated for many years. There is no caretaker or maintenance staff at the station. Buildings and structures are abandoned and deteriorated. There is no equipment inside the pumping station and other facilities.

The station's territory is accessible since the metal gates are bonded by a wire instead of a lock. During the previous years, the local population planted crops and vegetables inside the WDU, and the buildings were used as storage for straw and grass for livestock.

Figure 11: Navbahor settlement area
(Source: Google earth)

The water distribution station in Navbahor currently consists of the following buildings and facilities:

(1) Fencing (Figure 11): The Navbahor WDU is fenced with a precast reinforced concrete wall with an average height of 2.2 m along the perimeter. The reinforced concrete fence is severely destroyed. The wall's vertical position is violated. The racks are covered with rust.

(2) Gates (Figure 12): Gates are hinged and made of thin reinforcement covered with rust.

(3) Pumping station (Figure 13):

- The station is a one-story rectangular building of 21.3x6.0 m, without a basement, with walls of precast reinforced concrete panels 250 mm thick.
- The reinforced concrete wall panels are unsatisfactory; the structure has critical deformations, cracks, and destruction.
- There are no doors or windows in the building.

- The roof is made of rubberoid and is in an unsatisfactory condition. There is no drain system on the roof.
- The electric and lighting systems in the building are in poor condition.
- There is no heating, water supply, sewerage, and fire alarm system in the building.
- No concrete pavement along the building perimeter leads to the foundations' flooding by atmospheric precipitation and meltwater.

(4) Building for water reservoirs management (Figure 14):

- The station is a one-story rectangular building of 3.3.0x4.8 m, without a basement; with walls of precast reinforced concrete panels of 250 mm thick.
- The transverse walls are laid out unevenly of 380 mm thick bricks, while the other walls are made of precast reinforced concrete panels, but all the structures are deplorable.
- There are no doors or windows in the building.

(5) Water reservoirs (Figure 15): There are two water reservoirs of 18.60 x 12.0 m each. Reinforced concrete slabs, columns, and crossbars are generally in satisfactory condition, although the tanks have leaks, as evidenced by the destruction of the soil covering the outer walls.

(6) Filtration facilities: Filtration facilities are made in a metallic container and located outside WDU, inside the settlement.

The engineering assessment did not mention the presence of asbestos-containing materials (ACM) in the WDU facilities.

Figure 12: Fencing of the Navbahor WDU
(Source: Field visit of 15-17 December 2022 and Engineering report by Bukhara Neftegaz LLC)

Figure 13: Gates at the Navbahor WDU
(Source: Field visits 15-17 December 2022)

Figure 14: Existing state of pumping station at the Navbahor WDU
(Source: Field visit of 15-17 December 2022 and Engineering report by Bukhara Neftegaz LLC)

Figure 15: Building for water reservoirs management at the Navbahor WDU
(Source: Field visit of 15-17 December 2022 and Engineering report by Bukhara Neftegaz LLC)

Figure 16: Existing state of water reservoirs at the Navbahor WDU
(Source: Field visit of 15-17 December 2022 and Engineering report by Bukhara Neftegaz LLC)

### 13.3.3. Jarqoq WDU

The Jarqoq WDU is southwest of the Jarqoq settlement (Figure 16). The water station has access to intra-settlement roads and the A380 highway, about 4 km away. The Jarqoq settlement is about ten kilometers from the Tashquduq settlement and about 15 – 18 kilometers from Buzochi and Navbahor settlements.

The Jarqoq WDU station was built in 1988 but has not been operated since its construction. No water utility caretaker or equipment is at the pumping station and reservoirs. Despite metal gates with a lock, the facilities and WDU territory are used by a family who entered in the early 2000s and now living illegally in the pumping station.

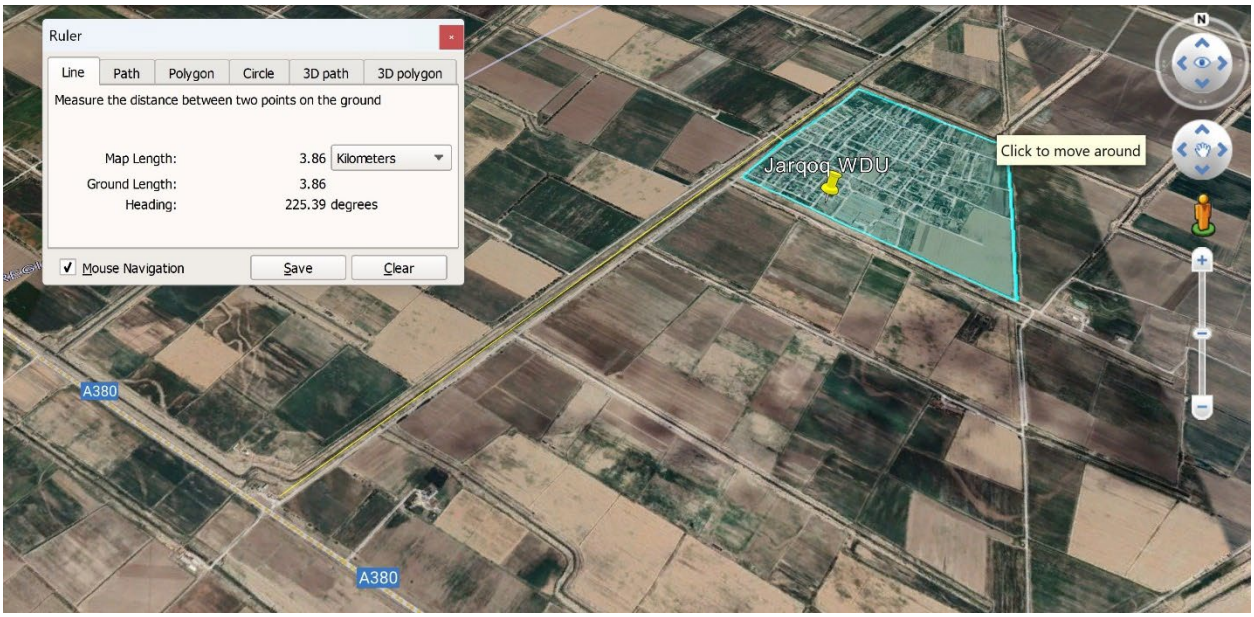



Figure 17: Jarqoq settlement area
(Source: Google earth)

The water distribution station in Jarqoq currently consists of the following buildings and facilities:

(1) Fencing (Figure 17): The Jarqoq WDU is fenced with a precast reinforced concrete wall with an average height of 2.2 m along the perimeter. The reinforced concrete fence has severe destruction of some fence sections and violation of the wall's vertical position, i.e., deviation from the vertical axes. The racks are covered with rust.

(2) Gates (Figure 18): Gates are hinged and made of thin reinforcement covered with rust.

(3) Pumping station (Figure 19):

- The station is a one-story rectangular building of 18.0x6.0 m, without a basement, and with walls made of precast reinforced concrete panels 300 mm thick.
- Exterior plaster walls and finishing have fallen into disrepair, the structure has critical deformations, cracks, and destruction.
- Wooden doors and windows are dry, lopsided and unable to retain heat in the winter.
- The roof is made of rubberoid and in unsatisfactory condition. The drain system was not constructed properly.
- The electric and lighting system in the building is in poor condition.
- There is no heating, water supply and sewerage systems and no fire alarm system in the building.

- There is no concrete pavement along the building perimeter, which leads to flooding of the foundations by atmospheric precipitation and meltwater.

(4) Water reservoirs (Figure 20): There are two water reservoirs of 12.20 x 12.0 m each. Reinforced concrete slabs, columns, and crossbars are generally in an unsatisfactory condition: there are longitudinal cracks, roughness, chips, and small voids; the structures have no protective concrete layer.

(5) Filtration facilities: Filtration facilities are made in the form of metallic container and located outside of WDU, inside settlement.

Engineering assessment revealed that some parts of the buildings and structures at the Jarqoq WDU also do not meet the basic requirements of earthquake-resistant construction per Uzbek Regulation No. KMK 2.01.03-19 “Construction in seismic regions9.” The engineering assessment did not mention the presence of asbestos-containing materials (ACM) in the WDU facilities.

Figure 18: Fencing of the Jarqoq WDU
(Source: Field visit of 15-17 December 2022 and Engineering report by Bukhara Neftegaz LLC)

Figure 19: Gates at the Jarqoq WDU
(Source: Field visit of 15-17 December 2022 and Engineering report by Bukhara Neftegaz LLC)

9 Regulation No. KMK 2.01.03-19 “Construction in seismic regions,”

https://shnk.uz/wp-content/uploads/2021/07/shnk_2.01.03-19rus.pdf

Figure 20: Existing state of pumping station at the Jarqoq WDU
(Source: Field visits of 15-17 December 2022 and Engineering report by Bukhara Neftegaz LLC)

Figure 21: Existing state of water reservoirs at the Jarqoq WDU
(Source: Field visits of 15-17 December 2022 and Engineering report by Bukhara Neftegaz LLC)

## 13.4. Subproject Interventions

The particular interventions under the subproject are provided in Table 2. The subproject works will help to meet the growing drinking water demand in the Karaulbazar district and provide proper public health conditions in the area.

Table 2: Summary of the subproject works

| No. | Component | Subproject Works |
|---|---|---|
| 1. | Rehabilitation of Buzochi WDU | ▪ Rehabilitation of the existing water reservoirs (2x500m$^3$) in Buzochi WDU<br>▪ Construction of a new pumping station<br>▪ Procurement and installation of new pumping equipment, including, but not limited to:<br>– two horizontal shaft centrifugal pumps of Q= 8.14 L/s; Nm=4.00 kW (one main and one standby) to supply water to the Buzochi network<br>– two vertical shaft centrifugal pumps with Q= 2.5 L/s; Nm=1.5 kW (1 main + 1 standby) to supply water to the Tashquduq network<br>– pumping equipment for the fire booster system: electrical pump of 11.00 kW, jockey pump of 1.5 kW, and diesel pump of 16.00 kW<br>– one submersible pump (flow capacity of 10 m$^3$/h, Nm=0.75 kW) for the drainage of the pumping station<br>– one submersible pump (flow capacity of 20 m$^3$/h, Nm= 1.1 kW) for the drainage of water tanks<br>▪ Enhancing the filtration facilities<br>▪ Procurement and installation of equipment for electrolysis systems<br>▪ Construction of two pipelines (DN150) connecting a pumping station with both water reservoirs<br>▪ Rehabilitation of the surrounding concrete wall of Buzochi WDU and installation of gates<br>▪ Construction of a 116 m pipeline DN100 connecting Buzochi settlement's water network with Buzochi WDU. |
| 2. | Rehabilitation of Navbahor WDU | ▪ Rehabilitation of the existing water reservoirs (2 x 1000m$^3$)<br>▪ Construction of a new pumping station<br>▪ Procurement and installation of new pumping equipment, including, but not limited to:<br>– two horizontal shaft centrifugal pumps of Q= 5.88 L/s; Nm=4.00 kW (one main and one standby) to supply water to the Navbahor network<br>– pumping equipment for the fire booster system: electrical pump of 11.00 kW, jockey pump of 1.5 kW, and diesel pump of 16.00 kW<br>– one submersible pump (flow capacity of 10 m$^3$/h, Nm=0.75 kW) for the drainage of the pumping station<br>– one submersible pump (flow capacity of 20 m$^3$/h, Nm= 1.1 kW) for the drainage of water tanks |

| No. | Component | Subproject Works |
|---|---|---|
| 3. | Construction of Jarqoq WDU | ▪ Enhancing the filtration facilities<br>▪ Procurement and installation of equipment for electrolysis systems<br>▪ Construction of a pipeline DN150 connecting a pumping station with both water reservoirs<br>▪ Construction of a 92 m pipeline DN100 connecting Navbahor settlement with Navbahor WDU and 1,209 m pipeline DN100 between existing pipes<br>▪ Construction of new water reservoirs (2x400m$^3$), pumping station and filtration facilities<br>▪ Procurement and installation of new pumping equipment, including, but not limited to:<br>– two horizontal shaft centrifugal pumps of Q= 5.57 L/s; Nm=4.00 kW (one main and one standby) to supply water to the Navbahor network<br>– pumping equipment for the fire booster system: electrical pump of 11.00 kW, jockey pump of 1.5 kW, and diesel pump of 16.00 kW<br>– one submersible pump (flow capacity of 10 m$^3$/h, Nm=0.75 kW) for the drainage of the pumping station<br>– one submersible pump (flow capacity of 20 m$^3$/h, Nm= 1.1 kW) for the drainage of water tanks<br>▪ Procurement and installation of equipment for electrolysis systems<br>▪ Construction of a pipeline DN150 connecting a pumping station with both water reservoirs<br>▪ Construction of a 531 m pipeline DN100 connecting Jarqoq settlement with Jarqoq WDU and construction of a 2045 expansion area water network pipe (DN110 mm, HDPE, L=852 m) |
| 4. | Pipeline to Tashquduq settlement | Construction of a 6,210 m pipeline DN110 connecting Tashquduq settlement's water network with Buzochi WDU |

WDU = water distribution unit; DN = nominal diameter of the flange in millimeters; kW = kilowatts; L/s = liter per second; m$^3$ = cubic meter; m$^3$/h = cubic meter per hour

Engineering design is foreseen (a) properly buffer zone and sanitary protection of the water supply infrastructure following the requirements of Uzbek legislation and (b) minimize or avoid displacement of trees. As an example, Figure 21 provides overview for a location of facilities in Jarqoq water station.

The Tashquduq settlement was not a part of the project feasibility study. However, the village population suffers from a water shortage. The water is delivered to the storage tank in Tashquduq on a truck and distributed to the people through the existing network for two hours per day. Considering the availability of a water network and a lack of feeding pipeline providing sustainable drinking water, it was agreed to include the construction of a 6,210 m pipeline DN100 from WDU to the Tashquduq settlement in the scope of work under subproject Volume-5.

The Tashquduq settlement is located about 4.5 km from the Buzochi WDU and 2.5 km from the Navbahor WDU (Figure 22). Due to the presence of the A380 highway between the Navbahor

WDU and the Tashquduq village, laying the supply pipeline through the highway will increase the work cost. Therefore, it was agreed to apply a second pipeline from the Buzochi WDU to the water network of the Tashquduq settlement.

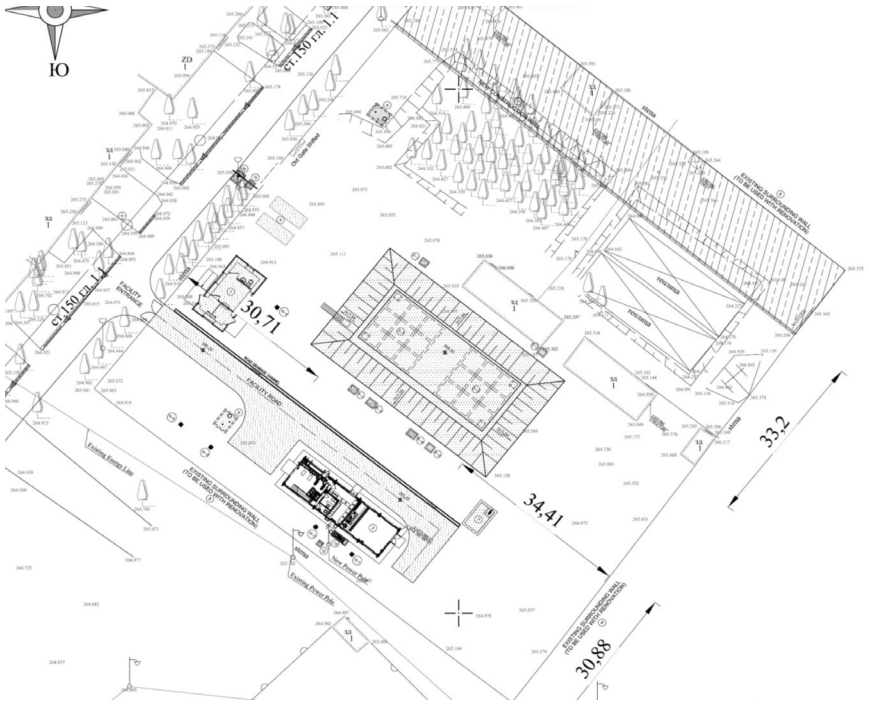



Figure 22: Proposed general layout for the Jarqoq WDU
(Source: Detailed design of Volume-5 No: BWSP-W20 Karaulbazar District)

Figure 23: Distance between Tashquduq settlement and WDUs in Buzochi and Navbahor (Source: Google earth)

There are power and gas supply in the subproject settlements. Moreover, the subproject WDUs are in close vicinity of the A-380 highway. So, no associated facilities are required for the implementation of the project.

## 13.5. Construction Methodology

The drinking water supply system of the subproject area will be based on water stations (located inside the subproject villages) supplying drinking water directly to consumers. The water source for these stations will be Kuyumazar-Mubarek water main. The stations will be collect water in two reservoirs.

The proposed water supply system will comprised of two infrastructure types:

(1) Water collection and treatment

This includes water reservoirs and filtration and treatment facilities. The latter represents a two-stage water treatment process comprising mechanical treatment through sand filters and chemical treatment by water chlorination based on hydrolysis of sodium hypochlorite. Such water treatment will remove pathogens, suspended matters, color and odour-producing substances, etc., from the drinking water. This treatment technology was proposed considering that the incoming raw water on the Kuyumazar-Mubarek water main is clear.

Two reservoirs per water station will be maintained for uninterruptable water supply to consumers.

Pressure sand filters will be used to filtrate incoming untreated water and the sedimentation of suspended solids and turbidity. The water to be purified will slowly sink through the sand filter's sand, leaving the dirt particles from the water behind in the fine pores of the sand. A sand filter can only filter solid particles like algae and organic material from the water. When a certain quantity of water has been filtered, or the sand has reached a certain degree of pollution, the sand filter will automatically switch to backwashing. During the backwashing, the dirt is washed from the sand again. Subsequently, this dirt is discharged, together with the backwash water. As a result, the sand filter will not get blocked, retaining its optimal purification qualities.

Sodium hypochlorite is the most widely used disinfection technology, as it kills most live pathogens in water and is safer to handle and store than chlorine. Electric chlorination applies an electrical current to saltwater to produce dilute sodium hypochlorite and hydrogen gas. The resultant sodium hypochlorite solution, containing 0.7%-1% chlorine, is considered non-hazardous to humans yet still destroys viruses, bacteria, and other harmful microorganisms in the water, making it safe to drink and preventing the spread of diseases. Electric chlorination produces sodium hypochlorite on-site on an “as needed” basis. It can function as part of a responsive system that automatically generates a dosage of sodium hypochlorite depending on the existing levels of free chlorine or organic matter in the water.

(2) Distribution Facilities

After having treated raw water in the water treatment plant, the last stage of the water supply system is water distribution to consumers. The distribution system will represent (1) pumping facilities to pump water into the network and (2) a network of pipelines inside the service zone (in our case, it is a designated project village) for transporting purified water to the consumers:

- Pumping facilities will be combined with an electrolysis plant.
- The distribution network system consists of large-sized mains, arterial mains, and intra-settlement networks. As was mentioned previously, the Government has already rehabilitated or constructed new arterial mains and all intra-settlement networks in the participating villages. So, the part to be built within this subproject will be related to the pipework of the water mains connecting water stations with the networks.
- Pipes for the water supply system will be made of High-Density Polyethylene (HDPE), which is a non-hazardous material. Unlike traditional metal pipes, HDPE pipes do not rust, corrode, or rot and are effective for large-scale water transfer.

Other works to support the water supply station operation will include the construction of an inlet chamber, container filtration facilities, a guard house, technological communications, an on-site power supply network, security lighting, landscaping, a septic tank, a transformer substation, and a generator.

The contractor, within a month after the start of mobilization, will prepare and provide the following deliverables:

(1) Plan for the Organization of Work (POW), which will be progressively updated through the construction’s various stages and

(2) Site Work Execution Programme (SWEP) specifying all key dates throughout the construction phase.

These documents will incorporate, among others, road access, construction seasons, construction labor availability, camp requirements, etc., as well as construction plans and schedules for certain subproject activities.

Mobilization will start with transporting the equipment, tools, spare parts, accessories, and materials by the contractor to the construction site. The physical construction activities will include of site grading, opening the access roads, and constructing temporary and maintenance facilities. The general earthwork activities will consist of cut and fill activities for degrading the site, construction of a foundation, pavement sub-grade preparation, and excavation and backfill for utilities. These earthworks will be followed by constructing the facilities specified in Section 2.4. It is anticipated that the construction activities will commence in November 2023.

## 13.6. Key Construction Materials

Table 3: Key Construction Materials

| № | Key Construction Materials |
|---|---|
| 1. | Geotextile |
| 2. | Geomembrane |
| 3. | Steel (incl. pipes) |
| 4. | Sewer polyethylene pipes |
| 5. | Water supply pipes of pressure polypropylene/polyethylene pipes |
| 6. | Cement |
| 7. | Bricks |
| 8. | Sand |
| 9. | Gravel |
| 10. | Reinforced concrete |

Detailed information on the required construction materials per WDU is provided in the Bill of Quantity.

## 13.7. Key Construction Equipment and Vehicles

During the subproject activities, the contractor will use at least 12 types of vehicles, equipment, and machinery as specified in Table 4.

Table 4: Vehicles, Equipment, and Machinery

| No. | Equipment Type and Characteristics | Required quantity |
|---|---|---|
| 1. | Truck-Crane / Mobile crane – 5 tons /20 tons lifting capacity | 3 |
| 2. | Excavator with the bucket of capacity 0.5-1 $m^3$ – Min 14 tons | 1 |
| 3. | Backhoe Loader – Mini Excavator | 2 |

| No. | Equipment Type and Characteristics | Required quantity |
|---|---|---|
| 4. | Wheel Loader – 2.0 $m^3$ bucket capacity | 1 |
| 5. | Tipper Trucks – 10 m3 hauling capacity | 4 |
| 6. | Water Tanker – 3.5-10 tons | 2 |
| 7. | Mobile Generator-Min 50 kVA | 2 |
| 8. | Compactors – Double drum vibratory compactors / Plate compactors | 4 |
| 9. | Dewatering System – Submersible pumps of 120 $m^3/h$ | 3 |
| 10. | Welding Unit Set – Welding Generator, Oxygen cutting set, mask, protective equipment for welding etc. | 1 |
| 11. | Extrusion Welding Machine for PE / PP – Welding Additive: ø 3–4 mm / 0.12–0.16 in; ø 4–5 mm / 0.16–0.2 in. | 2 |
| 12. | Pipe trailer – trailer for carrying pipe | 1 |

## 13.8. Manpower Requirements

It is expected the number of construction workers will be around 20 during the peak period of the construction, where approximately 50% of them will be unskilled while the remaining personnel will have some technical qualifications. The permanent highly-educated and experienced personnel of the contractor will comprise at least 14 experts as given in Table 3.

Table 5: Workforce Requirement

| No. | Position/specialization | Relevant academic qualifications | Minimum years of relevant work experience |
|---|---|---|---|
| 1. | Contractor's Representative (Project Manager) | Civil or Environmental Engineer | 10 |
| 2. | Site Manager | Civil or Environmental Engineer | 6 |
| 3. | Foreman (Master) | Technician | 6 |
| 4. | Foreman (Master) | Technician | 6 |
| 5. | Foreman (Master) | Technician | 6 |
| 6. | Land Survey Engineer | Engineer | 8 |
| 7. | Land Surveyor (topographer) | Land Surveyor | 3 |
| 8. | Land Surveyor (topographer) | Land Surveyor | 3 |
| 9. | Land Surveyor (topographer) | Land Surveyor | 3 |
| 10. | Mechanical Engineer | Mechanical Engineer | 5 |
| 11. | Electrical Engineer | Electrical Engineer | 5 |
| 12. | Quantity Surveyor | Engineer or another discipline experienced in this subject | 5 |
| 13. | Health and Safety Specialist | Engineer or other profession group | 3 |

| No. | Position/specialization | Relevant academic qualifications | Minimum years of relevant work experience |
|---|---|---|---|
| 14. | Environmental Specialist | Engineer or other profession group | 3 |

The composition of permanent and temporary construction teams may change during the subproject depending on the nature of implementing construction work.

## 13.9. Temporary Facilities

Temporary facilities will be locate where they will serve subproject adequately and result in minimum interference with performance of the work. Latter the contractor will relocate and modify facilities as required by progress of the work.

Temporary facilities on the construction sites to be used during the construction activities will include:

- Site Offices

The site office will be the hub of the construction site. Workers will sign in and out here. The contractor's team will often get briefed on tasks for the day, check documents, and schedules, and even get inductions here.

- Utilities infrastructure

Despite water, gas, and electricity availability on the sites, the contractor will make a temporary contract with utility operators for connection to utility infrastructure.

(a) Electricity will be used by the contractor for the following:
  - Electrical work following subproject design
  - Lighting of the site
  - Lighting of the site offices and facilities.

(b) Water on the sites is required for the following reasons:
  - Drinking (including bottled water or water tanks for drinking)
  - Handwashing (and sometimes showers)
  - Toilet facilities
  - Mixing materials like plaster and mortar
  - Wheel washing and equipment cleaning
  - Site cleaning and watering (in dry season)
  - Plant watering.

(c) Dewatering and drain facilities will be needed to maintain the site(s), excavation, and construction free of water. These will be achieved in the following ways:

  - Dispose of rainwater in a lawful manner that will not result in flooding the site and adjoining properties or endanger permanent work and temporary facilities
  - Removal of snow and ice as required to minimize accumulations.
  - Install barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- Welfare Facilities, including:
  - Separate toilets for men and women
  - Separate washing facilities for men and women, including hand washing facilities and showers
  - Separate changing rooms for men and women (the construction camp will be outside of the construction site)
  - Canteen including catering area and premises for heating during the cold season.
- Warehouse

Secure storage facilities will be organized for tools, equipment and materials throughout the project. Contractor will (a) provide adequately ventilated, watertight storage facilities with floors above ground level for materials and equipment susceptible to weather damage and (b) place materials and equipment to permit easy access for identification, inspection and inventory.

- Waste Disposal Facilities

The contractor will organize waste management in the construction sites in the following way:

  - A licensed waste carrier will provide the construction waste container per construction site following a contract to be made between the contractor and the waste management operator.
  - A licensed waste carrier will provide the hazardous waste container(s) per construction site following a contract to be made between the contractor and the waste management operator.
  - Contractor will locate containers for domestic waste throughout the construction site and in places accessible to workers, including places next to the washing facilities and toilets.
  - Contractor will locate separate food and household waste containers in the catering area.
  - All waste will be removed from the site(s) following a schedule prescribed and agreed between the contractor and a waste management operator.
- Site Security System

  Contractor will install lockable gates and fencing to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
- Equipment

- Worker Safety Equipment

  Contractor will provide all its personnel with personal protective equipment (PPE), where all equipment will be new and in good working order, and will meet safety standard requirements (Public Health Standard No. 0289-1010).

- Visitor Safety Equipment

  Contractor will have PPE for at least four visitors at the construction site. PPE will in good working order and meet safety standard requirements.

- Fire Extinguishers

  Contractor will have at the construction site a portable extinguishers, with class and extinguishing agent and classes of fire exposures as required by the local standard (OzDSt No.2589-201211).

- Project Signs as approved by PCU, PMC, and water utility.

The signs will be installed in each construction site. The signs will be made of sturdy material that resists tearing and fading and will be of the following types:

- Signs for prevention access to the sites by unauthorized people.
- Signs with information on the project and contacts of the contractor, PCU, PMC, and water utility.
- Signs with routs on the site for transport with construction materials.
- Signs with occupational health and safety information for workers.

- Tree and Plant Protection Facilities

  Contractor will install temporary fencing around trees to protect vegetation from damage from construction operations.

- Parking Area

  Contractors, workers and subcontractors are required to park in off campus areas, designated by water utility, PCU, and PMC.

## 13.10. Excavation and Earthworks

Surplus of soil could be generated during the construction of the reservoirs and pumping stations' foundations. According to the design, the excavated soil will be used primarily for the top coating of the reservoirs. The excess soil will be used for leveling and landscaping the water station area, including tree planting around the site. If any other excess soil remains, it will be transported to the places specified by the Karaulbazar District Municipality (khokimiyat). No significant excess

10 Public Health Standard No. 0022-22 dated 17.05.2022, https://lex.uz/docs/6050883

11 OzDSt No.2589-2012, http://my.standart.uz/files/uzdst/OzDSt_2589-2012.pdf

soil is expected to be generated during the proposed construction. Moreover, the contractor will prepare an earth management plan as part of the SSESMP and properly implement it.

Gravel and sand will be needed to lay pipes and restore damaged village roads. The contractor(s) will use only construction materials quarries approved by the PMC and PCU.

## 13.11. Generated Waste

During construction phase, the following main type of wastes will be generated at the proposed project sites:

- Surplus of soil after having buried the pipeline, top-coating of reservoirs, site leveling, and landscaping, and tree planting around the water station;
- Plastics from packaging;
- household waste, scrap metal, used batteries and used oils;
- Small amount of wood and iron from concreting activities at construction sites of the treatment plant, the pumping station and interim tank sites;
- Organic material from removal of vegetation along the pipeline corridor and at the sites of associated installations;
- Sanitary waste from workers.

The contractor will prepare waste management plan within the SSESMP. The contractor will organize waste management in the construction sites in the following way:

- A licensed waste carrier will provide the construction waste container per construction site following a contract to be made between the contractor and the waste management operator.
- A licensed waste carrier will provide the hazardous waste container(s) per construction site following a contract to be made between the contractor and the waste management operator.
- Contractor will locate containers for domestic waste throughout the construction site and in places accessible to workers, including places next to the washing facilities and toilets.
- Contractor will locate separate food and household waste containers in the catering area.
- All waste will be removed from the site(s) following a schedule prescribed and agreed between the contractor and a waste management operator.

Domestic wastewater generated during construction is planned to be collected in septic tanks with subsequent removal to the nearest treatment facilities in the city of Bukhara.

## 13.12. O&M procedure

Once the subproject is operating, the facilities will operate by water utility personnel with routine maintenance. Improved system operation will comply with the operation and maintenance manual to be developed by the contractor upon commissioning the water infrastructure and follow the

standard operating procedures to be prepared by Bukhara Suv Ta'minoti during the operation of infrastructure and facilities.

## 13.13. O&M Manpower

During the operational phase, it is anticipated that the workforce will be around four (guards and operators), and these personnel will be responsible for arranging their accommodation facilities. Perhaps the water utility will employ residents living in the villages where water pumping stations are. The new WDUs will have a minimum lifespan of 25 years, where pipes, water facilities, transformers will serve at least 25 years, buildings – about 40 years, pumping equipment – about 15 years, and control system – at least ten years.

# 14. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK AND STANDARDS

## 14.1. AIIB Environmental and Social Policy

### 14.1.1. AIIB ESP requirements

AIIB requires the consideration of environmental issues in all aspects of AIIB's operations, and the requirements for environmental assessment are described in AIIB ESP. The objectives are to ensure the environmental soundness and sustainability of the projects with AIIB financing, and to support the integration of environmental considerations into the project decision-making process.

**Screening and Categorization:** The nature of the environmental and social assessment required for a project depends on the significance of its environmental and social impacts, which are related to the type and location of the project, the sensitivity, scale, nature, and magnitude of its potential impacts, and the availability of cost-effective mitigation measures. All projects are screened for environmental impacts and assigned to one of the following four categories:

- **Category A:** Projects could have significant adverse environmental and social impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical work and may be temporary or permanent in nature. An environmental and social impact assessment (ESIA) with an environmental and social management plan (ESMP) are required to address significant impacts.
- **Category B:** Projects could have a limited number of adverse environmental and social impacts, but they would be less adverse than those in category A. These impacts are site-specific. In most cases, mitigation measures can be designed more readily than for category A projects. The ESIA and ESMP are required.
- **Category C:** A project is classified as category C if it is likely to have minimal or no adverse environmental and social impacts. The Bank does not require an environmental and social assessment, but it does require the Client to prepare an analysis of the environmental and social aspects of the Project.
- **Category FI:** A project is classified as category FI if the project financing structure involves the provision of funds to or through a Financial Intermediary (FI), whereas the FI shall establish an environmental and social management system approved by the Bank.

**Application of the Environmental and Social Standards.** In order to adopt an integrated approach to the environmental and social assessment, the projects are reviewed against three environmental and social standards:

(1) ESS1 (Environmental and Social Assessment and Management)

(2) ESS2 (Land Acquisition and Involuntary Resettlement)

(3) ESS 3 (Indigenous Peoples)

Table 6: Impacts, Receptors, and Applicable AIIB Standard

| Impacts and Receptors | | Applicable AIIB Standard |
|---|---|---|
| **Pre-Construction Phase** | | |
| Impact of land acquisition on land Use | ▪ The project sites will experience land use change from seasonal agriculture and community access roads. All these land uses will be converted into the project elements. | ESS2<br>▪ If the project is likely to involve involuntary resettlement, in that case, the ESS2 requires the preparation of a land acquisition and resettlement plan, land acquisition plan or resettlement plan (LARP/LAP/RP) |
| Impact of land acquisition on livelihood | ▪ Securing the required land will result in economic displacement due to the illegal agricultural activities inside the water utility-owned lands, which will no longer occur. At the time this ESIA was completed, farmers moved out all their belongings from the water utility lands. | ESS2<br>▪ If the project is likely to involve involuntary resettlement, in that case, the ESS2 requires the preparation of a land acquisition and resettlement plan, land acquisition plan or resettlement plan (LARP/LAP/RP)<br>▪ Inhabitants without Title or Recognized Land Rights. The Bank does not endorse illegal settlement. However, it recognizes that significant populations already inhabit both urban and rural land without title or recognized land rights in its economies of operation. Given this situation, the Bank requires the Client to make displaced persons without title to land or any recognizable legal rights to land eligible for, and to provide them with, resettlement assistance and compensation for loss of nonland assets, in accordance with cut-off dates established in the LARP12/LAP/RP, and to include them in consultation processes. |
| **Construction Phase** | | |
| Labor influx impact on biodiversity | ▪ The presence and activities of immigrant workers, who may have different living styles, social roots, and cultures to the residents of the subproject villages, can introduce unacquainted activity in the local environment and disturb the local biodiversity. | ESS 1<br>▪ if the project is likely to have adverse environmental and/or social risks and impacts, then ESS1 requires conducting an environmental and social assessment relating to those risks and impacts, and designing measures to avoid, minimize, mitigate, offset, or compensate for them. |

12 LARP = Land Acquisition and Resettlement Plan; LAP = Land Acquisition Plan; RP = Resettlement Plan

| Impacts and Receptors | | Applicable AIIB Standard |
|---|---|---|
| Labor influx impact on the community health and safety | ▪ Labor influx poses a potential threat to the local community and emerging conflicts among social groups, including those relating to employment under the project.<br>▪ The presence of migrants will likely put more pressure on local health services. | ESS 1<br>▪ if the project is likely to have adverse environmental and/or social risks and impacts, then ESS1 requires conducting an environmental and social assessment relating to those risks and impacts, and designing measures to avoid, minimize, mitigate, offset, or compensate for them. |
| Impact of land preparation and earthworks on the terrestrial ecosystem | ▪ No significant impact on the local ecosystem is expected due to the desert climate.<br>▪ Operation of machinery, vehicles, and equipment will contribute to greenhouse gas emission. | ESS 1<br>▪ if the project is likely to have adverse environmental and/or social risks and impacts, then ESS1 requires conducting an environmental and social assessment relating to those risks and impacts, and designing measures to avoid, minimize, mitigate, offset, or compensate for them. |
| Impact of land preparation and earthworks on the community health and safety and occupational health and safety | ▪ Both local communities and the project workforce could be exposed to dust and noise generated by construction works.<br>▪ Accidents, injuries, fatalities, and safety risks may arise from inappropriate working or unsafe conditions, lack of safety training, insufficient personal protective equipment, and equipment failure. | ESS 1<br>▪ if the project is likely to have adverse environmental and/or social risks and impacts, then ESS1 requires conducting an environmental and social assessment relating to those risks and impacts, and designing measures to avoid, minimize, mitigate, offset, or compensate for them. |
| Impact of land preparation and earthworks on the traffic and transport safety | ▪ The project vehicles transporting construction materials to the sites will likely increase the (1) risk of accidents for the local communities that have not been exposed to dense traffic and (2) access to houses, businesses, public infrastructure, social objects, etc. | ESS 1<br>▪ if the project is likely to have adverse environmental and/or social risks and impacts, then ESS1 requires conducting an environmental and social assessment relating to those risks and impacts, and designing measures to avoid, minimize, mitigate, offset, or compensate for them. |
| Impact of construction equipment, vehicles, and machinery on the | ▪ Operating machinery, vehicles, and equipment will contribute to greenhouse gas emissions, worsening ambient air quality. | ESS 1<br>▪ if the project is likely to have adverse environmental and/or social risks and impacts, then ESS1 requires conducting an |

| Impacts and Receptors | | Applicable AIIB Standard |
|---|---|---|
| community health and safety and occupational health and safety | ▪ Local communities and the project workforce could be exposed to high-level noise from construction activities, including transporting construction materials. | environmental and social assessment relating to those risks and impacts, and designing measures to avoid, minimize, mitigate, offset, or compensate for them. |
| Impact of transportation of materials, equipment, and waste on the community health and safety | ▪ The construction phase involves transporting materials, equipment, workers, and waste to and from the sites, where the intensive operation of vehicles will contribute to the overall greenhouse gas emission and worsening air quality in the area.<br>▪ Project vehicles will increase the risk of traffic congestion and collision in the project villages. | ESS 1<br>▪ if the project is likely to have adverse environmental and/or social risks and impacts, then ESS1 requires conducting an environmental and social assessment relating to those risks and impacts, and designing measures to avoid, minimize, mitigate, offset, or compensate for them. |
| Impact of wastewater (construction and domestic) on the community health and safety and occupational health and safety | ▪ Wastewater generated from the project activities will increase the risk of local health and hygiene conditions. | ESS 1<br>▪ if the project is likely to have adverse environmental and/or social risks and impacts, then ESS1 requires conducting an environmental and social assessment relating to those risks and impacts, and designing measures to avoid, minimize, mitigate, offset, or compensate for them. |
| Impact of solid waste (including hazardous) on the community health and safety and occupational health and safety | ▪ Solid waste generated from the project activities will increase the risk of the local health and hygiene conditions. | ESS 1<br>▪ if the project is likely to have adverse environmental and/or social risks and impacts, then ESS1 requires conducting an environmental and social assessment relating to those risks and impacts, and designing measures to avoid, minimize, mitigate, offset, or compensate for them. |
| **Operation Phase** | | |
| Impact of labor influx on the community health and safety | ▪ The new water stations and infrastructure will require no more than two operators and a guard. No significant labor influx impact is foreseen on the community. | ESS 1<br>if the project is likely to have adverse environmental and/or social risks and impacts, then ESS1 requires conducting an environmental and social assessment relating to those risks and impacts, and designing measures to avoid, minimize, mitigate, offset, or compensate for them. |

| Impacts and Receptors | | Applicable AIIB Standard |
|---|---|---|
| Impact on land | ▪ The new water station will generate sludge resulting from sedimentation and filtration. This can result in soil erosion and surface disturbance. | ESS 1<br>if the project is likely to have adverse environmental and/or social risks and impacts, then ESS1 requires conducting an environmental and social assessment relating to those risks and impacts, and designing measures to avoid, minimize, mitigate, offset, or compensate for them. |
| Impact of noise from pumping equipment on occupational health and safety and community health and safety | ▪ Operation noise will be generated by pumping equipment and can create nuisance or health risks to human receptors near the water stations. | ESS 1<br>if the project is likely to have adverse environmental and/or social risks and impacts, then ESS1 requires conducting an environmental and social assessment relating to those risks and impacts, and designing measures to avoid, minimize, mitigate, offset, or compensate for them. |
| Unplanned events such as fire, spillage of fuel, or chemical materials, transport accidents, etc. | ▪ Unplanned events can happen during the project implementation and can affect various environmental and social receptors. | ESS 1<br>if the project is likely to have adverse environmental and/or social risks and impacts, then ESS1 requires conducting an environmental and social assessment relating to those risks and impacts, and designing measures to avoid, minimize, mitigate, offset, or compensate for them. |

## Other Applicable AIIB's Provisions

Table 7: Other Applicable AIIB's Provisions

| Project Components | Applicable AIIB Provisions |
|---|---|
| Grievance Redress Mechanism | ▪ The AIIB requires the Client to establish, in accordance with the ESP and applicable ESSs, a suitable Project-level GRM to receive and facilitate resolution of the concerns and complaints of people who believe they have been adversely affected by the Project's environmental or social impacts, and to inform Project-affected people of its availability.<br>▪ According to the AIIB, the GRM is scaled to the risks and impacts of the Project. The GRM: (a) may utilize existing formal or informal complaint-handling mechanisms, provided that they are properly designed and implemented, and deemed by the Bank to be suitable for the Project (these may be supplemented, as needed, with Project-specific arrangements); (b) is developed in such a manner that it does not impede access to other judicial or administrative remedies that might be available under law or through existing arbitration or mediation procedures; (c) is designed to address affected people's concerns and complaints promptly, including gender-related concerns and complaints relating to GBV, using an understandable and transparent process that is gender sensitive, culturally appropriate and readily accessible to all affected people; (d) includes provisions: (i) to protect complainants from retaliation, grant them confidentiality and enable them to remain anonymous, if requested; and (ii) to protect those who defend the rights of complainants to |

| Project Components | Applicable AIIB Provisions |
|---|---|
| | make such complaints; (e) provides for maintenance of a publicly accessible case register and reports on grievance redress and outcomes, which are disclosed in accordance with the applicable ESS; and (f) is required to be operational by the time implementation of the relevant Project activities commences and for the duration of the Project.<br>▪ The AIIB also requires the Client to establish or maintain a GRM for contracted Project workers under the Project to address workplace concerns, and reflect this in the tender documents for contracted Project workers. |
| Public Consultations | ESS 1<br>The ESS 1 aims to ensure the environmental and social soundness and sustainability of Projects and to support the integration of environmental and social considerations into the Project decision-making process and implementation. The AIIB ESS1 also requires:<br>▪ Carry out meaningful consultation with Project-affected people and other stakeholders and facilitate their informed participation in the consultations<br>▪ Meaningful consultation is an interactive process to provide information and facilitate informed decision-making.<br>▪ Continue consultation with Project-affected people throughout Project implementation as necessary on issues related to environmental and social performance and implementation of the Project-level GRM |

### 14.1.2. Subproject category

Based on the AIIB ESP, approved detailed design, and findings of field visits and surveys, this subproject (Volume-5, Karaulbazar district) is classified as Category B due to the following:

(1) Civil works include rehabilitation and new construction and are limited to the water utility-owned and fenced area.

(2) The subproject activities' adverse environmental and social impacts are less than those in Category A.

(3) The impacts are site-, as the civil works will be carried out inside the existing water distribution stations (Buzochi WDU, Navbahor WDU, and Jarqoq WDU).

(4) In most cases, mitigation measures can be designed more readily than for category A projects.

## 14.2. National Environmental Regulatory Framework

### 14.2.1. Uzbek regulatory requirements

The Constitution[13] is the fundamental law of the Republic of Uzbekistan (2023). The national environmental and social policy of Uzbekistan is based on the provisions of the country's Constitution. The following articles of the Constitution specify public obligations toward environmental protection:

- Article 49 constitutes citizens' right for safe environment and reliable information about its condition, whereas Government is obliged to conduct environmental monitoring and mitigation measures for improvement and protection of nature;
- Article 61 requires citizens to protect the environment and constitutes that environmental heritage is protected by the government;
- Article 62 requires citizens to take care of the environment.
- Article 66 stipulates the owner's right to the property own, use, and dispose of, whereas the owner must not cause damage to the environment or violate the rights and legitimate interests of other persons, society, and the state;
- Article 68 states that lands, subsoil, flora and fauna, and other natural resources are protected by the state and considered national wealth.

These policies are headed by the President of the Republic of Uzbekistan and secure efficient coordination of governmental authorities (Article 105). The President approves general, strategic, and specific regulations binding across Uzbekistan (Article 110). The specific regulatory documents relate, amongst others, to implementing investment projects following loan agreements and other covenants (Article109).

The President is supported by a bicameral Supreme Assembly named "Oliy Majlis." The latter has the responsibilities of the legislature with the power to shape laws. The Oliy Majlis comprises the Legislative Chamber and the Parliament. The Oliy Majlis defines the national environmental and social policies, approves national environmental programs, develops and adopts environmental and social legislation, coordinates environmental compliance monitoring actions, defines the rates of environmental charges and establishes respective incentives, etc.

The Cabinet of Ministers is the executive institution responsible for securing the efficient functioning of the national economy, social and community services, enforcement, and enacting national laws and regulations. It comprises the Prime Minister, Deputy Prime Ministers, Ministers, and the Government Executive of the Republic of Karakalpakstan (Article 114). The Cabinet of Ministers ensures implementation of a state policy in environmental protection, biodiversity, conservation and combating climate change, epidemics, and pandemics, and mitigating their consequences.

13 Constitution of the Republic Uzbekistan: https://lex.uz/docs/6451070

On the local level, the Councils of People's Deputies, or "Kengash" (Article 120), represent local government authorities and are responsible for the design of social and economic development and social safety net programs (Article 122). The executive power in place is represented by governors (khokims) who address issues within their designated service territory and are responsible for legal, environmental, health and safety, and economic, social, and cultural development (Article 123)

The environmental mandate of local government includes: identification of environmental priorities for the respective territory; approval of local environmental programs; inventory and evaluation of natural resources; inventory of environmentally hazardous facilities; logistical support to environmental actions; environmental permitting; waste management; a collection of environmental charges; and environmental control (Law on Nature Protection, No.754-XII of 09.12.1992).

The Ministry of Natural Resources of the Republic of Uzbekistan (MNR) is the primary environmental regulator. The MNR is responsible for developing and enforcing the national environmental and conservation policy, overseeing ecological compliance, and integrating environmental management across various national, province, and district economic sectors. The MNR has provincial branches and agencies providing scientific and technical support. The MNR Bukhara local branch oversees the environmental compliance of all projects in their designated province.

There are some other government institutions with responsibilities related to environmental protection and control, including the Ministry of Agriculture, the Ministry of Water Resources, Surveys, Cartography and the State Cadaster, the State Committee for Geology and Mineral Resources, the Centre of Hydro-meteorological Service, the Ministry of Health, the Ministry of Housing and Utility Services, etc. Their responsibilities include facilitation in setting up and maintaining a robust system of state environmental control and monitoring over the development and implementation of environmental programs, strategies, and action plans to address conservation and sustainability issues.

The Regulation on State Environmental Expertise (SEE), approved by Decree No.491 of the Cabinet of Ministers on December 31, 2001 and amended in 2005 and 2009, defines the legal requirements for EIA in Uzbekistan. SEE is a review procedure undertaken by the SCNP SEE Center, depending on the project category.

According to the Regulation on SEE (No.541[14]), all projects are screened for their expected environmental impacts and assigned to one of the following four categories:

- Category I – projects with high risks
- Category II – projects with moderate risks
- Category III – projects with low risks and

14 Regulation of the Cabinet of Ministers of the Republic of Uzbekistan "On the further improvement of environmental expertise", No. 541, 07.09.2020, https://lex.uz/docs/4984499

- Category IV – projects with local Impact.

Project categorization is based on the nature and scale of the proposed activities and the significance of the potential environmental impacts. The projects under Categories I and II are examined by national regulator, while the activities under Categories III and IV are reviewed by the territorial authorities of the environmental regulator.

SEE is mandatory and commercial procedure paid by the applicant. The SEE evaluates the project in terms of the following provisions:

- nature and level of all possible environmental impacts related to the project implementation;
- risk level associated with the project and its possible or existing impact on the environment, economy, and public health;
- social priorities;
- sustainable use of natural resources;
- relevance and feasibility of proposed mitigation measures aiming to protect the environment.

Pursuant to Section 3 of Regulation on SEE (No.541), the project-related materials are electronically submitted by applicants through the MNR information system. The SEE procedure comprises the following three stages for the projects under Categories I, II and III (Article 24 of Regulation on SEE, No.541):

(1) Draft application for environmental impact assessment of planned activities

The application shall include general information on the project implementation organization, a review of the environment before the project activities, including air, surface water, and groundwater quality, and a description of topography, landscape, climate, geology and hydrological conditions of the project site(s), flora and fauna, recreational and protected areas, and other specificities of the local environment. The application shall also include information on the proposed technology, its impact on the environment, and proposed mitigation measures. In addition, for the projects under Categories I and II, the applicant shall provide information on conducting public consultations.

(2) Statement of the Environmental Impacts (SEI)

If the previous information is insufficient, the regulator might request additional surveys, including a detailed environmental assessment, an engineering and geological survey, public consultations, and an environmental management plan.

(3) Statement on environmental consequences

During this stage, the regulator provides and agrees upon the following:

- recommendations and comments supplied by SEE Center experts;
- justification supporting materials;
- environmental standards applicable to the project;

- measures for protecting the environment and the rational use of natural resources and principal conclusions.

The SEE approval is issued for a three year period. In cases where the project implementation takes more than three years (starting from the SSE approval date), the SEE approval is extended for two more years. However, the SEE will be reconsidered if the project design is changed. If the project has not started within the approved period, the SEE renewal or extension remains with the environmental regulator upon considering the provided information.

### 14.2.2. Subproject category

Pursuant to Appendix 1 of the Regulation on SEE, No.54115, the water supply projects are classified as Category III. Therefore, the subproject is classified as Category III and requires an environmental impact assessment per national standards.

During the feasibility study, the water utility received SEE Approval (No. E-7-1047z dated September 30, 2019) for the project comprising water supply and sewerage components (Appendix 1). Following Uzbek regulation, the Bukhara Regional Environmental Committee issued the SEE approval for three years, valid until September 30, 2022.

Upon critical review of the scope of work specified in the feasibility study, the subproject design has changed significantly. Instead of the construction of two water distribution units (WDUs) in the Buzochi and Jarqoq settlements, as proposed by the project feasibility study, the detailed design was agreed upon for constructing three water distribution stations in the Buzochi, Navbahor, and Jarqoq settlements and connecting the Buzochi WDU with the Tashquduq settlement's water network. The regulator requested the preparation of a new SEE for the subproject and each WDU. Four environmental assessment reports covering only water supply activities under the subproject were prepared and submitted to the regulator on April 27, 2023 through www.eco-service.uz (Appendix 2). The SEE approval on the subproject design was received on May 03, 2023 (Appendix_3). Reports prepared per national legislation requirements are provided in Appendix 20.

## 14.3. Environmental Standards Applicable to the Subproject

The environmental monitoring under Volume-5 No: BWSP-W20 Karaulbazar District will include soil, water, and ambient air testing and noise and vibration measurement. The AIIB ESF requires that the project should apply pollution control methods consistent with international good practice. When national standards differ from corresponding international standards, the borrower is required to achieve whichever is more stringent.

The national standards for the aforementioned environmental indicators in comparison with international standards are the following:

15 Regulation on Further Development of Procedure for Environmental Impact Assessment

### 14.3.1. Ambient air quality standards

Public Health Regulation No. 0293-11[16] "Hygienic standard: List of pollutants maximum allowable concentrations in ambient air of populated areas in Uzbekistan" specifies requirements for ambient air quality. The corresponding international standards for ambient air quality monitoring are the World Health Organization's (WHO) Global Air Quality Guidelines, which provide guidance on thresholds and limits for key air pollutants that constitute health risks. The WHO Global Air Quality Guidelines specify temporary targets that promote the gradual shift from higher levels to lower ones and recommend controlling the following components of the ambient air: particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide, and carbon monoxide[17] (regulation specifies air quality levels for the ambient air quality monitoring in outdoor and indoor environments).

**Table 2** provides a comparison of certain standards of national and international regulation. It also specifies the standard to be applied for environmental, health and safety monitoring on certain indicators within the frame of the sub-project.

Table 8: Standards for the ambient air

| No. | Indicator | National standards | International standard | | Applicable standard |
|---|---|---|---|---|---|
| 1 | Sulfur dioxide | 0.05 mg/m$^3$ (annual mean)<br>0.2 mg/m$^3$ (24-hour mean) | 40 µg/m$^3$ (24-hour mean) | WHO Global air quality guidelines | 0.04 mg/m$^3$ (24-hour mean) (WHO Global air quality guidelines) |
| 2 | Nitrogen dioxide | 0.04 mg/m$^3$ (annual mean)<br>0.06 mg/m$^3$ (24-hour mean) | 10 µg/m$^3$ (annual mean)<br>25 µg/m$^3$ (24-hour mean) | WHO Global air quality guidelines | 0.025 mg/m$^3$ (24-hour mean)<br>(WHO Global air quality guidelines) |
| 3 | Ozone ($O_3$) | 0.1 mg/m$^3$ (daily) | 100 µg/m$^3$, 8-hour daily maximum | WHO Global air quality guidelines | 0.1 mg/m$^3$ (daily)<br>(Public Health Regulation No. 0293-11 "Hygienic standard: List of pollutants maximum allowable concentrations in ambient air of populated areas in Uzbekistan") |

16 http://med.uz/documentation/detail.php?ID=47545

17 WHO global air quality guidelines: Particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide, ISBN 978-92-4-003422-8 (electronic version), World Health Organization 2021, https://apps.who.int/iris/bitstream/handle/10665/345329/9789240034228-eng.pdf?sequence=1&isAllowed=y

| No. | Indicator | National standards | International standard | | Applicable standard |
|---|---|---|---|---|---|
| 4 | Carbon monoxide (CO) | 5.0 mg/m$^3$ | 4.0 mg/m$^3$ | WHO Global air quality guidelines | 4.0 mg/m$^3$ (WHO Global air quality guidelines) |
| 5 | PM 2.5 | 0.15 mg/m$^3$ (annual mean)<br>0.35 mg/m$^3$ (24-hour mean) | 5 µg/m$^3$ (annual mean)<br>15 µg/m$^3$ (24-hour mean) | WHO Global air quality guidelines | 0.015 mg/m$^3$ (24-hour mean)<br>(WHO Global air quality guidelines) |
| 6 | PM 10 | 0.05 mg/m$^3$ (annual mean)<br>0.3 mg/m$^3$ (24-hour mean) | 15 µg/m$^3$ (annual mean)<br>45 µg/m$^3$ (24-hour mean) | WHO Global air quality guidelines | 0.045 mg/m$^3$ (24-hour mean)<br>(WHO Global air quality guidelines) |

WHO = World Health Organisation; PM = particulate matter

### 14.3.2. Noise and vibration standards

Public Health Regulation № 0325-16[18] "Sanitary standards for acceptable noise levels at the workplace" of February 01, 2016 and Public Health Regulation No. 0267-09[19] "Sanitary standards on permissible noise in residential and public buildings and nearby areas" of June 19, 2009 specify the following requirements for the noise level. The corresponding international standards for ambient air quality monitoring include the following:

- WHO Guidelines for Community Noise[20]

The regulation provides the WHO guideline values for specific environments.

- International Labour Organization Standard (ILO): Protection of workers against noise and vibration in the working environment[21]

Among other terms, the regulation provides limits for noise and vibration levels.

Table 9 provides a comparison of certain standards of national and international regulations. It also specifies the standard to be applied for environmental, health and safety monitoring on certain indicators within the frame of the subproject.

18 Public Health Regulation № 0325-16, https://ssv.uz/ru/documentation/sanpin-ruz-0325-16-sanitarnye-normy-dopustimyh-urovnej-shuma-na-rabochih-mestah

19 Public Health Regulation No. 0267-09, https://lex.uz/acts/1765725

20 Guidelines for Community Noise, April 1999, World Health Organization, https://apps.who.int/iris/handle/10665/66217

21 Protection of workers against noise and vibration in the working environment, International Labour Office, Switzerland, 1984, ISBN 92-2-101709-5,third edition, https://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---safework/documents/normativeinstrument/wcms_107878.pdf

Table 9: Standards for noise and vibration

| No. | Indicator | National standards | | International standard | | Applicable standard |
|---|---|---|---|---|---|---|
| 1 | Area adjacent to the residential buildings | 55 dB (7 am – 11 pm)<br>45 dB (11 pm – 7 am) | Public Health Regulation No. 0267-09, Sanitary standards on permissible noise in residential and public buildings and nearby area | 55 dB (daytime, 16 hours)<br>45 (night time, 8 hours) | WHO Guidelines for Community Noise | 55 dB (7 am – 11 pm)<br>45 dB (11 pm – 7 am)<br>Public Health Regulation No. 0267-09, Sanitary standards on permissible noise in residential and public |
| 2 | Schools | 40 dB (during class) | Public Health Regulation No. 0267-09, Sanitary standards on permissible noise in residential and public buildings and nearby area | 35 dB (during class) | WHO Guidelines for Community Noise | 35 dB (during class)<br>WHO Guidelines for Community Noise |
| 3 | Hospitals | 35 dB(7.00 am – 11 pm)<br>25 dB (11 pm – 7 am) | Public Health Regulation No. 0267-09, Sanitary standards on permissible noise in residential and public buildings and nearby area | 30 dB (8 hours, daytime and evenings) | WHO Guidelines for Community Noise | 30 dB (8 hours, daytime and evenings)<br>WHO Guidelines for Community Noise |
| 4 | Industrial, commercial shopping and traffic areas, indoors and outdoors | 60 dB | Public Health Regulation No. 0267-09, Sanitary standards on permissible noise in residential and public buildings and nearby area | 70 dB (24 hours) | WHO Guidelines for Community Noise | 60 dB (24 hours)<br>Public Health Regulation No. 0267-09, Sanitary standards on permissible noise in residential and public buildings and nearby area |
| 5 | Noise level at the working places | 91 dB – 95 dB (during work with noisy equipment) | Public Health Regulation № 0325-16, Sanitary standards for acceptable noise levels at workplace | 85 dB (daytime) | ILO Standard: Protection of workers against noise and vibration in the working environment | 85 dB<br>ILO Standard: Protection of workers against noise and vibration in the working environment |

WHO = World Health Organisation; ILO = International Labour Organisation

### 14.3.3. Drinking water quality standards

Uzbek Standard for Drinking Water No. O'zDST 950:2011 "Hygienic requirements and quality control" and Hygienic Criteria for Centralized Drinking Water Quality Monitoring in Uzbekistan No.

0211-0622 specify the requirements for water quality indicators and methods for their control. This includes monitoring of microbiological and toxicological indicators (benzene, benzo(a)pyrene, polyacrylamide and pesticides), parasites, and chemical elements (15 chemical elements) in the water.

The corresponding international standards for drinking water quality include the following:

- The World Health Organization's Guidelines for Drinking-water Quality[23] (in terms of instrumental monitoring, regulation stipulates the provision of microbial water quality and chemical water quality tests);
- EU Council Directive 98/83/EC (European Commission Regulation) on the quality of water intended for human consumption[24] (regulations specify performance of drinking water monitoring of microbiological parameters and chemical parameters, including pesticides; monitoring is carried out on a case-by-case basis of substances and micro-organisms for which no parametric value has been set by regulation).

Table 10 below provides a comparison of certain standards of national and international regulations. It also specifies the standard to be applied for environmental, health and safety monitoring on certain indicators within the frame of the sub-project. The following are indicators commonly used by utility operators for frequent and rapid drinking water quality monitoring:

Table 10: Standards for the drinking water

| No | Indicator | National standard | International standard | | Applicable standard |
|---|---|---|---|---|---|
| 1 | Odour at 20 and 60 °C | 2 grade | Water should be free of tastes and odors that would be objectionable to the majority of consumers<br><br>Acceptable to consumers and no abnormal change | WHO Guidelines for Drinking-water Quality<br><br>EU Council Directive 98/83/EC on the quality of water intended for human consumption | Water is free of odour (WHO Guidelines for Drinking water quality) |
| 2 | Taste | 2 grade | Water should be free of tastes and odors that would be objectionable | WHO Guidelines for Drinking-water Quality | Water is free of tastes (WHO Guidelines for |

22 Hygienic Criteria for Centralized Drinking Water Quality Monitoring in Uzbekistan No. 0211-06, https://lex.uz/ru/docs/1934624

23 Guidelines for Drinking-water Quality: fourth edition incorporating the first addendum, ISBN 978-92-4-154995-0, World Health Organization 2017, https://apps.who.int/iris/bitstream/handle/10665/254637/9789241549950-eng.pdf

24 Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31998L0083&from=EN

| No | Indicator | National standard | International standard | | Applicable standard |
|---|---|---|---|---|---|
| | | | to the majority of consumers | | drinking water quality) |
| | | | Acceptable to consumers and no abnormal change | EU Council Directive 98/83/EC on the quality of water intended for human consumption | |
| 3 | Colour | 25 units[25] | Drinking-water should ideally have no visible colour | WHO Guidelines for Drinking-water Quality | Water has no visible colour (WHO Guidelines for Drinking water quality) |
| | | | Acceptable to consumers and no abnormal change" | EU Council Directive 98/83/EC on the quality of water intended for human consumption | |
| 4 | Turbidity | 2.0 mg/l ($mg/dm^3$) | none to exceed 1 NTU | WHO Guidelines for Drinking-water Quality | Water turbidity is none exceed 1 NTU (WHO Guidelines for drinking water quality) |
| | | | Acceptable to consumers and no abnormal change | EU Council Directive 98/83/EC on the quality of water intended for human consumption | |
| 5 | pH | 6.0-9.0 | 6.5 – 8.5 | WHO Guidelines for Drinking-water Quality | Water pH range is 6.5 – 8.5 (WHO Guidelines for drinking water quality) |
| | | | ≥6.5 and ≤ 9.5 | EU Council Directive 98/83/EC on the quality of water intended for human consumption | |
| 6 | Total hardness ∑(Ca+Mg) | 7.0 (10.0) mg-eq./l ($mg-eq/dm^3$) | no guideline values are proposed | WHO Guidelines for Drinking-water Quality | Total hardness of water is 7.0 mg-eq/l (Uzbek Standard for Drinking Water No. O'zDST 950:2011 "Hygienic requirements and quality control") |
| | | | - | EU Council Directive 98/83/EC on the quality of water intended for human consumption | |
| 7 | Alkalinity ($HCO_3$) | 3.0 mg-eq./l ($mg-eq/dm^3$) | - | WHO Guidelines for Drinking-water Quality | Water alkalinity is 3.0 mg-eq/l (Uzbek Standard for Drinking Water |
| | | | - | EU Council Directive 98/83/EC on the quality | |

25 The color of water is determined visually or using spectrophotometer with following conversion of the results to a colour scale in the Platinum – Cobalt system (i.e. comparing the colour of the sample with the colour of the conventional 1000-degree color scale of water prepared from a mixture of potassium dichromate $K_2Cr_2O_7$ and cobalt sulfate $CoSO_4$).

| No | Indicator | National standard | International standard | | Applicable standard |
|---|---|---|---|---|---|
| | | | | of water intended for human consumption | No. O'zDST 950:2011 "Hygienic requirements and quality control") |
| 8 | Chloride | 250 (350) mg/l ($mg/dm^3$) | 200 – 300 mg/l | WHO Guidelines for Drinking-water Quality | Chloride concentration in the water is 250 mg/l (Uzbek Standard for Drinking Water No. O'zDST 950:2011 "Hygienic requirements and quality control") |
| | | | 250 mg/l | EU Council Directive 98/83/EC on the quality of water intended for human consumption | |
| 9 | Oxygen demand | 5.0 mg/l ($mg/dm^3$) | - | WHO Guidelines for Drinking-water Quality | Oxygen demand in the water is 5.0 mg/l (Uzbek Standard for Drinking Water No. O'zDST 950:2011 "Hygienic requirements and quality control") |
| | | | - | EU Council Directive 98/83/EC on the quality of water intended for human consumption | |
| 10 | Sulphate | 400 (500) mg/l ($mg/dm^3$) | - | WHO Guidelines for Drinking-water Quality | Sulphate concentration in the water is 250 mg/l (EU Council Directive 98/83/EC on the quality of water intended for human consumption) |
| | | | 250 mg/l | EU Council Directive 98/83/EC on the quality of water intended for human consumption | |
| 11 | Iron | 0.3 mg/l ($mg/dm^3$) | below 0.3 mg/l | WHO Guidelines for Drinking-water Quality | Iron concentration in the water is 0.2 mg/l (EU Council Directive 98/83/EC on the quality of water intended for human consumption) |
| | | | 200 µg/l | EU Council Directive 98/83/EC on the quality of water intended for human consumption | |

| No | Indicator | National standard | International standard | | Applicable standard |
|---|---|---|---|---|---|
| | | | 2 mg/l | WHO Guidelines for Drinking-water Quality | Copper concentration in the water is 1.0 mg/l (Uzbek Standard for Drinking Water No. O'zDST 950:2011 "Hygienic requirements and quality control") |
| 12 | Copper | 1.0 mg/l ($mg/dm^3$) | 2 mg/l | EU Council Directive 98/83/EC on the quality of water intended for human consumption | |
| | | | between 0.5 and 1 mg/l | WHO Guidelines for Drinking-water Quality | Fluoride concentration in the water is 0.7 mg/l (WHO Guidelines for drinking water quality) |
| 13 | Fluoride | 0.7 mg/l ($mg/dm^3$) | 1.5 mg/l | EU Council Directive 98/83/EC on the quality of water intended for human consumption | |
| | | | 600 – 1000 mg/l | WHO Guidelines for Drinking-water Quality | Total dissolved solids is 600 - 000 mg/l (WHO Guidelines for drinking water quality) |
| 14 | Total dissolved solids (TDS) | 1000 (1500) mg/l ($mg/dm^3$) | 500−15000 mg/ L | EU Council Directive 98/83/EC on the quality of water intended for human consumption | |
| | | | Escherichia coli provides conclusive evidence of recent fecal pollution and should not be present in drinking water. Must not be detectable in any 100 ml sample | WHO Guidelines for Drinking-water Quality | Zero Escherichia coli is in the water (WHO Guidelines for drinking water quality) |
| 15 | Number of Escherichia coli | Not more than 3 number/1c $m^3$ | Escherichia coli (E. coli): 0 | EU Council Directive 98/83/EC on the quality of water intended for human consumption | |

TDS = total dissolved solids; NTU = Nephelometric Turbidity Units; WHO = World Health Organisation; EU = European Union

### 14.3.4. Surface water quality standards

Public Health Regulation No. 0200-06[26] "Sanitary standards of water sources hygienic assessment, definition of surface water and groundwater sources classes, and their selection for

26 Public Health Regulation No. 0200-06, 15.05.2006, https://nrm.uz/contentf?doc=368410_sanitarnye_pravila_i_normy_gigienicheskoy_ocenki_opred

drinking water supply" and Public Health Regulation No.0318-15[27] "Hygienic and anti-epidemic requirements for the protection of water reservoirs in Uzbekistan" stipulates requirements for surface water quality (**Table 5**).

Table 11: National standard for surface water quality

| No. | Indicator | Unit | Standard |
|---|---|---|---|
| 1 | Color | degree | Not more than 30 |
| 2 | Turbidity | mg/l (mg/dm$^3$) | Not more than 20 |
| 3 | pH | - | Within the range of 6.5 - 8.5 |
| 4 | BOD | mg$O_2$/l (mg$O_2$/ dm$^3$) | Not more than 5 (II class) |
| 5 | Acid capacity (permanganate) | mg$O_2$/l (mg$O_2$/ dm$^3$) | Not more than 7 |
| 6 | Total hardness | Mg-equiv/l (mg-equiv/ dm$^3$) | Not more than 7 |
| 7 | Dry solid | mg/l (mg/dm$^3$) | Not more than 1000 |
| 8 | Iron ($Fe^{+2}$) | mg/l (mg/dm$^3$) | Not more than 0.3 |
| 9 | Chloride (Cl) | mg/l (mg/dm$^3$) | Not more than 250 |
| 10 | Sulphate ($SO_4^{+6}$) | mg/l (mg/dm$^3$) | Not more than 400 |
| 11 | SS | mg/ dm$^3$ | < 0.75 |
| 12 | COD | mg$O_2$/ dm$^3$ | < 15.0 |

TDS = total dissolved solids; BOD = biochemical oxygen demand; COD = chemical oxygen demand; SS = suspended solids

### 14.3.5. Soil quality standards

Public Health Regulation № 0183-05[28] "Hygienic requirements for the quality of soil in populated areas in the specific natural climatic conditions of Uzbekistan" of January 10, 2005 and Public

eleniya_klassov_poverhnostnyh_i_podzemnyh_vodoistochnikov_ih_vybora_dlya_centralizovannogo_hozyaystvenno-pitevogo_vodosnabjeniya_naseleniya_uzbekistana_(sanpin_ruz_n_0200-06)_(utverjdeny_glavnym_gosudarstvennym_sanitarnym_vrachom_15_05_2006_g_)&products=1_vse_zakonodatelstvo_uzbekistana

27 Public Health Regulation No.0318-15, https://ssv.uz/ru/documentation/sanpin-ruz-0318-15gigienicheskie-i-protivoepidemicheskie-trebovanija-k-ohrane-vody-vodoemov-na-territorii-respubliki-uzbekistan

28 https://nrm.uz/contentf?doc=368500_predelno_dopustimye_koncentracii_(pdk)_i_orientirovochno_dopustimye_koncentracii_(odk)_ekzogennyh_vrednyh_veshchestv_v_pochve_(sanpin_ruz_n_0055-96)_(utverjdeny_glavnym_gosudarstvennym_sanitarnym_vrachom_22_07_1996_g_)&products=1_vse_zakonodatelstvo_uzbekistana

Health Regulation № 0191-0529 “Maximum permissible concentrations and approximate permissible concentrations of exogenous harmful substances in the soil” of November 5, 2005 stipulate requirements for the soil quality. The corresponding international standards for soil quality monitoring include the following:

- The Food and Agriculture Organization (FAO) Global Soil Partnership: Standard Operating Procedures30 (provides methods for soil monitoring);
- WHO permissible limits for heavy metals in plants and soil31 (specifies maximum levels of elements in soils).

**Table 6** below provides a comparison of certain standards of national and international regulation. It also specifies the standard to be applied for environmental, health and safety monitoring on certain indicators within the frame of the subproject.

Table 12: Standards for the soil quality

| No. | Indicator | National Standard | International Standards | | Applicable Standard |
|---|---|---|---|---|---|
| 1 | pH | 6-9 | 6.0 – 7.5 | FAO Global Soil Partnership | **6.0 – 7.5** (FAO Global Soil Partnership) |
| 2 | Copper | 3 mg/kg | 36 mg/kg | WHO permissible limits for heavy metals in plants and soil | **3 mg/kg** (Uzbek Public Health Regulation № 0191-0532 “Maximum permissible concentrations and approximate permissible concentrations of exogenous harmful substances in the soil”) |
| 3 | Lead | 32 mg/kg | 85 mg/kg | | **32 mg/kg** (Uzbek Public Health Regulation № 0191-0533 “Maximum permissible concentrations and approximate permissible |

29 https://ssv.uz/ru/documentation/perechen-utverzhdennyh-sanitarnyh-norm-pravil-i-gigienicheskih-normativov-sanpin-respubliki-uzbekistan

30 FAO Global Soil Partnership: Standard Operating Procedures, Volume 2.1 pH, https://www.fao.org/global-soil-partnership/pillars-action/5-harmonization/glosolan/sops/volume-21/en/, https://www.fao.org/3/ca2796en/CA2796EN.pdf

31 WHO permissible limits for heavy metals in plant and soil, WHO (1996), https://www.omicsonline.org/articles-images/2161-0525-5-334-t011.html

32 https://ssv.uz/ru/documentation/perechen-utverzhdennyh-sanitarnyh-norm-pravil-i-gigienicheskih-normativov-sanpin-respubliki-uzbekistan

33 https://ssv.uz/ru/documentation/perechen-utverzhdennyh-sanitarnyh-norm-pravil-i-gigienicheskih-normativov-sanpin-respubliki-uzbekistan

| No. | Indicator | National Standard | International Standards | Applicable Standard |
|---|---|---|---|---|
| | | | | concentrations of exogenous harmful substances in the soil") |
| 4 | Zinc | 23 mg/kg | 50 mg/kg | **23 mg/kg** (Uzbek Public Health Regulation № 0191-05[34] "Maximum permissible concentrations and approximate permissible concentrations of exogenous harmful substances in the soil") |
| 5 | Nitrate | 130 mg/kg | - | **130 mg/kg** (Uzbek Public Health Regulation № 0191-05[35] "Maximum permissible concentrations and approximate permissible concentrations of exogenous harmful substances in the soil") |

### 14.3.6. Sanitary buffer zone

The main goal pursued by the state when creating a buffer zone is the protection of water supply sources and facilities from accidental or intentional pollution and damage. The Uzbek regulatory framework comprises some legal documents regulating the buffer zone of the water supply facilities. However, the key regulations in the water and wastewater sector are standards issued by the Ministry of Health and the Ministry of Construction, Utility and Housing Services. Both legal documents have the exact requirements and standards for establishing sanitary protection around the drinking water infrastructure.

The Ministry of Health of Uzbekistan (Public Health Regulation No. 0244-07, Sanitary Rules and Standards on Design and Operation of Water Supply Sources and Drinking Water Infrastructure36) requires establishing a buffer zone around the drinking water infrastructure, such as water distribution and pumping stations. In particular, the buffer zone for the drinking water reservoir, filtration facilities, and pumping stations should be at least 30 m; for water towers it should be at least 10 m, and for other drinking water facilities (such as sedimentation ponds, chlorination facilities, etc.) it should be at least 15 m. The regulation also foresees a buffer zone of at least 300 m from the residential and public buildings for the water supply station provided by the chlorine warehouse.

34 https://ssv.uz/ru/documentation/perechen-utverzhdennyh-sanitarnyh-norm-pravil-i-gigienicheskih-normativov-sanpin-respubliki-uzbekistan

35 https://ssv.uz/ru/documentation/perechen-utverzhdennyh-sanitarnyh-norm-pravil-i-gigienicheskih-normativov-sanpin-respubliki-uzbekistan

36 https://lex.uz/docs/1921690

The Ministry of Construction, Utility and Housing Services refers to Regulation ShNK 2.04.02-2019 “Water Supply. External Water Supply Infrastructure.”37 Article 10.17 specifies the following requirements for establishing a buffer zone:

- The buffer zone should be at least 30 m for filtration facilities, drinking water reservoirs, and sedimentation ponds.
- At least 15 m should be from the water towers and other facilities.

The document provides for the reduction of the buffer zone in agreement with the territorial Public Health and Population Wellbeing Service.

### 14.3.7. Waste management

The Law on Waste No.362-II38 of April 5, 2002 regulates solid waste management in Uzbekistan. It requires legal and individual entities to contract a solid waste management operator to collect and dispose of waste. Beyond overseeing solid waste management, the environmental regulator also maintains an Internet-based billing management system, CleanCity39, for individual entities the private operator serves. The legal customers are served by Bukhara regional solid waste company “Toza Hudud”40 or its district branches.

Uzbekistan does not have regulations prohibiting ACM use in the construction of buildings and structures, except for Regulation No. 102 “On approval of common technical procedure on safety of telecommunication equipment”, 27.02.2017, which serves as a ban[41] on ACM use when laying telecommunication lines. However, international hazardous waste management standards require identifying ACM and their subsequent careful removal and disposal. Since AIIB funds the project, the subproject will follow the requirements of the AIIB Environmental and Social Exclusion List.

### 14.3.8. Other national regulations

Other regulations include the following:

37 https://mc.uz/wp-content/uploads/2021/01/shnk-2.04.02-19-tashki-suv-tarmoklari.pdf

38 https://lex.uz/docs/44872

39 https://cleancity.uz/about-us

40 https://www.uznature.uz/ru/region_organization?numer=1084

41 Regulation No. 102 “On approval of common technical procedure on safety of telecommunication equipment”, 27.02.2017, https://lex.uz/docs/3124839

- Public Health Regulation No. 0212-0642 "Sanitary rules and norms of hygienic assessment of the degree of soil pollution of different types of land use in the specific conditions of Uzbekistan", July 7, 2006;
- Engineering Standard KMK 2.04.02-2 “Water supply. External networks and facilities"[43], 1997;
- Public Health Standard No. 0244-07 “Design and operation of sanitary protection zones of drinking water sources and pipelines”44, December 29, 2007.

42 https://lex.uz/docs/1932321?query=%D0%A1%D0%B0%D0%BD%D0%9F%D0%B8%D0%BD

43 https://mc.uz/gradostroitelnye-normy/

44 https://lex.uz/docs/1921690

# 15. BASELINE ENVIRONMENTAL AND SOCIAL DATA

## 15.1. Physical Conditions

### 15.1.1. Geographic location

Bukhara province is 41.87 thousand sq. km and comprises 11 districts, whereas Karaulbazar district is located south of the area (Figure 23). The subproject district borders the Kagan, Bukhara, and Alat regions in the west and the Kashkadarya province in the north and east. The Karaulbazar district consists of six settlements (Buzochi, Jarqoq, Navbahor, Nagoratepa, Sardoba, and Tashquduq) and one town, Karaulbazar. The latter is the administrative center of the Karaulbazar district (39°30′ north latitude and 64°48′ east longitude) and is 51.3 km from Bukhara city via the A-380 highway.

Figure 24: Geographic location of Karaulbazar District

### 15.1.2. Climate

The Karaulbazar district is located on an open plain of Kyzylkum desert. The area belongs to a sharply continental arid climate with long hot and dry summers and short but rather cold winters with unstable snow cover up to 5 – 7 cm. This climate type is considered to be BWk and BSk

according to the Köppen-Geiger climate classification (**Appendix 4**). The average annual temperature in the subproject area is 17.2 °C (Figure 24).

| | January | February | March | April | May | June | July | August | September | October | November | December |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Avg. Temperature °C (°F) | 2.7 °C (36.9) °F | 5.1 °C (41.2) °F | 11.6 °C (52.8) °F | 18.2 °C (64.7) °F | 25.2 °C (77.4) °F | 30 °C (85.9) °F | 31.8 °C (89.2) °F | 30 °C (86) °F | 23.9 °C (75.1) °F | 16.2 °C (61.2) °F | 8.6 °C (47.4) °F | 3.7 °C (38.7) °F |
| Min. Temperature °C (°F) | -1.8 °C (28.8) °F | -0.3 °C (31.5) °F | 5.1 °C (41.2) °F | 11 °C (51.8) °F | 17.4 °C (63.3) °F | 22.2 °C (71.9) °F | 24.6 °C (76.3) °F | 22.8 °C (73) °F | 16.6 °C (61.9) °F | 9.5 °C (49.2) °F | 3.3 °C (38) °F | -0.6 °C (30.9) °F |
| Max. Temperature °C (°F) | 7.9 °C (46.2) °F | 10.9 °C (51.5) °F | 17.7 °C (63.8) °F | 24.5 °C (76.1) °F | 31.7 °C (89) °F | 36.4 °C (97.5) °F | 37.9 °C (100.2) °F | 36.5 °C (97.7) °F | 30.9 °C (87.7) °F | 23.1 °C (73.6) °F | 14.4 °C (58) °F | 8.8 °C (47.9) °F |
| Precipitation / Rainfall mm (in) | 22 (0) | 27 (1) | 33 (1) | 25 (0) | 10 (0) | 2 (0) | 0 (0) | 0 (0) | 0 (0) | 6 (0) | 16 (0) | 16 (0) |
| Humidity(%) | 68% | 62% | 53% | 43% | 31% | 22% | 22% | 23% | 29% | 44% | 63% | 68% |
| Rainy days (d) | 4 | 4 | 5 | 4 | 2 | 0 | 0 | 0 | 0 | 1 | 3 | 3 |
| avg. Sun hours (hours) | 6.5 | 7.7 | 9.2 | 11.1 | 12.8 | 13.4 | 13.2 | 12.3 | 11.2 | 9.9 | 7.8 | 6.6 |

Figure 25: Average weather by month (1991-2021) in the Karaulbazar District
(Source: Climate Data London45)

The weather in summer, from May to September, is hot and dry, and there is almost no rain. The warmest month of the year is July, with an average temperature of 31.8 °C. The maximum soil temperature during this period can reach +60÷70$^0$C.

The winter season is from December to February. It is mild and unstable, often cloudy. The average daily temperature in winter is usually +3÷5 $^0$C. In winter, precipitation most often is drizzling rain, sometimes as snowfall, but without stable snow cover; the snow stays for no more than two weeks. January is the coldest month, with temperatures averaging 2.7 °C.

Precipitation is about 157 mm per year. The principal precipitation amount falls from October to April. The precipitation difference between the driest and the wettest months is 33 mm. The month with the highest relative humidity is January (68.17 %). The month with the lowest relative humidity is July (21.78 %). The wettest month is March (6.27 days). The driest month is August (0.17 days). Evaporation significantly exceeds precipitation. The moisture deficit is further enhanced by almost constantly blowing desert winds, which increases evaporation from the soil and plant transpiration.

Winds from the northern, northeastern, and northwestern directions prevail across the project area, often reaching hurricane force and accompanied by dust and sand storms. The average monthly wind speed in July is 4.1 m/s, and the maximum is 6.5 – 5.4 m/s.

There are the longest days in June, with up to 13.2 day hours. The lowest number of sunny hours is in January, with up to 6.59 hours per day.

45 https://en.climate-data.org/asia/uzbekistan/bukhara-province-724/

### 15.1.3. Topography

The land surface of the project area is undulating, slightly inclined to the northwest, a plain, most of which is covered by the Kyzylkum desert with hilly and ridged sands held by separate hills (Figure 26). The topographic relief is relatively flat, with absolute elevations of 252.8 m to 265.3 m, and the surface slope runs from east to southwest (Appendix 5).

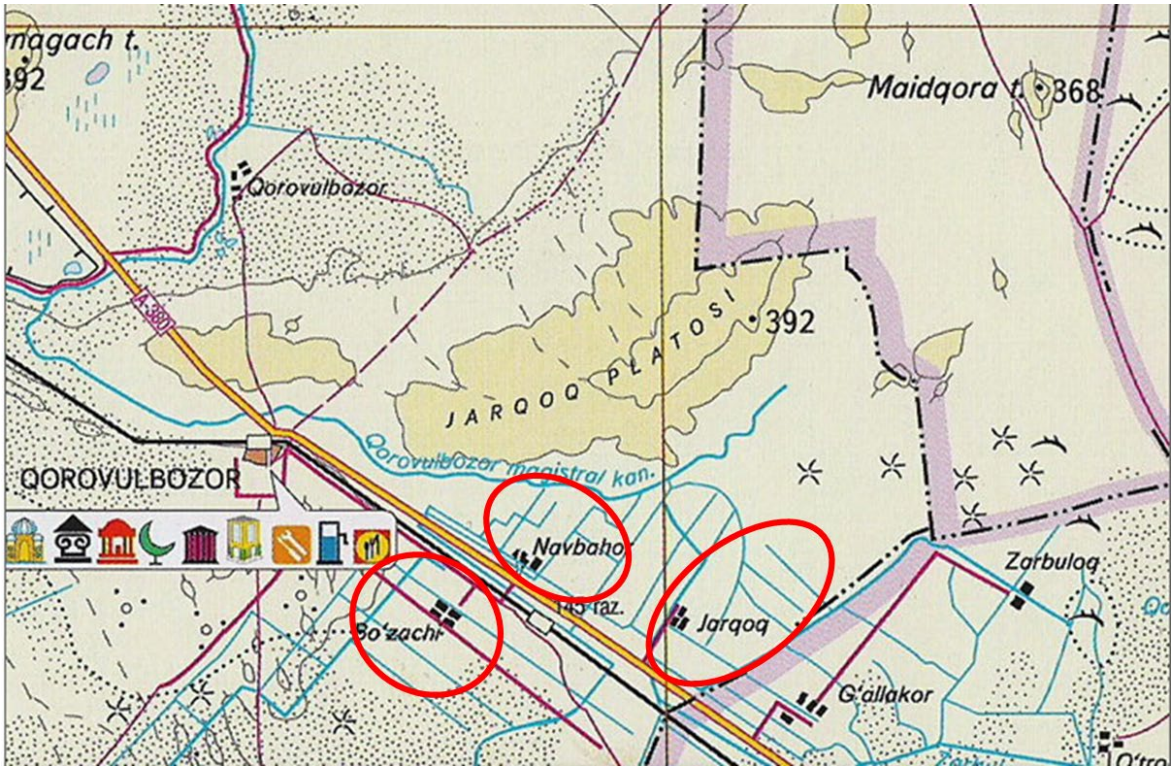



Figure 26: Topographic relief map of the subproject area

Topography report is enclosed to detailed engineering design for each project site. Brief description of the sites topography and their surroundings are presented in the table below.

Table 13: Brief information on WDUs' topography and surrounding area

| Project Site | Brief sites topography |
|---|---|
| Buzochi WDU | ▪ The terrain of the site is flat.<br>▪ Elevation is 255-257 m.<br>▪ Structures on the site are old building of pumping station, two underground water reservoirs, and reinforced concrete fence around the station.<br>▪ Surrounding area is an urban built-up area, where engineering communication represents by water network pipes, gas supply network, and power supply infrastructure.<br>▪ A flat and paved road is on one side of the water station. |

| Project Site | Brief sites topography |
|---|---|
| Navbahor WDU | ▪ The terrain of the site is flat.<br>▪ Elevation is 259-260 m.<br>▪ Structures on the site are old building of pumping station, two underground water reservoirs, and reinforced concrete fence around the station.<br>▪ Surrounding area is an urban built-up area, where engineering communication represents by water network pipes, gas supply network, and power supply infrastructure.<br>▪ A flat and paved road is on both sides of the water station. |
| Jarkok WDU | ▪ The terrain of the site is flat.<br>▪ Elevation is 268-269 m.<br>▪ Structures on the site are old building of pumping station, two underground water reservoirs, and reinforced concrete fence around the station.<br>▪ Surrounding area is an urban built-up area, where engineering communication represents by water network pipes, gas supply network, and power supply infrastructure.<br>▪ A flat and paved road is on both sides of the water station. |

### 15.1.4. Geology

A geological study of the subproject sites in Buzochi, Navbahor, and Jarqoq was conducted to determine the sites' suitability for the intended purpose, identify potential geologic hazards, and determine the soil and rock properties that may affect the design and construction of the subproject. The survey included document review and investigation of the six geological wells. EDZEM ENGINEERING LLC (Uzbekistan) was appointed to perform geological surveys and soil tests on three water distribution stations (Buzochi, Navbahor, and Jarqoq) to identify their composition. The tests were performed in December 2022.

The study area is located on the Turanian geological plate and is represented by an alluvial plain with aeolian processes (Figure 27). The foundation of the slab is composed of Lower Paleozoic crystalline schists, and the sedimentary cover is mainly terrigenous, carbonate, and salt-bearing sediments of the Carboniferous-Quaternary age. Local geological structures are mostly Meso-Cenozoic formations occurring on a Paleozoic base. Deposits are alluvial and loess loams.

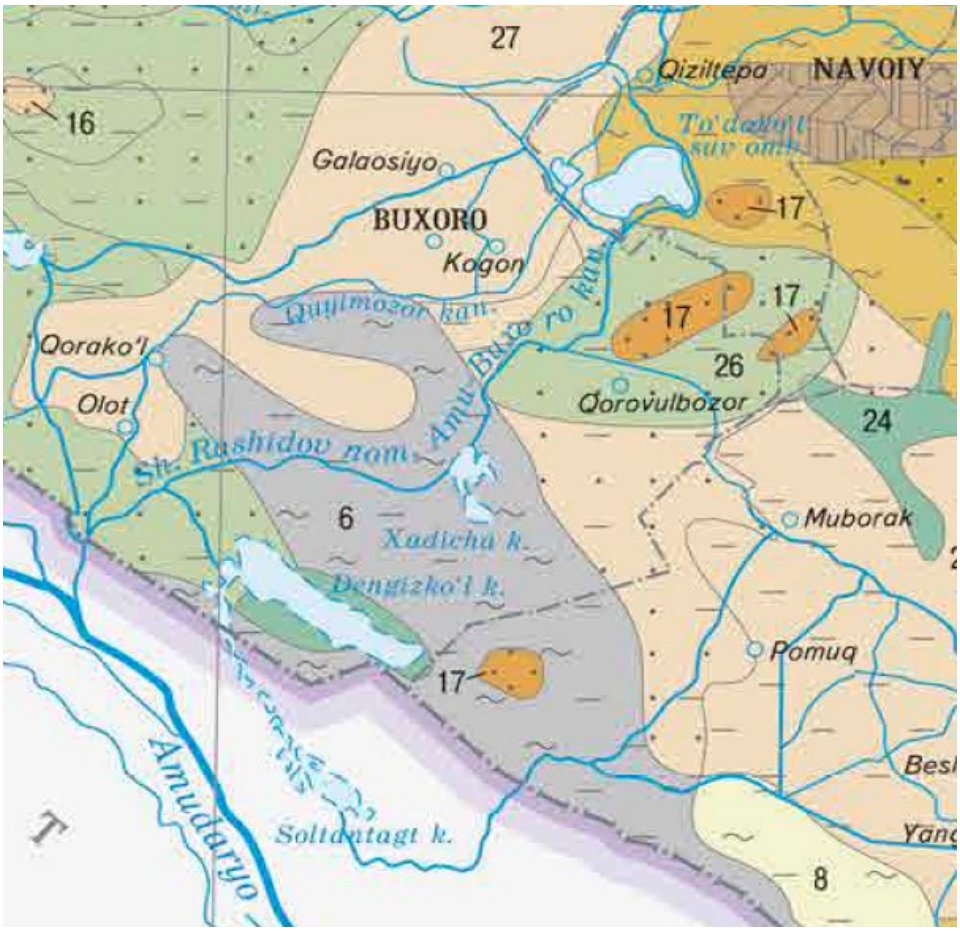



Figure 27: Geomorphologic map of the subproject area
17 – Remains of upland plains of the lower Pliocene-Quaternary age, 26 – Low sub-horizontal plains of Holocene age
(Source: National Atlas of Uzbekistan, 2020)

Four major tectonic plates (Arabia, Eurasia, India, and Africa) and one smaller tectonic block (Anatolia) are responsible for seismicity and tectonics in the Bukhara Province of Uzbekistan. The geologic development of the region is a consequence of some first-order plate tectonic processes that include subduction, large-scale transform faulting, compressional mountain building, and crustal extension. The project area is located in the center of the most active seismic South Tien Shan zone, which has an almost rectilinear shape. The basement of this area is stable, with a seismic intensity of 7 and an earthquake frequency of once in 1000 years (Figure 28). The last strongest earthquakes with a magnitude of 7.0÷7.3 occurred in Gazli, northwest of Bukhara Province, in 1976 and 1984. Gazli is 160.2 km from Karaulbazar district via the A-380 highway. The seismic zoning map of Uzbekistan and the data on the strongest earthquakes in the region are provided in Appendix 6.

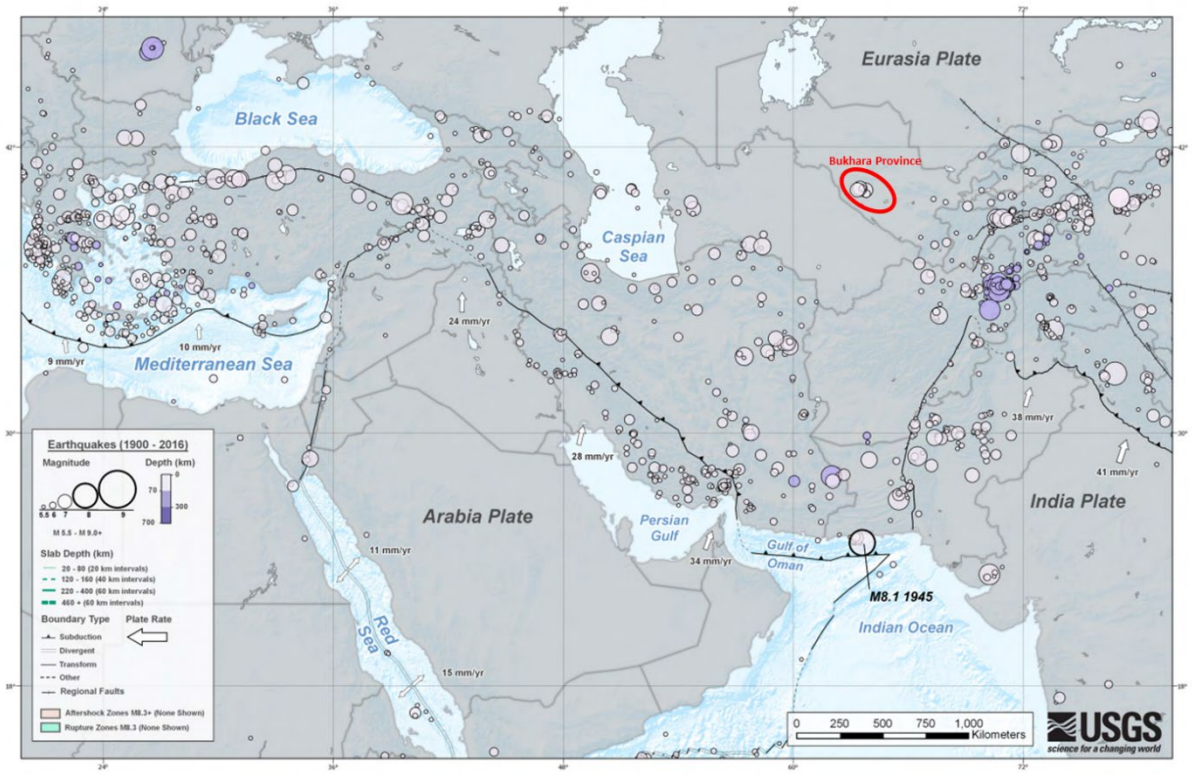



Figure 28: Seismic intensity of the project area
(Source: Map of Tectonic Summary Region, U.S. Geological Survey46)

The soils of the Buzochi, Navbahor, and Jarqoq lands are loess-like deposits in the form of sandy loam and loam. Local grounds are roughly divided into three groups:

(1) Sandy loam and loam above the water level are represented by loess loams, dark brown, macroporous, and silty, with interlayers of in-equigranular sand, with carbonate and gypsum inclusions, and of demanding to hard-plastic consistency;

(2) Sandy loam and loam below the water level are represented by loess loams, dark brown, and silty, with interlayers of in-equigranular sand, with carbonate and gypsum inclusions, and of stiff-plastic to fluid-plastic consistency;

(3) Gray and brownish-gray, silty and fine, moist and water-saturated sands, with silty sandy loam and medium-density layers.

These soils subside under additional factors, such as building and structure pressure. Soils are saline with easily soluble salts. The soil survey on the WDU's territory also revealed its sandy loam and loam composition mixed with construction and household waste, asphalt, and partly

46 U.S. Geological Survey, https://earthquake.usgs.gov/earthquakes/tectonic/images/middleeast_tsum.pdf

concrete coating. The study also showed the availability of buried irrigation dumps and old cesspools.

The summarized soil test results provided as part of the geological engineering survey report (Appendix 8) are presented in Table 14.

Table 14: Soil test results of the subproject area

| No. | Monitoring site | Test depth (m) | pH | $HCO_3^-$ (mg/kg) | $Cl^-$ (mg/kg) | $SO_4^{2-}$ (mg/kg) | $Ca^{2+}$ (mg/kg) | $Mg^{2+}$ (mg/kg) | $Na^+ + K^+$ (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|
| 1. | Buzochi WDU | 0.8÷1.0 | 7.7 | 211.0 | 1,114.0 | 8,610.0 | 2,809.0 | 342.0 | 1,051.0 |
| 2. | Navbahor WDU | 1.0 | 7.8 | 242.0 | 914.0 | 4,660.0 | 1,686.0 | 292.0 | 508.0 |
| 3. | Jarqoq WDU | 1.0 | 7.6 | 182.0 | 960.0 | 6,054.0 | 2,205.0 | 293.0 | 679.0 |

WDU = water distribution unit/station; $HCO3^-$ = bicarbonate ion; $Cl^-$ = chloride ion; $SO_4^{2-}$ = sulphate ion; $Ca^{2+}$ = calcium ion; $Mg^{2+}$ = manganese ion; $Na^+ + K^+$ = total sodium and potassium ions

### 15.1.5. Groundwater

Groundwater will not be used as a water source in this subproject. However, hydrogeological matters shall be considered before construction works to minimize adverse outcomes, such as wet basements and other findings noticed during engineering assessment of the structures in three WDUs (see figures provided in Sections 2.1.1., 2.2.1., and 2.3.1.). EDZEM ENGINEERING LLC (Uzbekistan) was appointed to perform groundwater tests in three water distribution stations (Buzochi, Navbahor, and Jarqoq) and an overview of water table conditions, define the groundwater depth and static, perched, and artesian states, and determine the groundwater composition.

The hydrogeological conditions of the area are closely related to the climate and geomorphological conditions, the lithological composition of the water-bearing rocks, and the structural characteristics of the study area. Groundwater was found at a 3.0-3.6 m depth during the engineering survey. The primary groundwater sources are the underground inflow from the adjacent territory and infiltration from the Zarafshan River and the Amu-Bukhara Canal. The widely used irrigated agriculture also specifies the high groundwater level in the project area. The water table conditions can rise or fall depending on the time of year. During the late winter and spring, water (melted snow and spring rainfall) on the surface infiltrates the ground, and the water table rises.

The tests were performed in December 2022 and showed that groundwater is salty and affects soil, leading to its salinization, which is typical for the project area. Below are the groundwater test results from the geological engineering survey report.

Table 15: Groundwater test results

| No. | Monitoring site | Test depth (m) | pH | $HCO_3^-$ (mg/l) | $Cl^-$ (mg/l) | $SO_4^{2-}$ (mg/l) | $Ca^{2+}$ (mg/l) | $Mg^{2+}$ (mg/l) | $Na^+ + K^+$ (mg/l) |
|---|---|---|---|---|---|---|---|---|---|
| 1. | Buzochi WDU point 1 | 3.4 | 7.0 | 406.0 | 1,728.0 | 2,930.0 | 671.0 | 456.0 | 1,045.0 |
| 2. | Buzochi WDU point 2 | 3.4 | 7.1 | 689.0 | 700.0 | 2,490.0 | 661.0 | 261.0 | 653.0 |
| 3. | Navbahor WDU point 1 | 3.2 | 7.6 | 373.0 | 176.0 | 2,020.0 | 640.0 | 78.0 | 227.0 |
| 4. | Jarqoq WDU point 1 | 3.2 | 7.2 | 610.0 | 2,111.0 | 6,530.0 | 92.0 | 518.0 | 4,511.0 |
| 5. | Jarqoq WDU point 2 | 3.3 | 7.1 | 366.0 | 2,509.0 | 6,530.0 | 94.0 | 502.0 | 3,435.0 |

WDU = water distribution unit/station; $HCO3^-$ = bicarbonate ion; $Cl^-$ = chloride ion; $SO_4^{2-}$ = sulphate ion; $Ca^{2+}$ = calcium ion; $Mg^{2+}$ = manganese ion; $Na^+ + K^+$ = total sodium and potassium ions

The detailed information on groundwater test points and particular tests are provided in Appendix 7**.**

### 15.1.6. Surface water

The Kuyumazar water reservoir and the water intake facilities of the River Zarafshan will provide water for this project. Kuyumazar water reservoir is fed by the Amu-Bukhara Canal, supplying water from the Amudarya River. Source sustainability has been assessed during a hydrological survey prior to project preparation and detailed design.

The hydrological conditions of the project area are determined by the presence of the Zarafshan River, Amu-Bukhara and Kuyumazar Canals, Kuyumazar Reservoir, and Lakes Dengizkul Tudakul, Devkhana, and Khadicha.

The Zarafshan River, manmade canals, irrigation networks, and lakes present the surface water resources in the project area. The primary surface water resource of the Bukhara province is the Zarafshan River, which crosses from the northeast to the southwest. The average speed of the river flow is 3.6-3.7 m/s. The average annual water consumption is approximately 30 $m^3$/s. The maximum discharge falls in the summer months and reaches about 180 $m^3$/s. The Zarafshan River is located about 100 km from the Karaulbazar region and has some influence on the project area.

The other water sources are the Amu-Bukhara Canal and Kuyumazar Canal (Figure 28), built due to the Bukhara Province's limited water resources. The Amu-Bukhara Canal was built in 1965 – 1976 with a 400 km length and 270 $m^3$/s capacity. It has 11 pumping stations and 65 hydraulic facilities. Both canals are used for irrigation and water supply.

On-farm irrigation, small agricultural canals, and drainage networks represent the main hydrographic networks of the settlements. On-farm irrigation is fed from the Karaulbazar canal.

The maximum water flow of the Karaulbazar canal is in the spring-summer (vegetation) period, whereas the minimum water flow is in the autumn-winter period. The outflow of drainage water is carried out by the central collector, which is open type and flows outside the subproject settlements.

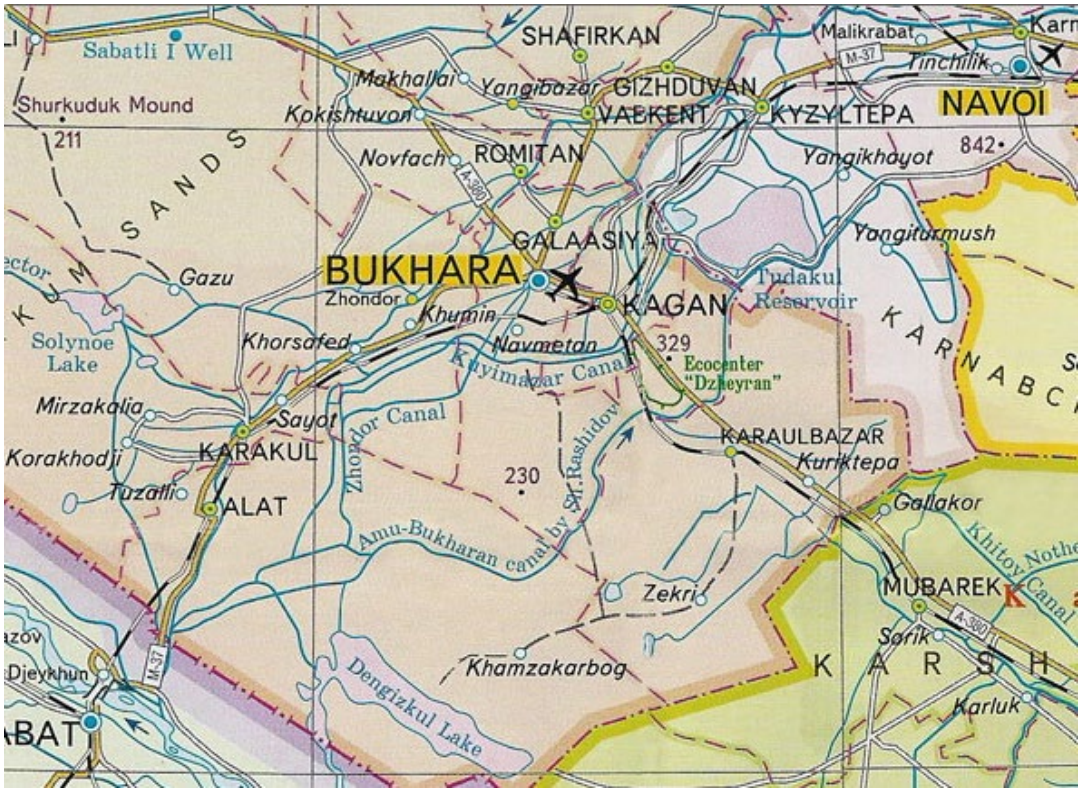



Figure 29: Water canals map of the project area47
(Source: Physical Map of Uzbekistan)

The nearest lakes to the subproject area are Tudakul and Devkhana (Figure 30). Lake Tudakul is a water basin that formed naturally in 1952 due to the breakthrough of the Zarafshan River floodwaters into the Tudakul depression. The water object is about 40 km north of the Karaulbazar district. Lake Tudakul is seasonally regulated and fed from the Zarafshan River and the Amu-Bukhara Canal. The other lake is Devkhana, a natural depression 30-32 km south of the Karaulbazar district. It is filled with the residual runoff of the Kashkadarya River and drainage water from irrigation.

Despite the desert climate, two more water objects are within the 65 km zone of the subproject area. Kuyumazar Reservoir is located 2 km from the western shore of Lake Tudakul. Kuyumazar Reservoir is the primary source of drinking water supply system in Bukhara Province. Its water quality has less salinity than the water in Lake Tudakul.

47 http://www.capone-online.ru/uzbekistan_imaps.html?063-G07

The biggest lake in the area is Dengizkul with a total area of about 40,000 ha. It is also located in a natural depression. The lake is salty and has no permanent shoreline, although its wetlands provide essential habitat for flora and fauna. Since 1973, Lake Dengizkul has been protected as a state reserve.

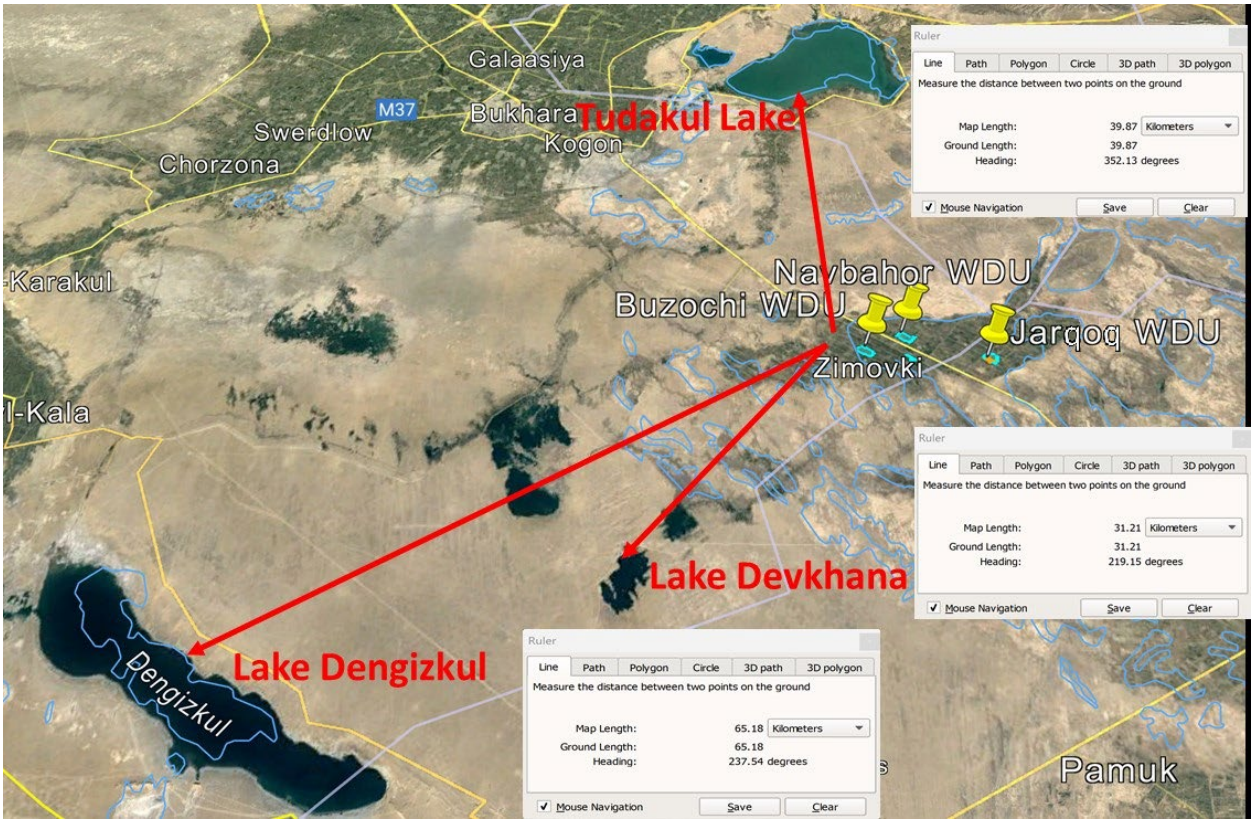



Figure 30: Lakes nearby the Karaulbazar district
(Source: Google Earth)

The project will use surface water (rivers, reservoirs, and water mains) as its primary source. Source sustainability has been assessed as satisfactory by a hydrological assessment before project preparation and during the detailed design phase. The existing water supply of the Karaulbazar district is carried out from the Kuyumazar-BNPZ and Kuyumazar-Mubarek water mains. The Kuyumazar-BNPZ pipeline supplies water to Karaulbazar town, and the Kuyumazar-Mubarek pipeline provides water to the district's villages. The subproject design foresees the Kuyumazar-Mubarek water main as the water source for the three WDUs in Buzochi, Navbahor, and Jarqoq. The Tashquduq settlement's water network will be connected to the Buzochi WDU.

### 15.1.7. Air quality

According to the proposed detailed design (Section 2.4.), some WDUs' buildings will be demolished, while others will be restored. These civil works can potentially impact air quality. However, this impact is local and temporary. For instance, (a) the demolition of the building materials can provide exposure to mold, asbestos, lead, bird waste, and other respiratory irritants, and (b) the application tile adhesive, roofing materials, paints, and other products used during

construction provides point sources of volatile organic compounds (VOCs) and other irritating chemicals. These respiratory irritants do not go beyond the construction site but can affect the contractor personnel. The contractors also frequently use fossil-fueled machinery and equipment that generate combustion products (e.g., carbon monoxide), which shall be monitored to prevent their migration into the ambient air over the settlements. Moreover, when determining the air quality baseline data in the Karaulbazar district, all industries in the subproject area should also be considered. The overview of the company list revealed the presence of Cotton Gin Plant and Bukhara Oil Refinery (BNPZ48). These industries are known to be the principal emission sources for some air pollutants, including VOCs, greenhouse gases, and particulate matter.

BNPZ is northwest of the Karaulbazar district, 16.43 km from the Buzochi settlement (Figure 30). According to the data of the environmental regulator, its department (the Center for Analytic Environmental Control), together with the BNPZ environmental service, conducts ambient air monitoring of nitrogen oxides, sulfur dioxide, and carbon monoxide (Figure 31) at the border of the buffer zone subproject area. The BNPZ management states that the plant operation complies with local and international environmental standards justified by the ISO 14001 certificate49.

48 BNPZ is the established abbreviation for Bukhara Oil Refinery.

49 BNPZ certificates: https://bnpz.uz/certificate; BNPZ environmental and social policy: https://bnpz.uz/social

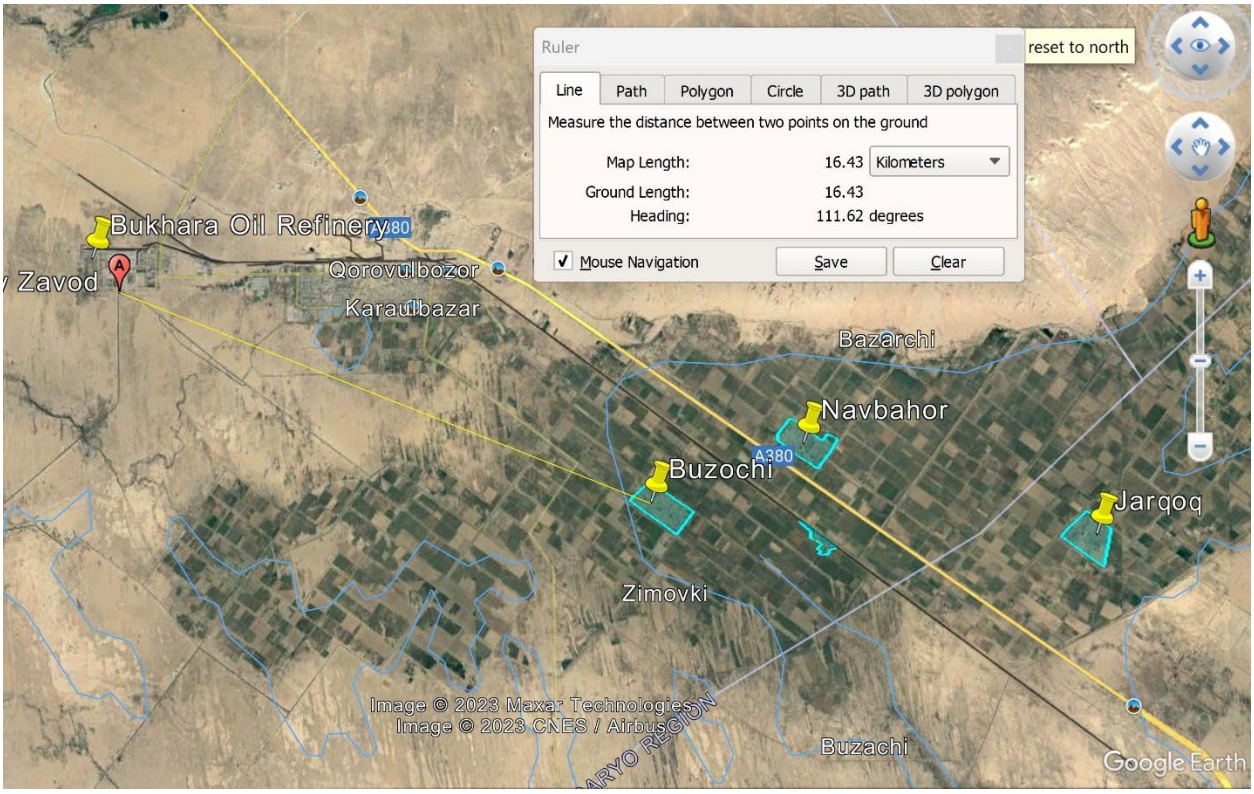



Figure 31: Air pollutant location in the subproject area
(Source: Google earth)

Despite the BNPZ statement on ensuring environment, health and safety, and its relative remoteness from the subproject sites, emission sources can negatively impact up to 20-25 km. Therefore, air quality monitoring at the subproject settlements should include nitrogen oxides, sulfur dioxide, methane, and carbon monoxide.

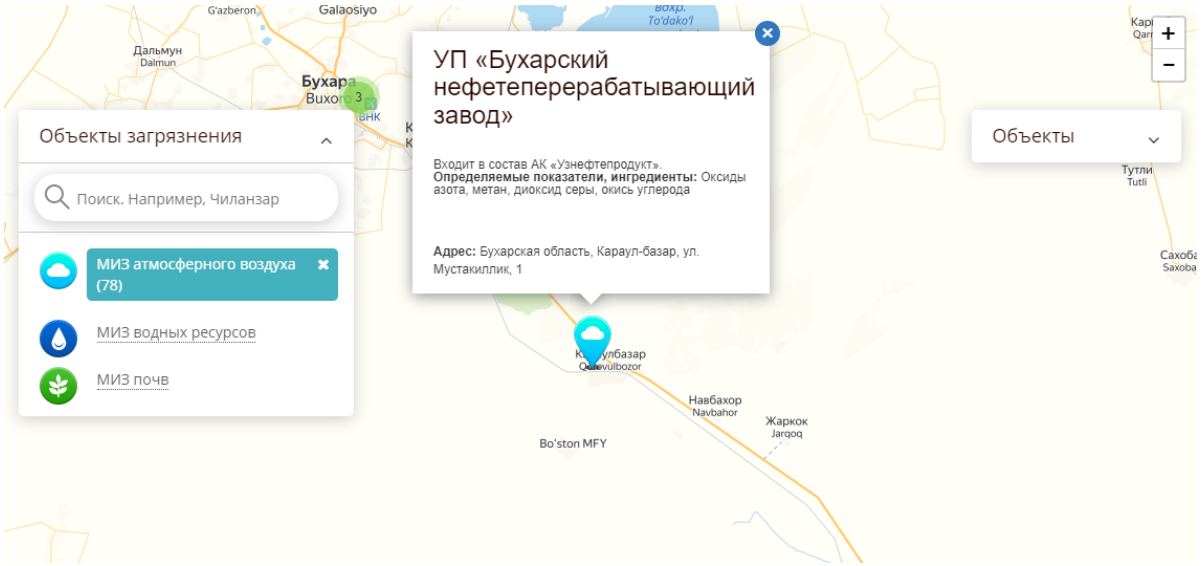



Figure 32: Regulator's Interactive Map of Pollutants in Karaulbazar district
(Source: Center for Analytic Environmental Control, Uzbekistan50)

The Cotton Gin Plant is another major air pollutant in the subproject area. It is close to the subproject settlements (Figure 33): only 860 m from the Navbahor village and 5-7 km from the Buzochi and Jarqoq villages. Despite such proximity to populated areas, there is no information on the regulator's website that this enterprise is subject to environmental and public health monitoring by the respective government authorities. The cotton gin is not on the regulator map of pollutants; still, the Uzbek legislation requires environmental and public health authorities to conduct state ecological and public health monitoring of air quality at the buffer zone (which is 500 m, following Uzbek Public Health Regulation No.0248-08, "Sanitary Rules and Standards for Cotton Gin Industry" 51) and nearby settlements. Despite the proximity of the cotton plant to the subproject settlements, it is a seasonal industry and has a temporary impact on the nearby environment during the three-four month cotton treatment.

50 The Center for Analytic Environmental Control, https://www.csak.uz/ru/monitoring/pollution-sources/

51 Uzbekistan Public Health Regulation No.0248-08 "Sanitary Rules and Standards for Cotton Gin Industry", https://lex.uz/docs/1862949

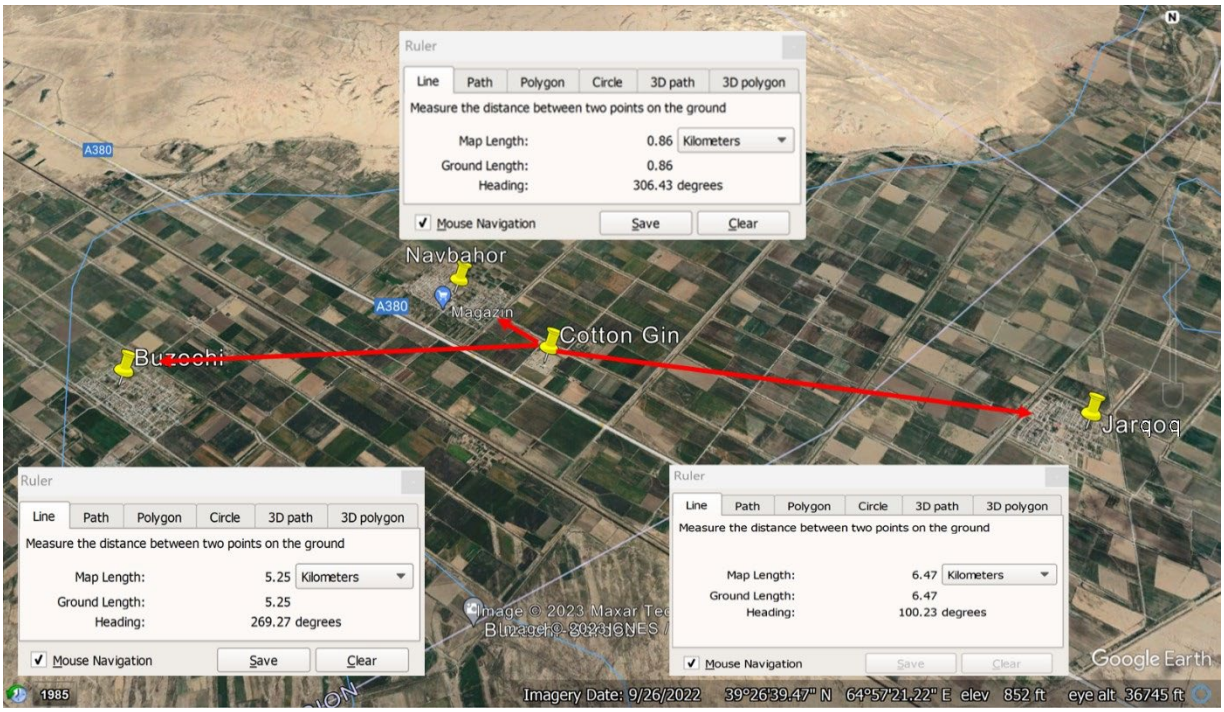



Figure 33: Distance between the subproject settlements and cotton gin
(Source: Google earth)

Following the Public Health Regulation No.0248-08, ambient air monitoring in the cotton gin buffer zone and the area bordering surrounding settlements should be conducted on the following indicators:

1. Suspended substances (dust undifferentiated in composition)
2. Cotton dust
3. Tetra-methyl-thiuram disulfide (TMTD)
4. Copper trichloro phenolate (TCPM)
5. Hexatiuram
6. Magnesium chlorate
7. Butylcaptax (2-butylthio-benzothiazole).

The regulation specifies bordering concentrations per pollutant. Among these harmful compounds, cotton dust is defined as the most concentrated emission and is present in the air for a long time during the handling and processing of cotton. This dust may contain fiber, bacteria, fungi, soil, pesticides, and other contaminants which may have accumulated with the cotton during the growing, harvesting, and subsequent processing. Chronic exposure to cotton dust has caused lung airway obstruction, leading to disability and premature death. Proper monitoring of cotton dust, P2.5, and P10 should be conducted regularly in the surrounding settlements.

The air quality in the subproject area has undergone changes in the composition of gases and requires monitoring to balance air pollution control measures during the subproject activities. The

list of air quality indicators to be monitored and served as baseline conditions should include at least carbon monoxide, VOCs, Sulfur dioxide, nitrogen dioxide, airborne particles, and methane.

The Bukhara Province Public Health Service was appointed to determine the air quality at the Buzochi, Navbahor, and Jarqoq project settlements, considering all existing conditions. Ambient air quality data at the subproject sites and surrounding settlements were measured on April 19, 2023 to verify the current air quality conditions. This assignment served to compare the current air quality with the requirements of the applicable national legislation and the WHO (Section 3.3.1) and to keep these data as indicators for comparison with air quality data obtained during the subproject activities. Table 16 is the ambient air quality report from the Bukhara Province Public Health Service for the subproject sites and settlements.

Table 16: Ambient air quality report for the subproject area

| No. | Monitoring site | Air pollutant | Monitored concentration (mg/m$^3$) | Applicable standard* (mg/m$^3$) |
|---|---|---|---|---|
| 1. | Public school no.4, Buzochi settlement | CO | absent | 4.0 |
| | | $SO_2$ | absent | 0.04 |
| | | $NO_2$ | absent | 0.025 |
| | | $PM_{2.5}$ | 0.015 | 0.015 |
| | | $PM_{10}$ | 0.025 | 0.045 |
| 2. | Kindergarten no.7, Buzochi settlement | CO | 2.33 | 4.0 |
| | | $SO_2$ | absent | 0.04 |
| | | $NO_2$ | **0.96** | 0.025 |
| | | $PM_{2.5}$ | 0.013 | 0.015 |
| | | $PM_{10}$ | 0.018 | 0.045 |
| 3. | Buzochi WDU, point 1 | CO | 2.33 | 4.0 |
| | | $SO_2$ | absent | 0.04 |
| | | $NO_2$ | **1.34** | 0.025 |
| | | $PM_{2.5}$ | 0.014 | 0.015 |
| | | $PM_{10}$ | 0.015 | 0.045 |
| 4. | Buzochi WDU, point 2 | CO | 3.49 | 4.0 |
| | | $SO_2$ | absent | 0.04 |
| | | $NO_2$ | 1.15 | 0.025 |
| | | $PM_{2.5}$ | **0.016** | 0.015 |
| | | $PM_{10}$ | 0.020 | 0.045 |
| 5. | | CO | absent | 4.0 |
| | | $SO_2$ | absent | 0.04 |

| No. | Monitoring site | Air pollutant | Monitored concentration (mg/m$^3$) | Applicable standard* (mg/m$^3$) |
|---|---|---|---|---|
| | Public school no.3, Navbahor settlement | $NO_2$ | **0.57** | 0.025 |
| | | $PM_{2.5}$ | 0.011 | 0.015 |
| | | $PM_{10}$ | 0.017 | 0.045 |
| | | CO | 2.33 | 4.0 |
| | | $SO_2$ | absent | 0.04 |
| 6. | Kindergarten no.8, Navbahor settlement | $NO_2$ | **1.53** | 0.025 |
| | | $PM_{2.5}$ | 0.020 | 0.015 |
| | | $PM_{10}$ | 0.025 | 0.045 |
| | | CO | absent | 4.0 |
| | | $SO_2$ | absent | 0.04 |
| 7. | Navbahor WDU, point 1 | $NO_2$ | **0.77** | 0.025 |
| | | $PM_{2.5}$ | 0.017 | 0.015 |
| | | $PM_{10}$ | 0.015 | 0.045 |
| | | CO | 3.49 | 4.0 |
| | | $SO_2$ | absent | 0.04 |
| 8. | Navbahor WDU, point 2 | $NO_2$ | **0.77** | 0.025 |
| | | $PM_{2.5}$ | 0.012 | 0.015 |
| | | $PM_{10}$ | 0.021 | 0.045 |
| | | CO | 2.33 | 4.0 |
| | | $SO_2$ | absent | 0.04 |
| 9. | Public school no. 5, Jarqoq settlement | $NO_2$ | 1.34 | 0.025 |
| | | $PM_{2.5}$ | 0.013 | 0.015 |
| | | $PM_{10}$ | 0.022 | 0.045 |
| | | CO | absent | 4.0 |
| | | $SO_2$ | absent | 0.04 |
| 10. | Jarqoq WDU, point 1 | $NO_2$ | 0.77 | 0.025 |
| | | $PM_{2.5}$ | 0.011 | 0.015 |
| | | $PM_{10}$ | 0.022 | 0.045 |
| | | CO | absent | 4.0 |
| | | $SO_2$ | absent | 0.04 |
| 11. | Jarqoq WDU, point 2 | $NO_2$ | 0.57 | 0.025 |
| | | $PM_{2.5}$ | 0.018 | 0.015 |

| No. | Monitoring site | Air pollutant | Monitored concentration (mg/m$^3$) | Applicable standard* (mg/m$^3$) |
|---|---|---|---|---|
| 12 | Kindergarten no.5, Jarqoq settlement | $PM_{10}$ | 0.021 | 0.045 |
| | | CO | 3.49 | 4.0 |
| | | $SO_2$ | absent | 0.04 |
| | | $NO_2$ | **1.34** | 0.025 |
| | | $PM_{2.5}$ | 0.012 | 0.015 |
| | | $PM_{10}$ | 0.015 | 0.045 |

PM = particulate matter; CO = carbon monoxide; ozone = $O_3$; nitrogen dioxide = $NO_2$; $SO_2$ = sulfur dioxide; WHO = World Health Organization; *WHO Global Air Quality Guidelines

As can be seen from Table 16, nitrogen dioxide exceeds the national and international standards at all monitoring points and PM2.5 exceeds international standard at one point in the village of Buzochi. The nitrogen dioxide emission source was not identified by the Bukhara Province Public Health and Wellbeing Service, but most likely it is the BNPZ emissions, since an increased nitrogen dioxide is registered in three subproject settlements.

### 15.1.8. Acoustic environment

Noise is among the top environmental risks, having negative impacts on human health and well-being. Schools and hospitals are determined as the most sensitive receptors:

- Noise in a classroom is not conducive to learning and interferes with auditory communication, adversely affecting speech perception and recognition.
- Hospitals are high-stress environments. A noisy environment in a hospital affects complex tasks, reduces concentration, and causes anxiety, high blood pressure, increased heart rate, and heart disease due to the inability to relax, fall asleep or relieve stress.

There are no hospitals in the subproject area. However, there are seven schools in the three subproject settlements (Figure 34, Figure 35, and Figure 36):

- Public school no.4 and kindergarten no.7 in Buzochi settlement
- Public school no.8 and kindergarten (public kindergarten no.8) in Navbahor settlement
- Public school no.5 in Jarqoq settlement.

Considering that the schools are noise sensitive receptors (NSRs), it was decided to measure the distances from the subproject sites (WDUs) to the schools (Table 17), and to measure the current level of noise impact in the subproject area.

Table 17: Distance between NSRs and WDUs

| No. | NSR | Distance to WDU, km |
|---|---|---|
| 1. | Public school no.4, Buzochi settlement | 0.34 |
| 2. | Kindergarten no.7, Buzochi settlement | 0.65 |

| No. | NSR | Distance to WDU, km |
|---|---|---|
| 3. | Public school no.8, Navbahor settlement | 0.65 |
| 4. | Public kindergarten no.8, Navbahor settlement | 0.47 |
| 5. | “Qaldirgoch” Kindergarten, Navbahor settlement | 0.58 |
| 6. | Public school no.5, Jarqoq settlement | 0.47 |

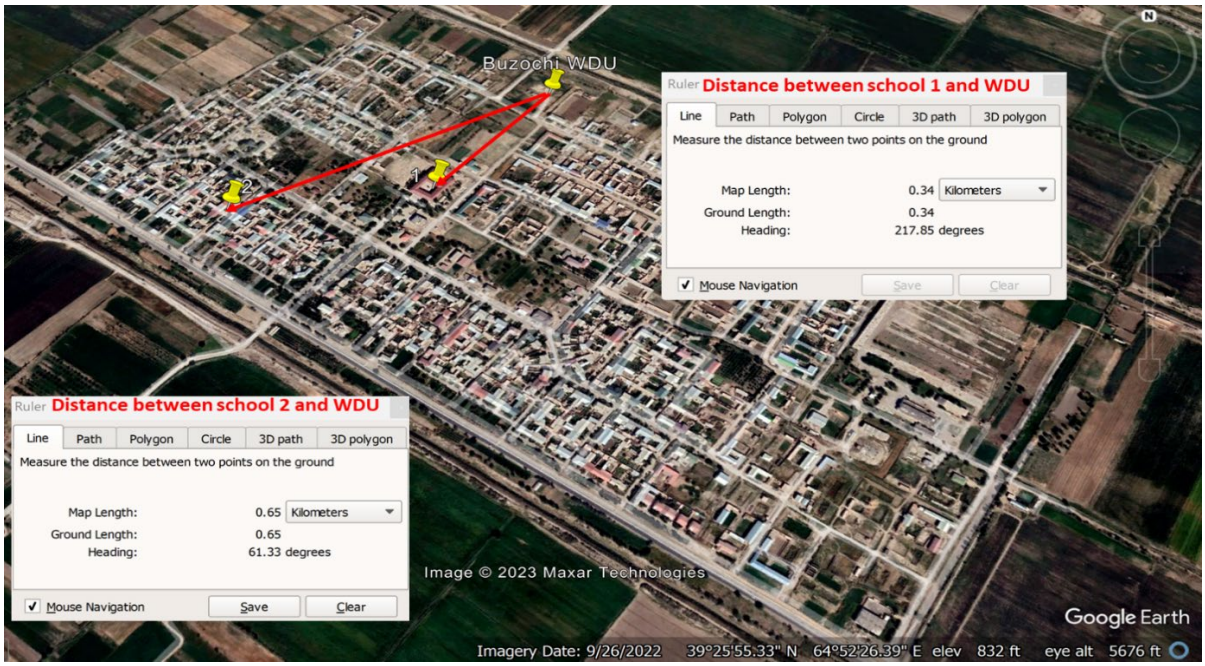



Figure 34: Schools mapping in Buzochi settlement
1 – Public school, 2 – Kindergarten (Source: Google earth)

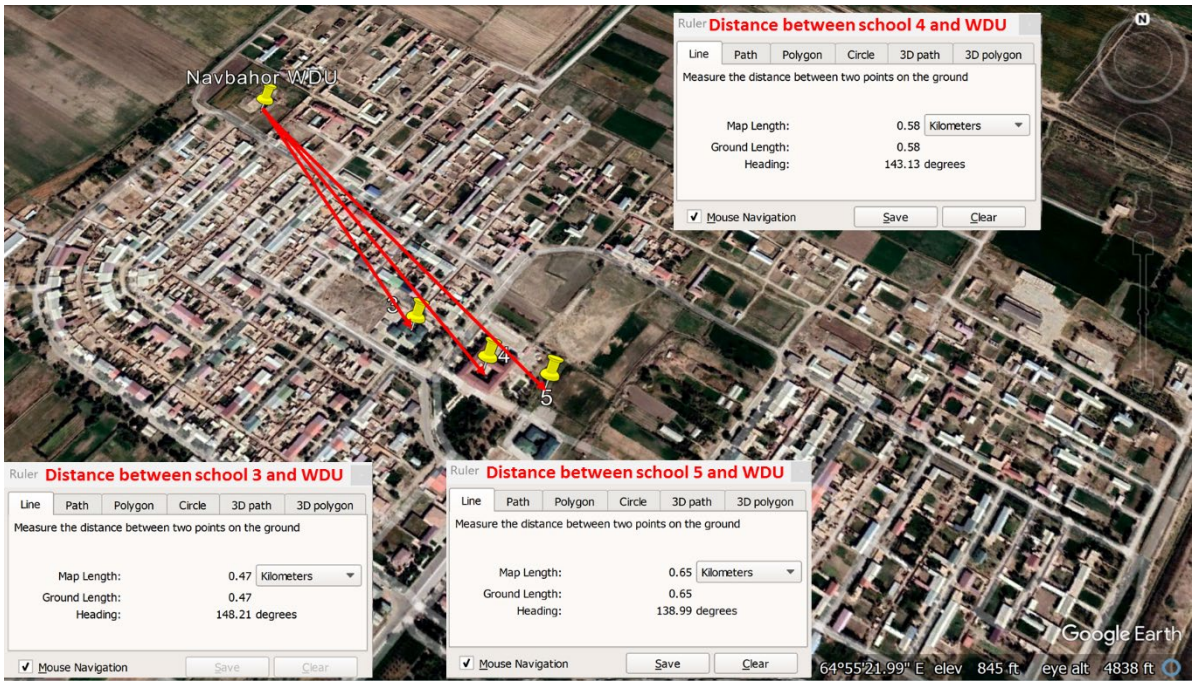



Figure 35: Schools mapping in Navbahor settlement
3 and 4 – kindergartens, 5 – public school (Source: Google earth)

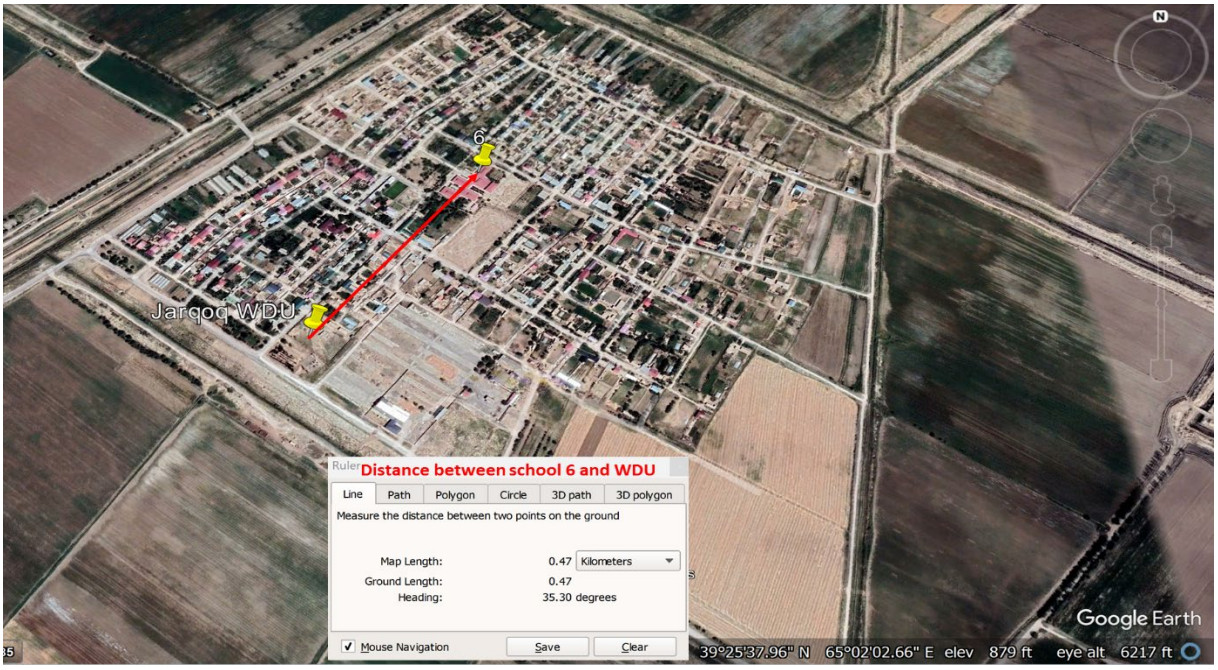



Figure 36: Schools mapping in Jarqoq settlement
6 – Public school in Jarqoq village (Source: Google earth)

The subproject sites (i.e. WDUs) are inside the settlements. Figure 37 provides overview of the settlements area (red line) that can be affected by noise produced during the subproject activities. The average distance between WDUs' wall and the nearest households is about 20 m.

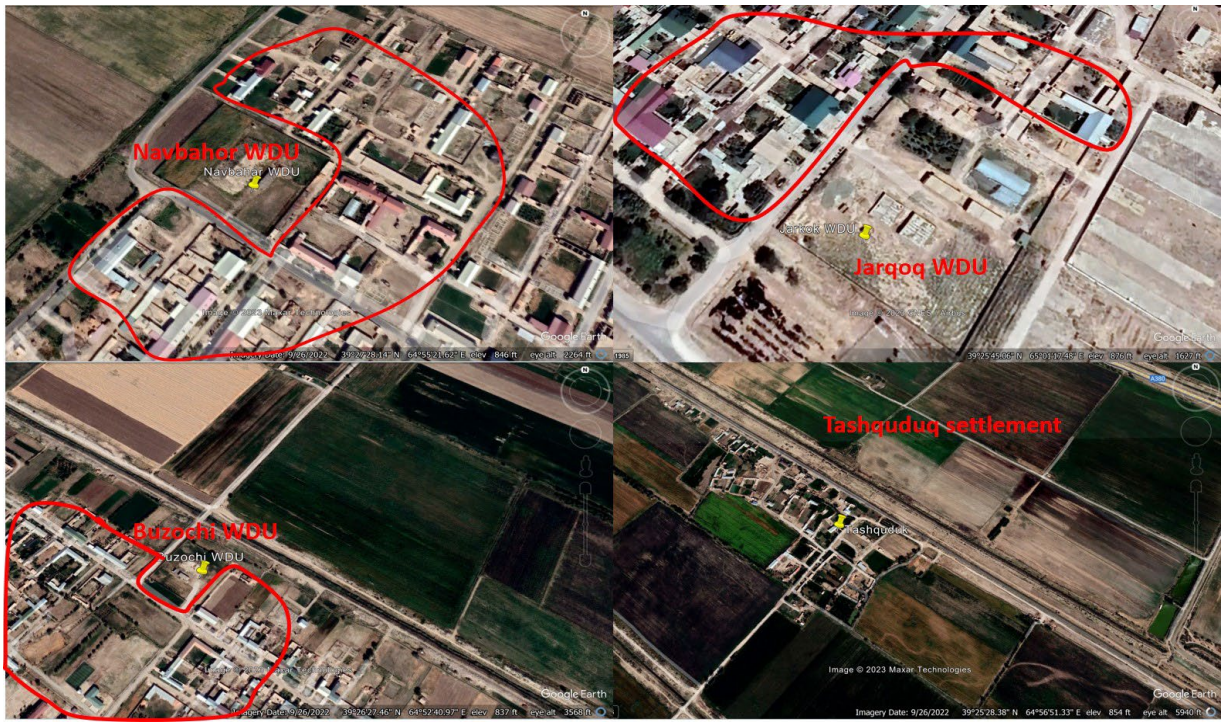



Figure 37: Proximity of the subproject sites to the households
(Source: Google earth)

The Public Health and Wellbeing Service of Bukhara Province was appointed to determine the existing acoustic environment at the school territory and some selected points inside the Buzochi, Navbahor, and Jarqoq settlements. Existing acoustic environment at the subproject sites and surrounding settlements were measured to compare the current noise level with the requirements of the applicable national legislation and the WHO (Section 3.3.2.) and to keep the test results as baseline data for the monitoring during the subproject activities and determine further appropriate noise control measures that need to be put in place.

Noise level measurements were performed on April 19, 2023 in the water stations and inside the settlements. All the locations of sample collection and measurement results are shown in Table 17. The measurements show that the time-weighted average value of the sound monitored inside the subproject-influenced area exceed the applicable standard for both daytime in Navbahor settlement and nighttime in Buzochi settlement.

Table 18: Acoustic environment test results

| No. | Monitoring site | Average noise level (LAeq) | | Applicable standard | |
|---|---|---|---|---|---|
| | | daytime | night | daytime | night |
| 1. | Public school no.4, Buzochi settlement | 30 | **36** | 35 dB* | --- |
| 2. | Kindergarten no.7, Buzochi settlement | 32 | **36** | 35 dB* | --- |
| 3. | Buzochi WDU point 1 | 33 | 35 | 55 dB** | 45 dB** |
| 4. | Buzochi WDU point 2 | 30 | 34 | 55 dB** | 45 dB** |
| 5. | Public school no.3, Navbahor settlement | **36** | **36** | 35 dB* | --- |
| 6. | Public kindergarten no.8, Navbahor settlement | **37** | 34 | 35 dB* | --- |
| 7. | Navbahor WDU point 1 | 34 | 34 | 55 dB** | 45 dB** |
| 8. | Navbahor WDU point 2 | 36 | 34 | 55 dB** | 45 dB** |
| 9. | Public school no.5, Jarqoq settlement | 28 | 34 | 35 dB* | --- |
| 10. | Public kindergarten no.9, Jarqoq settlement | 28 | 33 | 35 dB* | --- |
| 11. | Jarqoq WDU point 1 | 32 | 34 | 55 dB** | 45 dB** |
| 12. | Jarqoq WDU point 2 | 32 | 35 | 55 dB** | 45 dB** |

LAeq = Equivalent Continuous Sound Pressure Level in decibels, known as the time-average sound level; WDU = water distribution unit/station; *Section 4.2. Specific Effects, Guidelines for community noise, World Health Organization52;
**Uzbek Public Health Regulation No. 0267-09, Sanitary standards on permissible noise in residential and public53

52 https://apps.who.int/iris/handle/10665/66217

53 https://lex.uz/acts/1765725

## 15.2. Biological Environment

### 15.2.1. Flora

**Terrestrial Flora**

Bukhara province occupies 4,193,705 ha, whereas more than half of the territory is desert, extending to the Turan lowland and Kyzylkum desert. Sandy desert landscapes with flat, hilly, hilly-cellular, hilly-ridge, ridge-cellular, ridge, dune sands, and gypsum deserts are widespread in the subproject and project areas. Such ecosystems have psammophilous tree-shrub, semi-shrub, and herbaceous vegetation[54]:

- Hilly and ridged sands are dominated by the growth of *white saxaul* (*Haloxylon persicum*), various species of *juzgun* (*Calligonum aphyllum, C. arborescens, C. caput-medusae, C. eriopodum, C. leucocladum, C. macrocarpum, and C. microcarpum), sand acacia (Ammodendronconollyi*), Salsola richteri, *Ephedra strobilacea, astragalus of the Ammodendron section (Astragalus unifoliolatus, A. villosissimus).*
- Flat, undulating and small-hilly sandy plains have semi-shrub vegetation dominated by *perennial saltworts* (*Salsola arbuscula, S. arbusculiformis, and S. orientalis*), *partec (Convolvulus hamadae)* and *spreading sagebrush (Artemisia diffusa)*.
- The sandy desert is covered by *swollen sedge* or *ilak (Carex physodes), aristida (Stipagrostis karelinii, S. pennata), bulbous bluegrass (Poa bulbosa),* and various *dicotyledonous ephemera*.
- The vegetation of the gypsum desert is dominated by associations of *Sagebrush and Sagebrush Turanian* on gray-brown skeletal gypsum-bearing soils, and *forb-partheca and forb-syngraine associations* on aeolian sandy deposits.

Moreover, *solonchaks communities of halophilic vegetation (Aeluropus litoralis, Halimocnemum strobilaceum, Salicornia europaea, Halostachys caspica, Kalidium caspium, Limonium suffriticosum, Lycium ruthenicum, and Aeluropus littoralis)* occupy a reasonably significant area in the Bukhara province. This vegetation is confined to numerous depressions of erosion-karst origin formed due to the dissolution and subsidence of salt-bearing rocks and closely spaced groundwater.

The subproject area belongs to the Karshi-Karnabchul botanical-geographical region, which includes the Sundukli sands and the gravel and clay Karnabchul desert. The subproject area is known for sandy, gravel, and clay desert landscapes with salt marshes, small remnant hills, outcrops of variegated rocks, and areas of irrigated land. The soil is composed mainly of semi-fixed and fixed sands, gypsum-bearing gray-brown soils, and, in places, light-gray soils. Most of this area has degraded vegetation due to intensive grazing, as well as desertification and increased salinization of soil and groundwater as consequences of climate change. Some ecosystems have been preserved only near Lake Dengizkul, the state reserve. Another protected

54 Geographic Atlas of Uzbekistan, 2012

territory in the subproject area is the "Jeyran" nursery ("Jeyran" Ecocenter), established in 1976 with an area of 16,522 ha.

Twenty-five plant species of the Bukhara province are listed in the Red Book of Uzbekistan[55], whereas 14 species are Uzbekistan's national endemics. Fifteen rare flora species grow on the remnant low mountains, and the remaining species are distributed on the gypsum, sand, and solonchaks plains. Table 18 specifies the particular location of the flora listed in the Red Book.

Table 19: Bukhara province plant species listed in the Red Book[56]

| No. | Plant species | Geographic habitat in the Bukhara Province |
|---|---|---|
| 1 | Acanthophyllum cyrtostegium (Caryophyllaceae) | Southern slopes and foothill plains of Kuldzhuktau |
| 2 | Astragalus adylovii (Fabaceae) | Kuldzhuktau (on the border with Navoi Province) |
| 3 | Calligonum matteianum (Polygonaceae) | Sundukli sands (surroundings of Dengizkul Lake) |
| 4 | Calligonum molle (Polygonaceae) | Sundukli sands (surroundings of Dengizkul Lake) |
| 5 | Calligonum paletzkianum (Polygonaceae) | Sundukli sands (surroundings of Dengizkul Lake) |
| 6 | Calligonum zakirovii (Polygonaceae) | Southern plumes and piedmont plains of Kuldzhuktau |
| 7 | Climacoptera amblyostegia | Lower Zarafshan River (salt marshes) |
| 8 | Climacoptera merkulowiczii и (Chenopodiaceae) | Lower Zarafshan River (surroundings of Kuyumazar) |
| 9 | Eremosparton flaccidum (Fabaceae) | Southwestern Kyzylkum, Kyzylkum Reserve |
| 10 | Eremostachys eriolarynx (Lamiaceae) | Southern foothill plains of Kokchatau |
| 11 | Ferula kyzylkumica (Apiaceae) | Kuldzhuktau |
| 12 | Iris hippolyti (Iridaceae) | Kokchatau |
| 13 | Jurinea psammophila Iljin (Asteraceae) | Southern plumes of Kuldzhuktau |
| 14 | Lagochilus inebrians (Lamiaceae) | Remnant mountains of Kyzylkum |
| 15 | Lagochilus vvedenskyi (Lamiaceae) | Kuldzhuktau |
| 16 | Lepidium subcordatum (Brassicaceae) | Kuldzhuktau |
| 17 | Oligochaeta vvedenskyi (Asteraceae) | Southwestern Kyzylkum (surroundings of Karakul and Lake Zamon Bobo), Karnabchul |
| 18 | Onobrychis tavernierifolia (Fabaceae) | Southern plumes of Kuldzhuktau |
| 19 | Phlomoides aralensis (Lamiaceae) | South-Western Kyzylkum (Southeastern tip of Kuldzhuktau, surroundings of Lake Tudakul)) |

55 Red Book of Uzbekistan, https://botany.uz/ru/structure/#, http://zoology.uz/ru/aboutus/

56 Cadaster of flora of Uzbekistan: Bukhara region. Institute of Botany of the Academy of Sciences of Uzbekistan.

| No. | Plant species | Geographic habitat in the Bukhara Province |
|---|---|---|
| 20 | Phlomoides transoxana (Lamiaceae) | Southwestern Kyzylkum |
| 21 | Silene tomentella (Caryophyllaceae) | Kuldzhuktau |
| 22 | Stipa aktauensis (Poaceae) | Kuldzhuktau |
| 23 | Tulipa korolkowii (Liliaceae) | Kokchatau and the area between Shafirkan and Kyzylkum desert station |
| 24 | Tulipa lehmanniana (Liliaceae) | Southwestern Kyzylkum (including remnants), Karnabchul |
| 25 | Tulipa micheliana (Liliaceae) | Kokchatau |

**Agricultural area**

Agricultural area habitat type constitutes 90% of the subproject area. The range of vegetation mostly covers grain and cotton and fewer vegetables, which are more season specific. Photographs of some plant species found in this habitat type are shown in the Appendix 9 - Appendix 11.

**Subproject sites' flora**

As can be seen from Table 10, none of the plants listed in the Red Book grow in the subproject sites (Buzochi WDU, Navbahor WDU, and Jarqoq WDU). This was confirmed during field visits to the subproject sites and settlements (Appendix 9, Appendix 10, and Appendix 11). Even so, the possible habitat of the Red List threatened plant species should be subject to vegetation monitoring at the subproject sites before any excavation or earthworks (e.g., laying pipes along roads to connect WDUs with the settlements' network).

All three water stations (Buzochi WDU, Navbahor WDU, and Jarqoq WDU) have not been in operation since their construction (some more than twenty years ago), their lands have very sparse natural vegetation, as the local population widely uses the territories for growing crops, vegetables, and fruits. The crops grown at the subproject sites are season specific. There are about 40 apricot trees, 20 apple trees, two Siberian/Asiatic elms (*Ulmus pumila*), and one mulberry tree (*Morus Alba L.*) inside the Buzochi WDU (Appendix 9). The fruit trees (apple and apricot) were planted by locals, while elms and mulberry are wild trees. The uncultivated area of Buzochi WDU is covered with camelthorn (*Alhagi*); common reeds (*Phragmites communis*) grow on the outskirts of the water station territory.

The proposed engineering design avoids or minimizes the displacement of existing trees. Figure 33 shows two drawings where existing trees are highlighted in red: the current situation of the subproject site is a drawing on the left, and the proposed design of the Buzochi WDU is a drawing on the right. The drawing (Figure 38) shows that more than 95% of the trees will remain in their places. In December 2022, the community was informed about upcoming engineering surveys and the following construction work. In response, the locals moved out all their belongings and left trees for the water utility.

Figure 38: Buzochi WDU drawings: As Is and To Be
(Source: Karaulbazar district engineering design, Tumas-Seureca Consortium)

The subproject design provides a pipe from the Buzochi water station to the Buzochi intra-settlement and Tashquduq water networks. Following engineering design, pipe laying is done along the roads. Due to the desert climate, vegetation along the roads is sparse or non-existent at all. The subproject's impact on the vegetation along the roads is not expected during pipe laying.

The wild vegetation in Navbahor WDU is presented by camelthorn (*Alhagi*), typical for the desert ecosystem (Appendix 10). The proposed engineering design avoids the replacement of pines, as shown in Figure 39. Despite the gates and fences, the local population widely used the water utility's land for agricultural activities. However, in December 2022, the community was informed about upcoming engineering surveys and the following construction work. In response, the farmers moved out their belongings to a new place. The subproject activities envisage no crop damage as farmers did not plant crops on WDU land.

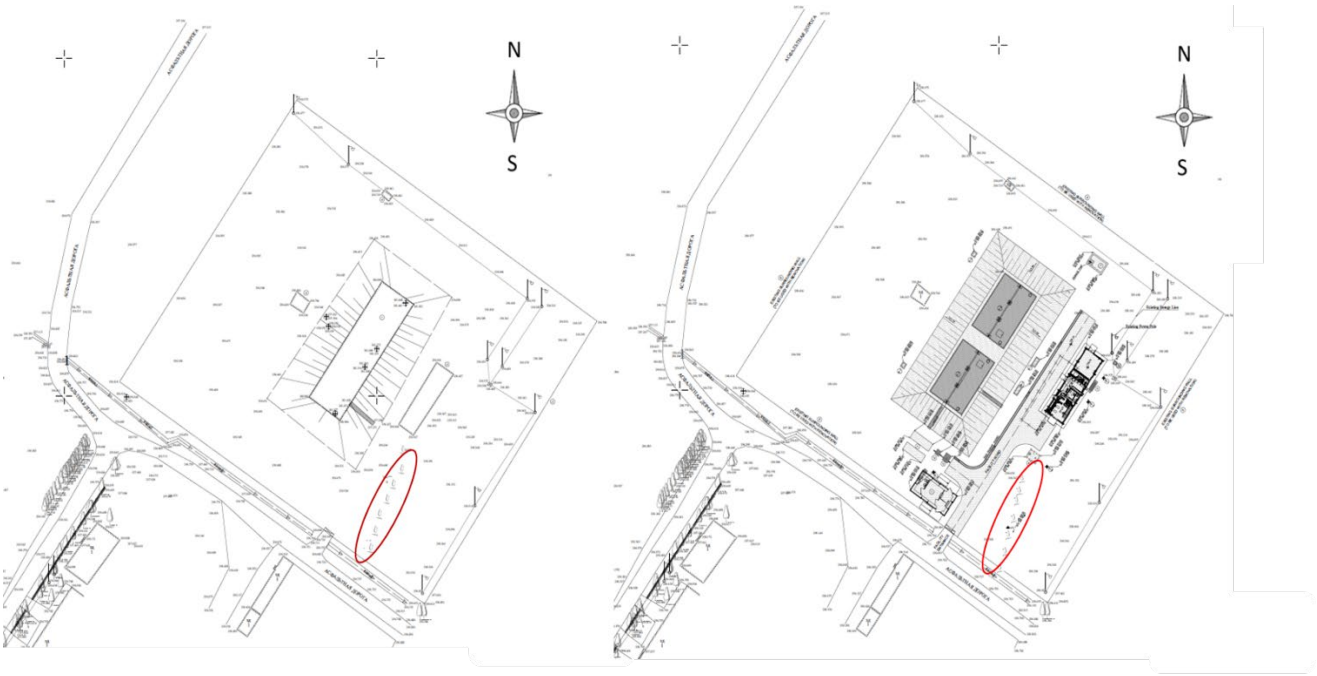



Figure 39: Navbahor WDU drawings: As Is and To Be
(Source: Karaulbazar district engineering design, Tumas-Seureca Consortium)

The subproject design provides a pipe from the Navbahor water station to the Navbahor intra-settlement water network. Following engineering design, pipe laying is along the main road. Vegetation along the road is sparse, so the subproject's impact on the vegetation along the road is not expected during pipe laying.

Jarqoq WDU has almost no natural vegetation except for outskirt areas covered by rare camelthorn (*Alhagi*). In the early 2000s, a family moved in illegally into the pumping station building and have lived on the Jarqoq WDU ever since. The family cleared the land of natural vegetation, planted about 57 trees, vineyard, and made two large greenhouses and a small hand-made greenhouse for greenery and, perhaps, radish (**Appendix 11**). However, the household owner did not allow entrance inside the greenhouses nor describe what she grows in the greenhouses; she only mentioned that the last winter led to frost damage to plants. As shown in Figure 40, no trees replacement is foreseen by the subproject design in the Jarqoq WDU.

Most of the subproject activities will take place inside the WDU lands. However, some works will be carried out outside the sites, including laying connection pipes between WDUs and water networks, transporting construction materials and equipment, and waste collection and disposal. Disturbance of the flora habitat area during the subproject activities can increase vegetation destruction risk and the spread of invasive flora species, along with colonization of the disturbed areas by natural dispersion, such as by being carried on the bodies of birds and other animals and by winds. About 20 trees of elms and pines were noted on one outer side of the Jarqoq WDU

(Appendix 11). The subproject design is provided for establishing a tree belt around the WDU to reduce operational noise and improve air quality in the settlement.

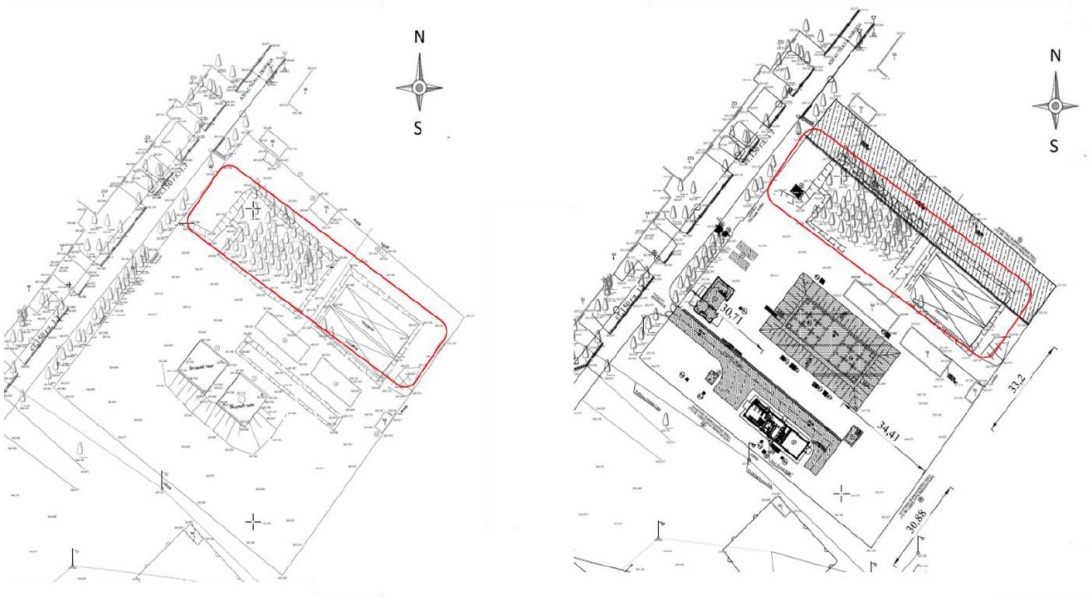



Figure 40: Jarqoq WDU drawings: As Is and To Be
(Source: Karaulbazar district engineering design, Tumas-Seureca Consortium)

### 15.2.2. Fauna

**Protective Area**

There are some state reserves, nurseries, and lakes in the Bukhara province (Appendix 12), of which Jeyran Ecocenter and Lake Khadicha are in the subproject area (Figure 41):

**(1) Dengizkul Ornithological Reserve**

Lake Dengizkul has been mentioned as Bakhr ul-Bukhoro since the middle ages. The total area of Dengizkul is more than 40,000 ha. The lake is salty. Although the lake has no permanent shoreline, its wetlands provide essential habitat for flora and fauna, resulting in a state reserve's establishment. In 2001, Lake Dengizkul was included in the Ramsar Convention on Wetlands due to the habitat of pelicans, small cormorants, spoonbills, white-headed ducks (*Oxyura Leucocephala*), and other waterfowl. Dengizkul Ornithological Reserve was established in 1973. Over 40% of all waterfowl wintering in Uzbekistan is observed on Lake Dengizkul. Among them, 32 species were included in the National Red Book and 19 in the IUCN Red List. Lake Dengizkul is about 65 km away from the subproject area. Therefore, there will be no impact of the subproject on the reserve.

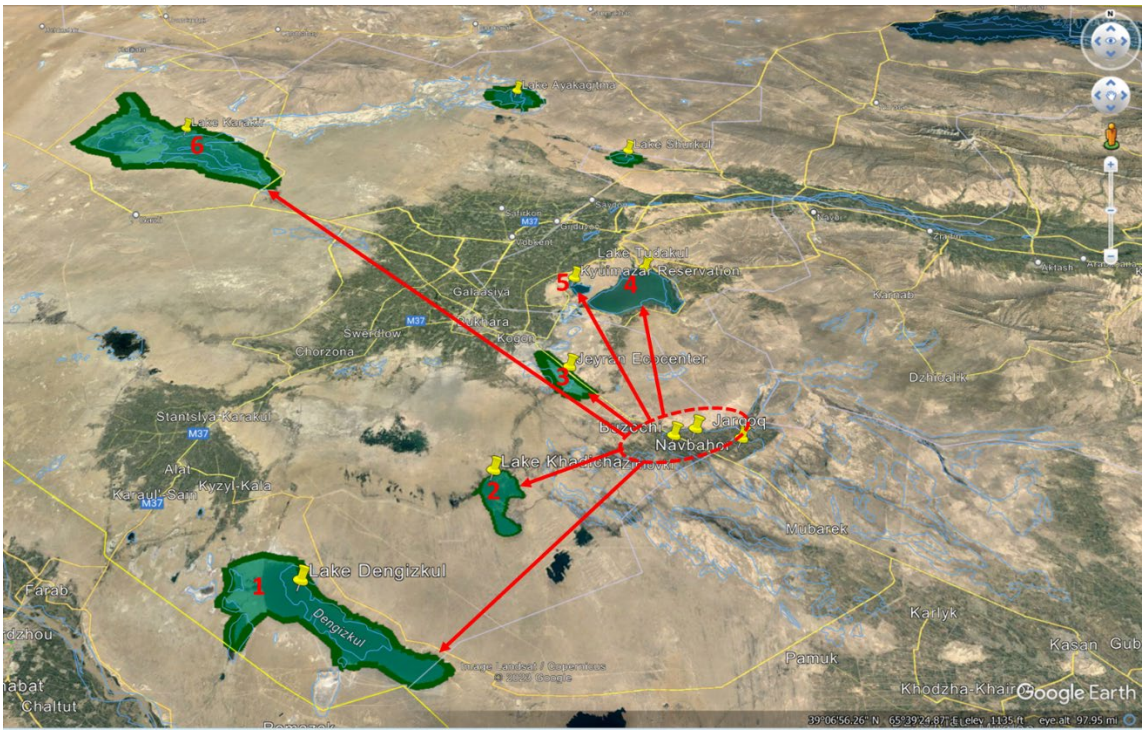



Figure 41: Map of lakes and gazelle nursery in Bukhara Province
1 – Lake Dengizkul, 2 – Lake Khadicha, 3 – Jeyran Ecocenter, 4 – Lake Tudakul, 5 – Kuyumazar Reservation, 6 – Lake Karakir
(Source: Google earth)

### (2) Khadicha State Reserve

The reserve was established on Lake Khadicha in 1980 in the Karaulbazar District of Bukhara Province. The lake was formed due to the flooding of the Kashkadarya River into the natural depression. The lake is about 100 m from the right bank of the Amu-Bukhara Canal. The total lake area is 12,300 ha, with about 18 km length, 8 km width, and a maximum depth of 10.8 m. Lake Khadija has about 63 species of phytoplankton. Dominant species include diatoms (*Bacillariophyta*), blue-green algae (*Cyanophyta*), green algae (*Chlorophyta*), and euglena algae (*Euglenophyta*). The lake is 26-27 km away from the Buzochi settlement, the nearest point to the lake, so there will be no impact of the subproject on the lake and its surroundings.

### (3) Jeyran Ecocenter

Jeyran Ecocenter is in the Karaulbazar District of Bukhara Province. The nursery was established in 1976 with 38 gazelles (*Gazella subgutturosa*), and now the population has about 800 gazelles. The nursery consists of two areas where the main part of 5,145 ha is fenced for ungulates breeding, and the second part, three times larger than the first one, is not fenced and is used for free grazing. The nursery animals include kulans, Przewalski's horses, Bukhara mountain sheep, and Markhor goats. Site visits to the sanctuary revealed major salinization and desertification due to climate change and the impact of nearby oil refinery emissions. Despite being a vital part of the regional economy, the petroleum refinery is a significant source of pollutants in the sanctuary area. These hazardous and toxic air pollutants are BTEX compounds (benzene, toluene, ethylbenzene, and xylene), particulate matter (PM), nitrogen oxides ($NO_x$), carbon monoxide

(CO), hydrogen sulfide ($H_2S$), and sulfur dioxide ($SO_2$). Research states that petrochemical industry emissions contribute to surface $SO_2$, $NO_2$, and $PM_{2.5}$ concentrations within 9 km. The distance between BNPZ and Jeyran Ecocenter is about 7 km (Figure 42).

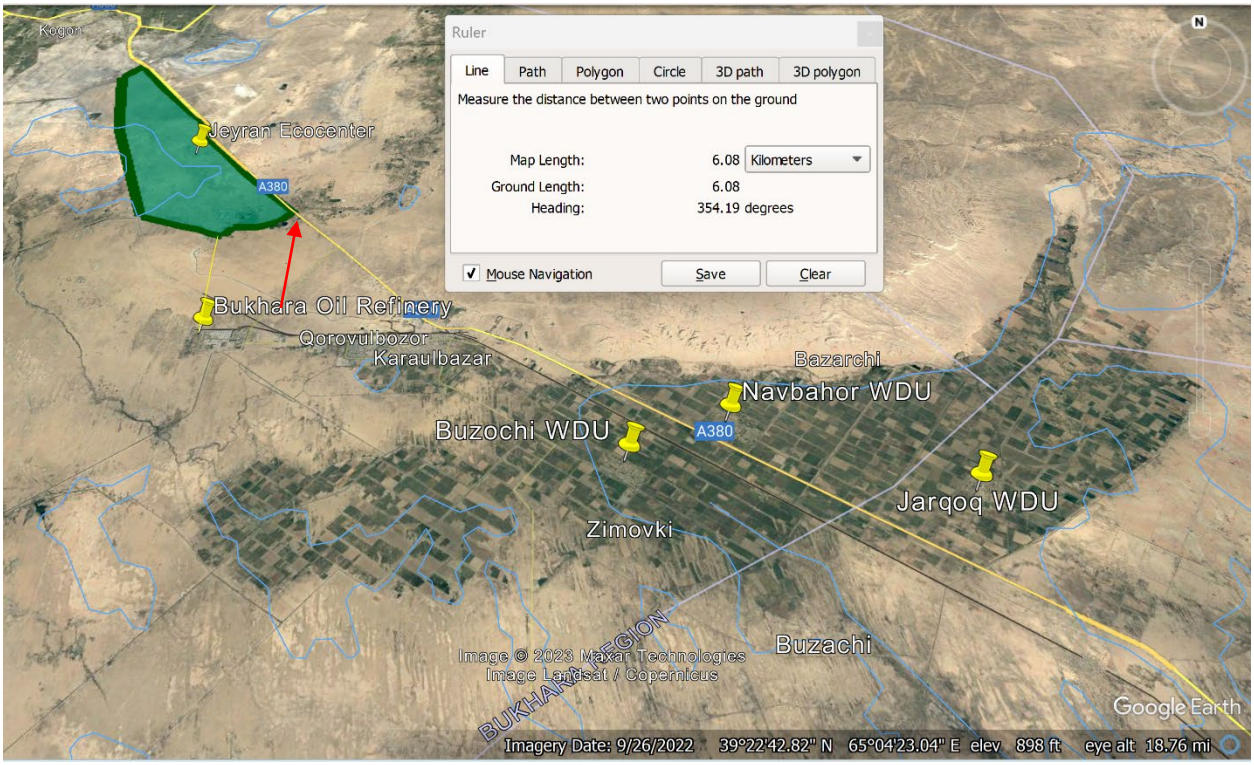



Figure 42: Distance between Jeyran Ecocenter and BNPZ
(Source: Google earth)

The existing salinization and land degradation in the nursery are consequences of climate change and BNPZ emissions (Appendix 12). The visit to Jeyran Ecocenter revealed that despite the 6-7 km between the nursery and BNPZ, the soil is covered with a thick layer of dust and a whitish coating, which are salts. Soil contamination by toxic substances leads to the alkalization of the soil profile and sparse vegetation needed for nursery inhabitants.

Although the nursery is in the subproject district (Figure 43), the civil works will be carried out inside the water stations and settlements, so the subproject will not impact the nursery habitats. However, to prevent the project's contribution from harming the Jeyran Ecocenter by using petroleum materials from the Bukhara Oil Refinery, the use of petroleum and other products produced by the Bukhara Oil Refinery should be prohibited within the project.

Corresponding measures should be carried out to protect the flora and fauna of the sanctuary; the project must provide for not using the products manufactured by this plant.

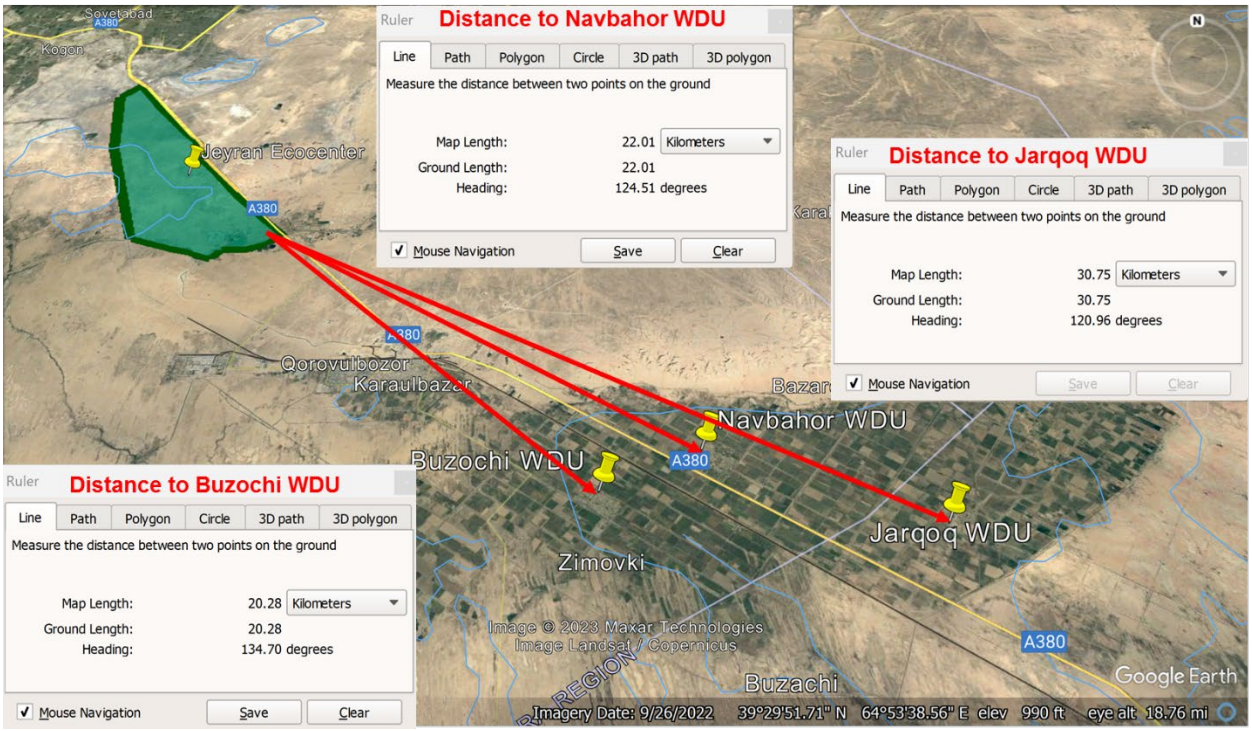



Figure 43: Distance from Jeyran Ecocenter to Subproject WDUs
(Source: Google earth)

The cotton gin is seasonable business and does not impact the nursery as it is about 20 km away.

### (4) Lake Tudakul

Lake Tudakul is a natural desert depression filled with floodwater from the Zarafshan River and fed by the Amu-Bukhara canal and drainage waters from irrigation. The lake was formed in 1952 with an average depth of 4.8 m. The lake water is salty. It has large and shallow wetlands of 32,000 ha, which provide a wintering area for many waterfowl. The wetlands are home to a wide range of birds, such as white-tailed eagles, black-headed gulls, swans, pelicans, long-tailed eagles, and other species. And the lake water is a habitat for carp, catfish, bream, etc. The lake is 35 km away from the subproject area, so there will be no impact of the subproject on the lake and its wetlands.

### (5) Karakir State Reserve

Karakir State Reserve was established in 1992 on Lake Karakir, located northwest of Bukhara province. The lake has more than 26,000 ha of area for various fish species, including carp, asp, silver carp, trophy zander, snakehead, asp, catfish, and others. The lake is about 120 km away from the subproject area, so there will be no impact of the subproject on the lake and its surroundings.

### (6) Kuyumazar Reservoir

The Kuyumazar reservoir is included in the list of critical ornithological areas and is attractive for waterfowl, mainly during seasonal migration and winter. Just like Tudakul Lake, the Kuyumazar Reservoir is used by waterfowl for wintering. The average annual number of migratory birds on

both lakes exceeds 40 thousand. Both lakes, located 1 km apart, support and stop over 229 bird species, including the endangered white-headed duck (*Oxyura leucocephala*). The lake is 36-37 km away from the subproject area, so there will be no impact of the subproject on the lake and its wetlands.

**Subproject Sites**

The subproject WDUs and settlements have some species typical of desert ecosystems and which are adapted to the settlement conditions and comprise ground squirrels (*Citellus*), gerbils, jerboas, bats, desert warblers, saxaul jays, owls, snakes (*Coluber*), some lizards, and others.

The local population is engaged in livestock rearing. Most of the animals owned are poultry and cattle. Livestock noted in the villages includes cattle, goats, domestic sheep, and chickens. Livestock owners engage herders to rear goats, sheep, and cows, whereas poultry is raised at home. More than 95% of households keep livestock for self-consumption, and less than 5% for commercial and self-consumption.

As mentioned in previous sections, the local population widely used the lands of the WDUs for agricultural activities (Appendix 13). During the visits in December 2022, livestock and chickens were found in the WDU territories. The local population was informed of upcoming subproject activities.

## 15.3. Socioeconomic Conditions

### 15.3.1. Socio-economic data

**Bukhara Province**

According to the Statistics Committee of Uzbekistan, the Bukhara province has an area of 40,220 thousand sq. km as of 2022. The region comprises 11 administrative districts, 11 towns, 68 urban townships, and 1,473 rural settlements. The capital of the province is Bukhara.

The main economic activities of the Bukhara province are agriculture, oil and gas, food, and textile industries. The share of the Bukhara region in the national GDP is 5.0%. As of Q2 2022, the volume of GNP per capita amounted to 9,818.7 thousand Uzbek sums. The gross value-added volume created in all sectors of the Bukhara region's economy amounted to 95.0% of GDP, and net taxes on products were 5.0%. The share of industry in GNI by economic sectors, including construction, is 28.8% (in 2021 – 26.9%), the agriculture share is 37.3% (in 2021 – 39.9%), and the share of services is 33.9% (in 2021 – 33.2%)57. As of 2022, the GRP of the Bukhara Province

57 Center for economic research and reforms, Uzbekistan, https://www.cer.uz/ru/news/news/analysis-of-macro-economic-indicators-of-bukhara-region-for-january-june-2022

was amounted to UZS 22,975.6 thousand per capita and increased by 2.8% compared to 202158. Overall GRP of the Bukhara Province as monetary measure of the market value of all final goods and services produced in Bukhara Province as of June 2023 was amounted to UZS22,625.5 billion59. Compared to 2021 data, the Bukhara Province's economic indicators increased as of March 2022 as following: GNP – 104.0%, industry – 103.3%, agriculture and fishery – 103.1%, trade – 103.5%, services – 109.9%, investment – 56.7, and construction – 103.1%60. **Table 13** provides some socioeconomic baseline data for the project area as of 2021-2022.

Table 20: Bukhara province socioeconomic baseline data (2021-2022)

| No. | Indicator | 2021 | 2022 |
|---|---|---|---|
| 1. | Total population | 1154.1 | 1157.0 |
| 2. | Economically active population* | 862.2 | 860.6 |
| 3. | Women employed in the economy**, thousand people | 333,700 | n/a |
| 4. | Men employed in the economy**, thousand people | 443,700 | n/a |
| 5. | Employment rate,% | 67.2 | 67.2 |
| 6. | Unemployed women, thousand people | 50.5 | n/a |
| 7. | Unemployed men, thousand people | 34.3 | n/a |
| 8. | Women unemployment rate, % | 13.2 | n/a |
| 9. | Men unemployment rate, % | 7.2 | n/a |
| 10. | Total unemployment rate, % | 9.8 | 8.8 |
| 11. | Women - individual entrepreneurs registered with the State Tax Authority, persons | 6,687 | n/a |
| 12. | Men - individual entrepreneurs registered with the State Tax Authority, persons | 8,869 | n/a |
| 13. | People receiving pensions and social benefits, per 10,000 population | 1303.6 | 1,367.4 |
| 14 | Average monthly pension assigned to retirees by region, thousand Uzbek sums | 982 | 1,097.9 |
| 15 | Operating enterprises and organizations, excluding farms | 28,233 | 31,160 |

* The economically active population is part of the country's population employed in producing goods and services for a certain period. The economically active population includes employed and unemployed.

** Employed in the economy include persons of both sexes aged 16 and over and younger individuals who: a) performed paid work on a full or part-time basis, as well as other income-generating work independently or from individual citizens, regardless of the timing of receiving direct payment or income for their activities. The following types are not included

58 Uzbekistan Statistics Agency, https://stat.uz/en/press-center/news-of-committee/36268-buxoro-viloyati-bo-yicha-aholi-jon-boshiga-yalpi-hududiy-mahsuloti-hajmining-o-sishi-3

59 Bukhara Region Department of State Statistics Committee of Uzbekistan, https://www.buxstat.uz/uz/rasmiy-statistika/asosiy-iqtisodiy-ko-rsatkichlar

60 Bukhara Region Department of State Statistics Committee of Uzbekistan, https://www.buxstat.uz/uz/, https://stat.uz/ru/ofitsialnaya-statistika/social-protection

in the category "employed in the economy": (a) registered unemployed who have some paid jobs and students who have paid agricultural jobs complying with the educational institution profile; b) temporarily unemployed individuals due to: illness or injury, nursing; annual leave or days off; compensation for overtime work or public holidays; pregnancy, childbirth, and child care leave; training and study leave; c) individuals working for a family business without payment. Source: State Statistics Committee of Uzbekistan61

Republican Statistics Committee publicized information on total resident population of the Bukhara Province being 2,016.6 thousand people as of April 01, 202362.

**Karaulbazar District**

Karaulbazar district is one of the parts of Bukhara province that was established as an administrative unit in 1993. The subproject comprises six settlements (Buzochi, Jarqoq, Navbahor, Nagoratepa, Sardoba, and Tashquduq) and one town, Karaulbazar (Figure 29). The subproject area is located along the A-380 highway, which provides free access to the surrounding settlements, Bukhara, and Kashkadarya province.

The population of the subproject area (Figure 44) is mainly engaged in agriculture, with fields and farms surrounding the subproject villages. The industrial enterprises are represented by oil production, refinery and oil infrastructure engineering, cotton, food, and agricultural processing industries. Leading industrial enterprises are concentrated in Karaulbazar, but Karaulbazar Cotton Gin is about 3 km from the subproject sites.

61 State Statistics Committee of Uzbekistan, https://stat.uz/

62 https://stat.uz/en/press-center/news-of-committee/39087-buxoro-viloyati-doimiy-aholisi-sonining-taqsimlanishi-3

Figure 44: Karaulbazar district area
(Source: Google map)

The offices of public institutions and major private businesses are also located in Karaulbazar. The small and medium businesses of the subproject area are sales firms, shops, insurance, mass media, and other companies. Some of the businesses specified in the open register are presented Table 21.

Table 21: List of organizations operating in the subproject area

| No. | Organization | Address | Services/Product | Type |
|---|---|---|---|---|
| 1. | Karaulbazar District President Office | 22/2 Navoi St., Karaulbazar, 200900, Bukhara region | public services | public |
| 2. | Karaulbazar District Municipality | 1 Buyuk Ipak Yuli, St., Karaulbazar, 200900, Bukhara region | public services | public |
| 3. | Pension Fund of Karaulbazar District | 22/2 Navoi St., Karaulbazar, 200900, Bukhara region | public services | public |
| 4. | Statistic Committee Karaulbazar District Branch | 54 Buyuk Ipak Yuli, St., Karaulbazar, 200900, Bukhara region | public services | public |
| 5. | Bukhoro Pochtasi Karaulbazar Branch | 15 Geologov St., Karaulbazar, 200900, Bukhara region | post office | public |
| 6. | Karaulbazar District Public Health Service | 19 Navoi St., Karaulbazar, 200900, Bukhara region | public health control services | public |
| 7. | Karaulbazar Power Supply Company | 1 Chulkuvar St., Karaulbazar, 200900, Bukhara region | power supply | public |
| 8. | Karaulbazar Branch of the Bukhoro Suv Taminoti | Karaulbazar, 200900, Bukhara region | water supply | public |

| No. | Organization | Address | Services/Product | Type |
|---|---|---|---|---|
| 9. | Bukhara Oil Refinery | 1 Mustakillik St., Karaulbazar, 200900, Bukhara region | oil refinery | PPP |
| 10. | Uzneftgazkuduktamirlash JSC | 40 Mekhnatabad St., Karaulbazar, 200900, Bukhara region | engineering services | public |
| 11. | "Bukhoroneftgazparmalash" JSC | 25 Navoi St., Karaulbazar, 200900, Bukhara region | engineering services | public |
| 12. | Uzpartamponaj JSC | Karaulbazar, 200900, Bukhara region | engineering services | public |
| 13. | Karaulbazar District Economic Court | 125 Naqshbandi St., Karaulbazar, 200900, Bukhara region | court | public |
| 14. | Karaulbazar District Civil Registration Office | 1/4 Mustakillik St., Karaulbazar, 200900, Bukhara region | public services | public |
| 15. | Karaulbazar District Branch of the Telecommunication Company | Geologov St., Karaulbazar, 200900, Bukhara region | telecommunication services | public |
| 16. | Karaulbazar District Criminal Cases Court | 10 Nodira St., Karaulbazar, 200900, Bukhara region | public services | public |
| 17. | Karaulbazar District Police Department | Karaulbazar, 200900, Bukhara region | police | public |
| 18. | Law Office of Zoirov Akmal Narzullaevich | Karaulbazar, 200900, Bukhara region | public services | public |
| 19. | Karaulbazar District Hospital | 84 Nakshbandi St., Karaulbazar, 200900, Bukhara region | health services | public |
| 20. | O'zsanoatqurilish Bank, Karaulbazar Branch | 32 Geologov St., Karaulbazar, 200900, Bukhara region | banking services | PPP |
| 21. | Karaulbazar District Main Railway Station | 12 Hamid Alimjan St., Karaulbazar, 200900, Bukhara region | transport services | public |
| 22. | “Korovulbozor Tongi” Newspaper | 1 Navoi St., Karaulbazar, 200900, Bukhara region | mass media | private |
| 23. | G'ijduvon Baraka Saxovati LLC | Mehnatobod St., Karaulbazar, 200900, Bukhara region | --- | private |
| 24. | “Eco Consalting Servis” LLC | 17 Gijduvani, Karaulbazar, 200900, Bukhara region | consulting services | private |
| 25. | “Baxtiyor Gulnoz” LLC | Chulkuvar St., Karaulbazar, 200900, Bukhara region | --- | private |
| 26. | “Karaulbazar omuhta em sotish birlashmasi” LLC | Karaulbazar, 200900, Bukhara region | agriculture (forage conservation) | private |
| 27. | Alfa Invest LLC | Mehnatobod St., Karaulbazar, 200900, Bukhara region | insurance | private |

| No. | Organization | Address | Services/Product | Type |
|---|---|---|---|---|
| 28. | “Uzinsurance” Karaulbazar District Branch | 1A Bekhzod St., Karaulbazar, 200900, Bukhara region | insurance | private |
| 29. | “Buxoro Agroklaster Chorva” LLC | Karaulbazar, 200900, Bukhara region | agriculture | private |

Source: Yellow Pages of Uzbekistan (https://www.yellowpages.uz/gorod/karaul-bazar), Golden Pages (https://www.goldenpages.uz/city/?Id=196)

Even though the subproject area is small in territory, the Karaulbazar district has several large industries. So, the subproject district is considered a leading industrial area of Bukhara province with related economic benefits and social and environmental consequences. In 2019, the Government of Uzbekistan adopted Regulation No. 74363 on improving labor relationships, which provides for a list of settlements with severe and unfavorable natural and climatic conditions. The regulation stipulates mandatory 20-50% salary supplements and additional vacation days for those living in such areas. The mentioned list comprises four areas from the Bukhara province – the Karaulbazar District, Alat District, Karakul District, and Gazli town. A 50% salary supplement applies to the population living in the Karaulbazar district. Such economic benefits help vulnerable populations, but require increasingly mindful of ways to protect the environment as source of public health stability in the affected areas.

**Subproject Settlements**

The subproject settlements are along the A-380 highway and linked by paved roads. Electricity and communication services are available in all the subproject settlements. Schools and rural medical stations are public in the subproject villages. Shops are present in each village and provide for the day-to-day needs of the local communities. There were one or two shops of basic groceries found in each settlement, mostly belonging to households with transportation facilities in the respective settlement. For major purchases, all subproject populations depend mainly on Karaulbazar town, the hub of economic activity in the subproject district. Hospitals, police stations, markets, and banks are available in Karaulbazar town.

The primary livelihood sources are agriculture, wage labor, and private and government services. A number of households have more than one source of income. Subsistence agriculture, an oil refinery, and a cotton gin significantly contribute to the subproject economy.

### 15.3.2. Demographics

**Bukhara Province**

The general demographic data of Bukhara province is provided in Table 22.

63 Appendix 1 to Regulation No. 743 “On additional measures for regulating the labor relations on the labor market,” 06.09.2019, https://lex.uz/ru/docs/4502808#4505154, https://lex.uz/ru/docs/4502806#5370670

Table 22: General demographic data on Bukhara region

| No. | Indicators | 2021 | 2022 | 2023 |
|---|---|---|---|---|
| 1. | Population size, thousand people | 1,947.1 | 1,976.8 | 2,016.6 |
| 2. | Females, thousand people | 971.9 | 986.4 | 1,002.4 |
| 3. | Males, thousand people | 975.2 | 990.4 | 1,007.3 |
| 4. | Permanent urban population, thousand people | 715.4 | 725.8 | 743.2 |
| 5. | Permanent rural population, thousand people | 1,231.7 | 1,251 | 1,273.5 |
| 6. | Total birth rate, % | 22.0 | 22.6 | n/a |
| 7. | Mortality rate, % | 4.7 | 4.5 | n/a |
| 8. | Population density, the number of inhabitants per 1 sq. km | 48.4 | 49.2 | 50.0 |

Source: State Statistics Committee of Uzbekistan64, Bukhara Regional Department of Statistics Committee65

**Karaulbazar District**

As of 2022, the State Statistics Committee of Uzbekistan ranked the Karaulbazar district among the ten most sparsely populated areas of Uzbekistan66. The Karaulbazar district has a natural area of 2,200 sq. km. Its average population amounted to 19,500 people as of February 2023, with a population density of 8.86 people/km$^2$.

Table 23 provides data on the average population, gender composition, and gender ratio for 2021 per subproject settlement. The most densely populated subproject territories are Karaulbazar town and the Navbahor and Buzochi villages. The least sparsely populated villages are Tashquduq and Sardoba, where the population is 0.83% and 2.05%, respectively, of the district's total population. Urban residents slightly dominate the population of the sub-project area; they make up 57.18% of the total population and live in the city of Karaulbazar. The number of people in the rural subproject area is 42.82%. On average, equal numbers of men and women live in all subproject settlements, including urban and rural areas.

Table 23: Gender data of the subproject population as of 2022

| No. | Settlement | Population | Males | Females | Gender ratio* |
|---|---|---|---|---|---|
| 1. | Karaulbazar | 10,564 | 5,281 | 5,283 | 99.96 |
| 2. | Navbahor | 2,163 | 1,095 | 1,068 | 102.53 |
| 3. | Tashquduq | 153 | 75 | 78 | 96.15 |

64 https://stat.uz/en/official-statistics/demography

65 https://www.buxstat.uz/uz/rasmiy-statistika/demography-2

66 https://stat.uz/ru/press-tsentr/novosti-goskomstata/34277-aholi-soni-eng-kam-bo-lgan-tumanlar-top-o-ntaligi-2

| No. | Settlement | Population | Males | Females | Gender ratio* |
|---|---|---|---|---|---|
| 4. | Nagoratepa | 1,366 | 665 | 701 | 94.86 |
| 5. | Buzochi | 2,300 | 1,131 | 1,169 | 96.75 |
| 6. | Sardoba | 378 | 185 | 193 | 95.85 |
| 7. | Jarqoq | 1,550 | 734 | 816 | 89.95 |
| | | **18,474** | **9,166** | **9,308** | **98.47** |

Source: Bukhara Regional Branch of Statistics Committee, September 2022
*Sex ratio is a number of males per hundred females.

The population by age groups living in the Karaulbazar district in 2022 is shown in Table 24**.** The most prominent group is the 40-49 age group, and the smallest is the 85+ age group. The working-age population (aged 16-60) is 60.91% of the total subproject population, and children comprise 31.13%. The current retirement age for the state pension in Uzbekistan is currently 60 for men and 55 for women, according to the Law of Uzbekistan[67] "On State Pension." So, the subproject area's retirement age (60+) population is 11.7%.

Table 24: Population by age groups in Karaulbazar district, 2022

| No. | Age group | Number of people |
|---|---|---|
| 1. | 0-2 | 1,238 |
| 2. | 3-5 | 1,054 |
| 3. | 6-7 | 649 |
| 4. | 8-15 | 2,384 |
| 5. | 16-17 | 613 |
| 6. | 18-19 | 561 |
| 7. | 20-24 | 1,318 |
| 8. | 25-29 | 1,776 |
| 9. | 30-34 | 1,852 |
| 10. | 35-39 | 1,627 |
| 11. | 40-49 | 2,390 |
| 12. | 50-59 | 1,480 |
| 13. | 60-69 | 1,388 |
| 14. | 70-74 | 385 |
| 15. | 75-79 | 259 |
| 16 | 80-84 | 84 |
| 17. | 85+ | 14 |

Source: State Statistics Committee of Uzbekistan

[67] Article 7, Law of Uzbekistan "On State Pension," https://lex.uz/acts/112312

Between January and June 2023, 206 children were born in Karaulbazar District, with an equal number of boys and girls 103. As given in Table 25, the highest birth rate in the subproject district is observed in Karaulbazar town, while among rural areas, the highest birth rate is in Buzochi village. The overall birth rate of the subproject district is 2.0% as of 2021.

Table 25: Population birth rate in the subproject area as of 2021

| No. | Settlement | Population | Fertility | | | |
|---|---|---|---|---|---|---|
| | | | Males | Females | Total | Birth Rate* |
| 1. | Karaulbazar | 10,564 | 117 | 94 | 211 | 1.9% |
| 2. | Navbahor | 2,163 | 13 | 15 | 28 | 1.2% |
| 3. | Tashquduq | 153 | 3 | 1 | 4 | 2.6% |
| 4. | Nagoratepa | 1,366 | 2 | 16 | 18 | 1.3% |
| 5. | Buzochi | 2,300 | 35 | 28 | 63 | 2.7% |
| 6. | Sardoba | 378 | 6 | 5 | 11 | 2.9% |
| 7. | Jarqoq | 1,550 | 21 | 15 | 36 | 2.3% |
| | | **18,474** | **197** | **174** | **371** | **2.0%** |

Source: Bukhara Regional Branch of Statistic Committee, September 2022

*Birth rate is calculated by dividing the number of live births in a population in a year by the midyear resident population.

As of 2021, the overall mortality rate of the subproject district is 0.38% (Table 26).

Table 26: Population mortality rate in the subproject area as of 2021

| No. | Settlement | Population | Mortality | | | |
|---|---|---|---|---|---|---|
| | | | Males | Females | Total | Mortality rate* |
| 1. | Karaulbazar | 10,564 | 12 | 28 | 40 | 0.38% |
| 2. | Navbahor | 2,163 | 2 | 6 | 8 | 0.37% |
| 3. | Tashquduq | 153 | - | 1 | 1 | 0.65% |
| 4. | Nagoratepa | 1,366 | 1 | 2 | 3 | 0.22% |
| 5. | Buzochi | 2,300 | 6 | 2 | 8 | 0.35% |
| 6. | Sardoba | 378 | 1 | 2 | 3 | 0.79% |
| 7. | Jarqoq | 1,550 | - | 8 | 8 | 0.52% |
| | | **18,474** | **22** | **49** | **71** | **0.38%** |

Source: Bukhara Regional Branch of Statistic Committee, September 2022

*Mortality rate is calculated by dividing the number of deaths in a population in a year by the midyear resident population.

In January-June 2023, 185 people moved in and 120 moved out of Karaulbazar District[68], while in 2022 these indicators were as 262 (moved-in) and 183 (moved-out) people. The migration process has been changed compared with 2021. Some information on population migration in the subproject area as of 2021 is provided in Table 27. The data show that the number of people leaving the subproject area exceeds the number of people arriving in the subproject area. At the same time, the total population is not decreasing but growing: in 2021, the average population was 18,474 people; in 2022, it was 19,072 people; at the end of February, this figure was 19,500 people.

Table 27: Population migration in the subproject area as of 2021

| No. | Settlement | Moved in | | | Moved out | | | Permanent population |
|---|---|---|---|---|---|---|---|---|
| | | Males | Females | Total | Males | Females | Total | |
| 1. | Karaulbazar | 12 | 28 | 40 | 117 | 94 | 211 | 10,564 |
| 2. | Navbahor | 2 | 6 | 8 | 13 | 15 | 28 | 2,163 |
| 3. | Tashquduq | - | 1 | 1 | 3 | 1 | 4 | 153 |
| 4. | Nagoratepa | 1 | 2 | 3 | 2 | 16 | 18 | 1,366 |
| 5. | Buzochi | 6 | 2 | 8 | 35 | 28 | 63 | 2,300 |
| 6. | Sardoba | 1 | 2 | 3 | 6 | 5 | 11 | 378 |
| 7. | Jarqoq | - | 8 | 8 | 21 | 15 | 36 | 1,550 |
| | | **49** | **22** | **71** | **197** | **174** | **371** | **18,474** |

Source: Bukhara Regional Branch of State Statistics Committee of Uzbekistan[69]

### 15.3.3. Local minority population

Karaulbazar district is inhabited by multiple ethnic groups, in which Uzbeks and Tajiks are dominant and account for more than 99% of the total district population. The population of other ethnicities has moved into the subproject area by marriage or job transfer. The survey on minority residents has found no centralized minority population, no traditional estate, and no minority language or culture in the subproject area. Therefore, there is no ethnic minority that triggers ESS3 in the subproject area, and there is no need to prepare an ethnic minority development plan for the subproject area. Moreover, the subproject activities will be carried out inside the territory of water distribution stations owned by the water utility.

### 15.3.4. Education

Each settlement in the subproject area has one public school and at least one kindergarten. There are no higher educational institutions in the subproject area. Educational institutions in the project

[68] https://www.buxstat.uz/uz/rasmiy-statistika/demography-2

[69] https://stat.uz/en/official-statistics/demography

area comprises vocational education and secondary schools. Each subproject settlement has one public school and kindergarten.

### 15.3.5. Access to public services

Access to municipal services in Bukhara province is specified in Table 28.

Table 28: Access to municipal services in Bukhara region

| No. | Indicator | 2021 | 2022 |
|---|---|---|---|
| 1. | Water supply services coverage, % | 50.9 | 55.6 |
| 2. | Wastewater services coverage, % | 27.0 | n/a |
| 3. | Natural gas supply services coverage, % | 62.2 | n/a |
| 4. | Electricity consumption per capita, kWh | 1,759.0 | n/a |

Source: State Statistics Committee of Uzbekistan

**Water and Sanitation**

The existing water supply of the Karaulbazar district is carried out from the Kuyumazar-BNPZ and Kuyumazar-Mubarek water mains. The Kuyumazar-BNPZ pipeline supplies water to Karaulbazar town, and the Kuyumazar-Mubarek pipeline provides water to the district's villages. As mentioned, the government recently repaired all intra-village water supply networks in the subproject district. However, the population suffers from an unsustainable water supply and shortage, leading to the purchase of bottled water and water from tanker trucks, the installation and operation of private water tanks or underground water storage, and private water wells with pumps. In particular, raw water is delivered to the water tank of the Tashquduq settlement by railway train. Each house has a concrete pond with a 4-5 tons capacity with a water meter installed at the entrance to the pond. One ton of water costs UZS50,000.

There is no proper sanitation system in the subproject area. In most cases, the local population uses soak pits for sewage discharge. All the surveyed households have a pit latrine. The current issue of sewage being dumped into the soak pits, both from residential and commercial discharges, is a crucial concern. Sewage penetrates the ground, then into the aquifer (the groundwater depth is 3.0-3.6 m), poisoning the soil and water. The subproject should not contribute to this but contribute to its mitigation. Proper waste disposal procedures should be part of the requirements of the subproject both during the construction and operation phases.

**Solid waste**

Solid waste management is in place in the subproject district. The Karaulbazar district is served by the local private operator, Aholi Trans Ltd. (**Appendix 14**). Spontaneous dumpsites were also noted in Buzochi settlement.

**Power and Gas Supply**

Power supply in the subproject area is provided by the Karaulbazar District Power Supply Company (Figures 30 – 32), and Khududgaz Bukhara Regional Gas Supply Company carries out the gas supply. The subproject settlements are connected to the primary grid. Electricity is mainly used for lighting purposes and running household electrical appliances. Fuelwood, electricity, and

LPG are interchangeably used for cooking, water, and space heating purposes, depending on availability and whichever is more economical.

Figure 45: Power supply in the subproject area, Buzochi settlement
(Source: Field visits of December 2022 and May 2023)

Figure 46: Power supply in the subproject area, Jarqoq settlement
(Source: Field visits of December 2022 and May 2023)

Figure 47: Power supply in the subproject area, Navbahor settlement
(Source: Field visits of December 2022 and May 2023)

**Road and Transport**

The subproject district is located along the A380 highway, providing access to other locations. The intra-settlements' main roads are paved. However, the municipal services are provided in the administrative center of the subproject district. 57.18% of the Karaulbazar district's population resides in the town, whereas 42.82% is in the rural area. The distance between the settlements and the city of Karaulbazar is from Buzochi – 13 km, Navbahor – 16 km, Tashquduq – 17 km, and Jarqoq – 25 km. To receive services, most of the population needs to travel to the Karaulbazar administrative center, not once, but possibly a few times, depending on the desired service. The remote trip is associated with a lack of financial resources, transportation means, and other issues.

Figure 48: Roads in the subproject area, Jarqoq settlement
(Source: Field visits of December 2022 and May 2023)

Figure 49: Roads in the subproject area, Navbahor settlement
(Source: Field visits of December 2022 and May 2023)

Figure 50: Roads in the subproject area, Buzochi settlement
(Source: Field visits of December 2022 and May 2023)

### 15.3.6. Healthcare

The medical station network is available in most subproject settlements. As of 2022, there is one hospital in Karaulbazar town and seven outpatient clinics in the subproject district. Primary medical services are available in the subproject district, while specific health services are in the Karaulbazar town and Bukhara city (Table 29Table 32 is a summary providing information on the receptors around the subproject area, distance between project components and receptors, their type and justification.

Table 29: Sensitivity Receptors

| Receptor | Receptor type | Project Components | Distance between PC and Receptor | Description |
|---|---|---|---|---|
| Public school no.4, Buzochi village | Human Receptor | Buzochi WDU | 0.34 km | Children and school staff are NSRs and vulnerable to changes in the ambient air quality and overall acoustic environment. |
| Kindergarten no.7, Buzochi village | Human Receptor | Buzochi WDU | 0.65 km | Children and school staff are NSRs and vulnerable to changes in the ambient air quality and overall acoustic environment. |
| Buzochi WDU, point 1 (residential area) | Human Receptor | Buzochi WDU | 0.02 km | Permanent residents in residential areas would be vulnerable to changes in the ambient air quality and acoustic environment. |
| Buzochi WDU, point 2 (residential area) | Human Receptor | Pipe line connecting WDU with village network | 0.04 km | Permanent residents in residential areas would be vulnerable to changes in the ambient air quality and acoustic environment. |
| Buzochi-Tashquduq water main, point 3 (agricultural area) | Agricultural Receptor | Water main connecting Buzochi WDU with Tashquduq village network | 0.08 km | Agricultural area that is near the project components. |
| Public school no.3, Navbahor village | Human Receptor | Navbahor WDU | 0.65 km | Children and school staff are NSRs and vulnerable to changes in the ambient air quality and overall acoustic environment. |
| Kindergarten no.8, Navbahor village | Human Receptor | Navbahor WDU | 0.47 km | Children and school staff are NSRs and vulnerable to |

| Receptor | Receptor type | Project Components | Distance between PC and Receptor | Description |
|---|---|---|---|---|
| | | | | changes in the ambient air quality and overall acoustic environment. |
| "Qaldirgoch" Kindergarten, Navbahor village | Human Receptor | Navbahor WDU | 0.58 km | Children and school staff are NSRs and vulnerable to changes in the ambient air quality and overall acoustic environment. |
| Navbahor WDU, point 1 (residential area) | Human Receptor | Navbahor WDU | 0.06 km | Permanent residents in residential areas would be vulnerable to changes in the ambient air quality and acoustic environment. |
| Navbahor WDU, point 2 (agricultural and traffic area) | Agricultural Receptor | Pipe line connecting WDU with village network | 0.02 km | Agricultural area that is near the project components. |
| Public school no. 5, Jarqoq village | Human Receptor | Jarqoq WDU | 0.47 km | Children and school staff are NSRs and vulnerable to changes in the ambient air quality and overall acoustic environment. |
| Kindergarten no.5, Jarqoq village | Human Receptor | Jarqoq WDU | 0.42 km | Children and school staff are NSRs and vulnerable to changes in the ambient air quality and overall acoustic environment. |
| Jarqoq WDU point 1 (residential area) | Human Receptor | Jarqoq WDU | 0.02 km | Permanent residents in residential areas would be vulnerable to changes in the ambient air quality and acoustic environment. |
| Jarqoq WDU, point 2 (residential area) | Human Receptor | Jarqoq WDU | 0.08 km | Permanent residents in residential areas would be vulnerable to changes in the ambient air quality and acoustic environment. |
| Jarqoq WDU, point 3 (agricultural and traffic area) | Agricultural Receptor | Pipe line connecting WDU with village network | 0.15 km | Agricultural area that is near the project components. |
| Workers at the site(s) | Human Receptor | Buzochi, Navbahor and Jarkok WDUs | - | Workers at the site(s) are exposed to changes in the ambient air quality and acoustic environment |

WDU = water distribution station/unit; NSR = noise sensitive receptors; PC = project components

# 16. ENVIRONMENTAL AND SOCIAL RISKS AND IMPACTS

Potential environmental and social impacts of the proposed subproject activities are presented in this section, along with the recommended mitigation measures. Screening of potential environmental and social impacts was implemented considering the following subproject phases:

(i) Pre-construction phase impacts

These impacts include location and design impacts. Location impacts include impacts associated with site selection, loss of on-site biophysical array, and encroachment directly or indirectly on adjacent environments. It also includes impacts on people who could lose their livelihoods or any other structures due to the development of that site. Design impacts include impacts arising from project design, including technology used, the scale of operation, waste production, and ancillary services.

(ii) Construction phase impacts

Construction impacts include environmental and social impacts caused by site clearing, earthworks, machinery, vehicles, and workers, whereas construction site impacts include erosion, dust, noise, traffic congestion, and waste production.

(iii) Operations and maintenance phase impacts.

Operations and maintenance impacts include impacts arising from the operation and maintenance activities of the infrastructure facility. These include routine management of operational waste streams and occupational health, social, and safety issues.

In this subproject, (i) most of the individual project components involve simple construction and operation, so impacts will be mainly localized and not greatly significant; (ii) most of the predicted impacts are associated with the construction process and are produced because that process is invasive, involving excavation and earth movements; and (iii) being located in an already used area, will not cause a direct impact on biodiversity values. The project will be on properties held by the local government, and access to the subproject location is through public rights-of-way and existing roads. Land acquisition and encroachment on private property will not occur except for temporary disturbance of the intra-settlement road traffic during pipe laying for connecting WDU with the water network. No blasting (including a controlled one) will be used during the construction.

## 16.1. Anticipated Positive Impacts of the Proposed Subproject

The project is expected to generate benefits in terms of improving the efficiency of water use and enhancing the water environment and public health security in the Bukhara Region. The proposed subproject will bring significant benefits or positive impacts, including the following:

(a) Economic benefits

Due to its desert geographic location, water supply is a critical element in the economic development of the subproject area. The effective functioning of the water supply system will lead to sustainable development in the district and an improvement of the living standards and livelihoods of the local population. The expected economic benefits are the following:

- cost savings from avoiding direct coping costs of inadequate water supply (purchase of electric/ manual pumps for shallow wells, purchase of water from water vendors and bottled water, and costs of private water storage);
- savings from indirect coping costs, including time saved from handling water (time to boil, manually pump, and haul water);
- health benefits (sick days avoided);
- increase in supply duration and availability (incremental water);
- cost savings from reduced technical losses and improved energy efficiency.

(b) Employment benefits

During the subproject's construction activities, jobs and income opportunities will be created, and as such, per capita income will be enhanced in this area. For new water infrastructure operations, a number of long-term skilled and unskilled personnel will be required for operation and maintenance (O&M) work, which will also create employment opportunities for the local inhabitants, including jobs for women.

Migration will be increased due to new job opportunities in the subproject area. People in the neighborhood are expected to benefit from the employment that would be generated and from the increased business activities during the construction period.

(c) Visual and Landscape

The proposed design of the water distribution stations will add to the local aesthetics by changing abandoned structures to new operational facilities and landscaping the sites.

(d) Health and safety

The new water infrastructure will ensure clean and safe drinking water for the subproject settlements and protect public health by controlling and eliminating waterborne diseases. Children are most vulnerable to unclean water and waterborne diseases, while women are responsible for water collection. Therefore, women and children as well as elderly residents, people with disabilities and with low income will be the specific beneficiaries of this subproject due to a clean and safe water supply household connection.

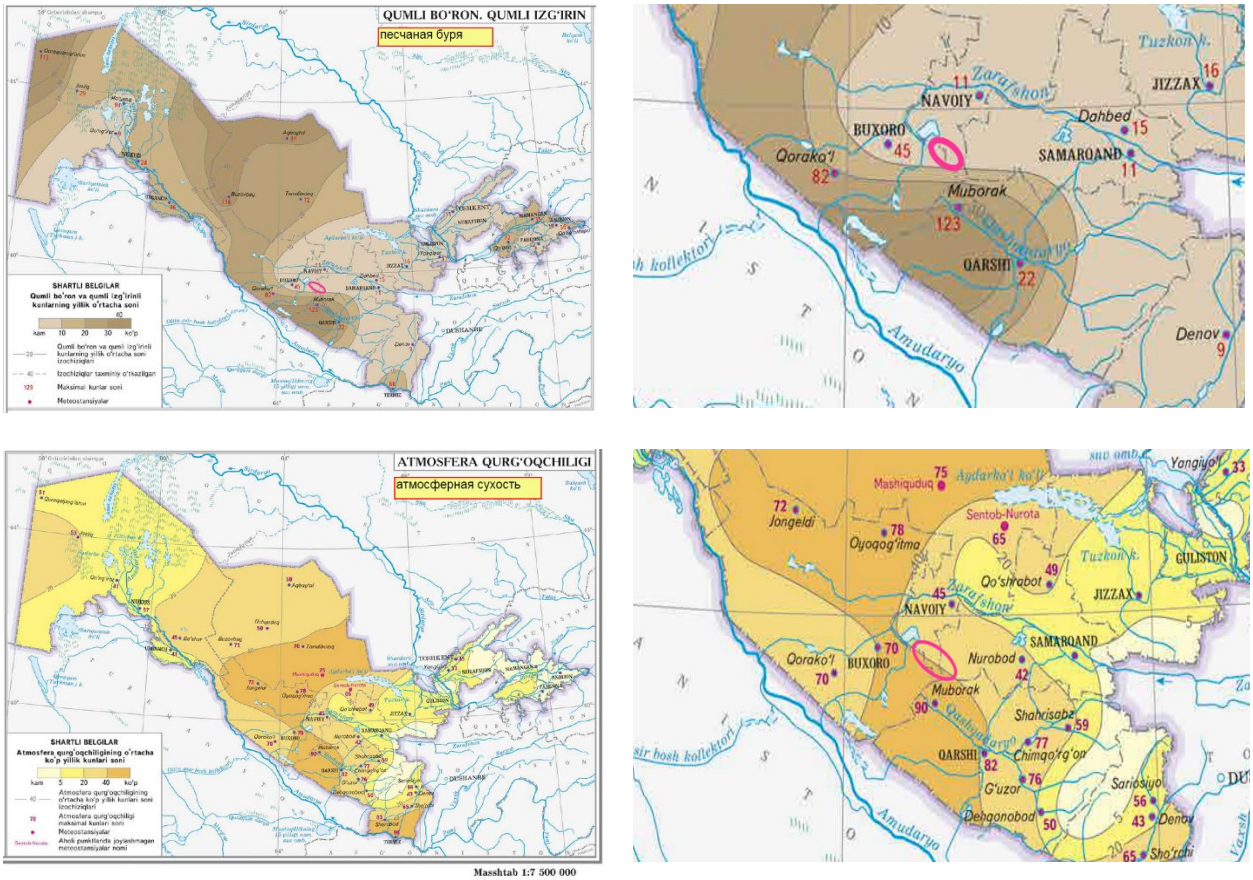
## 16.2. Climate Change Adaptation

Uzbekistan is among the countries most vulnerable to climate change. The warming rates are higher than the average rates observed globally. The Bukhara Province is considered a medium vulnerable region in the country. Climate change has caused low precipitation and high temperatures in the subproject area, which have resulted in impending desertification, a lack of water, and salinization of soils and groundwater (Section 4.1.).

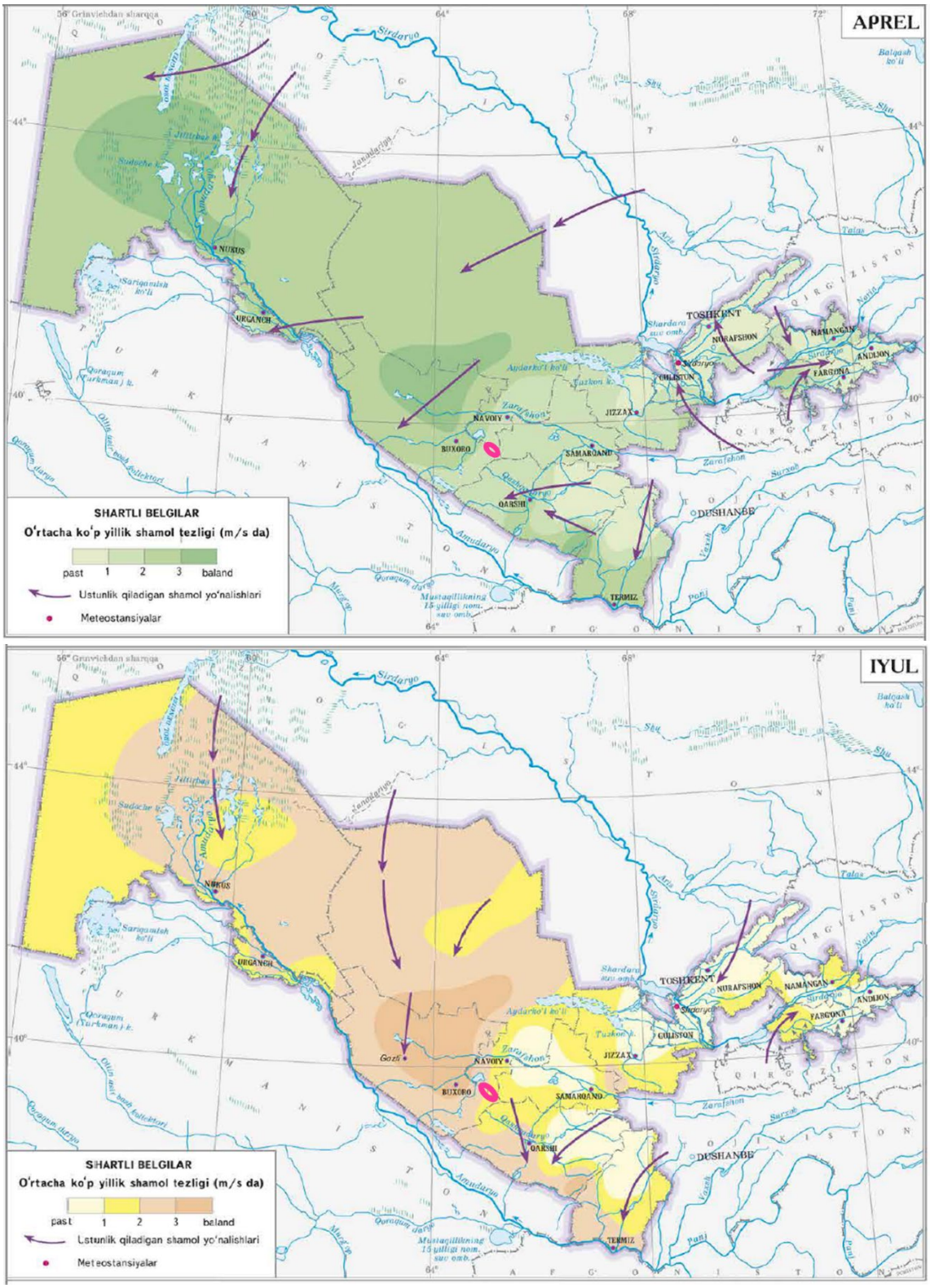
Sand and dust storms are atmospheric events involving small particles blown from land surfaces. They are notoriously unpredictable and difficult to manage, with multiple impacts on both the environment and people. However, sand and dust storms are a regionally common and seasonal natural phenomenon in Bukhara Province exacerbated by geographical location, droughts, and climate change. Climate change is likely exacerbating the dust problem in Bukhara Province:

alterations in weather patterns bring less rainfall, and high temperatures dry out soils faster. Surface winds cause dust storms in Bukhara Province, lifting large amounts of sand and dust from the desert. These processes most often develop in spring and summer. Figures below provides overview of ambient air dryness, wind directions, and potential occurrence of sand and dust storms in Uzbekistan and the subproject area (highlighted in red).

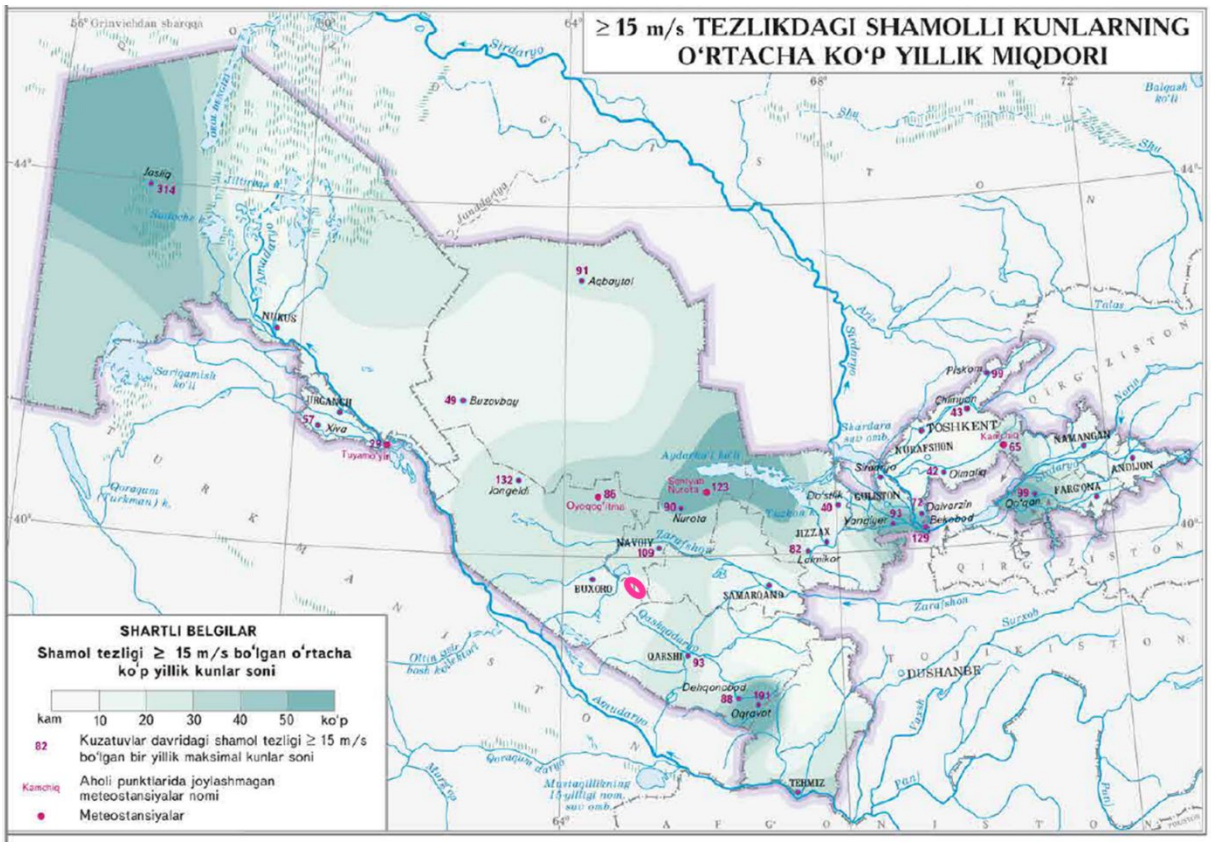
The range of sand and dust storms impacts include reduced visibility and associated incidents, deteriorated land surface, disrupted transportation, etc. The mitigation measures include: (a) planting of trees tolerant to geographic and climatic conditions around the WDUs, (b) dust control activities, such as regular watering of the construction site, storage of bulk building materials in a closed facility, and (c) preparation of traffic management plan by contractor and its monitoring by PMC; the plan will include among other requirement to stop transportation of materials in case of a sand and dust storm.



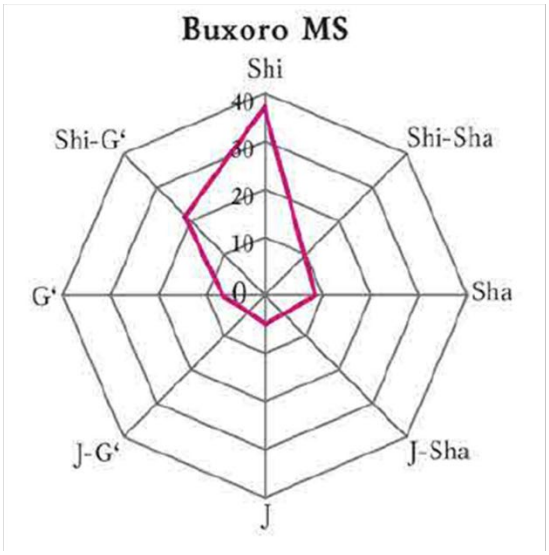

Maps of sandstorms potential occurence and atmospheric dryness occurenes in Uzbekistan (*the boundaries of the Karaulbazar region are outlined in red on the maps*)
(Source: National Atlas of Uzbekistan, Chapter I)



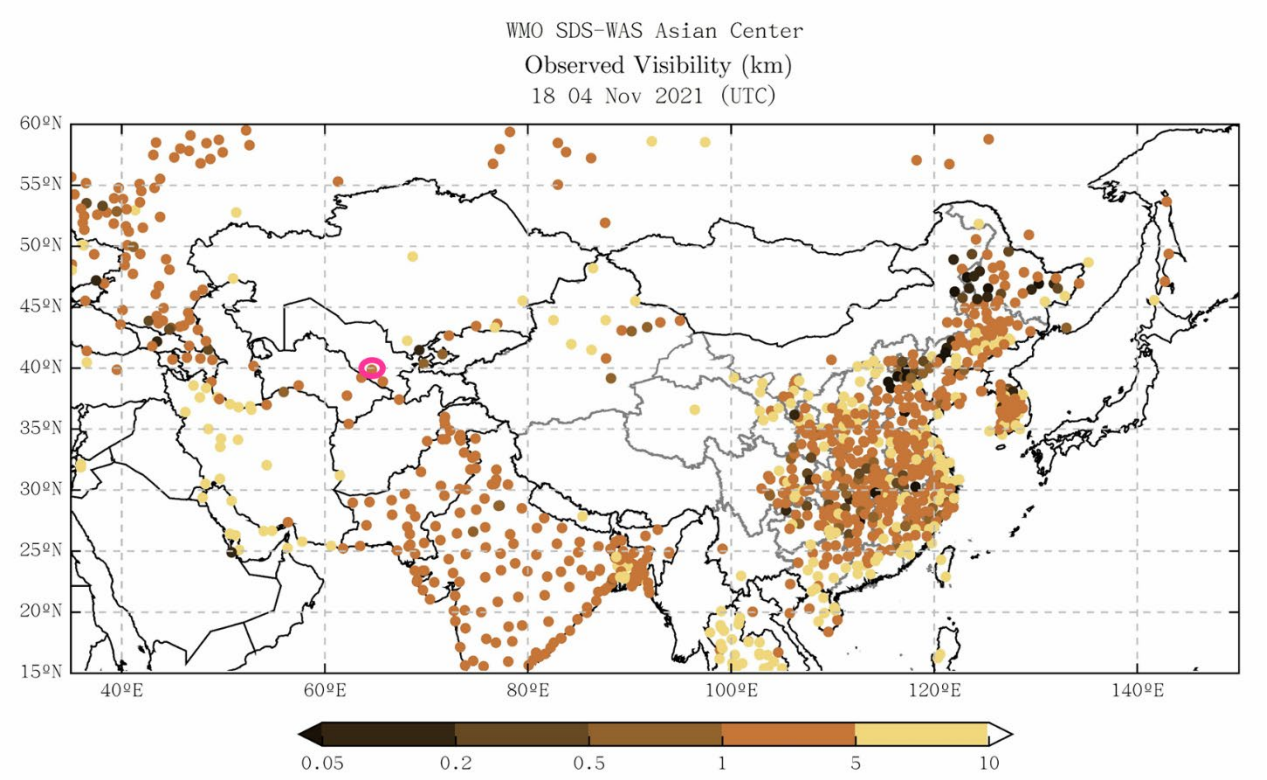

Maps of winds direction in Uzbekistan in spring and summer (*the boundaries of the Karaulbazar region are outlined in red on the maps*)
(Source: National Atlas of Uzbekistan, Chapter I)




KO‘P YILLIK O‘RTACHA USTUVOR SHAMOL YONALISHI (%)




Average annual number of days with strong wind (speed more than 15 m/s) in Uzbekistan (the boundaries of the Karaulbazar region are outlined in red on the maps) and wind rose Bukhara Province (Source: National Atlas of Uzbekistan, Chapter I)




World Meteorological Organization (https://community.wmo.int/en/sds-asia-0)

The subproject also aims to improve water use efficiency, sustainable water management and in the Karaulbazar district in the following ways:

- Engineering design of the water infrastructure prepared in an effective way to reduce water losses;
- Engineering design foresees introducing energy efficiency technology at the water facilities which will also contribute to reducing greenhouse gas emissions during operation.

## 16.3. Planning Phase

This section assesses the impacts caused by project-siting prior to construction.

### 16.3.1. Involuntary resettlement

Engineering design foresees subproject activities on the water utility-owned lands, which formerly served as rural water stations. However, the subproject sites' survey revealed that people without titles are carrying out agricultural activities (i.e., Buzochi, Navbahor, and Jarqoq WDUs) and living (Jarqoq WDU) on water utility-owned land. In these sites, physical or economic displacement of non-title holders is envisaged. Correspondingly, the affected people's income/livelihood loss will be compensated following the provisions of ESS2. A Livelihood Restoration Plan (LRP) with an entitlement matrix is provided as a separate document to address such impacts.

### 16.3.2. Subproject design

Planning principles, subproject selection criteria, and design considerations have been reviewed and incorporated into the site planning and design process wherever possible. Therefore, environmental impacts due to the project design or location will not be significant. The proposed design encompasses mitigation measures to reduce all adverse effects to acceptable levels. These were discussed with specialists responsible for the engineering aspects, and as a result, significant steps have already been included in the subproject design.

In most cases, mitigation measures can be designed with uncomplicated measures commonly used at construction sites and known to civil works contractors. Once the subproject is operating, the facilities will operate with routine maintenance, which will not affect the environment. Improved system operation will comply with the operation and maintenance manual to be developed by the contractor upon commissioning the water infrastructure and follow the standard operating procedures to be developed by Bukhara Suv Ta'minoti during the operation of infrastructure and facilities.

The mitigation measures during the Design Phase will include the following:

**Design of WDUs**

The design of WDU's infrastructure is based on international best practices and adopted by the Uzbek legislation. Finally, treated water will comply with the requirements set in applicable national legislation (Section 3.3.3.). This will be achieved with effective water treatment technology, applying sand filters as a filter technology and sodium hypochlorite (NaOCl) for water disinfection.

Pressure sand filters will be used to filtrate incoming untreated water and the sedimentation of suspended solids and turbidity. The water to be purified will slowly sink through the sand of the sand filter, leaving the dirt particles from the water behind in the fine pores of the sand. A sand filter can only filter solid particles from the water, like algae and organic material. When a certain quantity of water has been filtered or the sand has reached a certain degree of pollution, the sand filter will automatically switch to backwashing. During the backwashing, the pores enlarge upon which the dirt is washed from the sand again. Subsequently, this dirt is discharged, together with the backwash water. As a result, the sand filter will not get blocked, retaining its optimal purification qualities.

Sodium hypochlorite is the most widely used disinfection technology, as it kills most live pathogens in water and is safer to handle and store than chlorine. Electric chlorination applies an electrical current to saltwater to produce dilute sodium hypochlorite and hydrogen gas. The resultant sodium hypochlorite solution contains between 0.7%-1% chlorine. This low concentration is considered non-hazardous to humans yet still destroys viruses, bacteria, and other harmful microorganisms in the water, making it safe to drink and preventing the spread of diseases. Electric chlorination produces sodium hypochlorite on-site on an "as needed" basis. It can function as part of a responsive system that automatically generates a dosage of sodium hypochlorite depending on the existing levels of free chlorine or organic matter in the water.

- Design ensures a sanitary buffer zone around the water reservoir according to the standards specified in Section 3.3.6.

- Design provides fencing, gates, and a guardhouse around WDUs to protect drinking water from contamination and infrastructure and equipment from damage by aliens.

**Design of WDU water distribution pipelines**

Inadequate design of distribution pipelines will lead to disproportional water supplies and losses. The incorrect choice of pipe material will lead to a change in water quality and incompliance with the established standards (Section 3.3.3.). The design provides for connecting the WDUs with the water networks in Buzochi, Navbahor, Tashquduq, and Jarqoq through HDPE pipes (Section 2.4.). High-Density Polyethylene (HDPE) is a non-hazardous material, and its overexposure by short-term or long-term application does not cause harmful health effects. Unlike traditional metal pipes, HDPE pipes do not rust, corrode or rot and are effective for large-scale water transfer.

Design follows the requirements for minimizing water losses from pipelines by perfect jointing and alignments using appropriate techniques, including the structural integrity of the hydraulic system. Design provides for an optimized number of elbows and turns.

**Bidding documents**

- Bidding documents and the contract will ensure the inclusion of environmental and social provisions along with the Environmental and Social Management Plan (ESMP).
- Bid evaluation will ensure the selection of an experienced bidder in environmentally and socially friendly construction who proposes a proper ESMP budget.
- Contract with a successful bidder will ensure the provision of a SSESMP within 30 days after the contract award and before commencing any physical works by the contractor. SSESMP will be prepared by the contractor and approved by PCU/PMC. SSESMP will include the following sections:
    (i) earthworks and top soil management plan
    (ii) traffic management plan
    (iii) petroleum products management plan
    (iv) solid waste management plan
    (v) hazardous waste management plan
    (vi) landscaping management plan
    (vii) construction camp management plan
    (viii) occupational health and safety management plan
    (ix) emergency response plan
    (x) contingency and spoil management plan
    (xi) social impacts mitigation plan
    (xii) recruitment plan (jobs for women and unskilled residents).
- Bidding documents will ensure the non-use of products of Bukhara Oil Refinery.
- Bidding documents will ensure the reinstatement of damaged utilities such as roads (including access roads) and transmission/distribution lines (if any) in the subproject area.

- Bidding documents will ensure the contractor's preparation of the operation and maintenance manual for the three WDUs.

**Existing utilities and infrastructure**

- Design provides for connection pipes from WDUs to the water network and may impact the existing utilities and infrastructure, such as roads and power transmission lines. To avoid unnecessary disruption of services during construction, the design specifies specific routes for laying connection pipes.

**Sources of materials**

- To prevent the project's contribution to harming the Jeyran Ecocenter (Section 4.2.2.) through using petroleum materials from the Bukhara Oil Refinery, the use of petroleum and other products produced by the Bukhara Oil Refinery will be prohibited for the use by the contractors within the project.

## 16.4. Construction Phase

Except for the pipe-laying works, all other construction activities will be confined to the selected sites, and interference with the public and community will be minimal. There will be temporary negative impacts, mainly from construction dust and noise, hauling of construction material, waste, and equipment on local roads (traffic, dust, and safety), and occupational health and safety. In some cases, limited access to services and community's objects will be temporary.

### 16.4.1. Physical resources

**Land Erosion and Surface Disturbance**

Excavation and digging of trenches during construction can cause erosion and cave, silt runoff, which may lead to destruction of the integrity of upper soil layers and unsettling of nearby road surfaces. Unorganized disposal of the excavated earth may disturb the surface and decrease the aesthetic and economic value of the area. Damaged soil is more readily eroded and washed into water courses during rainfall events and can also form dust during dry periods.

During civil works, accidental spills and leakages may occur from fuel and oil tanks, vehicles and machinery, asphalt and batching plants, and storage of construction materials used in construction areas. These spills can pollute soils by entailing surface water and groundwater contamination in the subproject area. Waste effluents from temporary facilities such as camps, offices, dumping of waste, and debris can also contaminate the soil if not stored in the proper containers. Disposing of construction waste in the fields adjacent to the subproject sites may lead to soil impairment for agriculture, mainly when the adjacent areas are used primarily for agriculture. Parked construction machinery, trucks, and vehicles by the side of roads also could lead to soil compaction and may spoil the soil's cultivation characteristics.

Table 33 provides characterization of land erosion and surface disturbance impact during construction phase.

Table 30: Land Erosion and Surface Disturbance during Construction Phase

| Impact | Duration | Extent | Likelihood | Magnitude | Sensitivity | Significance |
|---|---|---|---|---|---|---|
| Land Erosion and Surface Disturbance | Long term | Local | Likely | Major | Sever | High |

During construction, the precautionary measures will include:

- The Contractor will prepare and implement the SSESMP prior to the start of the work. The SSESMP will include an earthwork management plan describing trench backfilling technology, stabilization of the exposed soil and its vegetation to prevent further soil erosion, excess soil caused by excavation and that cannot be reused at the site(s), schemes for temporary access, diversions, and signboards for pedestrians.
- The Contractor will be required to take appropriate measures to avoid and contain any spillage and pollution of the soil. In case of spillage, the contaminants should be confined immediately after such accidental spillage and contaminated soil should be collected, treated, and disposed of in an environment-friendly manner.
- All areas intended for the storage of hazardous materials must be quarantined and provided with adequate facilities to combat emergencies, complying with all the applicable statutory stipulations.
- The Contractor will strip and stockpile topsoil where practical.
- The Contractor will not repair vehicles and equipment at the WDU sites or along the roads. If unavoidable, impervious sheathing will be used to avoid soil and water contamination.
- For sewage waste, the contractor will operate appropriate septic tanks installed on site. The sewage container will prevent wastewater percolation into the ground, so there will be no discharge. Sewage from construction camps and other facilities will be collected and transported to a nearby sewage treatment plant.
- To avoid soil compaction on unpaved roads, the movement of construction vehicles, machinery, and equipment will be restricted to the corridor or identified route. In case of land compaction due to subproject activities, the contractor will restore land for agricultural use.

**Air Quality Pollution**

The dust will be generated during construction activities. In particular, air quality pollution will be due to inadequately managed or haphazard activities: (i) earthworks such as clearing, grubbing, excavations, and drilling; (ii) stockpiling of natural aggregates, excavated materials, and spoils; (iii) transport, loading, and unloading of construction materials; (iv) movement of construction-associated vehicles; and (v) onsite rock crushing and concrete mixing; (vi) burning and heating of bitumen, etc. Dust raised from the above activities will have impacts on crops, animals and public health. These impacts will be most severe for the households around the subproject WDUs. However, suspended dust particles are coarse and settle within a short distance of the

construction area. Therefore, the impact on the nearby inhabited area will be direct but temporary and restricted within the closed vicinity of the construction activities only.

During subproject activities, localized emissions are anticipated from the hot mix and batching plants. These emissions would be coarse particulate matter and will settle close to the construction site. Other emission sources, such as odor, dust, and volatile organic compounds, are expected during the compaction of the road pavement. In addition, the generators and powered equipment that supply crushed rock and asphalt will also create dust and other air emissions, which will be rapidly dispersed. As this will be a temporary phase, no significant impact is expected during construction. However, the main existing pollution sources of the subproject area are Cotton Gin Bukhara Oil Refinery, and oil refinery in Sardoba settlement. The use of Bukhara Oil Refinery's products will contribute to decay of the air quality in the Jeyran Ecocenter.

Table 34 provides characterization of impact on air quality during construction phase.

Table 31: Impact on Air Quality during Construction Phase

| Impact | Duration | Extent | Likelihood | Magnitude | Sensitivity | Significance |
|---|---|---|---|---|---|---|
| Air Pollution | Short term | Widespread | Likely | Major | Mild | Moderate |

The following mitigation measures are foreseen:

- The Contractor will prepare SSESMP comprising earth earthworks and top soil management plan and a traffic management plan.
- The Contractor will implement dust prevention measures such as watering roads near the residential areas and watering dry, exposed surfaces and stockpiles of aggregates. The stockpiles of construction materials will be inside the WDUs and sprinkled with water, as needed. Water will also be sprayed on temporary service and access roads. After compacting, water should be regularly sprayed on the earthwork to prevent dust.
- The Contractor will keep the construction area where local roads are used for hauling in serviceable condition, and repair any damage promptly without interference to local routes.
- The Contractor will cover loose and fine materials (e.g. sand and fine aggregates) when being transported on trucks and store piled at the site.
- The Contractor will place warning signs at active work sites in populated areas.
- The Contractor will limit the speed of construction vehicles on access roads and inside the subproject settlements to a maximum of 40 km/h.
- The Contractor will use vehicles and other construction equipment such as diesel generators complying with applicable national legislation regarding emissions, and carry out regular maintenance of machinery and equipment. The Contractor will use vehicles, plant, and equipment meet Euro-4 standard as required by Uzbek legislation.[70]
- The Contractor is prohibited from incinerating domestic, construction, and landscaping waste at construction sites.

[70] Decree of the Cabinet of Ministers of Uzbekistan "About improvement of the environmental certification of vehicles and mobile equipment," https://mintrans.uz/ru/news/2022-yildan-ba-zi-toifadagi-transport-vositalarini-olib-kirish-sotish-va-ulardan-foydalanish-man-etiladi

- The Contractor will not use petroleum and other products produced by the Bukhara Oil Refinery.
- The Grievance Redress Mechanism will be used to record, investigate, and respond to any complaints related to subproject activities. Investigation of the complaints will be undertaken by the PMC and PCU.
- The Contractor will prepare Traffic Management Plan as part of SSESMP and will manage scheduled transport movement to minimize gas emission.
- The Contractor will store hazardous materials with potential gas emissions in sealed containers and will use them well-ventilated and secure low-risk areas.
- The Contractor will seal cement and other fine materials after use or put them in containers with lid; concrete batching plants will be located away from sensitive receptors.
- The Contractor will conduct air quality monitoring in line with the monitoring plan (Section 8.2.1) and on the monitoring points at the sensitive receptors' places.

**Noise Impact**

Noise will be one of the critical environmental issues in this subproject. It is anticipated that noise from using powered mechanical equipment on sites and the haulage of construction materials during the WDU's construction will cause a nuisance to the nearby noise-sensitive receivers. Noise-emitting construction activities include earthworks, concrete mixing, movement and operation of construction vehicles and equipment, and loading and unloading coarse aggregates. The foundations and trenches construction will use earthworks machinery, such as excavators, compactors, bulldozers, and compactors. The technical data reports[71] that the noise level from a bulldozer when running a diesel engine is 92 dB. Still, as far as the receptor, the noise level decreases correspondingly. The significance of noise impact will be higher in noise-sensitive receptor areas (NSRs). In particular, the sensitive receptors listed in Table 10 will be severely affected by the subproject activities' noise generated by the some key construction equipment and vehicles (Table 35).

Table 32: Expected Noise Level of Key Construction Equipment and Vehicles

| No. | Equipment Type and Characteristics | Noise level, dB |
|---|---|---|
| 1. | Truck-Crane | 67-87 dB |
| 2. | Excavator | 87 dB |
| 3. | Backhoe Loader | 85 dB |
| 4. | Wheel Loader | 68-77 dB |
| 5. | Tipper Trucks | 95-100 dB |
| 6. | Mobile Generator, 50 kVA | 74-76 dB |
| 7. | Compactors | 85-90 dB |

[71] https://core.ac.uk/download/pdf/42046515.pdf

Table 36 below provides information on possible noise level generated by two types of earthwork machinery at the places of sensitive receptors.

Table 33: Expected noise generation by construction vehicles

| Receptor | Receptor type | Project Components (PC) | Standard, daytime | Distance between PC and Receptor, m | Noise level generated by bulldozer, dB | Noise level generated by excavator, dB |
|---|---|---|---|---|---|---|
| Public school no.4, Buzochi village | Human Receptor | Buzochi WDU | 35 | 340 | 46.97 | **41.97** |
| Kindergarten no.7, Buzochi village | Human Receptor | Buzochi WDU | 35 | 650 | 43.39 | **38.39** |
| Buzochi WDU, point 1 (residential area) | Human Receptor | Buzochi WDU | 55 | 20 | 62.66 | **57.66** |
| Buzochi WDU, point 2 (residential area) | Human Receptor | Pipe line connecting WDU with village network | 55 | 40 | 58.82 | 53.82 |
| Buzochi-Tashquduq water main, point 3 (agricultural area) | Agricultural Receptor | Water main connecting Buzochi WDU with Tashquduq village network | 60 | 80 | 54.99 | 49.99 |
| Public school no.3, Navbahor village | Human Receptor | Navbahor WDU | 35 | 650 | 43.39 | **38.39** |
| Kindergarten no.8, Navbahor village | Human Receptor | Navbahor WDU | 35 | 470 | 45.18 | **40.18** |
| “Qaldirgoch” Kindergarten, Navbahor village | Human Receptor | Navbahor WDU | 35 | 580 | 44.02 | **39.02** |
| Navbahor WDU, point 1 (residential area) | Human Receptor | Navbahor WDU | 55 | 60 | 56.58 | 51.58 |
| Navbahor WDU, point 2 (agricultural area) | Agricultural Receptor | Pipe line connecting WDU with village network | 60 | 20 | 62.66 | 57.66 |
| Public school no. 5, Jarqoq village | Human Receptor | Jarqoq WDU | 35 | 470 | 45.18 | **40.18** |
| Kindergarten no.5, Jarqoq village | Human Receptor | Jarqoq WDU | 35 | 420 | 45.80 | **40.80** |
| Jarqoq WDU point 1 (residential area) | Human Receptor | Jarqoq WDU | 55 | 20 | 62.66 | **57.66** |
| Jarqoq WDU, point 2 (residential and traffic area) | Human Receptor | Jarqoq WDU | 60 | 80 | 54.99 | 49.99 |
| Jarqoq WDU, point 3 (agricultural and traffic area) | Agricultural Receptor | Pipe line connecting WDU with village network | 60 | 150 | 51.50 | 46.50 |

WDU = water distribution unit/station; PC = project components; dB = decibel

As can be seen from Table 33, almost all NSRs are expected to slightly exceed the sound level during the earthworks in the worst scenario. Moreover, the baseline measurements of the acoustic environment at the sensitive receptor places revealed that the time-weighted average noise level exceeded the applicable standard for both daytime in the Navbahor settlement and nighttime in the Buzochi settlement.

Site workers will be exposed to varying levels of noise depending on their specific roles and activities being conducted. Without mitigation, noise impacts to the workforce could results in health impacts, for example hearing damage.

Although noise generated by general construction works will be during regular working hours (i.e., 07:00 to 19:00 hours on any day, not a Sunday or public holiday), noise levels should not exceed the national standards for noise or WHO Guidelines for Community Noise (Section 3.3.2.).

Table 37 provides characterization of noise impact during construction phase.

Table 34: Noise Impact during Construction Phase

| Impact | Duration | Extent | Likelihood | Magnitude | Sensitivity | Significance |
|---|---|---|---|---|---|---|
| Noise | Short term | Local | Likely | Medium | Mild | Moderate |

The following measures are provided to mitigate noise impact:

- The Contractor will prepare and implement the SSESMP prior to the start of work. The SSESMP should provide for effective noise control measures, including scheduling noisy activities for the daytime, preparing work schedules and informing adjacent communities. In case percussive piling is employed during the subproject activities, it will be prohibited at any time on Sundays and public holidays and during the weekday evening and nighttime hours.
- The Contractor will use low-noise equipment and machinery. There is no getting around the fact that construction equipment can be loud, but there are ways to choose quieter equipment. A general rule of thumb is that electronic-powered equipment is quieter than diesel and hydraulically powered equipment is quieter than pneumatic power. Moreover, to mitigate and decrease noise levels, the contractor should properly maintain and lubricate machinery and equipment (e.g., oil bearings).
- The Contractor will limit engine idling to a maximum of one minute. Most construction noise originates from internal combustion engines. Much noise is emitted due to the air intake and exhaust cycle. Specifying adequate muffler systems can control much of the engine noise.
- The Contractor will install an acoustic screen during noisy activities to ensure the noise level in the area adjusted to the closest household is complied with standard. Employing shields that are physically attached to the particular piece of equipment is effective, particularly for stationary equipment and where considerable noise reduction is required.
- The Contractor will limit vehicles' speed inside settlements to a maximum of 40 km/h to mitigate noise produced during transport. This should also be supported by spreading out the schedule of material, spoil and waste transport.

- To mitigate noise produced during WDUs operation, the contractor will plant trees around the WDUs upon completion of all construction activities. Coniferous trees absorb sound more effectively than deciduous trees because their bark layer is much thicker. Although coniferous trees are invasive in the subproject area, about ten pines are planted on one outer side of the Jarqoq station, and some eight pines were noted inside the Navbahor WDU (Section 4.2.1.). However, the contractor should plant around the stations only trees with habitat typical for the area of growth in the given territory. Following public consultations conducted in four subproject settlements, the trees that take root at the subproject sites are maple, poplar, saxaul, apricot, apple, and elm.
- To comply with occupational health and safety standards, the contractor will provide all its workers with effective Personal Protective Equipment (PPE). Ear muffs and earplugs are the most common types of PPE. Increased protection can be achieved by wearing earplugs and earmuffs together.
- The Grievance Redress Mechanism will be used to record, investigate, and respond to any complaints related to subproject activities. The impacted receptors will have access to make any complaints regarding noise during the construction phase. Investigation of the complaints will be undertaken by the PMC and PCU.
- The Contractor will prepare Traffic Management Plan as part of SSESMP.
- The Contractor will employ additional noise barriers/attenuation to ensure that the maximum noise level at the location of sensitive receptors when all equipment is running does not exceed 35 dB (schools) and 55 dB (residential area), respectively (Section 3.3.2).
- The Contractor will conduct noise monitoring in accordance with the monitoring plan (Section 8.2.1) and on the monitoring points at the sensitive receptors' places.

**Impact on Water Resources**

Groundwater will not be used as a water source in this subproject. There are no private or community groundwater wells that will be affected by the subproject. The subproject design foresees the Kuyumazar-Mubarek water main as the water source for the three WDUs in Buzochi, Navbahor, and Jarqoq. The Tashquduq settlement's water network will be connected to the Buzochi WDU (Section 4.1.6.). No distribution pipeline will cross a water body.

Table 38 provides characterization of impact on water resources during construction phase.

Table 35: Impact on Water Resources during Construction Phase

| Impact | Duration | Extent | Likelihood | Magnitude | Sensitivity | Significance |
|---|---|---|---|---|---|---|
| Water Pollution | Short term | Widespread | Likely | Medium | Mild | Moderate |

However, considering 3.0-3.6 m groundwater depth the following mitigation measures should be followed:

- The Contractor will develop a spoil management plan as part of the SSESMP.
- The Contractor will carry out earthworks during the dry season.

- The Contractor will ensure the warehouse floor is adequately isolated to prevent the infiltration of liquid materials into the soil and groundwater.
- The Contractor will organize the fuel storage area in designated areas. Management and storage of fuel, waste oil, and hazardous waste will be planned following EHS[72] General Guidelines on Hazardous Materials Management.
- The Contractor will maintain effective wastewater collection and disposal at each site due to a lack of a sewerage system in the subproject settlements.

Domestic wastewater will be treated by the septic tanks (for settling and anaerobic processing) installed by the contractor. The treated liquid effluent will be discharged to the septic drain field located in Bukhara. There are national regulations establishing the standards of water being fed into a public effluent, which place limits on suspended solids (SS), acidity (pH), biological oxygen demand (BOD), and chemical oxygen demand (COD), among others. The sludge accumulated in the septic tank will be periodically removed and transported by suction trucks to the nearby wastewater treatment plant. For construction wastewater, the contractor will install a construction wastewater treatment facility that includes a neutralization tank and settling/sedimentation pond before the commencement of construction works. The water will be treated to meet national standards before being discharged into public effluent. The suction truck will transport accumulated sludge from the treatment facility to the solid waste disposal area in Bukhara province.

- The Grievance Redress Mechanism will be used to record, investigate, and respond to any complaints related to subproject activities. Investigation of the complaints will be undertaken by the PMC and PCU.

**Impact of Solid Waste**

Various types of solid wastes will be generated by different construction activities of this subproject, including excavated materials, construction spoils, domestic wastes, and other construction wastes, including hazardous wastes. The construction works will generate large quantities of excess materials from construction sites (concrete, discarded material, vegetation), demolition wastes (demolition of buildings, structures, and other facilities), and wastes from construction yards, including garbage, recyclables, food waste, and other debris. Most waste generated from construction camps will include paper, plastic containers, food residues, and liquid waste from kitchens and bathrooms.

In addition, some hazardous waste will also be generated mainly from vehicle maintenance activities (bitumen, liquid fuels; lubricants, hydraulic oils, antifreeze; machine/engine filter cartridges, oily rags, spent filters, etc.). Moreover, the engineering assessment did not mention the presence of ACM in the WDU facilities (Section 2.3.). However, many existing structures may have ACM. Before starting any demolition or repair works, thoroughly diagnosing the WDU structures for the presence of ACM is required. If these wastes are not responsibly disposed of, they can cause adverse environmental, human health, and aesthetic impacts.

[72] EHS = Environment, health, and safety

Table 39 provides characterization of solid waste impact during construction phase.

Table 36: Solid Waste Impact during Construction Phase

| Impact | Duration | Extent | Likelihood | Magnitude | Sensitivity | Significance |
|---|---|---|---|---|---|---|
| Solid Waste | Short term | Local | Likely | Medium | Mild | Moderate |

The following mitigation measures will be implemented to mitigate land pollution and spread of solid waste in the construction site:

- The Contractor will develop a waste management plan as part of the SSESMP. The waste management plan will comprise separate management plans for domestic, construction and hazardous waste.
- The Contractor will minimize the production of waste materials by applying the 3R approach (reduce, recycle, and reuse)

The Contractor will segregate and reuse or recycle all the wastes, wherever practical. The Contractor will provide reuse containers at each worksite.

- The Contractor will identify suitable sites for temporary storage of construction and domestic waste inside the WDU territory. The waste shall be transported for disposal in a timely manner. The Contractor will make a contract with a solid waste operator.
- The Contractor will train and instruct its personnel in waste disposal practices and procedures as a component of the environmental induction process.
- The Contractor will ensure all containers, drums, and tanks used for storage are in good condition and labeled with an expiry date. The Contractor will check for leakage regularly to identify potential problems before they occur. Otherwise, any container, drum, or dented, cracked, or rusted tank might eventually leak.
- The Contractor is prohibited from incinerating domestic, construction, and landscaping waste at construction sites.
- The Contractor will avoid the use of materials with more significant potential for contamination by substituting them with more environmentally friendly materials.
- The Contractor will maintain all construction sites in a cleaner, tidy, and safe condition and provide appropriate facilities for temporary storage of all wastes before transportation and final disposal.
- The Grievance Redress Mechanism will be used to record, investigate, and respond to any complaints related to subproject activities. Investigation of the complaints will be undertaken by the PMC and PCU.

### 16.4.2. Biological environment

Haphazard site clearing, parking, and movement of construction vehicles and equipment stockpiling will disturb the biological environment at the subproject sites. The subproject sites do not include any forest or protected area. The possible habitat of the Red List threatened plant

species should be subject to vegetation monitoring at the subproject sites before any excavation or earthworks. Moreover, some mature elm trees and fruit trees are inside the WDUs (Section 4.2.1.). The civil works will not significantly impact the environment since the subproject sites, i.e., WDUs, have already been used for water supply infrastructure and agricultural activities. However, during pipe laying, some disturbances may occur from the WDUs to the intra-settlement network. The lines will be laid along the existing road, but there may be areas with trees, the loss of which must be minimized. In case of necessity to cut the trees, the contractor will obtain permission from the Bukhara Province Branch of the Ministry of Natural Resources following applicable legislation[73].

Table 40 provides characterization of impact on flora and fauna during construction phase.

Table 37: Impact on Flora and Fauna during Construction Phase

| Impact | Duration | Extent | Likelihood | Magnitude | Sensitivity | Significance |
|---|---|---|---|---|---|---|
| Loss of Trees | Short term | Local | Likely | Medium | Mild | Moderate |
| Loss of Fertilized Soil | Long term | Local | Likely | Major | Severe | High |
| Loss of flora and fauna from the Red List | Long term | Widespread | Unlikely | Major | Severe | High |

The following mitigation measures will be implemented:

- The Contractor will conduct vegetation monitoring at the subproject sites before any excavation, trenching, and other earthworks.
- The Contractor will avoid or minimize the cutting of trees during the laying of pipes and other works. If tree felling is unavoidable, the contractor will obtain a felling permit and pay the appropriate fee in accordance with applicable law and, based on the results of the work performed, will plant more trees at the felling site or nearby than were cut down.
- The Contractor will ensure proper collection and disposal of wastewater and solid wastes to avoid any subproject area spillage, contamination, or mess.
- The Contractor will designate stockpiling areas to avoid mess on the subproject site.
- The Contractor will prepare a traffic management plan as part of SSESMP and specify routes for the vehicles transporting construction materials and equipment.
- The Contractor will restore the disturbed sites upon completion of all civil works.
- The Contractor will prepare and implement a landscape management plan as part of SSESMP.

73 Regulation No. 290 “On the use of biological resources and the procedure for obtaining corresponding permissions,” 20.10.2014, https://lex.uz/docs/2485767

### 16.4.3. Socio-economic environment

#### Impact on Land Use

All three WDU sites are water utility-owned lands. The subproject design foresees activities inside the water stations and pipe laying from WDU to the network. Therefore, no impact related to land acquisition is anticipated.

Table 39 provides characterization of impact on land use during construction phase.

Table 38: Land Use Impact during Construction Phase

| Impact | Duration | Extent | Likelihood | Magnitude | Sensitivity | Significance |
|---|---|---|---|---|---|---|
| Land Use | Short term | Local | Unlikely | Medium | Low | Moderate |

#### Impact of Construction Camps

The precise locations of construction camps will be finally decided by the water utility, Project Management Consultant (PMC), and contractor. Major impacts of construction camps include the pollution risk of soil due to the sanitation of the camps and waste from the camps.

The subproject activities may cause some temporary disturbance to the local population, possible damage to telecommunication lines, reduced access to sites, and damage to infrastructure. Inadequate lighting and fencing of construction sites inside settlement areas can be dangerous for pedestrians and vehicles, especially at nighttime. Inefficient solid waste disposal and improper sanitary conditions at construction sites and labor camps may cause pollution of the surrounding environment and affect the health of local people. Moreover, the heavy tracks may destroy or deteriorate the conditions of roads inside settlements.

Table 42 provides characterization of impact of construction camp during construction phase.

Table 39: Impact of Construction Camp during Construction Phase

| Impact | Duration | Extent | Likelihood | Magnitude | Sensitivity | Significance |
|---|---|---|---|---|---|---|
| Construction Camp | Short term | Local | Likely | Medium | Severe | High |

The following mitigation measures will be implemented:

- The Contractor will relocate the affected engineering communication before excavation and further pipe laying and will advise the concerned authority during accidental damage to utilities.
- The Contractor will inform the communities about planned work on pipe laying.
- The Contractor will locate the construction camps in areas that are acceptable from an environmental, cultural, or social point of view. The location of construction camps should be to avoid social conflict in using water, electricity, gas, or other resources or to avoid the possible adverse impacts of the construction camps on the surrounding communities.

- The Contractor will prepare a construction camp management plan[74] (CCMP) as part of SSESMP and approve it with the water utility, PMC, and PCU. CCMP should provide a detailed layout plan for the development of the construction camp showing the relative locations of all temporary buildings and facilities that are to be constructed together with the location of site roads, fuel storage areas (for use in power supply generators), solid waste management and dumping locations, and drainage facilities, prior to the development of the construction camps.
- The Contractor will ensure security and safety at the subproject sites. Local authorities responsible for health and security shall be duly informed on the setting up of camp facilities to maintain effective surveillance over public health, social and security matters.
- The Contractor will ensure proper collection and disposal of wastewater and solid waste within the construction camps to avoid any campsite spillage, contamination, or mess.
- The Contractor will ensure regular medical checkups of its workers to prevent disease spread into the surrounding villages.
- The Contractor will prepare a traffic management plan in collaboration with local authorities.
- The Contractor will hire the local population (especially women, if possible, and unskilled workers for relevant jobs) for construction work.
- The Contractor will complete the work quickly at nearby institutions, businesses, hospitals, and schools.
- The Contractor will restore damaged properties and utilities.
- The Grievance Redress Mechanism will be used to record, investigate, and respond to any complaints related to subproject activities. Investigation of the complaints will be undertaken by the PMC and PCU.

**Occupational Health and Safety**

Construction activities such as site preparation, excavation, concreting, operation of construction machinery and equipment, vehicular traffic, and temporary workers' accommodation pose potential risks to construction workers' health, safety, security, and well-being. Health and safety issues associated with using temporary accommodation sites include sanitation, disease, fire, cultural alienation, sleeping space, quality and quantity of food, personal safety and security, temperature control, and recreation.

Some of the Occupational Health and Safety (OHS) risks which are likely to arise during the construction phase of the subproject and are typical to many construction sites include: (a) exposure to physical hazards from working on heights, use of heavy equipment, including cranes, trip and fall hazards, (b) exposure to dust, noise, and vibrations, (c) falling objects, (d) exposure

74 A guidance note by IFC and the EBRD Workers' Accommodation: Processes and Standards (August 2009)

to hazardous materials, and (e) exposure to electrical hazards from the use of tools and machinery.

Table 43 provides characterization of impact on occupational health and safety during construction phase.

Table 40: Impact on Occupational Health and Safety during Construction Phase

| Impact | Duration | Extent | Likelihood | Magnitude | Sensitivity | Significance |
|---|---|---|---|---|---|---|
| Occupational Health and Safety | Short term | Local | Likely | Medium | Severe | High |

The following mitigation measures will be implemented to address the impacts on the contractor's workers:

- The Contractor will prepare and implement an occupational health and safety plan (covering the prevention of COVID-19 disease) as part of SSESMP.
- The contractor will appoint fulltime qualified and experienced OHS staff at the site.
- The Contractor will carry out job hazard analysis for each type of construction activity, which will result in the provision of specific training activities to the workers.
- The Contractor will deliver regular training sessions on occupational health and safety aspects.

The Contractor will train all construction workers on (a) equipment and machinery maintenance, (b) specific hazards of their work, (c) first aid, (d) basic sanitation and health care, and (e) environmental protection. The training sessions will be prior to any subproject activities.

- The Contractor will provide and install awareness-raising materials on occupational health and safety at every construction site.
- The Contractor will regularly screen the workers for communicable diseases, including sexually transmitted infections.
- The Contractor will ensure the provision of appropriate PPE for all workers and visitors, and ensure that PPE is used properly. No worker (or even visitor) will be allowed on the site without the required PPE (earplugs, safety shoes, hard hats, masks, goggles, etc.).
- The Contractor will ensure the provision of firefighting equipment at every construction site, campsites, and particularly near the fuel storage.
- The contractor's drivers will maintain a low speed while driving through/near the settlements.
- The Contractor will ensure the safety and reliability of all provided equipment and machinery for operation by workers. All electrical equipment will be inspected before it is used to ensure that it is suitable for its purpose. Persons operating electrical equipment should be thoroughly instructed about any possible danger to the equipment concerned. The contractor will provide proper labeling of equipment and containers at construction and storage sites.

- The Contractor will provide first aid appliances for its workers. At every workplace, there shall be maintained, in a readily accessible place, first aid appliances, including an adequate supply of sterilized dressing and cotton wool. First aid facilities will be made available at the work sites and in the camps. The contractor will engage a qualified first aider(s). The location and telephone numbers of the nearest hospital will be displayed at appropriate places at work sites and in construction camps.
- No child labor or forced labor will be engaged by the project or its contractors.
- The Contractor will maintain an accident management and reporting system.
- The drivers and operators of vehicles and materials handling equipment will be medically fit, trained, and tested and of a prescribed minimum age as required by government rules and regulations.
- The Contractor will provide housing, a safe and reliable water supply for all workers.
- The Contractor will ensure proper sanitary facilities for the workers. The sewage and domestic waste will be collected in containers and disposed of regularly. The Contractor will provide separate latrines and bathing places for males and females.
- The Contractor will provide appropriate security personnel and enclosures to prevent unauthorized entry into the sites and camp areas.

**Community Health and Safety**

Communities will be moderately exposed to threats due to impacts on their safety, air quality, ambient noise level; mobility of people, goods, and services; access to properties, economic activities, social services; service disruptions, etc. Construction workers may potentially bring communicable diseases into the community. The impact is thus indirect in nature, local in extent, medium in magnitude, and short-term in duration.

Table 44 provides characterization of impact on community health and safety during construction phase.

Table 41: Impact on Community Health and Safety during Construction Phase

| Impact | Duration | Extent | Likelihood | Magnitude | Sensitivity | Significance |
|---|---|---|---|---|---|---|
| Community Health and Safety | Short term | Widespread | Likely | Medium | Severe | High |

The following mitigation measures will be implemented:

- The Contractor will prepare and implement a community health and safety management plan as part of the SSESMP.
- The Contractor will provide adequate space and lighting, temporary fences, shining barriers, and signage at active work sites.
- The Contractor will ensure that alcohol and drugs are prohibited on the sites.
- The Contractor will prevent excessive noise.

- The Contractor will implement a code of conduct for workers, including restricting workers in designated areas, no littering, no fire, no trespassing, no residence at construction sites, and no obligation to do potentially dangerous work.
- The Contractor will maintain a complaint logbook in workers' camp and take action promptly on complaints.
- The Contractor will restrict access to the site, through a combination of institutional and administrative controls, with a focus on high-risk structures or areas depending on site-specific situations.
- The Contractor will remove hazardous conditions on construction sites that cannot be effectively controlled with site access restrictions, such as covering openings to small confined spaces, ensuring means of escape for larger openings such as trenches or excavations, or locked storage of hazardous materials.
- The Contractor will take measures to prevent the proliferation of disease vectors (including the COVID-19 virus and flu) at work sites.
- The Contractor will use risk management strategies to protect the local communities from physical, chemical, or other hazards associated with subproject activities.
- The Contractor will ensure preparedness in emergency response.
- Liaison with the community will be maintained. GRM will be established to address community grievances related to subproject activities. PMC and PCU will ensure the dissemination of GRM information.

**Restricted Access**

Access to facilities, shops, businesses, and houses might be blocked during the pipework. If the access is entirely blocked, it might cause a temporary loss of business. The open trenches would risk the community's safety if not well managed. However, this impact is temporary and likely will occur during pipework.

Table 45 provides characterization of impact on water resources during construction phase.

Table 42: Impact of Restricted Access during Site Restoration

| Impact | Duration | Extent | Likelihood | Magnitude | Sensitivity | Significance |
|---|---|---|---|---|---|---|
| Restricted Access | Short term | Local | Likely | Medium | Mild | Moderate |

The following mitigation measures will be implemented:

- Contractors will fence the construction site and install visible signs and lights in the open trenches.
- Contractor will install paths over the trenches.
- If needed, the contractor will arrange bypasses for pedestrians and vehicles and inform the community of a new temporary route before the construction.

- If any business loss is foreseen, the compensation should be agreed upon and paid following the Livelihood Restoration Plan (LRP).

**Traffic Management**

Laying pipelines through crossroads can lead to temporary disturbance to the traffic. Table 46 provides characterization of impact on traffic during construction phase.

Table 43: Impact on Traffic

| Impact | Duration | Extent | Likelihood | Magnitude | Sensitivity | Significance |
|---|---|---|---|---|---|---|
| Disturbance to the Traffic | Short term | Local | Likely | Major | Severe | High |

The following mitigation measures will be implemented:

- Contractor will prepare a traffic management plan to address the negative impacts on the traffic.
- Contractor will provide a temporary bypass for vehicles and pedestrians.
- If needed, the contractor will arrange bypasses for pedestrians and vehicles and inform the community of a new temporary route before the construction.
- Contractor will install temporary traffic lights, signs, and fences to ensure the residents safety.

**Livelihood impacts**

The subproject activities would be implemented mainly inside the WDU's territory. Therefore, no land acquisition is foreseen within the subproject activities, except for the temporary disturbance of road traffic during the connection of the WDU with the water network. The sole owner of these three concerned lands is Bukhara Suvtaminot LLC.

One family informally lived in Jarkok WDU and was resettled at the time of completing this ESIA with the assistance of Bukhara Province Municipality[75]. However, the family left there some fruit trees. The affected trees were calculated during inventory observation, which resulted in 40 apricot trees, nine cherry trees, 17 apple trees, and four vines, where the greenhouse plants and some ten fruit trees were damaged by frost last winter. The greenhouses will be dismantled and moved out by the family to a new place, but some 55 trees and four vines will be lost due to the subproject activities. The community representatives including affected family asked for recommendations on improving cultivation of trees and greenhouse plants.

The other two WDUs, Buzochi and Navbahor, have no residents. Still, the land and structures were used for various agricultural activities, which were discontinued after the first consultations in December 2023, when the farmers were informed about moving their assets to the new place

[75] Letter of Bukhara Province Municipality (Khokimiyat) about resettlement of a family informally lived in Jarkok WDU.

before the construction works. In May 2023, the lands of both WDUs were free of farmers' belongings.

Livelihood improvement activities are detailed in LRP, which will be implemented by the PMC and PCU. As part of this LRP, PMC will provide training sessions on planting vegetation tolerant to the local conditions and maintaining greenhouse. Information on provided training sessions will be included by PMC in the semi-annual environmental and social monitoring report.

**Influx of Labor**

It is planned that the project will employ more than 20 workers. The project contractor will be encourage to source employees from the local area, subject to the availability of candidates with the required skills and experience. During the construction there will be possible interactions between the workforce and local communities resulted in the following risks:

- COVID-19 related risks.
- Increased risk of infections, including:
  - water bone disease associated with poor sanitation of construction site and worker accommodation facilities;
  - sexually transmitted infections and HIV/AIDS;
  - intestinal diseases due to poor standard of food hygiene in site catering facilities.
- Disturbance and tension between migrant workers and local communities.
- Pressure on public service and infrastructure.

Table 47 provides characterization of impact of labor influx during construction phase.

Table 44: Impact of Labor Influx during Construction Phase

| Impact | Duration | Extent | Likelihood | Magnitude | Sensitivity | Significance |
|---|---|---|---|---|---|---|
| Labor Influx | Short term | Widespread | Likely | Medium | Mild | Moderate |

The following mitigation measures will be implemented:

- The project personnel including PMC and contractor's workers will be responsible for following Code of Conduct. PMC and contractor will deliver project induction training on engaging with the local community to the contractor's personnel. This will include an overview of culturally and religious measures and etiquette to bear in mind. The training and capacity-building activities will also include awareness on (1) prevention of communicable diseases and sexually transmitted infections, (2) ban on sexual exploitation, abuse, and harassment, (3) respect for residents' privacy, especially for women.
- Worker accommodation areas will be equipped properly by the contractor. The provision of good quality living accommodation, services and amenities will likely reduce the need for mixing with local communities.

- Sexual exploitation, abuse, and harassment will not be tolerated. The Contractor will work with local community leaders, local women committees and district authorities to ensure that any complaints are addressed in accordance with the law.
- A ban on wildlife harvesting (hunting/trapping/fishing) will be established for all project personnel.
- All persons housed in the local community must be transported daily to and from the site by the contractor's transportation as per the worker transit plan.
- PCU and PMC will work with the community to monitor influx.

**Cultural Heritage**

The subproject will not encroach on or be near cultural resources. However, considering the wealth of cultural heritage in the subproject area (Section 4.4.), the contractor will stop work immediately to allow further investigation if any findings are suspected.

Table 48 provides characterization of impact on cultural heritage during construction phase.

Table 45: Impact on Cultural Heritage during Construction Phase

| Impact | Duration | Extent | Likelihood | Magnitude | Sensitivity | Significance |
|---|---|---|---|---|---|---|
| Cultural Heritage | Short term | Local | Unlikely | Medium | Mild | Minimal |

**Site Restoration**

After completing the construction activities, the leftover construction material, debris, spoils, scraps, and other wastes from construction and campsites can create hindrance and encumbrance for the local communities and block natural drainage and irrigation canals. The impact is assessed as moderate.

Table 49 provides characterization of impact during site restoration.

Table 46: Impact during Site Restoration

| Impact | Duration | Extent | Likelihood | Magnitude | Sensitivity | Significance |
|---|---|---|---|---|---|---|
| Site Restoration | Short term | Local | Likely | Medium | Mild | Moderate |

The following mitigation measures will be implemented:

- Contractor will remove all leftover construction material, debris, spoils, and other wastes from the construction sites on time.
- The camp's areas will be thoroughly cleaned and restored to their original condition to the extent possible.
- No waste disposal will be carried out in the streams and rivers.
- With these measures implemented, the residual impact is considered low.

**Economic Impact**

The subproject will undoubtedly generate more job and market opportunities. The unskilled jobs generated by the subproject will be made available to the local population living around the subproject WDUs. Moreover, specific positions will be first made available to women to earn extra money while taking care of families. The local population can sell agricultural and self-produced products to the contractor's staff, thereby receiving additional income. Also, the local people can provide services for repairing machinery and equipment for the contractor or deliver other paid services.

Table 48 provides characterization of impact economics during construction phase.

Table 47: Impact on Economics during Construction Phase

| Impact | Duration | Extent | Likelihood | Magnitude | Sensitivity | Significance |
|---|---|---|---|---|---|---|
| Economics | Long term | Local | Likely | Major | Mild | High |

PMC will document economic improvement due to the project activities and provide information in their semi-annual environmental and social monitoring reports.

## 16.5. Summary of Impacts

The impact assessment revealed that the project will generate mostly positive socioeconomic benefits due to improving the water supply infrastructure in Karaulbazar District. Construction and rehabilitation of the drinking water supply system will significantly improve living conditions, improving the local population's health and environment. At the same time, the proposed project activities might generate various adverse environmental and social impacts. These impacts would be associated with waste generation, increased noise, air pollution, wastewater, disturbance to community and traffic, health and labor safety issues, etc. The project's potential environmental and social impacts have been assessed considering the methodology provided in ESMPF, where the key impacts are summarized in Table.

Table 48: Summary of Potential Impacts and their Significance

| Impact | Duration | Extent | Likelihood | Magnitude | Sensitivity | Significance |
|---|---|---|---|---|---|---|
| **Environmental Impacts during Construction Phase** | | | | | | |
| Land Erosion and Surface Disturbance | Long term | Local | Likely | Major | Sever | High |
| Air Pollution | Short term | Widespread | Likely | Major | Mild | Moderate |
| Noise | Short term | Local | Likely | Medium | Mild | Moderate |
| Water Pollution | Short term | Widespread | Likely | Medium | Mild | Moderate |
| Solid Waste | Short term | Local | Likely | Medium | Mild | Moderate |
| Loss of Trees | Short term | Local | Likely | Medium | Mild | Moderate |
| Loss of Fertilized Soil | Long term | Local | Likely | Major | Severe | High |

| Impact | Duration | Extent | Likelihood | Magnitude | Sensitivity | Significance |
|---|---|---|---|---|---|---|
| Loss of flora and fauna from the Red List | Long term | Widespread | Unlikely | Major | Severe | High |
| **Social Impacts during Construction Phase** | | | | | | |
| Land Use | Short term | Local | Unlikely | Medium | Low | Moderate |
| Construction Camp(s) | Short term | Local | Likely | Medium | Severe | High |
| Occupational Health and Safety | Short term | Local | Likely | Medium | Severe | High |
| Community Health and Safety | Short term | Widespread | Likely | Medium | Severe | High |
| Restricted Access | Short term | Local | Likely | Medium | Mild | Moderate |
| Disturbance to the Traffic | Short term | Local | Likely | Major | Severe | High |
| Labor Influx | Short term | Widespread | Likely | Medium | Mild | Moderate |
| Cultural Heritage | Short term | Local | Unlikely | Medium | Mild | Minimal |
| Site Restoration | Short term | Local | Likely | Medium | Mild | Moderate |
| Economics | Long term | Local | Likely | Major | Mild | High |

## 16.6. Operation Phase

### 16.6.1. Land erosion and surface disturbance

As part of water treatment, sludge generated after sedimentation and filtration is collected at the drying bed within the WDU territory for dewatering by gravity drainage, air drying, thickening, and temporary storage. After several months, the sludge cake formed on the surface can be removed by hand shoveling or mechanically and transferred to the sludge disposal sites at the landfills of Bukhara's regional solid waste company "Toza Hudud."

Mitigation measures will include:

- Timely and proper disposal of sludge excavated from clarifiers to the drying ponds;
- Avoiding collecting sludge next to water reservoirs.

### 16.6.2. Air quality pollution

No permanent impact on air is expected during the operation phase. However, it is recommended (i) to ensure compliance with national air quality standards (Section 3.3.1.) and (ii) water trees planted around the new WDUs to improve air quality and aesthetics.

### 16.6.3. Noise impact

Some temporary noise may occur during maintenance of WDUs and water supply networks. However, this disturbance is indirect in nature, local in extent, and short-term in duration.

The mitigation measures will include:

- A manual for operation and maintenance, including standard operating procedures for operation and maintenance, will be developed.
- Training on operation and maintenance of new WDU infrastructure.
- Planting trees around the new WDU to reduce noise levels.
- Ensuring compliance with national noise level quality standards (Section 3.3.2.).

### 16.6.4. Impact on water

Operation of WDU may cause some direct and indirect negative impacts on the water resources. These include excessive water withdrawal, discharge and seepage of wastewater from the newly constructed sewage system in the subproject area. Excessive water withdrawal can negatively impact the sensitive ecosystem of the Kuyumazar Water Reservoir. It may also have an impact on water users located in the downstream.

There is no wastewater system in the Karaulbazar administrative district. Wastewater can adversely affect groundwater and surface water. In most cases, wastewater is collected in local or household earthen basins, from where it seeps into deeper soil layers. The sewage system is expected to be improved under the Component 2 – Investment in Sewage Infrastructure of this Project. Currently, the detailed design of Component 2 and corresponding surveys are under way.

Without a proper wastewater system, water for washing down the contractor's vehicles and machinery on site and spills or leaks of fuels, lubricants, or chemicals from machinery and vehicles may contaminate soil and groundwater.

Mitigation measures will include:

- Following the operation and maintenance manual.
- Preparing and supervising the implementation of standard WDU operating procedures.
- Training water utility personnel for effective operation and maintenance of WDU, water main, and network.
- Screening and monitoring the equipment with further replacing defective ones.
- Developing and implementing a leak detection campaign.
- Installing specific wash down station of vehicles and machinery with further collection of wastewater.
- Implementing spill control measures to prevent spills from infiltrating into the groundwater table; measures will include appropriate materials handling and storage procedures, and the development of contingency plans in the event of a spill.

- Performing water quality monitoring (temperature, pH, odor, turbidity, dissolved oxygen, nitrogen, phosphorus, total organic carbon in the water, etc.).
- Organizing a public awareness campaign on effective water and wastewater management and environmental conservation.

### 16.6.5. Waste management

The operation and maintenance activities at the WDUs will generate sludge generated by sedimentation and filtration. It is collected at the drying bed within the WDU territory for dewatering by gravity drainage, air drying, thickening, and temporary storage. After several months, the sludge cake formed on the surface can be removed by hand shoveling or mechanically and transferred to the sludge disposal sites at the landfills of Bukhara's regional solid waste company "Toza Hudud."

Domestic waste will be generated by personnel of the water utility servicing WDUs. This debris will include paper, plastic containers, food residues, and liquid waste from kitchens and bathrooms.

Mitigation measures will include:

- Timely and proper disposal of sludge excavated from clarifiers to the drying lots;
- Avoiding collecting sludge next to water reservoirs.
- Developing and implementing a proper domestic waste management system included containers for domestic waste and a service agreement with the solid waste management operator of the subproject area.

### 16.6.6. Occupational health and safety

Operation of WDUs and networks will pose OHS risks for the maintenance staff. These risks may include exposure to dust, noise, and vibration, falling objects; exposure to chlorine and other hazardous materials; and exposure to electrical hazards from using electric tools and equipment.

Mitigation measures will include:

- As part of operation and maintenance (O&M) procedures, the water utility will prepare and implement an occupational health and safety management plan. The OHS plan should define methods and protocols for each type of activity to be carried out as part of the O&M.
- Job hazard analysis will be carried out for each type of O&M activity.
- Dedicated and qualified staff will be employed to ensure compliance with the OHS plan.
- Regular training sessions will be provided to the O&M workers on OHS aspects.
- Awareness-raising materials will be used, including posters, signage, booklets, and others.
- The water utility will provide PPE for all its personnel. No worker should be allowed on the site without the required PPE.

- Firefighting equipment will be made available as required at appropriate places.
- A complete record of accidents and near-misses will be maintained by the water utility.
- First aid facilities will be made available at the offices.

### 16.6.7. Community health and safety

Impacts during operations concern environmental or public health. Poorly operated WDUs pass pathogens; failure to chlorinate allows pathogens to survive in distribution systems; poor-quality pipes and low pressure allow cross-contamination from sewers and soil organisms. Modern, well-operated water stations deliver product water consistently free of coliform organisms and other pathogens, no matter how polluted the raw water is. WDU's water treatment technology includes filtration by pressure sand filters and sodium hypochlorite (NaOCl) disinfection.

Mitigation measures will include:

- Development and implementation of capacity building for WDU personnel in all aspects of operations and maintenance, which will ensure that high quality drinking water is provided through district systems.
- Provision of on-the-job training activities in the occupational and public safety aspects of storage and operational use of chlorine.
- Water quality test on residual chlorine.
- Water quality monitoring on all parameters required by the national standard[76].
- Screening electrical equipment and replacing the broken one by new.
- Ensuring the availability of health and safety specialists as part of the water utility personnel.
- Ensuring the availability of an emergency plan and provision of corresponding training to the water utility staff.

[76] Public Health Standard No. 950-2011, "Drinking water. Hygienic requirements and quality control," https://lex.uz/docs/4979438?type=doc

# 17. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

## 17.1. Consultation

### 17.1.1. Stakeholder identification

The subproject stakeholders comprise community stakeholders and institutional stakeholders. The community stakeholders are direct beneficiaries and comprise the local population in Buzochi, Navbahor, Jarqoq, and Tashquduq. The institutional stakeholders comprise the local administration, district and province-level line government departments, public health and wellbeing services, water utility, etc.

Table 49: Project Stakeholders and Priority

| Stakeholder Group | Stakeholder | Specific Interest, Relevance, or Influence | Priority |
|---|---|---|---|
| Government Representatives | ▪ Khokim of Bukhara Regional Administration<br>▪ Deputy Khokim on Investments of Bukhara Regional Administration<br>▪ Head of Construction Department of Bukhara Regional Administration<br>▪ Bukhara Regional Public Health and Wellbeing Service<br>▪ Bukhara Regional Environmental Protection Committee<br>▪ Khokim of Karaulbazar District Administration and his Deputies | ▪ Governance of the Project Area<br>▪ Issuance of permissions<br>▪ Coordination of project activities<br>▪ Environmental and social management<br>▪ Management of cumulative impacts<br>▪ Emergency preparedness and coordination | Medium |
| Client | ▪ Bukhara Suvtaminot LLC<br>▪ Uzsuvtaminot JSC<br>▪ Project Coordination Unit<br>▪ AIIB as funding source | ▪ Water and wastewater management<br>▪ Project coordination and management<br>▪ Project monitoring and evaluation<br>▪ Project grievance redress | High |
| Community Representatives | ▪ Chairman of Buzochi Community<br>▪ Chairman of Navbahor Community<br>▪ Chairman of Jarqoq Community<br>▪ Head of Buzochi community's women committee<br>▪ Head of Navbahor community's women committee | ▪ Community governance<br>▪ Community health and safety management<br>▪ Social support<br>▪ Assistance with employment<br>▪ Domestic conflict resolution | High |

| Stakeholder Group | Stakeholder | Specific Interest, Relevance, or Influence | Priority |
|---|---|---|---|
| | ▪ Head of Jarqoq community's women committee | ▪ Social mobilization for small community improvement projects | |
| Community Members | ▪ Teachers at Schools in Buzochi, Navbahor, Jarqoq<br>▪ Personnel of kindergartens in in Buzochi, Navbahor, Jarqoq<br>▪ Local medical point doctors, communities men and women | Potentially affected from Project related environemntal and social risks and impacts that will be managed through the Project environmental and social management plan | High |
| Local media | ▪ Mass media, including digital social media platforms | Project information sharing with stakeholders | High |

JSC = joint stock company; LLC = limited liability company

The objectives of public involvement are to inform stakeholders about the proposed project, provide an opportunity for those otherwise unrepresented to present their views and values, and provide better transparency and accountability in decision-making, creating a sense of ownership with the stakeholders. The primary approach used in public consultations was to provide sufficient relevant information in a form that is easily understood by non-experts without being simplistic or insulting, allow adequate time for stakeholders to read, discuss, and consider the data and its implications, and present their views. Responses should be provided to issues and problems raised or comments made by stakeholders, and the selection of venues and timing of events should encourage maximum attendance. Engaging stakeholders involved key informant interviews, on-site discussions, and random field interviews with stakeholders. These events included meetings with institutional stakeholders such as representatives of the Local Administration of Karaulbazar district, the Karaulbazar branch of Bukhara Suv Ta'minoti, local communities, etc., and local communities. The subproject will benefit residents in four settlements: Buzochi, Navbahor, Jarqoq, and Tashquduq, with a total population of 16,730, including 8,414 females, accounting for 50.3% (Table 23).

### 17.1.2. Consultations carried out during the preparation of ESMPF

Extensive consultations were carried out during the preparation of ESMPF. The first round of the consultations was carried in the November-December 2019 by the project proponents and social team in the Bukhara region by utilizing different methods such as focus group discussions (FGDs), in-depth interviews, and workshops. In total, 18 FGDs in nine districts and Bukhara and Kagan cities, around 10 in-depth interviews with key stakeholders, and two public consultations with secondary stakeholders have been undertaken. Separate female FGDs were organized in urban and rural areas in order to focus on examining the gender issues. More than 305 local people were involved in FGDs including 241 women.

During FGDs participants, mostly women, shared the current problems of the water and sewerage supply systems. They stated that in rural areas the access to the potable water is not reliable and they faced with frequent shortage of water delivery services. Even in urban areas of the region

people have access to the water for 2-4 hours per day. Because of the low pressure and worn-out pipes the residents of the multiple story houses needed to fetch water from yards or buy it from private service providers. The residents of the apartments stated that have no additional space for the water saving. Although participants from detached houses installed the cement water tankers the quality of delivered water is not satisfied.

### 17.1.3. Institutional Stakeholder Consultations Carried Out while Conducting ESIA

Stakeholder consultations were carried out in December 2022 and March and May 2023 in the form of focus group discussions, interviews, meetings, and workshops that covered the subproject design. Institutional stakeholder consultations included meetings with representatives of Local Administration of Karaulbazar District, Karaulbazar District Department of Health, Bukhara Province Public Health and Wellbeing Service, representatives of public schools and kindergarten, and rural medical stations.

Table 50: Public Consultations with Representatives of Institutional Stakeholders

| Date | Location | Representatives | Participants |
|---|---|---|---|
| 15.12.2022 | Bukhara Province Municipality (Khokimiyat) | khokimiyat, district health department, construction and finance and investment departments, Bukhara Suv Taminoti, PCU, province department of the environmental protection committee, etc. | 12 |
| 16.12.2022 | province department of the environmental protection committee | province department of the environmental protection committee | 3 |
| 16.12.2022 | province department of public health and wellbeing service | province department of public health and wellbeing service | 2 |
| 29.03.2023 | Bukhara Province Municipality (Khokimiyat) | deputy mayor, people's deputies, heads of construction and investment departments of regional municipality (khokimiyat), representative of statistic department, regional health, department, labor and social, protection, makhalla heads, and Bukhara Suv Taminoti, PCU, mass media | 30 |
| 02.05.2023 | Karaulbazar Municipality (Khokimiyat) | deputy mayor, head of district primary education department, head of district health department, head of district sanitary and hygienic department, makhalla heads, and others | 13 |

PCU = project coordination unit.

The project activities were widely covered in the local press and digital social media platform (Appendix 16).

The key concerns emerging from institutional stakeholder consultations are summarized in Table 54.

Table 51: Summary of concerns expressed and measures recommended

| No. | Concerns Expressed by Stakeholders | How they are Addressed |
|---|---|---|
| 1. | Stakeholders are concerned that water has a salty taste and whether the taste of the water will be better after commissioning of a new water treatment system. | The subproject design foresees that the treated water will comply with the drinking water requirements. |
| 2. | Stakeholders were interested in whether the project would improve the air quality in the district, as Karaulbazar district is industrial, and many industrial enterprises are concentrated here, resulting in a persistent smell in the air. | The subproject design includes an environmental monitoring plan requiring regular air quality monitoring around the subproject sites and drinking water tests upon installing and commissioning the new water system. However, the project's primary purpose is to provide safe, sustainable, and well-treated drinking water to the population of Bukhara province. |
| 3. | Stakeholders asked which organization would carry out construction work, how long construction would take, and who would conduct technical supervision. | The contractor will be selected based on the international competitive biddings. The contractor can be any foreign or local company meeting the requirements specified in the bidding documents. A Project Management Consultant (SU-YAPI Engineering & Consulting Inc., Turkey) will supervise construction and overall project management. The subproject works will be carried out for no more than 24 months. |
| 4. | Stakeholders asked why sewage systems are envisioned only in administrative centers, but what about other settlements? | Another consulting engineering company implements the sewage component under the AIIB project. Due to the lack of information on the subproject work scope, our response cannot be provided correctly. |
| 5. | Stakeholders noted that existing filtration facilities do not entirely treat water, so households hardly use tap water for cooking and drinking. | The subproject design provides two-stage water treatment, including mechanical treatment through sand filters and chemical disinfection by sodium hypochlorite. The water utility will conduct regular water quality tests per local regulations to make the water safe for drinking. |
| 6. | The purchase of clean drinking water remains one of the significant household budget expenditures. What will be the water tariff after installing a new water treatment system? | The water tariff is the same for the whole Bukhara Province. |

### 17.1.4. Community consultations carried out while conducting ESIA

The subproject communities were visited in December 2022 and May 02-05, 2023, and consultations were conducted with the community members within their settlements to encourage and facilitate their participation. In most of the consultations, women (78% participants of public consultations in subproject districts) also participated. Consultations were conducted in four subproject communities – Buzochi, Navbahor, Jarqoq, and Tashquduq, while ensuring that

people from various segments of society participated in the consultation to ensure proper coverage of possible stakeholder concerns.

Table 52: Community consultations in Karaulbazar district

| No. | Settlement | Meeting place | Date | Participants | |
|---|---|---|---|---|---|
| | | | | Male | Female |
| 1. | Buzochi | Community center, school, kindergarten, and rural medical station | May 2, 2023 | 7 | 6 |
| 2. | Navbahor | Community center, school, kindergarten, and rural medical station | May 3, 2023 | 5 | 35 |
| 3. | Jarkok | Community center, school, kindergarten, and rural medical station | May 4, 2023 | 2 | 10 |

During consultations, the participants were informed about the subproject design and associated activities, anticipated environmental and social impacts, expected social benefits and proposed GRM. The presentations were followed by discussions with meetings' participants. Table 56 summarizes the key concerns emerging from community consultations and explains how each concern is addressed in the ESIA.

Table 53: Summary of concerns expressed in community consultations

| No. | Concerns Expressed by Stakeholders | How they are Addressed |
|---|---|---|
| 1. | Most of the participants were not aware of the subproject. Only some institutional stakeholders were informed about the upcoming subproject activities. The local stakeholders asked whether the newly constructed water stations will be put into operation as this would be the second attempt to construct water supply system in the subproject settlements. | The subproject will bring many positive benefits to the local communities. The subproject will provide sustainable and safety water supply in four settlements and will create more livelihood opportunities and employment for people. |
| 2. | Some participants were concerned that the water in schools and kindergartens is salty, and they asked what the water taste would be after subproject implementation. | The subproject design foresees that the treated water will comply with the drinking water requirements. |
| 3. | The local population buys bottled water for cooking. 20L-bottle costs UZS9,000. So, they were worried about how much the water tariff would be after commissioning the new system. | The water tariff is the same for the whole Bukhara Province. |
| 4. | People are afraid to tap drink water because the water comes with sediment. Participants have asked what the water quality would be and whether the subproject design provides for the water's treatment. | The subproject design provides two-stage water treatment, including mechanical treatment through sand filters and chemical disinfection by sodium hypochlorite. The water utility will conduct regular water quality tests per local regulations to make the water safe for drinking. |
| 5. | Some stakeholders are concerned that no studies have been conducted on the district's air and water pollution levels. They raised | The subproject design includes an environmental monitoring plan requiring regular air quality monitoring around the subproject sites and |

| No. | Concerns Expressed by Stakeholders | How they are Addressed |
|---|---|---|
| | whether air and water quality tests will occur during and after the subproject. | drinking water tests upon installing and commissioning the new water system. |
| 6. | Local communities worried about a burning smell from the local dumpsites (for example, there is a dumpsite on the other side of WDU in Buzochi settlement) and other odors from People asked for regular monitoring of dumpsites and overall improving the level of public health in the region. | The subproject design includes an environmental monitoring plan requiring regular air quality monitoring around the subproject sites and drinking water tests upon installing and commissioning the new water system. However, the project's primary purpose is to provide safe, sustainable, and well-treated drinking water to the population of Bukhara province. |
| 7. | Please clarify whether any jobs will be provided for the local population during the subproject implementation. | The bidding documents will include requirements to engage the local population in jobs not requiring specific skills, particularly women, for non-construction works. |
| 8. | Some participants were worried whether the subproject would need more land for the new water treatment infrastructure during civil works: usually, the scope and design change when construction starts, and the subproject may need more land. | Once the subproject is approved, no additional land acquisition is allowed. The subproject detailed design is approved by the water utility, Uzsuvtaminot JSC, AIIB, and local regulators. Supervision will be established for the construction, ensuring the contractor does not deviate from the subproject documents. Supervisors will be present daily at each construction site. |
| 9. | People in Tashquduq asked who would pay for the construction work and how this would affect the population. Currently, the population pays UZS50,000 per one ton of water brought by truck. Participants were concerned about how much water will cost after the water station construction. | All construction and associated works will be implemented within the AIIB loan, which will be paid by the government. The water supply services will be paid by customers following established tariffs in Bukhara Province. |
| 10. | The participants expected that new water treatment stations would contribute to improved settlement and household water supply and stable supply of water to irrigate crop cultivation, construction of intra-settlement roads, and increasing business and employment opportunities to some extent. | ▪ The economic and social development will be increased in the subproject settlements. New businesses will be constructed due to the availability of water supply. Local people will get jobs in those industries and economic benefits.<br>▪ Due to the construction of three water stations, new investments in different economic sectors will be increased as the available water supply is mandatory for establishing development entities.<br>▪ The subproject will put a strong recommendation to the contractors to engage local labors in priority basis for civil works, and specifically to employ women in positions not associated with heavy physical labor.<br>▪ No intra-settlement roads will be constructed within the subproject activities. The pipe laying |

| No. | Concerns Expressed by Stakeholders | How they are Addressed |
|---|---|---|
| | | will be conducted along the existing roads. The subproject does not provide for demolishing the roads but will improve the conditions upon completion of the pipe laying. |

Some photographs of the community consultation meeting and focus group discussions are provided in in Appendix 16.

### 17.1.5. Consultation with affected persons

There is only one family in the subproject area that needs to be resettled. It is a family living illegally in the Jarqoq WDU since 2002. The meeting with this family took place on December 15, 2022 and May 03, 2023 in Jarqoq settlement (Appendix 16). The family headwoman participated in the meeting. The woman said that 21 years ago, she became homeless after leaving her husband's house with children (four sons and two daughters). At that time, she worked in the gas supply department of the district and knew that the WDU territory was unused, and the buildings were empty. She occupied the pumping station premises and repaired several rooms. During habitation at the WDU, the family built two large greenhouses and one hand-made smaller greenhouse for greenery, planted about 66 fruit trees (Section 4.2.1.), had a shed, and bred cattle, sheep, and poultry (Section 4.2.2.). The household head clarified that the greenhouse plants and some ten fruit trees were damaged by frost last winter. The large greenhouses are solid glass structures with lines of plants inside. However, the household owner did not allow entrance inside the greenhouses nor describe what she grows in the greenhouses; she only mentioned that the last winter led to frost damage to plants. She also could not describe in sufficient detail her additional income from livestock and poultry.

Today, her family comprises a divorced daughter living with her, married son, and their families. The detailed list of the family members is provided in the Resettlement Plan. When asked why she had not thought about her own legal home after so many years, she replied that she had begun collecting construction materials to build a house on the far left of the gate on the WDU land. When asked why she connected all her plans with the WDU, which does not belong to her legally, she replied that she has been living here for many years, she thinks she has the right to this territory, and she does not want to buy another land because someone else will occupy this WDU, if she moves out.

During the discussions of the upcoming subproject activities at the Jarqoq WDU, the woman said she understood that the family had to move out of the subproject site. The woman was informed that the Bukhara regional khokimiyat and Karaulbazar district administration would deal with her resettlement, but since the building where she lives belongs to the water utility, she will not receive compensation for it. However, she will be compensated for the trees and greenhouse plantings. Details are provided in the LRP.

### 17.1.6. Future consultation and participation

The stakeholder consultation will continue throughout the project implementation. The consultation process will be scheduled regularly with the stakeholders, including but not limited to, the concerned government departments, local administration, and community representatives from the subproject area with a specific focus on women empowerment. Visits will be undertaken in all the subproject communities twice or more, depending on the number of concerns raised under each consultation. Stakeholder engagement will provide stakeholders with opportunities to express their views on subproject risks, impacts and mitigation measures and will involve appropriate consideration of the views and responses by the PMC and PCU.

The overarching goal of consultations and community engagement will be to support and facilitate the subproject, maintain friendly relationships with the communities, reduce conflicts and project opposition, and effectively address grievances. Stakeholder consultation and participation will be carried out during implementation through the following:

- Grievance Redress Mechanism
- Mass media awareness campaign for all stakeholders
- Informal consultations during subproject implementation
- Formal interactions through periodic workshops and consultation sessions with wider stakeholders, especially institutional ones such as the women's committee, makhalla committee, and other relevant non-government organizations (NGOs) at the district and regional levels.

PMC/PCU will carry out consultations with a broad range of institutional stakeholders to address any outstanding issues of the subproject and concerns of the communities. The communication framework for stakeholder consultation and participation during subproject implementation is provided in Table 57.

The communications framework will be a key pathway for consultations with subproject communities, institutions, and other stakeholders. PMC and PCU will be responsible for handling communication between all subproject stakeholders.

Table 54: Stakeholder consultation and participation plan during subproject implementation

| No. | Activity | Location | Target stakeholders | Engagement method | Frequency | Responsibility |
|---|---|---|---|---|---|---|
| 1. | Public awareness campaigns and scoping sessions to share the ESMP and RP with the PAPs, communities and other stakeholders | Subproject settlements: Buzochi, Navbahor, Jarqoq, and Tashquduq | Communities of the subproject area and line departments and agencies | ▪ Meetings with the communities<br>▪ Visit to homes Group meetings<br>▪ Sharing of documents in local languages | Commencing upon engaging a contractor and throughout the subproject implementation | PCU/PMC |
| 2. | Establishment of GRM and GRCs | Subproject settlements: Buzochi, Navbahor, Jarqoq, and Tashquduq | Communities of the subproject area | ▪ Availability of information in the community center (makhalla committee)<br>▪ Sharing of documents in local languages | Before commencement of subproject activities | PCU/PMC |
| 3. | Grievance redress | Subproject settlements: Buzochi, Navbahor, Jarqoq, and Tashquduq | PMC/PCU; relevant line departments; and local communities | ▪ Meetings with the communities<br>▪ Visit to homes<br>▪ Group meetings<br>▪ Reporting | On an ongoing basis during the subproject implementation | PCU/PMC |
| 4. | Informal consultations and discussions | Subproject settlements: Buzochi, Navbahor, Jarqoq, and Tashquduq | Communities of the subproject area | ▪ Face-to-face meetings<br>▪ Meetings with the communities<br>▪ Visit to homes<br>▪ Group meetings | On an ongoing basis during the subproject implementation | PCU/PMC, contractor |
| 5. | Consultations with the communities during environmental and social monitoring | Subproject settlements: Buzochi, Navbahor, Jarqoq, and Tashquduq | Communities of the subproject area | ▪ Meetings with the communities<br>▪ Visit to homes<br>▪ Group meetings<br>▪ Sharing of documents in local languages<br>▪ Reporting | During construction stage | PCU/PMC |
| 6. | Monthly meetings at subproject sites | Office of Karaulbazar Branch of Bukhara Suv Taminoti | PCU/PMU, other consultants, and | ▪ Group meetings<br>▪ Reporting | During construction stage | PCU/PMC |

| No. | Activity | Location | Target stakeholders | Engagement method | Frequency | Responsibility |
|---|---|---|---|---|---|---|
| | | | communities representatives | | | |
| 7. | Consultation workshops to review work done and existing and outstanding grievances, concerns and recommendations | Office of Karaulbazar Branch of Bukhara Suv Taminoti | PCU/PMU, other consultants, and communities representatives | ▪ Invitation to public events<br>▪ Notification of availability of information in the communities center (makhalla committee)<br>▪ Group meetings with presentation of work done<br>▪ Reporting | At least once every six months of subproject activities | PCU/PMC |
| 8. | Communities consultations regarding the work done within the subproject | Subproject settlements: Buzochi, Navbahor, Jarqoq, and Tashquduq | Communities of the subproject area | ▪ Invitation to public events<br>▪ Notification of availability of information in the communities center (makhalla committee)<br>▪ Group meetings with presentation of work done<br>▪ Reporting | Upon completion of construction activities | PCU/PMC |
| 9. | Consultations during the AIIB Review Missions | Office of Karaulbazar Branch of Bukhara Suv Taminoti<br>Subproject settlements: Buzochi, Navbahor, Jarqoq, and Tashquduq | Water utility; PCU/PMU, other consultants, and communities representatives | ▪ Group meetings<br>▪ Reporting | Construction Stage | PCU/PMC |

## 17.2. Information Disclosure

AIIB EPS required the borrower to provide relevant environmental and social assessment information in a timely manner, in an accessible place and in a form and language(s) understandable to affected people and other stakeholders.

As part of information disclosure, the Environmental and Social Assessment, Livelihood Restoration Plan, and Gender Action Plan in English and summary in Russian and Uzbek will be available on the websites of Uzsuvtaminot JSC and AIIB upon the clearance of the documents. Moreover, the AIIB and Uzsuvtaminot JSC will post the semi-annual environmental monitoring reports to be prepared by PMC on their website.

A summary of the environmental and social assessment in Russian and Uzbek will be available to local communities and relevant authorities at the offices of PCU and Karakalpak Branch of Bukhara Suv Taminoti LLC.

# 18. GRIEVANCE REDRESS MECHANISM

Timely and effective redress of stakeholder grievances will bring sustainability in a subproject's operations. In particular, it will help advocate forming and strengthening relationships between project management and the stakeholder community groups and bridge gaps to create a common understanding, helping the project management operate efficiently in the area. To register and resolve the community's grievances in this process, a GRM will be established. The proposed mechanism will be based on two-tier grievance redress committees – at the settlement and project levels. The proposed GRM will help achieve sustainability objectives by dealing with the environmental and social issues of the subproject on time.

The settlement-level grievance redress committee (GRC) will be established to engage settlement-level community members/leaders (makhalla committee) to participate in the decision-making processes and to have “voices” of the aggrieved person/communities in the grievance redress procedures. This will also enhance local ownership of the subproject. Having members based in the settlement, the settlement-level GRC will help resolve the grievances quickly, often without going into lengthy documentation. The local participation will further build local capacity in dispute resolution and decision-making and provide leadership support in the implementation of the subproject. Cases which are not satisfactorily resolved or affected persons remain aggrieved, the case will then be forwarded to the project-level GRC as the prime floor for resolution of the grievances.

The purpose of the GRM is to facilitate resolving disputes without going into litigation. In this regard, the decision of the project level GRC will be final within the GRM. However, if any disputant remains dissatisfied with the GRC outcome, the disputant can seek redress from a court of law. Both tire GRMs are supported by Law on Appeals of Individuals and Legal Entities[77].

Following publication on the Uzsuvtaminot JSC[78], PCU has established GRM at the project level and adopted “Operating procedures for grievance management of the Bukhara Region Water Supply and Sewerage Project”. A detailed description of the GRM procedure is provided in Appendix 17. PCU’s personnel specified in the procedure are changed, and the current specialist list is provided in **Table 53**.

Table 55: PCU composition as of 01 May 2023

| No. | PCU personnel | Name |
|---|---|---|
| 1. | PCU Head | Mr. Erkin Iskandarov |
| 2. | PCU Environmental and Social Specialist | Ms. Sayyora Tillyakhodjaeva |
| 3. | PCU Water Supply Engineer | Mr. Laziz Rajabov |
| 4. | PCU Coordinator in Bukhara Province | Mr. Ravshan Khakimov |

[77] Law on Appeals of Individuals and Legal Entities, amended by law No.ZRY-445 dated 11.09.2017, https://lex.uz/docs/3336171

[78] Operating procedures for grievance management of the Bukhara Region Water Supply and Sewerage Project, https://uzsuv.uz/en/ongoing-projects

## 18.1. Grievance Redress Committees

The Grievance Redress Committees (GRCs) are to ensure accessibility, fairness, and independence of the procedures. The GRCs will be established at two levels:

(1) Settlement-level GRC with the scope limited to subproject activities in the specific settlement

(2) Project-level GRC, covering all subproject-affected settlements and subproject activities.

The project-level GRC besides PCU staff (**Table 54**) comprises two representatives of Bukhara Province Administration (khokimiyat) responsible for land acquisition and compensation and a representative of Bukhara Suv Taminoti Ltd.

The settlement-level GRC includes the following members:

1. Head of the community (makhalla)
2. Representative of the community's women committee
3. PMC Environmental and Social Specialists
4. PCU Coordinator
5. Head of Karaulbazar District Branch of Bukhara Suv Taminoti Ltd.
6. Contractor's representative.

**Table 54** specifies composition of the settlement-level GRC in Buzochi, Navbahor, and Jarqoq.

Table 56: Settlement-level GRC Composition

| No. | GRC members | Buzochi | Navbahor | Jarqoq |
|---|---|---|---|---|
| 1. | Head of the community (makhalla) | Ms. Gulnora Narzieva | Mr. Nodir Vakhidov | Mr. Tursinkhan Khudaibergenov |
| 2. | Head of community's women committee | Ms. Mokhichekhra Karimova | Ms. Mavjuda Ravshanova | Ms. Sadokat Sharipova |
| 3. | PMC Environmental and Social Specialists | Mr. Jamshid Tursunov | | |
| 4. | PCU Environmental and Social Specialist | Ms. Sayyora Tillakhodjaeva | | |
| 5. | PCU Coordinator | Mr. Ravshan Khakimov | | |
| 6. | Head of Karaulbazar District Branch of Bukhara Suv Taminoti Ltd | Mr. Sherali Salimov | | |
| 7. | Contractor's representative | To be determined upon international competitive bidding | | |

Community members of the settlement-level GRCs were appointed after consultations with communities. The settlement-level GRC composition will be available on the dashboard of the subproject-affected settlements. At this level, a complaint should be resolved within two weeks. If the grievance was not redressed in the first stage or the complainer is not satisfied with the

decision made/solution, s/he can submit the grievance directly to the project-level GRC in Tashkent.

The project-level GRC composition will be available at the office of Bukhara Suv Taminoti and the PCU Coordinator's office in the water utility. Grievances may be channeled through letters, emails, text messages (SMS), verbal narration, grievance boxes, and registers. However, the printed Complaint Registration Forms shall be available at the community center (makhalla committee) and complaints will be registered on the Grievance Log.

## 18.2. GRC's Scope of Work

The GRC scope of work will include the following:

(1) The settlement-level GRC will ensure that all grievances related to social and environmental issues are registered, formally recorded, reviewed, resolved, and the concerned person is informed on time.

(2) The project-level GRC will monitor the work of the settlement-level GRC and will work as a forum for appeal against the decision of the settlement-level GRC.

(3) Both tire GRCs will not consider complaints related to the procurement or any matters pending in the court of law.

(4) In resolving the disputes, the GRCs will consider the following:

- Merit of the complaints/case received for consideration;
- Evidence to decide on the complaint;
- Witness statements;
- Plausibility of the case in the light of related project activity;
- Applicable laws, environmental guidelines of Uzbekistan, initial environmental examination and environmental review document of the project, and AIIB ESP;
- Observations made on the field; and
- Available information on previous complaints of similar nature.

## 18.3. Hearing and Resolution of the Cases by Settlement GRC

The procedure for hearing and resolution of the complaint will be as follows:

On receipt of a complaint:

- The head of the community committee (head of makhalla committee) will log the complaint in a register called the Complaint Register.
- Contact other members of the GRC to conduct a meeting within 14 calendar days of the logging of the complaint.
- If needed, request the complainant or his representative to meet the settlement GRC on the appointed date to discuss his complaint.

- Prepare all the relevant information and documents relevant to the complaint prior to the meeting and provide copies to all members.

The settlement GRC will meet on the appointed date during which it may:

- Deliberate on the nature and circumstances of the complaint;
- Investigate the complaint based on evidence provided by the complainant;
- Meet with the complainant and other persons;
- Make a decision.

If the GRC needs extra time to investigate or deliberate on the complaint, the head of makhalla (community committee) will inform the complainant of the time when a decision is expected. In any case, all complaints shall be resolved within one month. Once the complaint is resolved, the PMC will document the decision and prepare full documentation on the process, including minutes of meeting, photographs of visits, documents reviewed, and reasons for the decision and will share this documentation and the complaint management report with all GRC members, the complainant, and the PCU. The GRC will ensure that the complainant is fully informed of the decision and is also informed about the right to appeal to the Project GRC and to the court of law. In case follow-up actions are required, the PMC will ensure that the actions are taken and documented and will share this information with the head of the community committee, other GRC members, and the PCU.

## 18.4. Hearing and Resolution of the Cases by Project GRC

The procedure for hearing and resolution of the complaint by the Project GRC will be as specified in the Uzsuvtaminot JSC[79].

The GRM will provide an accessible forum for receiving and facilitating resolution of affected persons' grievances related to the project. Every grievance will be registered with careful documentation of the process adopted for each grievance handled, as explained below.

PCU and PMC will have the overall responsibility for timely grievance redress on environmental and social safeguards issues. The Project Coordinator in Bukhara Province will be the focal person for facilitating the grievance redress at the local level.

Public awareness campaigns will be conducted on a regular basis as per the communication strategy of the project to ensure awareness of the subproject's progress and its GRM.

However, if the complainant is not satisfied with the decision made by the Project GRC, the grievance than will be considered by Uzsuvtaminot JSC through its complaint management system. Uzsuvtaminot JSC provides the following contacts for filing grievance:

[79] Operating procedures for grievance management of the Bukhara Region Water Supply and Sewerage Project, https://uzsuv.uz/en/ongoing-projects

Figure 51: Screenshot from Uzsuvtaminot JSC website

## 18.5. GRM for Workers

PCU and PMC will establish an independent complaint handling center with a locked "post box" and grievance forms in the construction sites to handle construction workers' grievances related to the contractor (wage, overtime pay, timely payment, accommodation, catering, drinking water, PPE, sanitation conditions, medical services, etc). The grievance box will be checked regularly by PMC and PCU. However, the workers can raise their complaints during the presence of PMC and PCU on the site or send their grievance over the telephone. If the complainant prefers a verbal grievance, the PMC and PCU personnel record and register it following the formal process.

The grievance form will be available to construction workers and project personnel in Uzbek, Russian, and other languages. Where the complainant is illiterate, the complaint can be made verbally to PCU and PMC personnel so that they will complete the grievance form on behalf of the grievant. The grievance form will include the complainant's contact details. However, the complainant can also raise a grievance anonymously.

PMC and PCU will take corresponding actions to resolve the grievance and provide the complainant with a proper corrective actions report. PMC and PCU will continue to monitor the situation until it is finally resolved. All complaints and corresponding grievance settlement reports will be kept in the PCU office in Tashkent and made available for review to the AIIB mission.

## 18.6. GRM on GBV

Gender-based Violence (GBV) grievances such as sexual exploitation, abuse, and harassment (SEAH) will be handled under a special protocol governed by the following principles:

- SEAH is not acceptable under any circumstance.
- Action will be taken on every allegation.
- Action will be fair, timely, and have due regard for procedural fairness.
- Above all else, SEAH survivors' needs, rights, and safety will be prioritized.

The complainant will be informed that the grievance will be treated confidentially and without reprisals. PCU and PMC will establish a locked "post box" and grievance forms in the construction sites and near the community centers to make available to raise compliant confidentially, anonymous, or non-anonymous complaints in writing, at their choice. The complaint can also be submitted by telephone (through the toll-free phone number provided by PCU and PMC) and electronically through email.

PMC and PCU will also dedicate a specific time to speak to the workers at the construction sites and residents of the subproject settlements on possible SEAH risks. Moreover, the PMC and PCU contact toll-free phone numbers will be made available at the community centers (makhalla committees) and construction sites, so any affected person can call to file an anonymous or non-anonymous complaint (at their discretion). The complainant will have the option to denounce a situation to any of the project representatives.

PCU and PMC will act as ethics agents in examining and screening complaints, and if needed, forwarding them to legal means to provide an appropriate response according to the complaints types and, finally, notifying the complainant about the actions taken on their complaint. Upon receiving such a sensitive complaint, PMC and PCU will immediately act to clarify the facts confidentially and safely. PMC and PCU will approach the judicial authorities for investigation and criminal proceedings if needed.

If acts of SEAH involve any project personnel, PCU and PMC will take action on a case-by-case basis. If it is proven that the acts were committed, PCU and PMC will be empowered to take the following measures:

- Immediate termination of the contractual relationship (for those under an agreement that does not grant them the status of staff member or another collaborative agreement) or suspend employment, depending on the severity of the grievance
- Inclusion of a specific reference in AIIB and Uzsuvtaminot records to prevent persons subject to a sensitive complaint from applying for future offers and having other contractual relations with AIIB and Uzsuvtaminot when it is proven that they have participated in SEAH acts or have encouraged or tolerated such actions.
- PCU and PMC will provide information on medical and social services for dealing with sexual violence and, in the case of a non-anonymous complaint, encourage the victim to visit medical and social facilities to prevent any consequences of SEAH.
- Provision of report on preliminary investigation to the complainant confidentially, safely, without discrimination.
- Provision of report on criminal proceedings to the complainant confidentially, safely, without discrimination and avoid causing harm.

- Delivery of training on code of conduct in the populated area and workplace and training on GBV risks.
- PCU and PMC will continue to monitor the situation until it is finally resolved.

All complaints and corresponding grievance settlement reports will be kept in the PCU office in Tashkent and made available for review to the AIIB mission.

## 18.7. Court of law

At any stage of the two-tire GRM process, if an issue is not resolved or the complainer is not satisfied with the decision, an aggrieved person may submit its grievance to a Court at his cost, where decisions will be made following applicable national legislation.

## 18.8. AIIB's Project-affected People's Mechanism

AIIB has established a Project-affected People's Mechanism (PPM) to provide an opportunity for an independent and impartial review of submissions from Project-affected people who believe they have been or are likely to be adversely affected by AIIB's failure to implement the ESP when the complaints cannot be addressed satisfactorily through Project-level GRM or AIIB Management's processes. AIIB Policy on the Project-affected People's Mechanism and Rules of Procedure of the PPM guide the PPM. The Complaints-resolution, Evaluation, and Integrity Unit (CEIU) is responsible for the functioning of the PPM.

The PPM's submission-handling functions include:

(1) Project Processing Queries

A Project Processing Query (PPQ) is designed to enable PAP to rapidly resolve their concerns about simple matters that arise during AIIB's environmental and social due diligence of a Project and do not require dispute resolution. The due diligence includes screening, categorization, and assessment of the environmental or social impacts of the Project. PPQ can include inquiries about the consultation process related to a Project or requests to address environmental nuisances such as dust, noise, or mobility restrictions experienced during Project preparation.

(2) Requests for Dispute Resolution

Requests for Dispute Resolution (RDR) allow the PPM to seek to facilitate and coordinate the resolution of a dispute that has arisen over measures required to mitigate known and quantifiable potential or actual material adverse environment and social impacts that occur during AIIB's due diligence of a Project or Project implementation. The parties to the dispute typically include the Client and the Requestors. Still, they may also involve Management and contractors or other parties involved in the Project processing or implementation. This process aims to reach a time-bound and monitorable dispute resolution agreement between the parties concerned on actions to mitigate these impacts. Under this process, the PPM explores the PAP's mutually acceptable dispute resolution

methods. This process may include consultative dialogue, information sharing, joint fact-finding, and creating a mediation mechanism or other methods.

(3) Requests for Compliance Review

The process under a Request for Compliance Review (RCR) involves an investigation by the PPM of allegations by Project-affected people that AIIB has failed to comply with its obligations under the ESP in its environmental and social due diligence of a Project during Project preparation or its oversight of the Project during implementation, thereby causing or being likely to cause material adverse ecological or social impacts on the Project-affected people. If the allegations are substantiated, the process includes reviewing any action plan proposed by Management to address these impacts.

## 18.9. Documentation of Grievances and Reporting

The complaint/grievance will be redressed in 15 days at each tier, and written communication will be sent to the complainant at each tier. A complaint log will be maintained at the PMC and PCU, with details of the complaint lodged, the date of the personal hearing, actions taken, and the date of communication sent to the complainant. The PMC is responsible for reporting the complaint log to PCU every month. The PCU is responsible for gathering the grievance statistics at two tiers and in the national complaint handling system, compiling the data in the Quarterly Project Progress Reports and semi-annual Environmental and Social Monitoring Reports, and reporting to AIIB.

# 19. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

## 19.1. Environmental and Social Management

The ESMP will guide the subproject's environmentally-sound construction and ensure efficient communication lines between PMC, PCU, Karaulbazar District Branch of Bukhara Suv Taminoti Ltd, and contractors. The ESMP will:

- Ensure that the activities are undertaken in a responsible, non-detrimental manner.
- Provide a pro-active, feasible, and practical working tool to measure and monitor environmental and social performance on site.
- Guide and control the implementation of the findings and recommendations of the environmental and social assessment conducted for the subproject.
- Detail specific actions deemed necessary to mitigate the subproject's environmental and social impacts.
- Ensure that safety recommendations are complied with.

The ESMP includes a monitoring program to measure the environmental and social conditions and effectiveness of implementing the mitigation measures. It will consist of observations on- and off-site, document checks, and interviews with workers and beneficiaries.

Due to the nature and applicability of the ESMP, it will also be used for contractual purposes through its inclusion as a part of the bidding documents for the contractor, who has to adhere to the EMP along with applicable Uzbek regulations and AIIB requirements.

The contractor will be required to (i) carry out the mitigation and monitoring measures set forth in the approved SSESMP; and (ii) implement any corrective or preventative actions set out in SAESMRs that the PMC/PCU will prepare from time to time to monitor implementation of this ESIA, ESMP, and SSESMP. The contractor will allocate a budget for compliance with the ESIA, ESMP, and SSESMP measures, requirements, and actions. The contractor will be required to submit to PMC/PCU, for review and approval, SSESMP with the following: (i) proposed sites/locations for work camps, storage areas, hauling roads, lay down areas, and disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the ESMP; and (iii) monitoring program as per the ESMP. No work can commence before PMC/PCU approves SSESMP. The strict implementation of the ESMP and project management's strict enforcement of fair construction practices and standards will significantly reduce the negative impacts of the subproject.

The ESMP (Table 60) is prepared for all the identified environmental and social impacts during the design, construction, and operation of various subproject activities. The methodology followed for preparing the ESMP includes the following: preparation of mitigation and protection measures for identified impacts using impact evaluation methodology[80]; systematization of mitigation, compensation, and enhancement measures for each identified impact with the following

[80] https://www.aiib.org/en/projects/details/2020/approved/_download/Uzbekistan/EN_BRWSSP_ESMPF.pdf

preparation of the overall efforts; development of a mechanism for monitoring the proposed mitigation measures; and estimation of budget requirements for implementation, mitigation, and monitoring measures.

Table 57: Environmental and Social Management Plan

| No. | Project Activity | Impact | Mitigation Measures | Responsibility | Monitoring Indicators | Frequency of Monitoring |
|---|---|---|---|---|---|---|
| **Planning Phase** | | | | | | |
| 1. | Design of WDUs | Inefficient treatment and treated water quality not satisfying the established standards | 1. Design of WDU's infrastructure is based on international best practices and adopted into Uzbek legislation.<br>2. Finally treated water will comply with the requirements set in applicable national legislation, Section 3.3.3. This will be achieved with effective water treatment technology, applying sand filters as a filter technology and sodium hypochlorite (NaOCl) for water disinfection in accordance with the detailed design.<br>3. Detailed engineering design ensures a sanitary buffer zone of water reservoir per national legislation, KMK 2.04.02-97 "Water supply. External networks and facilities"[81] and Public Health Standard No. 0244-07 "Design and operation of sanitary protection zones of drinking water sources and pipelines."<br>4. The design provides fencing, gates, and a guardhouse around WDUs to protect drinking water from contamination and infrastructure and equipment from damage by aliens. | Design Consultant, PCU/PMC, Water Utility | Incorporated in the design and communicated to contractors | Prior to civil works |
| 2. | Design of WDU water distribution pipelines | Inadequate design of distribution pipelines leading to disproportional water supply and | 5. Design provides for connecting the WDUs with the water networks in Buzochi, Navbahor, Tashquduq, and Jarqoq through HDPE pipes.<br>6. Design foresees structural integrity of the hydraulic system. | Design Consultant, PCU/PMC, Water Utility | Incorporated in the design and communicated to contractors | Prior to civil works |

[81] KMK 2.04.02-97 "Water supply. External networks and facilities", Ministry of construction of Uzbekistan, https://mc.uz/gradostroitelnye-normy/

| No. | Project Activity | Impact | Mitigation Measures | Responsibility | Monitoring Indicators | Frequency of Monitoring |
|---|---|---|---|---|---|---|
| | | losses, and water quality change | 7. Design follows the requirements for minimizing water losses from pipelines by perfect jointing and alignments using appropriate techniques.<br>8. Design provides for an optimized number of elbows and turns. | | | |
| 3. | Climate Change | Low precipitation and high temperatures may result in impending desertification, lack of water, and salinization of soils and groundwater | 9. Engineering design of the water infrastructure is prepared in an effective way to reduce water losses.<br>10. Engineering design foresees introducing energy efficiency technology at the water facilities, which will also contribute to reducing greenhouse gas emissions during operation. | Design Consultant, PCU/PMC, Water Utility | Incorporated in the design and communicated to contractors | Prior to civil works |
| 4. | Bidding documents | Failure to conduct environmental and social monitoring over the construction activities | 11. Bidding documents and the contract will ensure the inclusion of environmental provisions along with ESMP.<br>12. Bid evaluation will ensure the selection of an experienced bidder in environmentally friendly construction who proposes a proper ESMP budget.<br>13. Contract with successful bidder will ensure the provision of a SSESMP within 30 days after contract award and prior to commencing any physical works by the contractor. SSESMP will be prepared by the contractor and approved by PCU/PMC. SSESMP will include the following sections: (i) earthworks and top soil management plan, (ii) traffic management plan, (iii) petroleum products management plan, (iv) solid waste management plan, (v) hazardous waste management plan, (vi) landscaping management plan, (vii) construction camp management plan, (viii) | PCU/PMC, Water Utility | Incorporated in final design and communicated to contractors | Prior to civil works |

| No. | Project Activity | Impact | Mitigation Measures | Responsibility | Monitoring Indicators | Frequency of Monitoring |
|---|---|---|---|---|---|---|
| | | | occupational health and safety management plan, (ix) emergency response plan, (x) contingency and spoil management.<br>14. Bidding documents will ensure the non-use of Bukhara Oil Refinery products.<br>15. Bidding documents will ensure the reinstatement of damaged utilities such as roads (including access roads) and transmission/distribution lines (if any) in the subproject area.<br>16. Bidding documents will ensure the contractor's preparation of an operation and maintenance manual for the three WDUs. | | | |
| 5. | Existing utilities and infrastructure | Disruption of services | 17. Design provides for connection pipes from WDUs to the water network and may impact the existing utilities and infrastructure, such as roads and power transmission lines. To avoid unnecessary disruption of services during construction, the design specifies specific routes for laying connection pipes. | Design Consultant, PCU/PMC, Water Utility | Bidding documents include a requirement for a contingency plan for service interruptions | During preparation of bidding documents |
| 6. | Sources of materials | Emissions from the oil refinery worsen air quality in the settlement and the reserve in the subproject area | 18. Prohibition of use of petroleum and other products of BNPZ. | Water Utility, PCU/PMC | Bidding documents include a requirement for prohibition of use the products of BOR | During preparation of bidding documents |
| **Construction Phase** | | | | | | |
| 7. | Land Erosion and Surface Disturbance | Excavation and digging of trenches leading to soil erosion, silt runoff, and | 19. Contractor will prepare and implement the SSESMP prior to the start of the work. The SSESMP will include an earthwork management plan describing trench backfilling technology, stabilization of the | Implementation by Contractor<br>Supervision by PCU, PMC, | No visible land degradation to nearby territories due | Visual inspection by PMC on weekly basis |

| No. | Project Activity | Impact | Mitigation Measures | Responsibility | Monitoring Indicators | Frequency of Monitoring |
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| | | unsettling of nearby road surfaces, unorganized disposal of the excavated earth | exposed soil and its vegetation to prevent further soil erosion, excess soil caused by excavation and that cannot be reused at the site(s), schemes of temporary access, diversions, and signboards for pedestrians.<br>20. Contractor will be required to take appropriate measures to avoid and contain any spillage and pollution of the soil. In case of spillage, the contaminants should be confined immediately after such accidental spillage, and contaminated soils should be collected, treated, and disposed of in an environmentally friendly manner.<br>21. All areas intended for storage of hazardous materials must be quarantined and provided with adequate facilities to combat emergencies, complying with all the applicable statutory stipulations.<br>22. Contractor will strip and stockpile topsoil where practical.<br>23. Contractor will not repair vehicles and equipment at the WDU sites or along the roads. If unavoidable, impervious sheathing will be used to avoid soil and water contamination.<br>24. For sewage waste, the contractor will operate appropriate septic tanks installed on site. The sewage container will prevent wastewater percolation into the ground, so there will be no discharge. Sewage from construction camps and other facilities will be collected and transported to a nearby sewage treatment plant. | and Water Utility | to construction activities<br>Number of complaints from local populations | |

| No. | Project Activity | Impact | Mitigation Measures | Responsibility | Monitoring Indicators | Frequency of Monitoring |
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| 8. | Air quality pollution | Working during the dry season and transporting construction materials may increase dust, carbon, monoxide, sulfur oxides, nitrous oxides. particulate matter, methane in the air environment | 25. To avoid soil compaction on unpaved roads, the movement of construction vehicles, machinery, and equipment will be restricted to the corridor or identified route. In case of land compaction due to subproject activities, the contractor will restore land for agricultural use.<br>26. Contractor will prepare SSESMP comprising earth earthworks and top soil management plan and a traffic management plan.<br>27. Contractor will implement dust prevention measures such as watering roads near residential areas and watering dry, exposed surfaces and stockpiles of aggregates. The stockpiles of construction materials will be inside the WDUs and sprinkled with water, as needed. Water will also be sprayed on temporary service and access roads. After compacting, water should be regularly sprayed on the earthwork to prevent dust.<br>28. Contractor will keep the construction area where local roads are used for hauling in serviceable condition, and repair any damage promptly without interference to local routes.<br>29. Contractor will cover loose and fine materials (e.g. sand and fine aggregates) when being transported on trucks and store piled at the site.<br>30. Contractor will place warning signs at active work sites in populated areas.<br>31. Contractor will limit the speed of construction vehicles on access roads and inside the subproject settlements to a maximum of 40 km/h. | Implementation by Contractor<br>Supervision by PCU, PMC, and Water Utility | Number of complaints from sensitive receptors | Visual inspection by PMC on weekly basis<br>Quarterly inspection by PCU's Environmental and Social Specialist |

| No. | Project Activity | Impact | Mitigation Measures | Responsibility | Monitoring Indicators | Frequency of Monitoring |
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| | | | 32. Contractor will use vehicles and other construction equipment such as diesel generators complying with applicable national legislation regarding emissions, and carry out regular maintenance of machinery and equipment. The Contractor will use vehicles, plant, and equipment meet Euro-4 standard as required by Uzbek legislation.<br>33. Contractor is prohibited from incinerating domestic, construction, and landscaping waste at construction sites.<br>34. Contractor will not use petroleum and other products produced by the Bukhara Oil Refinery.<br>35. The Grievance Redress Mechanism will be used to record, investigate, and respond to any complaints related to the subproject activities. Investigation of the complaints will be undertaken by the PMC and the PCU.<br>36. The Contractor will prepare Traffic Management Plan as part of SSESMP and will manage scheduled transport movement to minimize gas emission.<br>37. The Contractor will store hazardous materials with potential gas emissions in sealed containers and will use them well-ventilated and secure low-risk areas.<br>38. The Contractor will seal cement and other fine materials after use or put them in containers with lid; concrete batching plants will be located away from sensitive receptors.<br>39. The Contractor will conduct air quality monitoring in line with the monitoring plan (Section 8.2.1) and on | | | |

| No. | Project Activity | Impact | Mitigation Measures | Responsibility | Monitoring Indicators | Frequency of Monitoring |
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| | | | the monitoring points at the sensitive receptors' places.<br>40. Contractor will prepare and implement the SSESMP prior to the start of work. The SSESMP should provide for effective noise control measures, including scheduling noisy activities for the daytime, preparation of a work schedule and informing adjacent communities. In case percussive piling is employed during the subproject activities, it will be prohibited at any time on Sundays and public holidays and during the weekday evenings and nighttime hours. | | | |
| 9. | Noise generation | Temporary increase in noise level and vibrations by excavation equipment, and the transportation of materials, equipment, and people | 41. Contractor will use low-noise equipment and machinery. There is no getting around the fact that construction equipment can be loud, but there are ways to choose quieter equipment. A general rule of thumb is that electronic-powered equipment is quieter than diesel and hydraulically powered equipment is quieter than pneumatic power. Moreover, to mitigate and decrease noise levels, the contractor should properly maintain and lubricate machinery and equipment (e.g., oil bearings).<br>42. Contractor will limit engine idling to a maximum of one minute. Most construction noise originates from internal combustion engines. Much noise is emitted due to the air intake and exhaust cycle. Specifying adequate muffler systems can control much of the engine noise.<br>43. Contractor will install an acoustic screen during noisy activities to ensure the noise level in the area adjusted to the closest household is no more than 70 | Implementation by Contractor<br>Supervision by PCU, PMC, and Water Utility | Number of complaints from sensitive receptors | Visual inspection by PMC on weekly basis<br>Quarterly inspection by PCU's Environmental and Social Specialist |

| No. | Project Activity | Impact | Mitigation Measures | Responsibility | Monitoring Indicators | Frequency of Monitoring |
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| | | | dB. Employing shields that are physically attached to the particular piece of equipment is effective, particularly for stationary equipment and where considerable noise reduction is required.<br>44. Contractor will limit vehicles speed inside settlements to a maximum of 40 km/h to mitigate noise produced during transport. This should also be supported by spreading out the schedule of material, spoil and waste transport.<br>45. To mitigate noise produced during WDUs operation, the contractor will plant trees around the WDUs upon completion of all construction activities. Coniferous trees absorb sound more effectively than deciduous trees because their bark layer is much thicker. Although coniferous trees are invasive in the subproject area, about ten pines are planted on one outer side of the Jarqoq station. However, the contractor should plant around the stations only trees with habitat typical for the area of growth in the given territory. Following public consultations conducted in four subproject settlements, the trees that take root at the subproject sites are apricot, apple, and elm.<br>46. To comply with occupational health and safety standards, the contractor will provide all its workers with effective Personal Protective Equipment (PPE). Ear muffs and earplugs are the most common types of PPE. Increased protection can be achieved by wearing earplugs and earmuffs together.<br>47. The Contractor will prepare Traffic Management Plan as part of SSESMP. | | | |

| No. | Project Activity | Impact | Mitigation Measures | Responsibility | Monitoring Indicators | Frequency of Monitoring |
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| | | | 48. The Contractor will employ additional noise barriers/attenuation to ensure that the maximum noise level at the location of sensitive receptors when all equipment is running does not exceed 35 dB (schools) and 55 dB (residential area), respectively (Section 3.3.2).<br>49. The Contractor will conduct noise monitoring in accordance with the monitoring plan (Section 8.2.1) and on the monitoring points at the sensitive receptors' places.<br>50. The Grievance Redress Mechanism will be used to record, investigate, and respond to any complaints related to subproject activities. The impacted receptors will have access to make any complaints regarding noise during the construction phase. Investigation of the complaints will be undertaken by the PMC and PCU. | | | |
| 10. | Water resources worsening | Trenching and excavation, runoff from ineffective stockpiled materials, infiltration of fuels and lubricants, and inadequate wastewater management may cause siltation and reduce groundwater quality. | 51. Contractor will develop a spoil management plan as part of the SSESMP.<br>52. Contractor will carry out earthworks during the dry season.<br>53. Contractor will ensure the warehouse floor is adequately isolated to prevent the contamination and infiltration of construction materials into the soil and groundwater.<br>54. Contractor will organize the fuel storage area in designated areas and ensure proper fuel management. | Implementation by Contractor<br>Supervision by PCU, PMC, and Water Utility | Areas for stockpile storage of fuels, lubricants, and waste;<br>Contractor's wastewater collection and disposal facilities;<br>Number of complaints from sensitive receptors | Visual inspection by PMC on weekly basis<br>Quarterly inspection by PCU's Environmental and Social Specialist |

| No. | Project Activity | Impact | Mitigation Measures | Responsibility | Monitoring Indicators | Frequency of Monitoring |
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| 11. | Waste generation | Generation of solid waste, wastewater from labor camp and other construction waste may cause pollution | 55. Contractor will maintain effective wastewater collection and disposal at each site.<br>56. Grievance Redress Mechanism will be used to record, investigate, and respond to any complaints related to subproject activities.<br>57. Contractor will develop a waste management plan as part of the SSESMP. The waste management plan will comprise separate management plans for domestic, construction and hazardous waste.<br>58. Contractor will minimize the production of waste materials by applying the 3R approach (reduce, recycle, and reuse);<br>59. Contractor will segregate and reuse or recycle all the wastes, wherever practical. Contractor will provide reuse containers at each worksite.<br>60. Contractor will identify suitable sites for temporary storage of construction and domestic waste inside the WDU territory. The waste shall be transported for disposal in a timely manner. Contractor will make a contract with the solid waste operator.<br>61. Contractor will train and instruct its personnel in waste disposal practices and procedures as a component of the environmental induction process.<br>62. Contractor will ensure all containers, drums, and tanks used for storage are in good condition and labeled with an expiration date. Contractor will check for leakage regularly to identify potential problems before they occur. Otherwise, any container, drum, | Implementation by Contractor<br>Supervision by PCU, PMC, and Water Utility | Worksite cleared of hazardous wastes, unutilized materials, and household and construction wastes;<br>Construction camp cleared of household waste;<br>Transport route and worksite cleared of dirt<br>Number of complaints from sensitive receptors | Visual inspection by PMC on weekly basis<br>Quarterly inspection by PCU's Environmental and Social Specialist |

| No. | Project Activity | Impact | Mitigation Measures | Responsibility | Monitoring Indicators | Frequency of Monitoring |
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| | | | or dented, cracked, or rusted tank might eventually leak.<br>63. Contractor is prohibited from incinerating domestic, construction, and landscaping waste at construction sites.<br>64. Contractor will avoid the use of materials with more significant potential for contamination by substituting them with more environmentally friendly materials.<br>65. Contractor will maintain all construction sites in a cleaner, tidy, and safe condition and provide appropriate facilities for temporary storage of all wastes before transportation and final disposal.<br>66. The Grievance Redress Mechanism will be used to record, investigate, and respond to any complaints related to subproject activities.<br>67. Contractor will conduct vegetation monitoring at the subproject sites before any excavation, trenching and other earthworks.<br>68. Contractor will avoid or minimize the cutting of trees during the laying of pipes and other works. If tree felling is unavoidable, the contractor will obtain a felling permit and pay the appropriate fee, in accordance with applicable law, and, based on the results of the work performed, will plant more trees at the felling site or nearby than were cut down.<br>69. Contractor will ensure proper collection and disposal of wastewater and solid wastes to avoid any spillage, contamination, or mess in the subproject area. | | | |
| 12. | Biological environment disturbance | Cutting trees and shrubs, haphazard site clearing, parking, and movement of construction vehicles and equipment stockpiling resulting in disturbance to the biological environment | | Implementation by Contractor<br>Supervision by PCU, PMC, and Water Utility | PCU and PMC's report on the number of trees cut and planted, if any | Visual inspection by PMC on weekly basis<br>Quarterly inspection by PCU's Environmental and Social Specialist |

| No. | Project Activity | Impact | Mitigation Measures | Responsibility | Monitoring Indicators | Frequency of Monitoring |
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| | | | 70. Contractor will designate stockpiling areas to avoid mess on the subproject site.<br>71. Contractor will prepare a traffic management plan as part of SSESMP and specify routes for the vehicles transporting construction materials and equipment.<br>72. Contractor will restore the disturbed sites upon completion of all civil works.<br>73. Contractor will prepare and implement a landscape management plan as part of SSESMP.<br>74. Contractor will relocate the affected engineering communication before excavation and further pipe laying and will advise the concerned authority during accidental damage to utilities.<br>75. Contractor will inform the communities about planned work on pipe laying.<br>76. Contractor will locate the construction camps in areas that are acceptable from an environmental, cultural, or social point of view. The location of construction camps should be to avoid social conflict in using water, electricity, gas, or other resources or to avoid the possible adverse impacts of the construction camps on the surrounding communities.<br>77. Contractor will prepare a CCMP as part of SSESMP and approve it with the water utility, PMC, and PCU. CCMP should provide a detailed layout plan for the development of the construction camp showing the relative locations of all temporary buildings and facilities that are to be constructed together with the location of site roads, fuel storage areas (for use in power supply generators), solid waste management | | | |
| 13. | Socio-economic environment disturbance | Excavation works, stockpiling, the operation of construction vehicles and equipment, and accidental damage to utilities during the pipe laying<br>Construction works will impede the access of residents and business in limited cases | | Implementation by Contractor<br>Supervision by PCU, PMC, and Water Utility | Number of complaints from sensitive receptors | Visual inspection by PMC on weekly basis<br>Quarterly inspection by PCU's Environmental and Social Specialist |

| No. | Project Activity | Impact | Mitigation Measures | Responsibility | Monitoring Indicators | Frequency of Monitoring |
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| | | | and dumping locations, and drainage facilities, prior to the development of the construction camps.<br>78. Contractor will ensure security and safety in the subproject sites. Local authorities responsible for health and security shall be duly informed on the set-up of camp facilities to maintain effective surveillance over public health, social and security matters.<br>79. Contractor will ensure proper collection and disposal of wastewater and solid waste within the construction camps to avoid any campsite spillage, contamination, or mess.<br>80. Contractor will ensure regular medical checkups of its workers to prevent disease spread into the surrounding villages.<br>81. Contractor will hire the local population (especially women for appropriate works if possible) for construction work.<br>82. Contractor will complete the work quickly at nearby institutions, businesses, hospitals, and schools.<br>83. Contractor will restore damaged properties and utilities.<br>84. The Grievance Redress Mechanism will be used to record, investigate, and respond to any complaints related to subproject activities. | | | |
| 14. | Occupational health and safety | Inadequate sanitation facilities and drinking water supply, poor housing | 85. Contractor will prepare and implement an occupational health and safety plan (covering the prevention of the COVID-19 disease) as part of the SSESMP. | Implementation by Contractor<br>Supervision by PCU, PMC, | Equipped first-aid stations<br>Number of accidents | Visual inspection by PMC on weekly basis<br>Quarterly inspection by |

| No. | Project Activity | Impact | Mitigation Measures | Responsibility | Monitoring Indicators | Frequency of Monitoring |
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| | | conditions, mishandling of hazardous substances leading to health and safety hazards to the workers | 86. The contractor will appoint fulltime qualified and experienced OHS staff at the site.<br>87. Contractor will carry out job hazard analysis for each type of construction activity resulting in the provision of specific training activities to the workers.<br>88. Contractor will deliver regular training sessions on occupational health and safety aspects.<br>89. Contractor will train all construction workers on (a) equipment and machinery maintenance, (b) specific hazards of their work, (c) first aid, (d) basic sanitation and health care, and (e) environmental protection. The training sessions will be prior to any subproject activities.<br>90. Contractor will provide and install awareness-raising materials on occupational health and safety at every construction site.<br>91. Contractor will regularly screen the workers for communicable diseases, including sexually transmitted infections.<br>92. Contractor will ensure the provision of appropriate PPE for all workers and visitors, and ensure that PPE is used properly. No worker (or even visitor) will be allowed on the site without the required PPE (earplugs, safety shoes, hard hats, masks, goggles, etc.).<br>93. Contractor will ensure the provision of firefighting equipment at every construction site, campsites, and particularly near the fuel storage. | and Water Utility | Conditions of workers eating areas<br>Conditions of sanitation facilities for workers<br>Availability of safe drinking water | PCU's Environmental and Social Specialist |

| No. | Project Activity | Impact | Mitigation Measures | Responsibility | Monitoring Indicators | Frequency of Monitoring |
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| | | | 94. The contractor's drivers will maintain a low speed while driving through/near the settlements.<br>95. Contractor will ensure the safety and reliability of all provided equipment and machinery for operation by workers. All electrical equipment will be inspected before it is used to ensure that it is suitable for its purpose. Persons operating electrical equipment should be thoroughly instructed about any possible danger to the equipment concerned. The contractor will provide proper labeling of equipment and containers at construction and storage sites.<br>96. Contractor will provide first-aid appliances for its workers. At every workplace, there shall be maintained in a readily accessible place first aid appliances including an adequate supply of sterilized dressing and cotton wool. First aid facilities will be made available at the work sites and in the camps. The contractor will engage qualified first aider(s). The location and telephone numbers of the nearest hospital will be displayed at appropriate places at work sites and in construction camps.<br>97. No child labor or forced labor will be engaged by the project or its contractors.<br>98. Contractor will maintain an accident management and reporting system.<br>99. The drivers and operators of vehicles and materials handling equipment will be medically fit, trained, and tested and of a prescribed minimum age as required by government rules and regulations. | | | |

| No. | Project Activity | Impact | Mitigation Measures | Responsibility | Monitoring Indicators | Frequency of Monitoring |
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| 15. | Community health and safety | Bringing noise, communicable diseases and unethical behavior of workers in the adjacent communities | 100. Contractor will provide housing, a safe and reliable water supply for all workers.<br>101. Contractor will ensure proper sanitary facilities for the workers. The sewage and domestic waste will be collected in containers and disposed of regularly. Contractor will provide separate latrines and bathing places for males and females.<br>102. Contractor will provide appropriate security personnel and enclosures to prevent unauthorized entry into the sites and camp areas.<br>103. Contractor will prepare and implement a community health and safety management plan as part of the SSESMP.<br>104. Contractor will provide adequate space and lighting, temporary fences, shining barriers, and signage at active work sites<br>105. Contractor will ensure that alcohol and drugs are prohibited on the sites.<br>106. Contractor will prevent excessive noise.<br>107. Contractor will implement a code of conduct for workers, including restricting workers in designated areas, no littering, no fire, no trespassing, no residence at construction sites, and no obligation to potentially dangerous work.<br>108. Contractor will maintain a complaint logbook in workers' camp and take action promptly on complaints.<br>109. Contractor will restrict access to the site, through a combination of institutional and administrative | Implementation by Contractor<br>Supervision by PCU, PMC, and Water Utility | Health and safety management plan included in SSESMP<br>Equipped first-aid stations<br>Number of accidents<br>Condition of workers eating areas<br>Record of H&S orientation training<br>Availability of PPE for all workers at the construction site<br>Signage for storage and disposal areas | Visual inspection by PMC on weekly basis<br>Quarterly inspection by PCU's Environmental and Social Specialist |

| No. | Project Activity | Impact | Mitigation Measures | Responsibility | Monitoring Indicators | Frequency of Monitoring |
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| | | | controls, with a focus on high-risk structures or areas depending on site-specific situations.<br>110. Contractor will remove hazardous conditions on construction sites that cannot be effectively controlled with site access restrictions, such as covering openings to small confined spaces, ensuring means of escape for larger openings such as trenches or excavations, or locked storage of hazardous materials.<br>111. Contractor will take measures to prevent the proliferation of disease vectors (including the COVID-19 virus and flu) at work sites.<br>112. Contractor will use risk management strategies to protect the local communities from physical, chemical, or other hazards associated with subproject activities.<br>113. Contractor will ensure preparedness in emergency response.<br>114. Liaison with the community will be maintained. GRM will be established to address community grievances related to the subproject activities. | | Condition of sanitation facilities for workers | |
| 16. | Restricted Access | Access to facilities, shops, businesses, and houses might be blocked during the pipework | 115. Contractors will fence the construction site and install visible signs and lights in the open trenches.<br>116. Contractor will install paths over the trenches.<br>117. If needed, the contractor will arrange bypasses for pedestrians and vehicles and inform the community of a new temporary route before the construction. | | | |

| No. | Project Activity | Impact | Mitigation Measures | Responsibility | Monitoring Indicators | Frequency of Monitoring |
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| | | | 118. If any business loss is foreseen, the compensation should be agreed upon and paid following the LRP.<br>119. Contractor will prepare a traffic management plan to address the negative impacts on the traffic.<br>120. Contractor will provide a temporary bypass for vehicles and pedestrians.<br>121. If needed, the contractor will arrange bypasses for pedestrians and vehicles and inform the community of a new temporary route before the construction.<br>122. Contractor will install temporary traffic lights, signs, and fences to ensure the residents safety. | | | |
| 17. | Traffic Management | Laying pipelines through crossroads can lead to temporary disturbance to the traffic | | | | |
| 18. | Livelihood | Loss of trees, crops, and income from them | 123. PMC and PCU will implement LRP<br>124. PMC will provide training sessions on planting vegetation tolerant to the local conditions and maintaining greenhouse. | Implementation by PMC and PCU | Number of training sessions and participants | PMC will include information on provided training activities in its quarterly and semi-annual environmental and social monitoring reports |
| 19. | Labour influx | Increased risk of infections, including COVID-19, disturbance and tension between migrant workers and local communities, pressure on | 125. The project personnel including PMC and Contractor's workers will be responsible for following Code of Conduct. PMC and contractor will deliver project induction training on engaging with the local community. This will include an overview of culturally and religious measures and etiquette to bear in mind. The training and capacity-building activities will also include awareness on (1) prevention of communicable diseases and sexually transmitted | Implementation by PMC and Contractor | Number of residents' complaints<br>Number of accidents and social conflicts<br>Training on code of conduct, engaging with | Inspection by PMC on weekly basis<br>Quarterly inspection by PCU's Environmental and Social Specialist |

| No. | Project Activity | Impact | Mitigation Measures | Responsibility | Monitoring Indicators | Frequency of Monitoring |
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| | | public service and infrastructure | infections, (2) ban on sexual exploitation, abuse, and harassment, (3) respect for residents' privacy, especially for women.<br>126. Worker accommodation areas will be equipped properly by the Contractor. The provision of good quality living accommodation, services and amenities will likely reduce the need for mixing with local communities.<br>127. Sexual exploitation, abuse, and harassment will not be tolerated. The Contractor will work with local community leaders, local women committees and district authorities to ensure that any complaints are addressed in accordance with the law.<br>128. A ban on wildlife harvesting (hunting/ trapping /fishing) will be established for all project personnel.<br>129. All persons housed in the local community must be transported daily to and from the site by the contractor's transportation as per the worker transit plan.<br>130. PCU and PMC will work with the community to monitor influx. | | the local community, community health and safety, and GBV risks | |
| 20. | Cultural heritage | The subproject will not encroach into or be near cultural resources | 131. Stop work immediately to allow further investigation, if any findings are suspected | Implementation by Contractor<br>Supervision by PCU, PMC, and Water Utility | Records of chance finds | Visual inspection by PMC on weekly basis;<br>Quarterly inspection by PCU's Environmental and Social Specialist |

| No. | Project Activity | Impact | Mitigation Measures | Responsibility | Monitoring Indicators | Frequency of Monitoring |
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| 21. | Site Restoration | The leftover construction material, debris, spoils, scraps, and other wastes can create hindrance and encumbrance for the local communities and block natural drainage and irrigation canals | 132. Contractor will remove all leftover construction material, debris, spoils, and other wastes from the construction sites on time.<br>133. The camp's areas will be thoroughly cleaned and restored to their original condition to the extent possible.<br>134. No waste disposal will be carried out in the streams and rivers.<br>135. With these measures implemented, the residual impact is considered low. | Implementation by Contractor<br>Supervision by PCU, PMC, and Water Utility | Condition of WDUs and area around them<br>Number of residents' complaints | Visual inspection by PMC on weekly basis<br>Quarterly inspection by PCU's Environmental and Social Specialist |
| 22. | Economics | The subproject will generate more job and market opportunities | 136. PMC will document economic improvement due to the project activities and provide information in their semi-annual environmental and social monitoring reports. | Implementation by PMC<br>Supervision by PCU | Increase in employment of residents and their income, businesses, living conditions | Semi-annually monitoring by PCU |
| **Operation Phase** | | | | | | |
| 17. | Land Erosion and Surface Disturbance | As part of water treatment, the sludge is generated upon sedimentation and filtration and collected in the specific sites | 137. Timely and proper disposal of sludge excavated from clarifiers to the drying ponds;<br>138. Avoiding collection sludge next to water reservoirs. | Water Utility | Number of complaints from sensitive receptors | Quarterly inspection by water utility's Environmental Specialist |
| 18. | Air Quality Pollution | No permanent impact on air is expecting during operation phase | 139. Ensuring compliance with the national air quality standards<br>140. Water the trees planted around the new WTP to maintain air quality and aesthetic | Water Utility | Number of complaints from sensitive receptors | Quarterly inspection by water utility's Environmental Specialist |

| No. | Project Activity | Impact | Mitigation Measures | Responsibility | Monitoring Indicators | Frequency of Monitoring |
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| 19. | Noise generation | Some temporary noise may occur during maintenance of WDU and water supply network | 141. A manual for operation and maintenance manual, including standard operating procedures for operation and maintenance, will be developed.<br>142. Training on operation and maintenance of new WDU infrastructure.<br>143. Planting trees around the new WDU to reduce noise levels.<br>144. Following the operation and maintenance manual.<br>145. Preparing and supervising over the implementation of standard WDU operating procedures. | Water Utility | Number of complaints from sensitive receptors | Quarterly inspection by water utility's Environmental Specialist |
| 20. | Water resources worsening | Operation of WDU may cause some direct and indirect negative impacts on the water. These include excessive water withdrawal, discharge and seepage of wastewater newly constructing sewage system in the subproject area | 146. Training water utility personnel on effective operation and maintenance of WDU, water main, and network.<br>147. Screening and monitoring the equipment with further replacing defective ones.<br>148. Developing and implementing a leak detection campaign.<br>149. Installing specific wash-down of vehicles and machinery station with further collection of wastewater.<br>150. Implementing spill control measures to prevent spills from infiltrating into the groundwater table; measures will include appropriate materials handling and storage procedures, and development of contingency plans in the event of a spill.<br>151. Performing water quality monitoring (temperature, pH, odor, turbidity, dissolved oxygen, nitrogen, phosphorus, total organic carbon in the water, etc.). | Water Utility | Areas for stockpile storage of fuels, lubricants, and waste<br>Records of system or equipment failure accidents<br>Drinking water quality tests<br>Training sessions on O&M of the infrastructure | Quarterly inspection by water utility's Environmental Specialist |

| No. | Project Activity | Impact | Mitigation Measures | Responsibility | Monitoring Indicators | Frequency of Monitoring |
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| | | | 152. Organizing public awareness campaign on effective water and wastewater management and environmental conservation. | | | |
| 21. | Waste generation | Inadequate management of domestic and operational waste may cause pollution | 153. Timely and proper disposal of sludge excavated from clarifiers to the drying lots.<br>154. Avoiding collecting sludge next to water reservoirs.<br>155. Developing and implementing a proper domestic waste management system includes containers for domestic waste and service agreement with the solid waste management operator of the subproject area. | Water Utility | Worksite cleared of operational and household wastes;<br>Wastewater facilities in place | Quarterly inspection by water utility's Environmental Specialist |
| 22. | Occupational Health and Safety | Operation of WDUs and networks will pose OHS risks for the maintenance staff. These risks may include exposure to dust, noise, and vibration, falling objects, and exposure to chlorine and other hazardous materials, exposure to electrical hazards from using electric tools and equipment | 156. As part of O&M procedures, the water utility will prepare and implement an occupational health and safety plan. The OHS plan should define methods and protocols for each type of activity to be carried out as part of O&M.<br>157. Job hazard analysis will be carried out for each type of O&M activity.<br>158. Dedicated and qualified staff will be employed to ensure compliance with the OHS plan.<br>159. Regular training sessions will be provided to the O&M workers on OHS aspects.<br>160. Awareness-raising material will be used, including posters, signage, booklets, and others.<br>161. The water utility will provide PPE for all its personnel. No worker should be allowed on the site without the required PPE.<br>162. Firefighting equipment will be made available as required at appropriate places. | Water Utility | O&M procedures<br>OHS training sessions<br>Record of accidents | Quarterly inspection by water utility's Environmental Specialist |

| No. | Project Activity | Impact | Mitigation Measures | Responsibility | Monitoring Indicators | Frequency of Monitoring |
|---|---|---|---|---|---|---|
| 23. | Community Health and Safety | Poorly operated WDUs pass pathogens; failure to chlorinate allows pathogens to survive in distribution systems; poor quality pipes and low pressure allow cross-contamination from sewers and soil organisms | 163. A complete record of accidents and near-misses will be maintained by the water utility.<br>164. First aid facilities will be made available at the offices.<br>165. Development and implementation of capacity building for WDU personnel in all aspects of operations and maintenance, which will ensure that high quality drinking water is provided through district systems.<br>166. Provision of on-the-job training activities in the occupational and public safety aspects of storage and operational use of chlorine.<br>167. Water quality test on residual chlorine.<br>168. Water quality monitoring of all parameters required by the national standard<br>169. Screening electrical equipment and replacing the broken one with a new one.<br>170. Ensuring availability of health and safety specialists as part of a water utility personnel.<br>171. Ensuring availability of an emergency plan and provision of corresponding training to water utility staff. | Water Utility | Water quality test results<br>Record of accidents | Quarterly inspection by water utility's Environmental Specialist |

## 19.2. Environmental and Social Monitoring and Reporting

### 19.2.1. Monitoring plan

Monitoring of environmental components and mitigation measures during implementation and operation stages is a critical component of the ESMP to safeguard the protection of the environment. The objectives of the monitoring are to:

- Manage environmental and social issues arising from construction works through closely monitoring evidence for implementation of the mitigation measures and environmental compliance; and
- Conduct environmental and social monitoring during various stages of the subproject life cycle concerning baseline conditions and water supply in the area.

The monitoring mechanism is developed for identifying impact and includes:

- Location of the monitoring (near the subproject activity, sensitive receptors, or within the subproject influence area);
- Means of monitoring, i.e., parameters of monitoring and methods of monitoring (visual inspection, consultations, interviews, surveys, field measurements, or sampling and analysis); and
- Frequency of monitoring (daily, weekly, monthly, seasonally, annually, or during the implementation of a particular activity).

The monitoring program will include regular monitoring of construction and commissioning activities for their compliance with the environmental requirements as per relevant standards, specifications, and ESMP. The monitoring aims to assess the performance of the undertaken mitigation measures, formulate additional mitigation measures, and modify the existing ones to meet environmental compliance as appropriate during construction.

The monitoring program will be coupled with a series of supporting procedures, yet to be developed, covering:

- Sample or data collection;
- Sample handling, sample storage, and preservation;
- Sample or data documentation;
- Quality control;
- Data reliability (calibration of instruments, test equipment, and software and hardware sampling);
- Data storage and backup, and data protection;
- Interpretation and reporting of results; and
- Verification of monitoring information by qualified and experienced external experts.

### 19.2.2. Site inspection

Site inspections will be undertaken regularly in relevant areas of the subproject. The inspections will focus on compliance with the ESMP. The inspections will play an important role in increasing awareness of ESMP. Minor non-conformances will be discussed during the inspection and

recorded as a finding in the inspection report. Major non-conformances will be reported as incidents. Inspection results will be disclosed at management meetings.

### 19.2.3. Non-conformance and incidents

Non-conformances include the following:

- Exceedances of relevant thresholds as identified during routine monitoring;
- Non-conformances with the requirements of the ESMP or supporting documentation identified during an internal inspection;
- Non-conformances identified during an environmental audit or during inspections by regulatory authorities;
- Events, such as spills, resulting in potential or actual environmental harm;
- Events that did or could result in injury to staff, visitors to the subproject sites or surrounding communities;
- Significant complaints or grievances received from adjacent communities and any other source.

Corrective and preventive actions will be identified and implemented in response to these non-conformances. These actions will address the root cause of the non-conformance and reduce or prevent repeated non-conformances. PMC and PCU will establish a process for the identification, investigation, and tracking of non-conformances, including:

- Prioritizing and classifying non-conformances based on the type and severity of the non-conformance;
- Recording of non-conformances and the results of corrective and/or preventive actions, including the actions necessary to mitigate or remedy any associated impacts;
- Defining results expected from the corrective and/or preventative actions;
- Confirming the corrective and/or preventive actions taken to eliminate the causes of the non-conformance are appropriate to the magnitude of the problem and commensurate with the impacts encountered;
- Reviewing the effectiveness of the corrective and/or preventive actions taken;
- Implementing and recording required changes in the ESMP or subproject monitoring plan resulting from corrective and preventive action.

Serious non-conformances will be classified as incidents and will be promptly managed.

Table 61 provides the subproject environmental monitoring plan for the subproject and includes relevant environmental parameters, a description of the sampling stations, and frequency of monitoring, applicable standards, and responsible stakeholders. During construction, environmental monitoring will ensure the protection of air and noise pollution, community relations and safety provisions, water quality control, soil quality tests, and greenbelt development around the WDUs. During operation, untreated water and treated drinking water quality monitoring will be critical responsibilities of the water utility.

Table 58: Subproject Monitoring Plan

| No. | E&S Component | Monitoring parameters | Location | Frequency | Standard | Responsibility |
|---|---|---|---|---|---|---|
| **Pre-Construction Phase** | | | | | | |
| P1. | Community safety and resettlement | Free access to the construction sites for contractor | Buzochi, Navbahor, and Jarqoq settlements | Before commencement of the civil works | Zero incident | PCU and PMC |
| P2. | SSESMP preparation training | SSESMP prepared on time | Construction sites (Buzochi WDU, Navbahor WDU, and Jarqoq WDU) | Once (before commencement of the civil works) | Section 5.3.2 | PCU and PMC |
| P3. | Permits and licenses per Uzbek legislation | Compliance of the contractor activities with local legislation requirements | Respective Uzbek Authorities | As needed per Uzbek regulation | Zero incident | PCU, PMC, and Contractor |
| P4. | Contractor's health and safety | Construction camp and contractor's field office<br>Purchasing PPE for contractor's team | Construction sites (Buzochi WDU, Navbahor WDU, and Jarqoq WDU) and contractor's office | Starting from the contractor's mobilization till completion of the contract | (a) separate and clean sanitation and bath facilities for women and men<br>(b) clean catering area<br>(c) clean barracks for contractor's personnel with beds and linen<br>(d) full set of PPE | PCU, PMC, and Contractor |
| P5. | Community social sustainability | Community awareness on the subproject activities | Buzochi, Navbahor, and Jarqoq settlements | Quarterly throughout the contract implementation | Information billboards, public consultations, job announcement | PCU, PMC, and Contractor |
| **Construction Phase** | | | | | | |
| C1. | Air quality | Dust (particle matter), CO, $SO_2$, $NO_2$, $CH_4$ | Monitoring sites specified in Table 16 | Quarterly during the active construction phase | Section 3.3.1. | Contractor (Associated costs will be included in the civil works contract) |

| No. | E&S Component | Monitoring parameters | Location | Frequency | Standard | Responsibility |
|---|---|---|---|---|---|---|
| C2. | Acoustic environment | Noise and vibration levels | Monitoring sites specified in Table 18 | Quarterly during the active construction phase | Section 3.3.2. | Contractor (Associated costs will be included in the civil works contract) |
| C3. | Untreated water quality | All standard parameters | Before treatment at the Buzochi WDU, Navbahor WDU, and Jarqoq WDU | (a) Before installation and putting into operation of filtration and chlorination facilities [82]<br>(b) Upon installation, testing, and putting into operation of filtration and chlorination facilities | Section 3.3.3. Appendix 19 | Contractor (Associated costs will be included in the civil works contract) |
| C4. | Treated water quality | All standard parameters | End of WDU line (after final disinfection) in Buzochi WDU, Navbahor WDU, and Jarqoq WDU | (a) At least two water quality analysis for residual chloride during installation and testing of new chlorination facilities<br>(b) At least two water quality analysis for chemistry and physical parameters during testing of the system with new chlorination and filtration facilities<br>(c) Two successful tests complied with Uzbek drinking water quality | Section 3.3.3. Appendix 18 | Contractor (Associated costs will be included in the civil works contract) |

[82] Public Health Standard No. 950-2011, “Drinking water. Hygienic requirements and quality control”, 02.02.2011, https://lex.uz/docs/4979438?otherlang=

| No. | E&S Component | Monitoring parameters | Location | Frequency | Standard | Responsibility |
|---|---|---|---|---|---|---|
| | | | | standard before handing over the system to the water utility | | |
| C5. | Soil quality | pH, copper, lead, zinc, nitrate | inside the WDU sites (Buzochi WDU, Navbahor WDU, and Jarqoq WDU) | Twice a year | Section 3.3.5. | Contractor (Associated costs will be included in the civil works contract) |
| C6. | Landscaping | Survival rate of trees and other vegetation | In the areas where replantation/ landscaping is proposed | Twice a year | --- | Contractor (Associated costs will be included in the civil works contract) |
| C7. | Community and occupational health and safety | (a) Incidence and types of health and safety issues<br>(b) full set of PPE for contractor's team | Work sites | Monthly | Zero incident | Contractor (Associated costs will be included in the civil works contract) |
| C8. | Community safety | (a) Labor influx data<br>(b) Number of conflicts between contractor and community<br>(c) Number of complaints<br>(d) Recruitment of local residents for subproject activities | Buzochi, Navbahor, and Jarqoq settlements | Quarterly during the active construction phase | (a) and (b) Zero community incident<br>(c) contractor's team | Contractor (Associated costs will be included in the civil works contract) |
| **Operation Phase** | | | | | | |
| O1. | Untreated water quality | All standard parameters | Before treatment at the Buzochi WDU, Navbahor WDU, and Jarqoq WDU | As per standard | Section 3.3.3.<br>Appendix 19 | Water Utility (own costs of the water utility) |

| No. | E&S Component | Monitoring parameters | Location | Frequency | Standard | Responsibility |
|---|---|---|---|---|---|---|
| O2. | Treated water quality | All standard parameters | End of WDU line (after final disinfection) in Buzochi WDU, Navbahor WDU, and Jarqoq WDU | As per standard | Section 3.3.3. Appendix 18 | Water Utility (own costs of the water utility) |
| O3. | Community and occupational health and safety | Incidence and types of health and safety issues | Work sites | Monthly | Zero incident | Water Utility (own costs of the water utility) |

pH = potential of hydrogen, $SO_2$ = sulphur dioxide, CO = carbon monoxide, $NO_2$= nitrogen dioxide, $CH_4$ = methane, WDU = water distribution unit

## 19.3. Documentation and Reporting

Monitoring elements of the ESMP will be documented and controlled by PMC and communicated to PCU. Records demonstrating compliance with legal requirements and conformance with the ESMP will also be maintained. PCU and PMC will supervise, establish, implement, and maintain reporting procedures.

The monitoring requirements will be fulfilled by maintaining the proper documentation records of the findings and include daily checklists by a contractor, weekly reports and monthly audits by PMC, and quarterly monitoring missions by PCU.

The following reports will be produced:

- Contractor will prepare monthly reports on SSESMP implementation under the subproject and submit them to PCU and PMC.
- To ensure the contractor implements the SSESMP accordingly, PMC will conduct environmental monitoring throughout the subproject and the contractor's contract. PMC's monthly and quarterly reports will include findings revealed during monitoring of the physical and social environment, the investigation of the subproject sites, and compliance of the contractor's activities with SSESMP.
- The subproject status and compliance with ESMP will be reported to the AIIB through semi-annual environmental monitoring reports prepared by PMC and approved by PCU.

## 19.4. Institutional Arrangements

**Executing Agency and Project Coordination Unit (PCU)**

JSC Uzsuvtaminot is the Project's Executing Agency. PCU has been established under JSC Uzsuvtaminot with responsibilities for the Project's overall management, implementation, and monitoring. PCU is a focal point for communication with the AIIB team on the project.

PCU is fully staffed and includes an environmental and social specialist. The main duty of the environmental and social specialist is to ensure that the project activities are implemented in compliance with the AIIB's ESP, applicable national regulations and procedures, and in compliance with the present ESIA/ESMP.

PCU is responsible for the project management and obtaining the relevant environmental permits, consents, and authorizations prior to commencing site work.

PCU will facilitate coordination with other project stakeholders, including government agencies, local administration, project communities, consultants, and contractors. PCU will ensure the corresponding reporting and activities are made available for the project stakeholders.

A Project Coordinator is set up in Bukhara city to manage day-to-day project implementation at the subprojects and district levels.

**Implementing Agency**

Bukhara Suv Taminoti Ltd is the Implementing Agency for the Project. The water utility is responsible for undertaking approval of all studies, designs, and construction under the project. It is also responsible for the project's operation and maintenance (O&M) after the commissioning of the infrastructure and facilities.

The water utility will have environmental, health, and safety engineers and social safeguard specialists in charge of ESMP implementation, ensuring compliance with the subproject design and following system operations in accordance with applicable national environmental requirements.

**Detailed Design Consultant**

The Project has Detailed Design Consultant on the board with the responsibilities to prepare design under all subprojects with corresponding environmental and social management instruments, such as ESIA, ESMP and Resettlement Plan.

Detailed Design Consultant is staffed with environmental and social specialists.

Detailed Design Consultant has prepared this ESIA, ESMP and Resettlement Plan, and submitted documentation for the environmental clearance by the environmental regulator.

**Project Management Consultant (PMC)**

The Project has PMC on the board with responsibilities for assisting PCU in project management, overseeing the implementation of ESMP, and ensuring environmental and social safeguard compliance of the project activities. The PMC should be staffed with environmental, health, and safety engineers and social safeguard specialist to perform proper environmental and social supervision and guidance of the contractors. PMC will have the following responsibilities:

- PMC will provide training on SSESMP preparation and the overall implementation of ESMP.
- PMC will supervise and guide the contractors throughout their contract implementation, including supervision of ESMP implementation.
- PMC will regularly monitor the contractor’s environmental performance, as scheduled in the ESMP.
- PMC will approve environmentally safe materials for use on-site in accordance with the ESIA.
- PMC will prepare semi-annual environmental and social monitoring reports to be approved by PCU.
- PMC will conduct a post-construction audit before WDUs, water networks, and mains commissioning for the water utility and verify sites' compliance with ESMP.
- PMC will liaise with the communities and makhalla committee’s heads in the subproject area and other stakeholders on environmental and social issues, keep the local communities informed on the progress, and adequately address their concerns, if any.
- PMC will lead the GRM and ensure the running of the GRM at the settlement level during the project activities.
- PMC’s reporting will be based on its environmental and social audits, site inspections, and analysis of the contractor’s monthly reports. The PMC reports to PCU monthly, quarterly, and semi-annual. The Final Environmental and Social Monitoring Report will be submitted upon post-construction audit to demonstrate that the subproject is appropriately completed.

**Contractor**

Contractor will be responsible for the preparation of the SSESMP within thirty days upon signing the contract and prior to commencing any physical works. Contractor will implement environmentally friendly construction and the corresponding mitigation measures.

Contractor will assign full-time and qualified environmental and occupational health and safety engineers/specialists.

The contractor environmental and social reporting will be monthly and will incorporate the scope of work for the reporting period, implemented mitigation measures, performed tests, delivered training activities, received and addressed complaints, accidents, etc. Contractor will submit its report to the PMC before the report submission to the PCU.

## 19.5. Environmental and Social Training and Capacity Building Activities

The project will support relevant training activities to be implemented by PMC and Contractor(s) on environmental and social topics provided in Table 62.

Table 59: Environmental and Social Training and Capacity Building Activities

| Training/Capacity Building | Training Provider | Training Participants | Period |
|---|---|---|---|
| Training on SSESMP preparation | PMC | Contractor | Upon signing the contract and prior any construction activities |
| Training on waste disposal practices and procedures, including training on hazardous waste management | Contractor | Contractor's personnel | Prior construction activities and during the civil work |
| Training on OHS (equipment and machinery maintenance, specific hazards of their work, first aid, basic sanitation and health care) and environmental protection | Contractor | Contractor's personnel | Prior construction activities and during the civil work |
| Training on code of conduct, engaging with the local community, community health and safety, and GBV risks | PMC and contractor | Contractor's personnel | Prior construction activities and during the civil work |
| Training on O&M of new WDU infrastructure, including O&M of WDU, water mains, and network | Contractor | Water Utility's personnel | Upon completing all the construction works, testing and commissioning water infrastructure to the water utility |
| Training on OHS during the operating of new infrastructure, including public safety aspects of storage and operational use of chlorine | Water Utility | Water Utility's O&M workers | During operation phase |

| Training/Capacity Building | Training Provider | Training Participants | Period |
|---|---|---|---|
| Training on emergency preparedness | Water Utility | Water Utility's personnel | During operation phase |
| **LRP Capacity building and Training Activities** | | | |
| Training on fruit trees native to the subproject area | PMC | Subproject communities (residents of four villages – Buzochi, Navbahor, Jarkok, and Tashquduq) | During the construction activities |
| Training on how to use a greenhouse in winter | PMC | Subproject communities (residents of four villages – Buzochi, Navbahor, Jarkok, and Tashquduq) | During the construction activities |
| **Gender Action Plan (GAP) Capacity building and Training Activities** | | | |
| Training on water conservation and hygiene | PMC | public schools in four project villages (Buzochi, Navbahor, Jarkok, and Tashquduq)<br>community's committees in four project villages (Buzochi, Navbahor, Jarkok, and Tashquduq) | During the construction activities |
| Community consultation meetings | PMC | Local population and specifically women in project villages (Buzochi, Navbahor, Jarkok, and Tashquduq) | During the construction activities |
| Behavior Change Communication activities | PMC | Women and girls-participants per village (four villages) | During the construction activities |
| Mass media campaign | PMC | Residents of the project area | During the construction activities |
| Training on gender and GAP awareness | PMC | Contractor(s) personnel and Water Utility and PCU personnel | During the construction activities |
| Training on gender equality and skills development | PMC | Contractor(s) personnel, with special focus on targeting female workers | During the construction activities |

WDU = water distribution unit; PMC = Project Management Consultant; PCU = Project Coordination Unit; O&M = Operation and maintenance; OHS = occupational health and safety; GAP = Gender Action Plan; LRP = Livelihood Restoration Plan

## 19.6. Implementation Cost

Most mitigation measures require the contractors to adopt good site practices, which are part of their routine procedures and comprise their scope of work, i.e. included in their civil work contract. PCU and PMC's supervision and monitoring will be provided as part of their management of the Project. The cost estimate of the subproject ESMP implementation is shown in **Table 31**.

Table 60: Cost estimates for Contractor's Environmental and Social Management, US$

| Cost item | Quantity | Unit cost | Total cost | Comments |
|---|---|---|---|---|
| **Environmental Monitoring** | | | | |
| Air quality | 480 (12 locations[83] x 5 indicators x 8 times quarterly) | 26 | 12,480 | costs are included in the civil works contract |
| Acoustic environment | 192 (12 locations[84] x 2 (daytime and nighttime) x 8 times quarterly) | 47 | 9,024 | costs are included in the civil works contract |
| Untreated water quality | 6 (3 WDUs x 2 times) | 2,000 | 12,000 | costs are included in the civil works contract |
| Treated water quality | 18 (3 WDUs x (2 residual chloride test + 4 full water tests)) | 2,000 | 36,000 | costs are included in the civil works contract |
| Soil quality | 12 (3 WDUs x 4 times) | 500 | 6,000 | costs are included in the civil works contract |
| **Environmental Mitigation Measures/Permissions** | | | | |
| Compensation for trees[85] | Lump sum | 2,000 | 2,000 | costs are included in the civil works contract |
| Trees planting around the three WDUs | 240 | 10 | 2,400 | costs are included in the civil works contract |
| Health check-up of the contractor's personnel | Lump sum | 2,000 | 2,000 | costs are included in the civil works contract |
| Management of liquid wastes (installation and operation of wastewater treatment facilities on each site) | lump sum | 15,000 | 15,000 | costs are included in the civil works contract |
| Management of solid wastes (storage facilities and transportation to the disposal site) | lump sum | 9,000 | 9,000 | costs are included in the civil works contract |
| Development of Operation and Maintenance Manual | 3 | 1,000 | 3,000 | costs are included in the civil works contract |
| LRP M&E | 4 | 1,000 | 4,000 | |
| **Staffing** | | | | |

[83] See Table 15.

[84] See Table 17.

[85] Contractor will receive permission for cutting trees from Bukhara Province Branch of the Ministry of Natural Resources.

| Cost item | Quantity | Unit cost | Total cost | Comments |
|---|---|---|---|---|
| Environmental Engineer | Lump sum | - | 24,000[86] | costs are included in the civil works contract |
| Health and Safety Specialist | Lump sum | - | 24,000 | costs are included in the civil works contract |
| **Environmental and Social Training and Capacity Building Activities** | | | | |
| Training on SSESMP preparation | Lump sum | - | 1,000 | costs are included in the PMC contract |
| Training on waste disposal practices and procedures, including training on hazardous waste management | Lump sum | - | 1,000 | costs are included in the civil works contract |
| Training on OHS (equipment and machinery maintenance, specific hazards of their work, first aid, basic sanitation and health care) and environmental protection | Lump sum | - | 1,000 | costs are included in the civil works contract |
| Training on code of conduct, engaging with the local community, community health and safety, and GBV risks | Lump sum | - | 2,000 | costs are included in the civil works and PMC contracts |
| Training on O&M of new WDU infrastructure, including O&M of WDU, water mains, and network | Lump sum | - | 1,000 | costs are included in the civil works contract |
| Training on OHS during the operating of new infrastructure, including public safety aspects of storage and operational use of chlorine | Lump sum | - | 2,000 | Water utility's costs |
| Training on emergency preparedness | Lump sum | - | 1,000 | Water utility's costs |
| Training on fruit trees native to the subproject area | 1 | 300 | 300 | costs are included in the PMC contract |
| Training on how to use a greenhouse in winter | 1 | 300 | 300 | costs are included in the PMC contract |

[86] Expected construction period is twelve months.

| Cost item | Quantity | Unit cost | Total cost | Comments |
|---|---|---|---|---|
| Training on water conservation and hygiene | 8 | 300 | 2,400 | costs are included in the PMC contract |
| Community consultation meetings | 8 | 300 | 2,400 | costs are included in the PMC contract |
| Behavior Change Communication activities | 4 | 300 | 1,200 | costs are included in the PMC contract |
| Mass media campaign | 4 | 100 | 400 | costs are included in the PMC contract |
| Training on gender and GAP awareness to contractor(s) | 1 | 300 | 300 | costs are included in the PMC contract |
| Gender and GAP awareness training to water utility and PCU personnel | 2 | 300 | 600 | costs are included in the PMC contract |
| Training on gender equality and skills development | 1 | 300 | 300 | costs are included in the PMC contract |
| **Subtotal** | **-** | **-** | **168,304** | **-** |
| *Miscellaneous* | - | - | *16,830* | *10% of Subtotal* |
| **Total** | - | - | **185,134** | - |

## 19.7. Performance Indicators

For evaluating the performance of environmental and social management and monitoring, performance indicators are identified for efficient and timely implementation of measures proposed in ESMP. The indicators are defined both for the construction phase and the operation phase. PMC will be responsible for compiling the information on these indicators and reporting it to PCU.

A list of performance indicators is given below to measure the subproject's overall environmental and social performance:

- Timely provision of SSESMP by the contractor.
- Number of inspections carried out by PMC per month.
- Number of non-compliances observed by PMC or PCU.
- Availability of an environmental engineer, a social safeguard specialist, and an operational health and safety engineer in the PMC team.
- Availability of environmental, health, and safety engineers by contractors.
- Timely reporting of documents as defined in Section 8.3.
- Number of training sessions conducted by contractor for its personnel
- Number of training sessions and capacity building initiatives conducted by PMC for the contractor personnel and PCU
- Timely disbursement of compensation/ timely resettlement of the subproject affected.
- Timely implementation of the resettlement schedule.

- Number of grievances received.
- Number of grievances resolved.
- Number of construction-related incidents, accidents, injuries, and fatalities.

# 20. CONCLUSIONS AND RECOMMENDATIONS

The ESIA has been prepared for BWSP-W20 Karaulbazar District (Volume 5). The subproject design, baseline conditions, and subproject-associated activities were assessed against AIIB ESP and applicable Uzbek regulations. Mitigation and management measures were recommended and made part of the subproject.

The subproject's environmental and social impacts are expected to be localized and low throughout the construction and operation stages. There will be some negative impacts. However, the extent of these impacts is expected to be local, confined within the subproject sites of influence and the routes to and from these sites. With effective ESMP implementation, the potential impacts will either be eliminated or minimized to insignificant levels. The significance of impacts during construction will be temporary and short-term (i.e., most likely to occur only during peak construction periods). Therefore, these will not be sufficient to threaten or weaken the surrounding resources.

The proposed subproject will bring about: (a) the benefits of access to a reliable supply of safe and potable water; (b) the promotion of good hygiene and sanitation practices and reduced health and safety risks as positive impacts; and (c) enhanced community health, improved quality of life and safe communities as outcomes.

The PCU will ensure that a sufficient budget will be allocated for the subproject's environmental and social management and monitoring.

# 21. APPENDICES

# Uzbekistan: Bukhara Region Water Supply and Sewerage (BRWSSP)

**Project No.: 000314**

**Component 1 – Investment in Water Supply Infrastructure**

## Environmental and Social Impact Assessment (ESIA)

## Volume-5 No: BWSP-W20 Karaulbazar District

**August 2023**

Prepared by: Detailed Design Consultant “JV Seureca (France) and Tumas (Turkey)” for JSC “Uzsuvtaminot”

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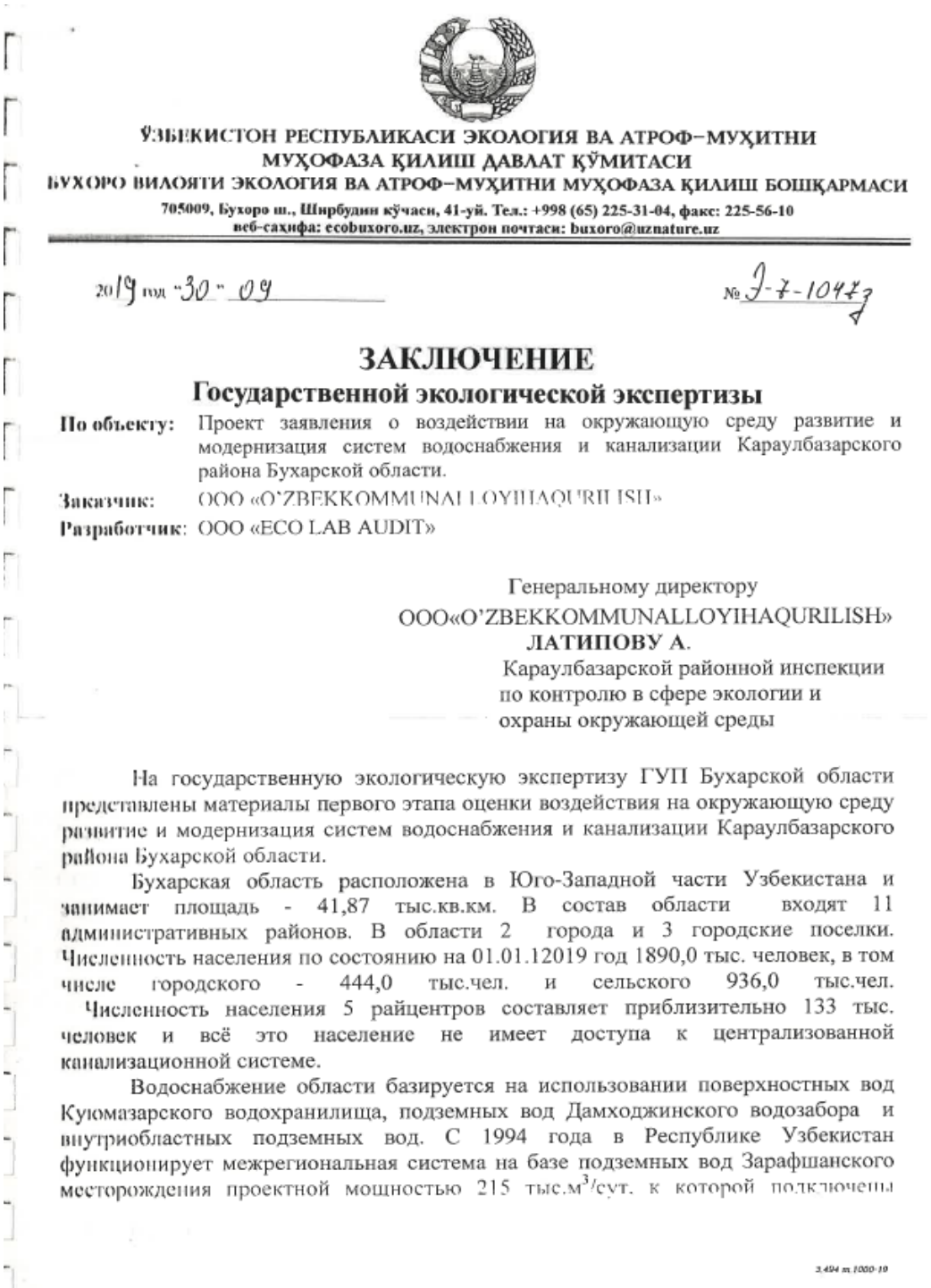
# Appendix 1. Original SEE Approval for Subproject Design

SEE Approval No. E-7-1047z of 30.09.2019 issued by Bukhara Regional Branch of State Environmental Committee.



ЎЗБЕКИСТОН РЕСПУБЛИКАСИ ЭКОЛОГИЯ ВА АТРОФ-МУҲИТНИ МУҲОФАЗА ҚИЛИШ ДАВЛАТ ҚЎМИТАСИ
БУХОРО ВИЛОЯТИ ЭКОЛОГИЯ ВА АТРОФ-МУҲИТНИ МУҲОФАЗА ҚИЛИШ БОШҚАРМАСИ
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2019 год "30" 09 № J-7-1047z

**ЗАКЛЮЧЕНИЕ**
**Государственной экологической экспертизы**

**По объекту:** Проект заявления о воздействии на окружающую среду развитие и модернизация систем водоснабжения и канализации Караулбазарского района Бухарской области.

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**ЛАТИПОВУ А.**
Караулбазарской районной инспекции
по контролю в сфере экологии и
охраны окружающей среды

На государственную экологическую экспертизу ГУП Бухарской области представлены материалы первого этапа оценки воздействия на окружающую среду развитие и модернизация систем водоснабжения и канализации Караулбазарского района Бухарской области.

Бухарская область расположена в Юго-Западной части Узбекистана и занимает площадь - 41,87 тыс.кв.км. В состав области входят 11 административных районов. В области 2 города и 3 городские поселки. Численность населения по состоянию на 01.01.12019 год 1890,0 тыс. человек, в том числе городского - 444,0 тыс.чел. и сельского 936,0 тыс.чел.

Численность населения 5 райцентров составляет приблизительно 133 тыс. человек и всё это население не имеет доступа к централизованной канализационной системе.

Водоснабжение области базируется на использовании поверхностных вод Куюмазарского водохранилища, подземных вод Дамходжинского водозабора и внутриобластных подземных вод. С 1994 года в Республике Узбекистан функционирует межрегиональная система на базе подземных вод Зарафшанского месторождения проектной мощностью 215 тыс.м$^3$/сут. к которой подключены

3.494 m 1000-10

Самаркандская, Навоийская и Бухарская области. В Бухарскую область от этой системы подается 50,0- 58,0 тыс.м$^3$/сут.

Водоснабжение Караулбазарского района осуществляется по двум водоводам «Куюмазар - БНПЗ» и «Куюмазар - Мубарек». Из первой системы обеспечивается водой райцентр Караулбазар, от второй системы 4 сельских населенных пункта, использующие воду без очистки и обеззараживания. В Караулбазарском районе существует 52,6 км подводящих водоводов и водопроводных сетей.

На современное положение население города испытывает дефицит воды, так как в определенных сельских пунктах вода подается без надлежащей подготовке. Поэтому вызвана необходимость решения проблемы питьевого водоснабжения города.

В представленном проекте предусматривается ряд мероприятий, которые позволят совершенствование системы водоснабжения и усиление эксплуатационной базы водоснабжающей организации путём повышения надёжности систем водоснабжения, сокращение потерь и утечек воды, внедрение эффективных технологических процессов, сооружений, оборудования для производства и обеззараживания питьевой воды, технического перевооружения и реконструкции действующих сооружений, организация учета подаваемой и реализуемой питьевой воды и установки приборов ее учета.

В целях обеспечения населения Караулбазарского района питьевой водой надлежащего качества проектом предусматривается строительство УРВ с установкой по очистке воды в количестве 2 штуки, реконструкция водопроводных сетей с устройством домовых вводов, новое строительство водоводов и водопроводных сетей с домовыми вводами.

Система канализации в Караулбазарском районе отсутствует, имеются лишь очистные сооружения для БНПЗ. Все население пользуются санитарными системами, имеющимися на их участках, такие как уборные и септические баки.

Проектом предусматривается строительство системы канализационных коллекторов, сетей и насосных станций для отвода бытовых сточных вод и загрязненных производственных вод, допускаемых к спуску в бытовую канализацию, от объектов канализования на канализационные очистные сооружения мощностью от 2-10 тыс.м$^3$/сутки. Канализационная самотечная сеть предусмотрена из труб d-200-600 мм, напорная из туб d-200-300 мм. Проектируемые канализационные коллекторы выполняются из неметаллических канализационных труб, которые не подвергаются коррозии и имеют долгий срок эксплуатации. По трассе коллекторов предусматривается устройство колодцев для осмотра и очистки. Глубина заложения сети 1,8-4,5м. На участках прокладки в водонасыщенных грунтах трубы укладываются на искусственное основание с производством водопонижения. Переходы трубопроводов через железные, автомобильные дороги и водные преграды следует предусматривать в кожухах.

Проектируемые очистные сооружения канализационных сточных вод включают:

- приемную камеру поступающей воды включающий механическую очистку – решетки и мацераторы которые располагаются в приемной камере;
- резервуар-усреднитель с системой распределения и перемешивания поступающих стоков, циркуляционными и подающими на биологическую очистку насосами;
- блок биологической очистки, в составе:

- биореакторы-илоотделители – I, II, III;
- седиментатор;
- блок доочистки (денитрификатор и дефосфотатор);
- ферментно-кавитационный стабилизатор;
- аэрационная система – оксиджеты;
- установка обеззараживания воды;
- подъемное оборудование;
- расходомер очищенных стоков;
- расходомер активного ила;

Учитывая высокие требования к сбросам в поверхностный водоем согласно проекта процесс очистки сточных вод, заключается в измельчение механических включений (гомогенизация) - механическая очистка с использованием мацераторов с последующим улавливание тяжелых минеральных веществ, главным образом, песка и взвешенных веществ. Далее сточные воды подвергаются биологической очистке в вертикальных биореакторах и биореакторах-илоотделителях в несколько ступеней в зависимости от состава исходных стоков. После прохождения биологической очистки стоки подлежат глубокой доочистка при помощи блока доочистки с применением биологической фильтрации с последующим извлечением биогенных веществ в виде азота и фосфора на ступени биологической очистки. На завершающей стадии очищенная вода подлежит дезинфекции с дальнейшим сбросом воды в ирригационный коллектор. Образующиеся иловые осадки планируется использовать в качестве удобрений при выращивании агрокультур.

При эксплуатации очистных сооружений, построенных в Караулбазаре, степень очистки сточных вод достигнет требований, предъявляемым к водоемам рыбохозяйственного назначения.

Анализ предетавленных материалов показал, что воздействие на окружающую среду будет не значительным и в период строительных работ. В период строительных работ прогнозируются выбросы загрязняющих веществ в атмосферный воздух от строительно-монтажных работ в общем количестве 0,42 тонн. Выбросы при производстве строительно-монтажных работ осуществляются только в течение срока строительства и не участвуют в формировании фоновых концентраций.

Водопотребление для рабочих за счет привозной воды в количестве 2257,16 м$^3$. Хозяйственно-бытовые стоки предусматривается в гидроизолированные выгреба.

В процессе строительства прогнозируется образование строительных отходов в виде лома черных металлов, обломков строительного кирпича и т.п.

Указанные отходы по окончании строительства и реконструкции будут утилизированы с принятыми стандартами и нормами в Узбекистане.

**Следующим этапом экологического сопровождения проекта строительства очистных сооружений в Караулбазаре следует разработать Заявление об экологических последствиях, в котором необходимо:**

**- привести качественную и количественную характеристику ирригационного коллектора, принимающего очищенные сточные воды;**

**- пронормировать выбросы и сбросы загрязняющих веществ в окружающую среду, образование и размещение отходов.**

Государственная экологическая экспертиза Бухарской области **согласовывает** проект заявления о воздействии на окружающую среду развитие и модернизация систем водоснабжения и канализации Караулбазарского района Бухарской области.

Контроль над соблюдением требований природоохранного законодательства на предприятии возлагается Караулбазарской районной инспекции по контролю в сфере экологии и охраны окружающей среды.

**Начальник управления** **М.Муртазоев**

# Appendix 2. Screenshots of Applications for the National SEE

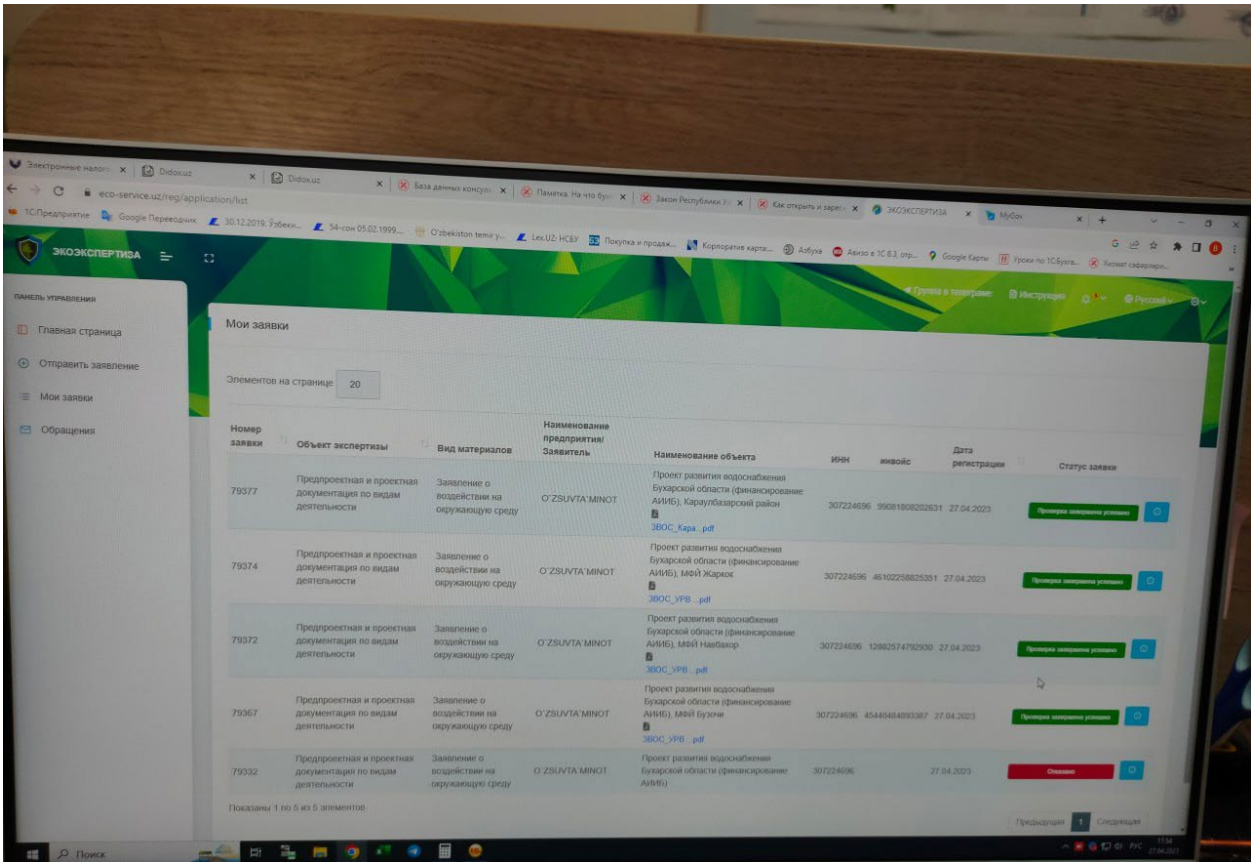


Figure 1: Application and reports submitted to environmental regulator for the subproject clearance (Source: Screenshot from the Uzsuvtaminot JSC account, www.eco-service.uz)

# Appendix 3. New SEE Approval (2023) of the Subproject Design

## New SEE approval for the overall subproject design

O'ZBEKISTON RESPUBLIKASI TABIAT RESURSLARI VAZIRLIGI
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**Davlat ekologik ekspertizasining**
**XULOSASI**

| | |
|---|---|
| **По объекту:** | Проект заявления о воздействии на окружающую среду развития и модернизация систем водоснабжения на территориях МСГ «Бузачи», МСГ «Навбахор» и МСГ «Жаркок» Караулбазарского района Бухарской области. |
| **Заказчик:** | АО "O`ZSUVTA`MINOT" |
| **ИНН** | 307224696 |
| **Категория:** | III, п.7, ПКМ РУз №541 от 07.09.2020 г. |
| **Разработчик:** | ООО "GLOBAL BUSINESS SERVICES" |
| **Эксперт:** | Сафаров Ғанишер Ғуломович |

| | |
|---|---|
| Организация: | АО "O`ZSUVTA`MINOT" |
| Руководитель: | SAIFNAZAROV SAXIB ISMAILOVICH |
| Копия: | Караулбазарскому районному инспекцию Природных ресурсов. |

На Бухарский областной филиал центра Государственной экологической экспертизы представлены материалы проекта заявления о воздействии на окружающую среду развития и модернизация систем водоснабжения на территориях МСГ «Бузачи», МСГ «Навбахор» и МСГ «Жаркок» Караулбазарского района Бухарской области.

Основанием для реализации данного объекта является постановление Кабинета Министров Республики Узбекистан № 482 от 12 августа 2020 года «О мерах по реализации проекта развития и модернизации систем водоснабжения и водоотведения Бухарской области с участием Азиатского банка инфраструктурных инвестиций».

Данный проект разработан для анализа возможного влияния на окружающую среду проектируемого участка с учетом имеющихся техногенных факторов на существующей территории. Дан прогноз последствий для сложившейся экосистемы, связанных с реализацией проекта.

Географические координаты расположения :

УРВ «Бузачи»

1. 39°26'31.60"C 64°52'55.00"B
2. 39°26'34.03"C 64°52'57.29"B
3. 39°26'35.70"C 64°52'54.34"B
4. 39°26'33.32"C 64°52'51.97"B

Границами УРВ «Бузачи» на данный момент является
с севера – пустырь далее на расстоянии 60 м коллектор
с востока – жилые дома
с юга – внутренняя дорога далее посевные поля
с запада - внутренняя дорога далее жилые дома.

УРВ «Навбахор»

1. 39°27'31.05"C 64°55'30.24"B
2. 39°27'33.51"C 64°55'32.43"B
3. 39°27'35.73"C 64°55'28.55"B
4. 39°27'33.27"C 64°55'26.11"B

Границами УРВ «Навбахор» на данный момент является
с севера – жилые дома
с востока – жилые дома
с юга – жилые дома
с запада – внутренняя дорога далее посевные поля.

УРВ «Жаркок»

1. 39°25'43.75"C 65° 1'14.56"B
2. 39°25'46.48"C 65° 1'17.05"B
3. 39°25'48.17"C 65° 1'13.84"B
4. 39°25'45.49"C 65° 1'11.31"B

Границами УРВ «Жаркок» на данный момент является
с севера – внутренняя дорога далее жилые дома
с востока – пром.предприятия
с юга – внутренняя дорога коллектор на расстоянии 123 м
с запада – внутренняя дорога далее жилые дома.

Исторические и культурные памятники в зоне предполагаемого размещения сооружений отсутствуют.

В рамках проекта будут восстановлены и построены водопроводы, УРВ, Магистральные линии водоснабжения, инфраструктура для восстановления и предоставления услуг питьевой воды жителям населенных пунктов «Бузачи», «Ташкудук», «Жаркок» и «Навбахор». В связи с этим проект предусматривает:

Строительство новой подводящей линии между УРВ «Бузачи» и сетью населенного пункта «Ташкудук» (6,2 км), новая подводящая линия между существующей фильтровальной установкой «Навбахор» и УРВ «Навбахор» (1,6 км), новая подводящая линия между существующей фильтровальной установкой «Жаркок» и УРВ «Жаркок» (0,6 км), дополнительная водопроводная линия, учитывая прирост населения МСГ "Жаркок" до 2045 года (0,9 км); строительство новой насосной станции и резервуара для населенного пункта «Жаркок», строительство новой насосной станции для населенного пункта «Бузачи», реконструкция резервуаров для населенных пунктов «Бузачи» и «Навбахор», строительство новой насосной станции для населенного пункта «Навбахор», строительство новой фильтровальной установки для населенных пунктов «Навбахор» и «Жаркок».

В соответствии с перечнем видов деятельности, по которым осуществляется Государственная экологическая экспертиза в соответствии с Постановлением КМ РУз № 541 от 07.09.2020 г. «Положение о государственной экологической экспертизе в Республики Узбекистан» строящийся объект относится к 3-категории предприятий воздействующих на окружающую среду с низком риском экологического воздействия.

В представленном проекте предусматривается ряд мероприятий, которые позволят совершенствование системы водоснабжения и усиление эксплуатационной базы водоснабжающей организации путём повышения надёжности систем водоснабжения, сокращение потерь и утечек воды, внедрение эффективных технологических процессов, сооружений, оборудования для производства питьевой воды, организация учета подаваемой и реализуемой питьевой воды и установки приборов ее учета.

Источником водоснабжения системы является существующая магистральная водопроводная линия «Куймазар-Касан».

Вода на объекте будет использоваться для питьевых нужд рабочего персонала. Водоснабжения участка будет осуществляться из существующего водопровода. Общий расход для этих целей составляет 81,0 м3/год.

Источниками шума и вибрации на рассматриваемом предприятии, является технологическое оборудование. При соблюдении правил эксплуатации и применении шума поглощающих мероприятий, увеличение шумового фона в районе размещения предприятия не ожидается.

В период строительно-монтажных работ прогнозируются выбросы загрязняющих веществ в атмосферный воздух в общем количестве 1,9905 тонн. Выбросы при производстве строительно-монтажных работ осуществляются только в течение срока строительства и не участвуют в формировании фоновых концентраций.

В процессе строительства прогнозируется образование строительных отходов в виде лома черного и цветного металла, отходов полиэтиленовых труб, обтирочной ветоши и непромышленных отходов. Указанные отходы по окончании строительства и реконструкции будут утилизированы с принятыми стандартами и нормами в Узбекистане.

Рассмотрев представленные материалы, Бухарский областной филиал центра Государственной экологической экспертизы **согласовывает** проект заявления о воздействии на окружающую среду развитии и модернизации систем водоснабжения на территориях МСГ «Бузачи», МСГ «Навбахор» и МСГ «Жаркок» Караулбазарского района Бухарской области.

**Предприятию необходимо:**

***Полностью соблюдать требования главы 5 статьи 16 (Условия использования природных ресурсов) и главы 10 статьи 45 (Охрана природы от загрязнения отходами) Закона Республики Узбекистан «Об охране природы».***

***Своевременно выполнять предусмотренные мероприятия по технической рекультивации нарушенных земель.***

***После завершения строительно-монтажных работ предприятию необходимо благоустроит собственную и прилегающую территорию УРВ.***

***В случае необходимости вырубки какого-либо дерева при проведении строительных работ, заказчик должен обратиться в Центр государственных услуг за разрешением на вырубку деревьев в соответствии с Постановлением Кабинета Министров Республики Узбекистан от 31 марта 2018 года No 255.***

Заключение государственной экологической экспертизы о соответствии объекта государственной экологической экспертизы экологическим требованиям **имеет юридическую силу в течение трех лет со дня его выдачи**.

Контроль над соблюдением требований природоохранного законодательства на предприятии возлагается Караулбазарскому районному инспекцию Природных ресурсов.

Исп.: Сафаров Ғанишер Ғуломович
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Номер заключения 3-7-251з
Дата заключения 03.05.2023
Для проверки

# New SEE approval for the design of Buzochi WDU

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Davlat ekologik ekspertizasining
X U L O S A S I

**По объекту:** Оценка воздействия на окружающую среду реконструкции УРВ со строительством новой насосной станции на территории МСГ Бузачи Караулбазарского района Бухарской области.

**Заказчик:** АО "O`ZSUVTA`MINOT"

**ИНН** 307224696

**Категория:** III, п.7, ПКМ РУз №541 от 07.09.2020 г.

**Разработчик:** ООО "GLOBAL BUSINESS SERVICES"

**Эксперт:** Абдуллаев Икром Иззатуллаевич

**Организация:** АО "O`ZSUVTA`MINOT"

**Руководитель:** SAIFNAZAROV SAXIB ISMAILOVICH

**Копия:** Караулбзарскому районному инспекцию природных ресурсов.

На Бухарский областной филиал ГУП центра Государственной экологической экспертизы представлены материалы оценки воздействия на окружающую среду реконструкции УРВ со строительством новой насосной станции на территории МСГ Бузачи Караулбазарского района Бухарской области.

Выполнение проекта реконструкции УРВ со строительством новой насосной станции на территории МСГ Бузачи Караулбазарского района вызвано необходимостью решения проблемы питьевого водоснабжения райцентров и поселков указанных районов.

Основанием для реализации данного объекта является постановление Кабинета Министров Республики Узбекистан № 482 от 12 августа 2020 года «О мерах по реализации проекта развития и модернизации систем водоснабжения и водоотведения Бухарской области с участием Азиатского банка инфраструктурных инвестиций».

Основной целью Проекта является улучшение здоровья и жизненных условий людей, проживающих в сельской местности Бухарской области.

Согласно Постановлению КМ РУз от 07.09.2020 года № 541 «О дальнейшем совершенствовании механизма оценки воздействия на окружающую среду» данное предприятие относится к 3-ей категории воздействия на окружающую среду (низкий риск п.7).

В представленном проекте предусматривается ряд мероприятий, которые позволят повышение уровня жизни, окружающей среды и общественного здравоохранения, улучшение и расширение доступа к надежным, устойчивым и доступным услугам водоснабжения в Бухарской области.

Границами реконструируемого УРВ, в настоящее время являются: с юга - жилые дома, с севера – пустырь далее на расстоянии 60 м коллектор, с запада - внутренняя дорога далее жилые дома, с юга – внутренняя дорога далее посевные поля, с востока- жилые дома.

Ближайшие жилые дома расположены на расстоянии 60 м с юго-восточной стороны, что соответствует требованиям СанПиН 0244-07 «Проектирования и эксплуатации зон санитарной охраны источников водоснабжения и водопроводов хозяйственно-питьевого назначения» от 29.12.2007, статья 5.1.

Географические координаты расположения УРВ Бузачи следующие: 39°26'31.60"С 64°52'55.00"В, 39°26'34.03"С 64°52'57.29"В, 39°26'35.70"С 64°52'54.34"В 39°26'33.32"С 64°52'51.97"В.

Исторические и культурные памятники в зоне предполагаемого размещения сооружений отсутствуют.

Положение изучаемого района в глубине континента обуславливает его климат резко континентальный, теплый, очень засушливый летом и влажный, сравнительно холодный зимой, а также значительные годовые и суточные колебания температуры воздуха. Средняя годовая температура воздуха составляет 16 С, самим холодным месяцем является январь (2,06 С), самым жарким – июль (38-40).

**Насосная станция Бузачи:**

Существующие резервуары для воды в УРВ Бузачи будут эксплуатированы путем реконструкции, и будет построена новая насосная станция. От насосной станции Бузачи будут проложены две отдельные трубопроводы для поселка Бузачи и поселка Ташкудук. Кроме того, для насосной станции была разработана усилительная система пожаротушения с электрическим и дизельным двигателем. Для слива воды из помещения насосной станции будет спроектирован погружной насос Дренажный водоем и погружной насос были спроектированы для слива воды из резервуаров. Система электролиза и оборудование были спроектированы для обеззараживания воды.

Для достижения цели, проектными задачами являются совершенствование системы водоснабжения и усиление эксплутационной базы водоснабжающей организации путём:

- Существующие резервуары для воды в УРВ Бузачи будут реконструированы и использованы (2 х 500 м3), а насосная станция будет перестроена, существующие трубы будут полностью заменены в соответствии с новыми диаметрами. В существующем водораспределительном узле насос отсутствует, будут установлены новые насосы.
- Будут проложены два отдельных трубопровода от насосной станции Бузачи до населенных пунктов Бузачи и Ташкудук.
- От каждого резервуара к насосной станции будет подключен один трубопровод диаметром 150 мм.
- Диаметр выпускной трубы насоса будет составлять DN100, который будет подключен к сети Бузачи.
- Диаметр выпускной трубы насоса будет составлять DN40, который будет подключен к линии водоснабжения Ташкудук.

2 единицы центробежных насосов с горизонтальным валом Q = 11,15 л /с; Nm = 5,5 кВт (1 основной + 1 резервный) будут использоваться для питания сети Бузачи, 2 единицы центробежных насосов с вертикальным валом Q = 0,89 л / с; Nm = 1,1 кВт (1 основной + 1 резервный) будут использоваться для питания сети Ташкудука.

-Дополнительно, для насосной станции была разработана система пожаротушения с электрическим и дизельным двигателем. о Насос (электрический) 11,00 кВт; Насос (Жокей) 1,5 кВт; Насос (дизельный) 16,00 кВ

- Поскольку дизельный насос сам будет обеспечивать необходимую энергию, его не будет в оборудовании, которое нуждается в электроэнергии в проектах электроснабжения.
- Погружной насос предназначен для слива воды из помещения насосной станции.
- Погружной насос:
- Скорость потока: 10 м3/ч
  Нм: 0,75 кВт
- Дренажный водоем и погружной насос предназначены для слива воды из резервуаров.
- Погружной насос: о
- Скорость потока: 20 м3/ч
- Нм: 1,1 кВт
- Электролизные системы и оборудование предназначены для обеззараживания воды.

Существующий напорный песчаный фильтр будет перемещен в УРВ, и его производительность будет увеличена.

Данные мероприятия позволят улучшить работу системы водоснабжения и обеспечить качественной питьевой воды населению.

Анализ представленных материалов показал, что воздействие на окружающую среду будет не значительным и в период строительных работ.

В период строительных работ прогнозируются выбросы загрязняющих веществ в атмосферный воздух от строительно-монтажных работ в общем количестве 0,42766 тонн. Выбросы при производстве строительно-монтажных работ осуществляются только в течение срока строительства и не участвуют в формировании фоновых концентраций.

Вода на объекте будет использоваться для питьевых нужд рабочего персонала. Водоснабжения участка будет осуществляться из существующего водопровода. Общий расход для этих целей составляет 81,0 м3/год.

В процессе строительства прогнозируется образование строительных отходов в виде лома черных металлов, обломков строительного кирпича и т.п. Указанные отходы по окончании строительства и реконструкции будут утилизированы с принятыми стандартами и нормами в Узбекистане.

Рассмотрев представленные материалы, Бухарский областной филиал ГУП центра Государственной экологической экспертизы согласовываетпроект заявления о воздействии на окружающую среду реконструкции УРВ со строительством новой насосной станции на территории МСГ Бузачи Караулбазарского района Бухарской области.

***Полностью соблюдать требования главы 5 статьи 16 (Условия использования природных ресурсов) и главы 10 статьи 45 (Охрана природы от загрязнения отходами) Закона Республики Узбекистан «Об охране природы».***

***Своевременно выполнять предусмотренные мероприятия по технической рекультивации нарушенных земель.***

***После завершения строительно-монтажных работ предприятию необходимо благоустроит собственную и прилегающую территорию УРВ.***

***В случае необходимости вырубки какого-либо дерева при проведении строительных работ, заказчик должен обратиться в Центр государственных услуг за разрешением на вырубку деревьев в соответствии с Постановлением Кабинета Министров Республики Узбекистан от 31 марта 2018 года No 255.***

Заключение государственной экологической экспертизы о соответствии объекта государственной экологической экспертизы экологическим требованиям **имеет юридическую силу в течение трех лет со дня его выдачи.**

Контроль над соблюдением требований природоохранного законодательства на предприятии возлагается Караулбзарскому районному инспекцию природных ресурсов.

## New SEE approval for the design of Navbahor WDU

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**Davlat ekologik ekspertizasining**
**XULOSASI**

| | |
|---|---|
| **По объекту:** | Проект заявления о воздействии на окружающую среду реконструкция узла распределения воды (УРВ) со строительством новой насосной станции и резервуара чистой воды на территории МСГ «Навбахор» Караулбазарского района Бухарской области. |
| **Заказчик:** | АО "O'ZSUVTA'MINOT" |
| **ИНН** | 307224696 |
| **Категория:** | III, п.7, ПКМ РУз №541 от 07.09.2020 г. |
| **Разработчик:** | ООО "GLOBAL BUSINESS SERVICES" |
| **Эксперт:** | Сафаров Ганишер Гуломович |

Организация: АО "O'ZSUVTA'MINOT"

Руководитель: SAIFNAZAROV SAXIB ISMAILOVICH

Копия: Караулбазарскому районному инспекцию природных ресурсов.

На Бухарский областной филиал ГУП центра Государственной экологической экспертизы представлены материалы оценки воздействия на окружающую среду реконструкции узла распределения воды (УРВ) со строительством новой насосной станции и резервуара чистой воды на территории МСГ «Навбахор» Караулбазарского района Бухарской области.

Основанием для реализации данного объекта является постановление Кабинета Министров Республики Узбекистан № 482 от 12 августа 2020 года «О мерах по реализации проекта развития и модернизации систем водоснабжения и водоотведения Бухарской области с участием Азиатского банка инфраструктурных инвестиций».

Основной целью Проекта является улучшение здоровья и жизненных условий людей, проживающих в сельской местности Бухарской области.

Согласно Постановлению КМ РУз от 07.09.2020 года № 541 «О дальнейшем совершенствовании механизма оценки воздействия на окружающую среду» данное предприятие относится к 3-ей категории воздействия на окружающую среду (низкий риск п.7).

В представленном проекте предусматривается ряд мероприятий, которые позволят повышение уровня жизни, окружающей среды и общественного здравоохранения, улучшение и расширение доступа к надежным, устойчивым и доступным услугам водоснабжения в Бухарской области.

Географические координаты расположения УРВ «Навбахор»:

1. 39°27'31.05"C 64°55'30.24"B
2. 39°27'33.51"C 64°55'32.43"B
3. 39°27'35.73"C 64°55'28.55"B
4. 39°27'33.27"C 64°55'26.11"B

Границами УРВ «Навбахор» является:
с севера – жилые дома
с востока – жилые дома
с юга - жилые дома
с запада - внутренняя дорога далее посевные поля.

Рассмотрев представленные материалы, Бухарский областной филиал ГУП центра Государственной экологической экспертизы согласовываетпроект заявления о воздействии на окружающую среду строительство новой насосной станции и резервуара чистой воды на территории МСГ «Навбахор» в Караулбазарском районе Бухарской области.

***Полностью соблюдать требования главы 5 статьи 16 (Условия использования природных ресурсов) и главы 10 статьи 45 (Охрана природы от загрязнения отходами) Закона Республики Узбекистан «Об охране природы».***

***Своевременно выполнять предусмотренные мероприятия по технической рекультивации нарушенных земель.***

***После завершения строительно-монтажных работ предприятию необходимо благоустроит собственную и прилегающую территорию УРВ.***

***В случае необходимости вырубки какого-либо дерева при проведении строительных работ, заказчик должен обратиться в Центр государственных услуг за разрешением на вырубку деревьев в соответствии с Постановлением Кабинета Министров Республики Узбекистан от 31 марта 2018 года No 255.***

Заключение государственной экологической экспертизы о соответствии объекта государственной экологической экспертизы экологическим требованиям **имеет юридическую силу в течение трех лет со дня его выдачи.**

Контроль над соблюдением требований природоохранного законодательства на предприятии возлагается Караулбазарскому районному инспекцию природных ресурсов.

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Номер заключения Э-7-259з
Дата заключения 05.05.2023
Для проверки

Номер документа: 41629
Пароль для проверки: 68731

Ближайшие жилые дома расположены на расстоянии 50 м с северной стороны, что соответствует требованиям СанПиН 0244-07 «Проектирования и эксплуатации зон санитарной охраны источников водоснабжения и водопроводов хозяйственно-питьевого назначения» от 29.12.2007, статья 5.1.

Исторические и культурные памятники в зоне предполагаемого размещения сооружений отсутствуют.

Положение изучаемого района в глубине континента обуславливает его климат резко континентальный, теплый, очень засушливый летом и влажный, сравнительно холодный зимой, а также значительные годовые и суточные колебания температуры воздуха. Средняя годовая температура воздуха составляет 16 С, самим холодным месяцем является январь (2,06 С), самым жарким – июль (38-40).

**Проектом предусматривается следующие работы:**

На территории УРВ ««Навбахор»» есть два резервуара с чистой водой и насосная станция. Резервуар для чистой воды состоит из 2-х секционных резервуаров объемом 500 м3 каждый. Размеры резервуара составляют 12,0 м х 18,0 м.

Для достижения цели, проектными задачами являются совершенствование системы водоснабжения и усиление эксплуатационной базы водоснабжающей организации путём:

- Существующие резервуары для воды в УРВ ««Навбахор»» будут реконструированы и использованы (2 х 500 м3), а насосная станция будет перестроена, существующие трубы будут полностью заменены в соответствии с новыми диаметрами. В существующем водораспределительном узле нет насоса. Будут установлены новые насосы.
- От насосной станции «Навбахор» до населенного пункта «Навбахор» будет проложен трубопровод.
- От каждого резервуара к насосной станции будет подключен один трубопровод диаметром 125 мм. о Трубопровод DN 100 будет подключен от насосной станции к сети «Навбахор».
- Для питания сети «Навбахор» будут использоваться 2 единицы центробежных насосов с горизонтальным валом Q= 9,01 л/с; Nm=5,5 кВт (1 основной + 1 резервный).
- Дополнительно, для насосной станции была разработана система пожаротушения с электрическим и дизельным двигателем.

Насос (электрический) 11,00 кВт; Насос (Жокей) 1,5 кВт; Насос (дизельный) 16,00 кВт о Поскольку дизельный насос сам будет обеспечивать необходимую энергию, его не будет в оборудовании, которое нуждается в электроэнергии в проектах электроснабжения.

Погружной насос предназначен для слива воды из помещения насосной станции.

Погружной насос:

Скорость потока: 10 м3/ч

Нм: 0,75 кВт

Дренажный водоем и погружной насос предназначены для слива воды из резервуаров.

Погружной насос:

Скорость потока: 10 м3/ч

Нм: 1,1 кВт

Электролизные системы и оборудование предназначены для обеззараживания воды.

Существующий напорный песчаный фильтр будет перемещен в УРВ, и его производительность будет увеличена.

Данные мероприятия позволят улучшить работу системы водоснабжения и обеспечить гарантированную бесперебойную круглосуточную подачу качественной питьевой воды населению.

Будет проложен трубопровод от насосной станции «Навбахор» до населенного пункта ««Навбахор»».

От каждого резервуара к насосной станции будет подключен один трубопровод диаметром 150 мм. о Трубопровод DN100 будет подключен от насосной станции к сети «Навбахор».

Для питания сети «Навбахор» будут использоваться 2 единицы центробежных насосов с горизонтальным валом Q= 8,53 л/с; Nm=5,5 кВт (1 основной +1 резервный). Дополнительно, для насосной станции была разработана система пожаротушения с электрическим и дизельным двигателем. о Насос (электрический) 11,00 кВт; Насос (Жокей) 1,5 кВт; Насос (дизельный) 16,00 кВт о Поскольку дизельный насос сам будет обеспечивать необходимую энергию, его не будет в оборудовании, которое нуждается в электроэнергии в проектах электроснабжения.

Погружной насос предназначен для слива воды из помещения насосной станции о Погружной насос:

Скорость потока: 10 м3/ч

Нм: 0,75 кВт

Дренажный водоем и погружной насос предназначены для слива воды из резервуаров. Погружной насос:

Скорость потока: 20 м3/ч

Нм: 1,1 кВт

Электролизные системы и оборудование предназначены для обеззараживания воды.

Существующий напорный песчаный фильтр будет перемещен в УРВ, и его производительность будет увеличена.

Данные мероприятия позволят улучшить работу системы водоснабжения и обеспечить гарантированную качественной питьевой воды населению.

В качестве источников водоснабжения УРВ «Навбахор» Караулбазарского района является магистральная водопроводная линия Куймазар-Мубарак

Анализ представленных материалов показал, что воздействие на окружающую среду будет не значительным и в период строительных работ.

В период строительных работ прогнозируются выбросы загрязняющих веществ в атмосферный воздух от строительно-монтажных работ в общем количестве 0,42766 тонн. Выбросы при производстве строительно-монтажных работ осуществляются только в течение срока строительства и не участвуют в формировании фоновых концентраций.

Вода на объекте будет использоваться для питьевых нужд рабочего персонала. Водоснабжение участка будет осуществляться из существующего водопровода. Общий расход для этих целей составляет 81,0 м3/год.

В процессе строительства прогнозируется образование строительных отходов в виде лома черного и цветного металла, отходов полиэтиленовых труб, обтирочной ветоши и непромышленных отходов. Указанные отходы по окончании строительства и реконструкции будут утилизированы с принятыми стандартами и нормами в Узбекистане.

## New SEE approval for the design of Jarqoq WDU

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**Davlat ekologik ekspertizasining**
**XULOSASI**

| | |
|---|---|
| **По объекту:** | Оценка воздействия на окружающую среду строительство новой насосной станции и резервуара чистой воды на территории МСГ Жаркок Караулбазарского района Бухарской области. |
| **Заказчик:** | АО "O`ZSUVTA`MINOT" |
| **ИНН** | 307224696 |
| **Категория:** | III, п.7, ПКМ РУз №541 от 07.09.2020 г. |
| **Разработчик:** | ООО "GLOBAL BUSINESS SERVICES" |
| **Эксперт:** | Абдуллаев Икром Иззатуллаевич |
| **Организация:** | АО "O`ZSUVTA`MINOT" |
| **Руководитель:** | SAIFNAZAROV SAXIB ISMAILOVICH |
| **Копия:** | Караулбазарскому районному инспекцию природных ресурсов |

На Бухарский областной филиал ГУП центра Государственной экологической экспертизы представлены материалы оценки воздействия на окружающую среду строительство новой насосной станции и резервуара чистой воды на территории МСГ Жаркок Караулбазарского района Бухарской области.

Выполнение проекта строительство новой насосной станции и резервуара чистой воды на территории МСГ Жаркок Караулбазарского района вызвано необходимостью решения проблемы питьевого водоснабжения райцентров и поселков указанных районов.

Основанием для реализации данного объекта является постановление Кабинета Министров Республики Узбекистан № 482 от 12 августа 2020 года «О мерах по реализации проекта развития и модернизации систем водоснабжения и водоотведения Бухарской области с участием Азиатского банка инфраструктурных инвестиций».

Основной целью Проекта является улучшение здоровья и жизненных условий людей, проживающих в сельской местности Бухарской области.

Согласно Постановлению КМ РУз от 07.09.2020 года № 541 «О дальнейшем совершенствовании механизма оценки воздействия на окружающую среду» данное предприятие относится к 3-ей категории воздействия на окружающую среду (низкий риск п.7).

В представленном проекте предусматривается ряд мероприятий, которые позволят повышение уровня жизни, окружающей среды и общественного здравоохранения, улучшение и расширение доступа к надежным, устойчивым и доступным услугам водоснабжения в Бухарской области.

Границами объекта, в настоящее время являются: с юга - внутренняя дорога далее коллектор на расстоянии 123 м, с севера и с запада – внутренняя дорога далее жилые дома, с востока - пром.предприятия.

Ближайшие жилые дома расположены на расстоянии 55 м с западной стороны, что соответствует требованиям СанПиН 0244-07 «Проектирования и эксплуатации зон санитарной охраны источников водоснабжения и водопроводов хозяйственно-питьевого назначения» от 29.12.2007, статья 5.1.

Географические координаты расположения объекта следующие: 39°25'43.75"C 65°1'14.56"B, 39°25'46.48"C 65°1'17.05"B, 39°25'48.17"C 65°1'13.84"B 39°25'45.49"C 65° 1'11.31"B

Исторические и культурные памятники в зоне предполагаемого размещения сооружений отсутствуют.

Положение изучаемого района в глубине континента обуславливает его климат резко континентальный, теплый, очень засушливый летом и влажный, сравнительно холодный зимой, а также значительные годовые и суточные колебания температуры воздуха. Средняя годовая температура воздуха составляет 16 С, самим холодным месяцем является январь (2,06 С), самым жарким – июль (38-40).

**Насосная станция Жаркок:**

Существующие резервуары для воды в УРВ Жаркок непригодны для использования, резервуары для воды (2-х 400 м3) и насосная станция будут восстановлены, существующие трубы будут полностью заменены в соответствии с новыми диаметрами. В существующем водораспределительном узле нет насоса. Будут установлены новые насосы.

Будет проложен трубопровод от насосной станции Жаркок до населенного пункта Жаркок.

От каждого резервуара к насосной станции будет подключен один трубопровод диаметром 150 мм. о Трубопровод DN100 будет подключен от насосной станции к сети Жаркок.

Для питания сети Жаркок будут использоваться 2 единицы центробежных насосов с горизонтальным валом Q= 8,53 л/с; Nm=5,5 кВт (1 основной +1 резервный). о Дополнительно, для насосной станции была разработана система пожаротушения с электрическим и дизельным двигателем. о Насос (электрический) 11,00 кВт; Насос (Жокей) 1,5 кВт; Насос (дизельный) 16,00 кВт о Поскольку дизельный насос сам будет обеспечивать необходимую энергию, его не будет в оборудовании, которое нуждается в электроэнергии в проектах электроснабжения.

Погружной насос предназначен для слива воды из помещения насосной станции о Погружной насос:

Скорость потока: 10 м3/ч

Нм: 0,75 кВт

Дренажный водоем и погружной насос предназначены для слива воды из резервуаров. Погружной насос:

Скорость потока: 20 м3/ч

Нм: 1,1 кВт

Электролизные системы и оборудование предназначены для обеззараживания воды.

Существующий напорный песчаный фильтр будет перемещен в УРВ, и его производительность будет увеличена

Данные мероприятия позволят улучшить работу системы водоснабжения и обеспечить гарантированную качественной питьевой воды населению.

В качестве источников водоснабжения УРВ Жаркок Караулбазарского района является магистральная водопроводная линия Куймазар-Мубарак

Анализ представленных материалов показал, что воздействие на окружающую среду будет не значительным и в период строительных работ.

В период строительных работ прогнозируются выбросы загрязняющих веществ в атмосферный воздух от строительно-монтажных работ в общем количестве 0,42766 тонн. Выбросы при производстве строительно-монтажных работ осуществляются только в течение срока строительства и не участвуют в формировании фоновых концентраций.

Вода на объекте будет использоваться для питьевых нужд рабочего персонала. Водоснабжения участка будет осуществляться из существующего водопровода. Общий расход для этих целей составляет 81,0 м3/год.

В процессе строительства прогнозируется образование строительных отходов в виде лома черных металлов, обломков строительного кирпича и т.п. Указанные отходы по окончании строительства и реконструкции будут утилизированы с принятыми стандартами и нормами в Узбекистане.

Рассмотрев представленные материалы, Бухарский областной филиал ГУП центра Государственной экологической экспертизы согласовываетпроект заявления о воздействии на окружающую среду строительство новой насосной станции и резервуара чистой воды на территории МСГ Жаркок в Караулбазарском районе Бухарской области.

***Полностью соблюдать требования главы 5 статьи 16 (Условия использования природных ресурсов) и главы 10 статьи 45 (Охрана природы от загрязнения отходами) Закона Республики Узбекистан «Об охране природы».***

***Своевременно выполнять предусмотренные мероприятия по технической рекультивации нарушенных земель.***

***После завершения строительно-монтажных работ предприятию необходимо благоустроит собственную и прилегающую территорию УРВ.***

***В случае необходимости вырубки какого-либо дерева при проведении строительных работ, заказчик должен обратиться в Центр государственных услуг за разрешением на вырубку деревьев в соответствии с Постановлением Кабинета Министров Республики Узбекистан от 31 марта 2018 года No 255.***

Заключение государственной экологической экспертизы о соответствии объекта государственной экологической экспертизы экологическим требованиям **имеет юридическую силу в течение трех лет со дня его выдачи**.

Контроль над соблюдением требований природоохранного законодательства на предприятии возлагается Караулбазарскому районному инспекцию природных ресурсов.

Исп.: Абдуллаев Икром Иззатуллаевич

Номер заключения Э-Т-249з
Дата заключения 03.05.2023
Для проверки

Номер документа: 41461
Пароль для проверки: 12204

# Appendix 4. Köppen – Geiger Climate Map

The Köppen climate classification is one of the most widely used climate classification systems. The classification divides climates into five main climate zones, with each group being divided based on seasonal precipitation and temperature patterns.

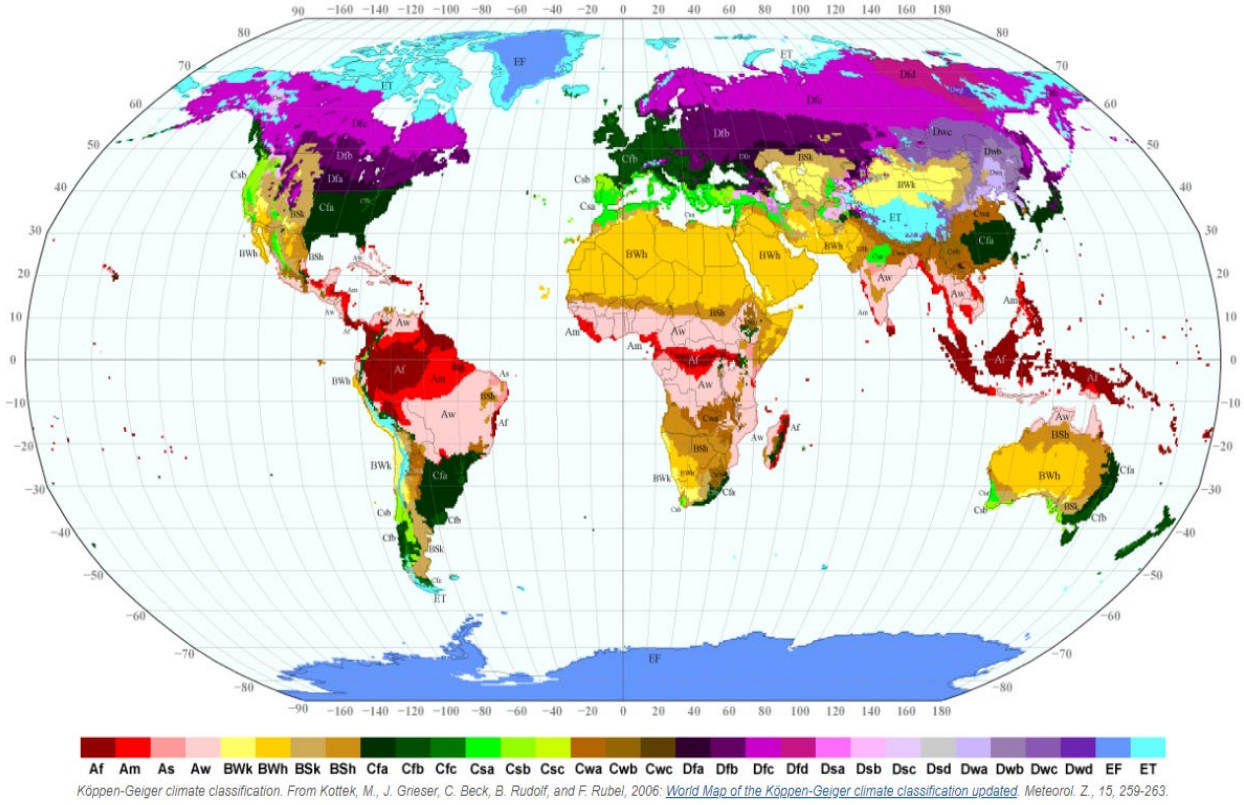



Figure 2: Köppen – Geiger climate map (source: US National Weather Service[1])

The zones are as follows:

- Zone A: tropical or equatorial zone (represented by blue colors on most maps)
- Zone B: arid or dry zone (represented by red, pink, and orange colors on most maps)
- Zone C: warm/mild temperate zone (represented by green colors on most maps)
- Zone D: continental zone (represented by purple, violet, and light blue colors on most maps)
- Zone E: polar zone (represented by gray colors on most maps).

Each zone is further subdivided based on temperature or dryness. These subcategories are as follows:

*Second letter* (lower case) adds divisions based on precipitation patterns.

- f – wet year-round
- s – dry summer season

[1] https://www.weather.gov/jetstream/climate_max

- w – dry winter season
- m – monsoon

*Third letter* (lower case) adds divisions based on temperature patterns.

- h – hot steppe/desert
- k – cold steppe/desert
- a – hot summer
- b – warm summer
- c – cool summer
- d – very cold winters.

Detailed description of the main climate zones are provided in Figure 60.

| | | |
|---|---|---|
| Af | Equatorial rainforest | No dry season. The driest month has at least 2.36" (60 mm) of rain. Rainfall is generally evenly distributed throughout the year. All average monthly temperatures are greater than 64°F (18°C). |
| Am | Equatorial monsoon | Pronounced wet season. Short dry season. There are one or more months with less than 2.36" (60 mm). All average monthly temperatures are greater than 64°F (18°C). Highest annual temperature occurs just prior to the rainy season. |
| As | Equatorial savanna | Summer dry season. There are more than two months with less than 2.36" (60 mm) in summer. All average monthly temperatures are greater than 64°F (18°C). |
| Aw | Equatorial savanna | Winter dry season. There are more than two months with less than 2.36" (60 mm) in winter. All average monthly temperatures are greater than 64°F (18°C). |
| BWk | Mid-latitude desert | Mid-latitude desert. Evaporation exceeds precipitation on average but is **less than half** potential evaporation. Average temperature is **less** than 64°F (18°C). Winter has below freezing temperatures. |
| BWh | Subtropical desert | Low-latitude desert. Evaporation exceeds precipitation on average but is **less than half** potential evaporation. Average temperature is **more** than 64°F (18°C). Frost is absent or infrequent. |
| BSk | Mid-latitude steppe | Mid-latitude dry. Evaporation exceeds precipitation on average but is less than potential evaporation. Average temperature is **less** than 64°F (18°C). |
| BSh | Subtropical steppe | Low-latitude dry. Evaporation exceeds precipitation on average but is less than potential evaporation. Average temperature is **more** than 64°F (18°C). |
| Cfa | Humid subtropical | Mild with no dry season, hot summer. Average temperature of warmest months are **over** 72°F (22°C). Average temperature of coldest month is under 64°F (18°C). Year around rainfall but highly variable. |
| Cfb | Marine west coast | Mild with no dry season, warm summer. Average temperature of all months is **lower** than 72°F (22°C). At least four months with average temperatures over 50°F (10°C). Year around equally spread rainfall. |
| Cfc | Marine west coast | Mild with no dry season, cool summer. Average temperature of all months is **lower** than 72°F (22°C). There are one to three months with average temperatures over 50°F (10°C). Year around equally spread rainfall. |
| Csa | Mediterranean | Mild with dry, hot summer. Warmest month has average temperature **more** than 72°F (22°C). At least four months with average temperatures over 50°F (10°C). Frost danger in winter. At least three times as much precipitation during wettest winter months as in the driest summer month. |
| Csb | Mediterranean | Mild with cool, dry summer. No month with average temperature of warmest months are over 72°F (22°C). At least four months with average temperatures over 50°F (10°C). Frost danger in winter. At least three times as much precipitation during wettest winter months as in the driest summer month. |
| Cwa | Humid subtropical | Mild with dry winter, hot summer |
| Dfa | Humid continental | Humid with hot summer |
| Dfb | Humid continental | Humid with severe winter, no dry season, warm summer |
| Dfc | Subarctic | Severe winter, no dry season, cool summer |
| Dfd | Subarctic | Severe, very cold winter, no dry season, cool summer |
| Dwa | Humid continental | Humid with severe, dry winter, hot summer |
| Dwb | Humid continental | Humid with severe, dry winter, warm summer |
| Dwc | Subarctic | Severe, dry winter, cool summer |
| Dwd | Subarctic | Severe, very cold and dry winter, cool summer |
| ET | Tundra | Polar tundra, no true summer |
| EF | Ice Cap | Perennial ice |
| H | Complex zone | Can encompass any of the above classifications due to the mountainous terrain. |

Figure 3: Köppen climate classification
(Source: US National Weather Service[2])

[2] https://www.weather.gov/jetstream/climate_max

# Appendix 5. Hypsometric Map

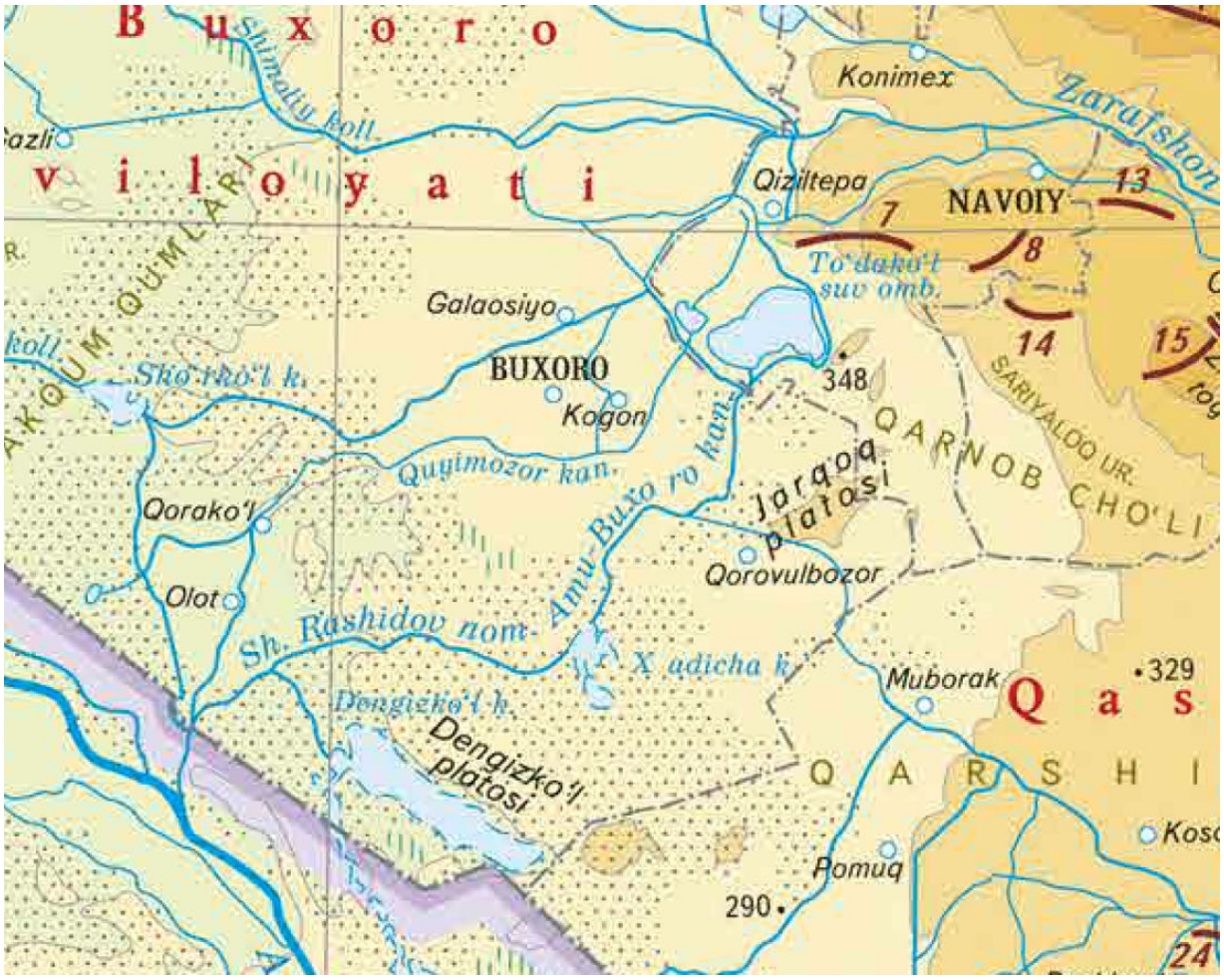



Figure 4: Hypsometric map of the subproject area

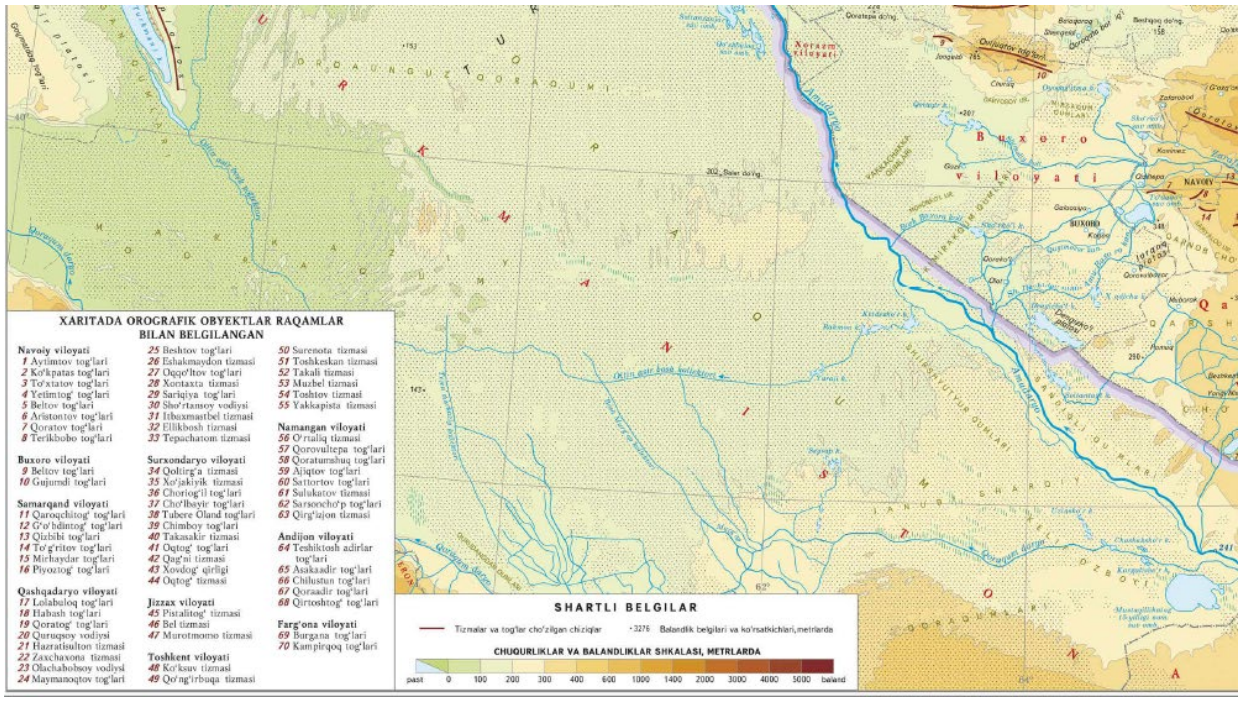



Figure 5: Hypsometric map of the project area

# Appendix 6. Seismic Zoning Map

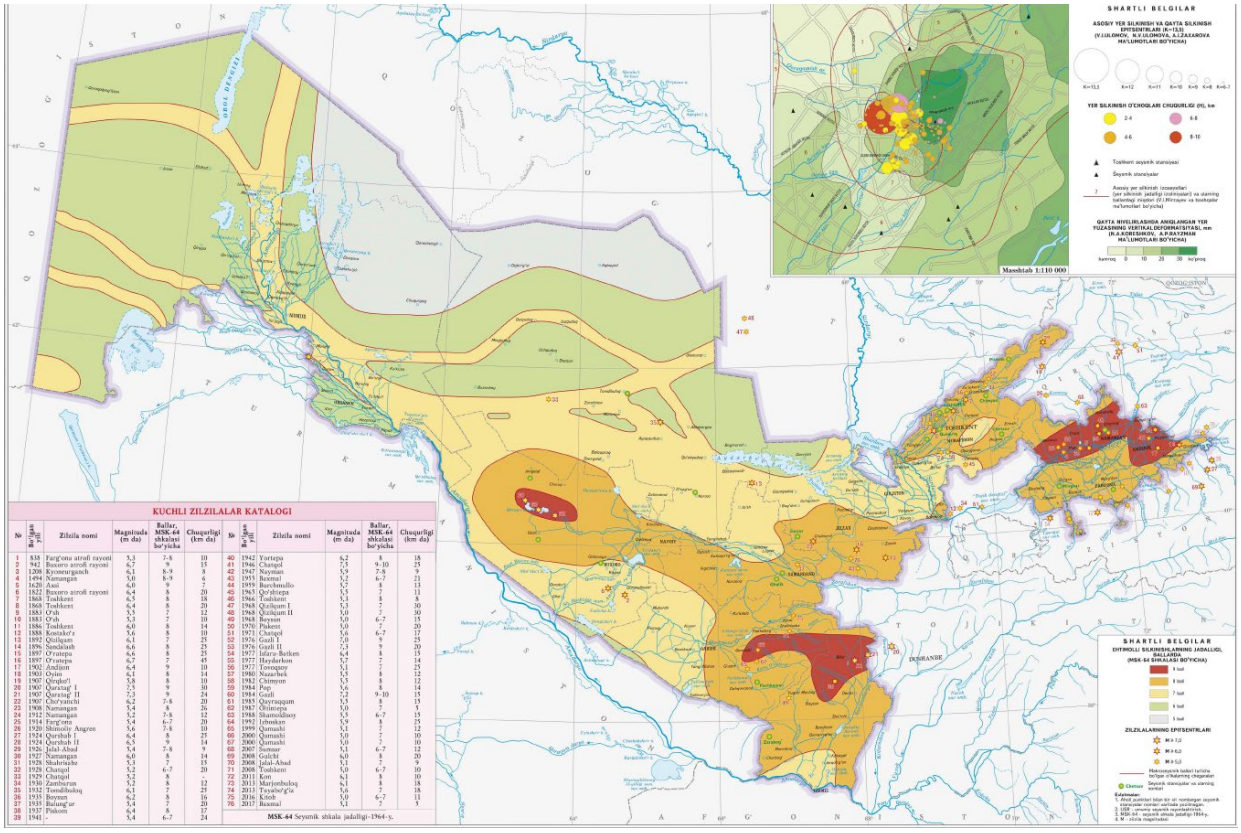



Figure 6: Seismic zoning map of Uzbekistan
(Source: National Atlas of Uzbekistan, 2020)

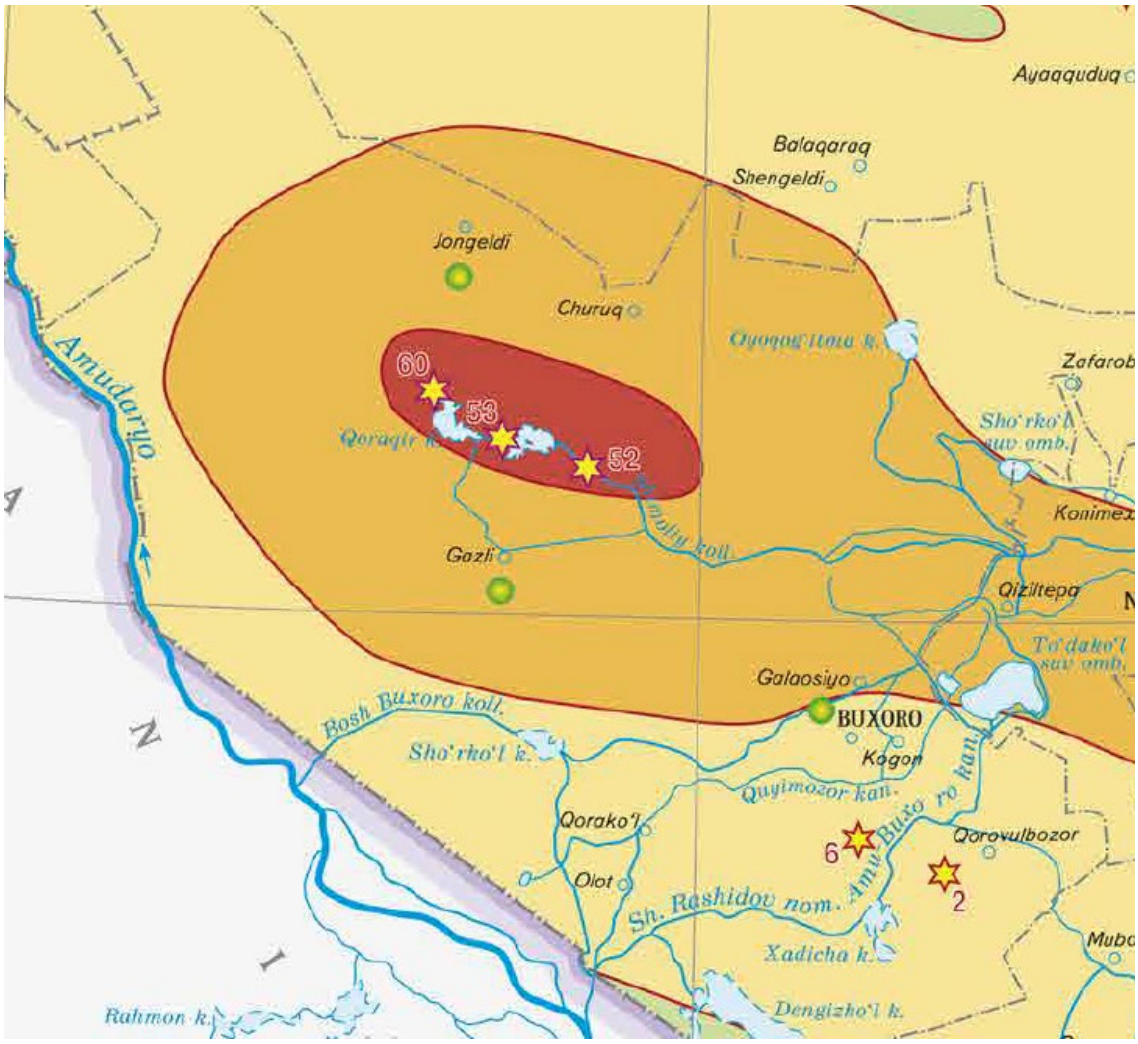


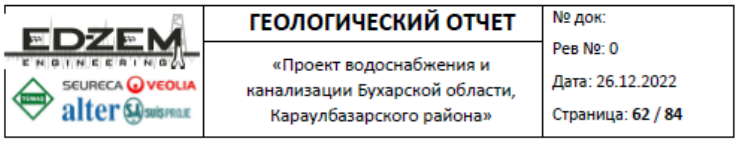

Figure 7: Seismic baseline of the project area
(Source: National Atlas of Uzbekistan, 2020)

**KUCHLI ZILZILALAR KATALOGI**

| № | Bo'lgan yili | Zilzila nomi | Magnituda (m da) | Ballar, MSK-64 shkalasi bo'yicha | Chuqurligi (km da) | № | Bo'lgan yili | Zilzila nomi | Magnituda (m da) | Ballar, MSK-64 shkalasi bo'yicha | Chuqurligi (km da) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 838 | Farg'ona atrofi rayoni | 5,3 | 7-8 | 10 | 40 | 1942 | Yortepa | 6,2 | 8 | 18 |
| 2 | 942 | Buxoro atrofi rayoni | 6,7 | 9 | 15 | 41 | 1946 | Chatqol | 7,5 | 9-10 | 25 |
| 3 | 1208 | Kyoneurganch | 6,1 | 8-9 | 8 | 42 | 1947 | Nayman | 5,9 | 7-8 | 9 |
| 4 | 1494 | Namangan | 5,0 | 8-9 | 6 | 43 | 1955 | Baxmal | 5,2 | 6-7 | 21 |
| 5 | 1620 | Axsi | 6,0 | 9 | 7 | 44 | 1959 | Burchmullo | 5,7 | 8 | 13 |
| 6 | 1822 | Buxoro atrofi rayoni | 6,4 | 8 | 20 | 45 | 1965 | Qo'shtepa | 5,5 | 7 | 11 |
| 7 | 1868 | Toshkent | 6,5 | 8 | 18 | 46 | 1966 | Toshkent | 5,3 | 8 | 8 |
| 8 | 1868 | Toshkent | 6,4 | 8 | 20 | 47 | 1968 | Qizilqum I | 5,3 | 7 | 30 |
| 9 | 1883 | O'sh | 5,5 | 7 | 12 | 48 | 1968 | Qizilqum II | 5,0 | 7 | 30 |
| 10 | 1883 | O'sh | 5,3 | 7 | 10 | 49 | 1968 | Boysun | 5,0 | 6-7 | 15 |
| 11 | 1886 | Toshkent | 6,0 | 8 | 14 | 50 | 1970 | Piskent | 5,0 | 7 | 20 |
| 12 | 1888 | Kostako'z | 5,6 | 8 | 10 | 51 | 1971 | Chatqol | 5,6 | 6-7 | 17 |
| 13 | 1892 | Qizilqum | 6,1 | 7 | 25 | 52 | 1976 | Gazli I | 7,0 | 9 | 25 |
| 14 | 1896 | Sandalash | 6,6 | 8 | 25 | 53 | 1976 | Gazli II | 7,3 | 9 | 20 |
| 15 | 1897 | O'ratepa | 6,6 | 8 | 25 | 54 | 1977 | Isfara-Batken | 6,4 | 8 | 15 |
| 16 | 1897 | O'ratepa | 6,7 | 7 | 45 | 55 | 1977 | Haydarkon | 5,7 | 7 | 14 |
| 17 | 1902 | Andijon | 6,4 | 9 | 10 | 56 | 1977 | Tovoqsoy | 5,1 | 7 | 25 |
| 18 | 1903 | Oyim | 6,1 | 8 | 14 | 57 | 1980 | Nazarbek | 5,5 | 8 | 12 |
| 19 | 1907 | Qirqko'l | 5,8 | 8 | 10 | 58 | 1982 | Chimyon | 5,5 | 8 | 12 |
| 20 | 1907 | Qaratag' I | 7,5 | 9 | 30 | 59 | 1984 | Pop | 5,6 | 8 | 14 |
| 21 | 1907 | Qaratag' II | 7,3 | 9 | 24 | 60 | 1984 | Gazli | 7,2 | 9-10 | 15 |
| 22 | 1907 | Cho'yanchi | 6,2 | 7-8 | 20 | 61 | 1985 | Qayraqqum | 5,5 | 8 | 15 |
| 23 | 1908 | Namangan | 5,4 | 8 | 26 | 62 | 1987 | Oltintepa | 5,0 | 7 | 5 |
| 24 | 1912 | Namangan | 5,2 | 7-8 | 12 | 63 | 1988 | Shamoldisoy | 5,5 | 6-7 | 15 |
| 25 | 1914 | Farg'ona | 5,4 | 6-7 | 20 | 64 | 1992 | Izboskan | 5,9 | 8 | 25 |
| 26 | 1920 | Shimoliy Angren | 5,6 | 7-8 | 10 | 65 | 1999 | Qamashi | 5,1 | 7 | 12 |
| 27 | 1924 | Qurshab I | 6,4 | 8 | 25 | 66 | 2000 | Qamashi | 5,0 | 7 | 10 |
| 28 | 1924 | Qurshab II | 6,5 | 9 | 14 | 67 | 2000 | Qamashi | 5,0 | 7 | 10 |
| 29 | 1926 | Jalal-Abad | 5,4 | 7-8 | 9 | 68 | 2007 | Sumsar | 5,1 | 6-7 | 12 |
| 30 | 1927 | Namangan | 6,0 | 8 | 14 | 69 | 2008 | Gulchi | 6,0 | 8 | 20 |
| 31 | 1928 | Shahrisabz | 5,3 | 7 | 15 | 70 | 2008 | Jalal-Abad | 5,1 | 7 | 9 |
| 32 | 1928 | Chatqol | 5,2 | 6-7 | 20 | 71 | 2008 | Toshkent | 5,0 | 6-7 | 10 |
| 33 | 1929 | Chatqol | 5,2 | 8 | - | 72 | 2011 | Kon | 6,1 | 8 | 10 |
| 34 | 1930 | Zamburun | 5,2 | 8 | 12 | 73 | 2013 | Marjonbuloq | 6,1 | 8 | 18 |
| 35 | 1932 | Tomdibuloq | 6,1 | 7 | 25 | 74 | 2013 | Tuyabo'g'iz | 5,6 | 7 | 18 |
| 36 | 1935 | Boysun | 6,2 | 8 | 16 | 75 | 2016 | Kitob | 5,0 | 6-7 | 11 |
| 37 | 1935 | Bulung'ur | 5,4 | 7 | 20 | 76 | 2017 | Baxmal | 5,1 | 7 | 5 |
| 38 | 1937 | Piskom | 6,4 | 8 | 17 | | | | | | |
| 39 | 1941 | - | 5,4 | 6-7 | 24 | | | **MSK-64** Seysmik shkala jadalligi-1964-y. | | | |

Figure 8: Data of strongest earthquakes in Uzbekistan
(Source: National Atlas of Uzbekistan, 2020)

# Appendix 7. Groundwater Tests




Приложение 1.4

**Таблица результатов химического анализа подземных вод – «Бузачи»**

| № п/п | Номер выработки | Глубина опробования, м | Сухой остаток, г/л. | Содержание ионов, мг/л / (мг-экв.) | | | | | | pH | Жесткость, мг-экв/л | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | $HCO_3^-$ | $CL^-$ | $SO_4^-$ | $Ca^{++}$ | $Mg^{++}$ | $Na^+ + K^+$ | | Общая | Устранимая | Постоянная |
| 1 | BUZ-BH-1 | 3,4 | 7,24 | 406/6,66 | 1728 | 2930 | 671/33,48 | 456/37,5 | 1045 | 7,0 | 70,98 | 6,66 | 64,32 |
| 2 | BUZ-LBH-1 | 3,4 | 5,45 | 689/113 | 700 | 2490 | 661/32,98 | 261/21,46 | 653 | 7,1 | 54,45 | 11,3 | 43,15 |
| **Среднее значение** | | | **6.35** | **548/8.98** | **1214** | **2710** | **666/33.23** | **359/29.48** | **849** | **7,1** | **62,7** | **9,0** | **53,7** |

**Таблица результатов химического анализа подземных вод – «Жаркок»**

| № п/п | Номер выработки | Глубина опробования, м | Сухой остаток, г/л. | Содержание ионов, мг/л / (мг-экв.) | | | | | | pH | Жесткость, мг-экв/л | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | $HCO_3^-$ | $CL^-$ | $SO_4^-$ | $Ca^{++}$ | $Mg^{++}$ | $Na^+ + K^+$ | | Общая | Устранимая | Постоянная |
| 1 | JAR-BH-2 | 3,2 | 14,37 | 610/10,0 | 2111 | 6530 | 92/4,59 | 518/42,6 | 4511 | 7,2 | 47,19 | 10,0 | 37,19 |
| 2 | JAR-LBH-1 | 3,3 | 13,44 | 366/6,0 | 2509 | 6530 | 94/4,69 | 502/41,3 | 3435 | 7,1 | 45,97 | 6,0 | 39,97 |
| **Среднее значение** | | | **13,91** | **488/8** | **2310** | **6530** | **93/4.64** | **510/41.9** | **3973** | **7,2** | **46,58** | **8** | **38,58** |

Адрес: массив Алай-13, д.3, М.Улугбекском р-не, г.Ташкент

Figure 9: Buzochi and Jarqoq groundwater test results

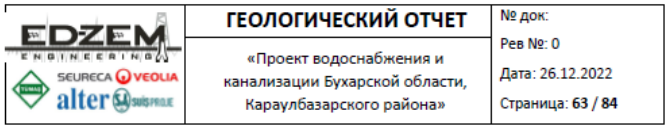



**Таблица результатов химического анализа подземных вод – «Навбахор»**

| № п/п | Номер выработки | Глубина опробования, м | Сухой остаток, г/л. | Содержание ионов, мг/л / (мг-экв.) | | | | | | pH | Жесткость, мг-экв/л | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | $HCO_3^-$ | $CL^-$ | $SO_4^-$ | $Ca^{++}$ | $Mg^{++}$ | $Na^+ + K^+$ | | Общая | Устранимая | Постоянная |
| 1 | NAV-BH-3 | 3,2 | 3,51 | 373/6,12 | 176 | 2020 | 640/31,94 | 78/6,41 | 227 | 7,6 | 38,35 | 6,12 | 32,23 |

Figure 10: Groundwater test results

These tables are an excerpt from the Geological Survey Report prepared by EDZEM Engineering LLC (Uzbekistan) on 26 December 2022.

# Appendix 8. Soil Chemical Tests



Приложение 1.3

**Таблица результатов химического анализа водных вытяжек из грунтов – «Бузачи»**

| №№ п. п. | Номер выработки | Глубина опробования, м. | Сухой остаток, % | Содержание ионов, в мг/кг сухого грунта | | | | | | pH | Содержание гипса CaSO4 X 2H2O, % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | $HCO_3^-$ | $Cl^-$ | $SO_4^{--}$ | $CA^{++}$ | $Mg^{++}$ | $(Na + K)^+$ | | |
| 1 | BUZ-BH-1 | 1,0 | 12243 | 845 | 7423 | 2605 | 304 | 612 | 195 | 7,5 | 8,45 |
| 2 | BUZ-BH-2 | 1,0 | 13339 | 430 | 8590 | 2780 | 330 | 680 | 280 | 8,1 | 10,16 |
| 3 | BUZ-BH-3 | 1,0 | 13808 | 1315 | 7975 | 2680 | 395 | 931 | 220 | 7,4 | 7,28 |
| 4 | BUZ-BH-4 | 1,0 | 14935 | 1580 | 8470 | 3000 | 400 | 950 | 200 | 8,0 | 13,53 |
| 5 | BUZ-BH-5 | 0,8 | 17932 | 1400 | 10590 | 2980 | 280 | 2080 | 160 | 7,4 | 11,3 |
| **Среднее значение** | | | **14451** | **211** | **1114** | **8610** | **2809** | **342** | **1051** | **7,7** | **10,14** |

**Таблица результатов химического анализа водных вытяжек из грунтов – «Жаркок»**

| №№ п. п. | Номер выработки | Глубина опробования, м. | Сухой остаток, % | Содержание ионов, в мг/кг сухого грунта | | | | | | pH | Содержание гипса CaSO4 X 2H2O, % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | $HCO_3^-$ | $Cl^-$ | $SO_4^{--}$ | $CA^{++}$ | $Mg^{++}$ | $(Na + K)^+$ | | |
| 1 | JAR-BH-1 | 1,0 | 10856 | 180 | 780 | 6500 | 2400 | 250 | 520 | 7,0 | 7,4 |
| 2 | JAR-BH-2 | 1,0 | 11814 | 260 | 510 | 7230 | 2640 | 310 | 650 | 8,0 | 9,1 |
| 3 | JAR-BH-3 | 1,0 | 11685 | 210 | 1290 | 6300 | 2360 | 420 | 870 | 7,4 | 7,2 |

Адрес: массив Алай-13, д.3, М.Улугбекском р-не, г.Ташкент

Figure 11: Soil chemical tests performed in Buzochi WDU and Jarqoq WDU

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | JAR-BH-4 | 1,0 | 13194 | 180 | 1600 | 7400 | 2800 | 260 | 660 | 7,9 | 12,5 |
| 5 | JAR-BH-5 | 1,0 | 14773 | 165 | 1350 | 8310 | 3100 | 300 | 1200 | 7,5 | 11,5 |
| 6 | JAR-BH-6 | 1,0 | 3487 | 140 | 225 | 2100 | 560 | 240 | 190 | 7,5 | 8,2 |
| 7 | JAR-BH-7 | 1,0 | 8320 | 137 | 965 | 4540 | 1572 | 272 | 660 | 7,8 | 9,5 |
| **Среднее значение** | | | **10590** | **182** | **960** | **6054** | **2205** | **293** | **679** | **7,6** | **9,3** |

**Таблица результатов химического анализа водных вытяжек из грунтов – «Навбахор»**

| №№ п. п. | Номер выработки | Глубина опробования, м. | Сухой остаток, % | Содержание ионов, в мг/кг сухого грунта | | | | | | pH | Содержание гипса CaSO4 X 2H2O, % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | $HCO_3^-$ | $Cl^-$ | $SO_4^{--}$ | $CA^{++}$ | $Mg^{++}$ | $(Na + K)^+$ | | |
| 1 | NAV-BH-1 | 1,0 | 10398 | 310 | 600 | 6880 | 1630 | 270 | 560 | 7,7 | 7,5 |
| 2 | NAV-BH-2 | 1,0 | 9043 | 240 | 960 | 4100 | 2500 | 320 | 780 | 7,9 | 4,2 |
| 3 | NAV-BH-3 | 1,0 | 6546 | 230 | 1220 | 3270 | 1300 | 240 | 210 | 8,0 | 6,5 |
| 4 | NAV-BH-4 | 1,0 | 5912 | 180 | 1040 | 3600 | 680 | 210 | 120 | 8,1 | 10,4 |
| 5 | NAV-BH-5 | 1,0 | 10233 | 250 | 750 | 5450 | 2320 | 420 | 870 | 7,5 | 8,0 |
| **Среднее значение** | | | **8426** | **242** | **914** | **4660** | **1686** | **292** | **508** | **7,8** | **10,14** |

Адрес: массив Алай-13, д.3, М.Улугбекском р-не, г.Ташкент

Figure 12: Soil chemical tests performed in Jarqoq WDU and Navbahor WDU

These tables are an excerpt from the Geological Survey Report prepared by EDZEM Engineering LLC (Uzbekistan) on 26 December 2022.

# Appendix 9. Flora of Buzochi WDU

Figure 13: Apricot tree, Buzochi WDU
(Source: Field visits 15-17 December 2022)

Figure 14: Mulberry (*Morus Alba L.*), Buzochi WDU
(Source: Field visits 15-17 December 2022)

Figure 15: Apricot and apple trees, Buzochi WDU
(Source: Field visits 15-17 December 2022)

Figure 16: Siberian or Asiatic elm (*Ulmus pumila*), Buzochi WDU
(Source: Field visits 15-17 December 2022)

Figure 17: Common reed (*Phragmites communis*), Buzochi WDU
(Source: Field visits 15-17 December 2022)

Figure 18: Saxaul growing along the road to Buzochi settlement
(Source: Field visit, May 02-05, 2023)

Figure 19: Elm and fruit trees (mainly apricots and apples) grow along irrigation canals

# Appendix 10. Flora of Navbahor WDU

Figure 20: Plowed land on the Navbahor WDU territory
(Source: Field visits 15-17 December 2022)

Figure 21: Common reed (*Phragmites communis*), Navbahor WDU
(Source: Field visits 15-17 December 2022)

# Appendix 11. Flora of Jarqoq WDU

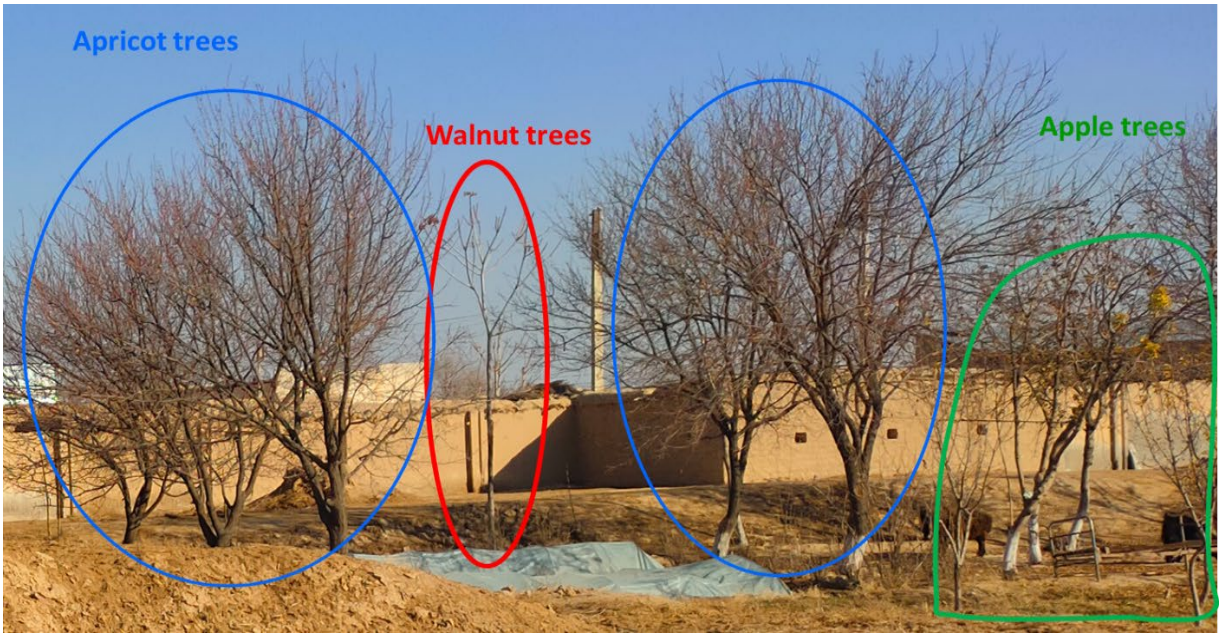



Figure 22: Apricot, apple, and walnut trees, Jarqoq WDU
(Source: Field visits 15-17 December 2022)

Figure 23: Greenhouses in Jarqoq WDU
(Source: Field visits 15-17 December 2022)

Figure 24: Vineyard in Jarqoq WDU
(Source: Field visits 15-17 December 2022)

Figure 25: Trees of elms and pines on one outer side of the Jarqoq WDU
(Source: Field visits 15-17 December 2022)

# Appendix 12. Fauna of the Project Area

Figure 26: Wetlands of Lake Dengizkul
(Source: Protection of Biodiversity at Lake Dengizkul, https://uznews.uz/posts/53399)

Figure 27: Lake Tudakul

Figure 28 Jeyran Ecocenter

(Source: Field visit to Jeyran Ecocenter, 2022)

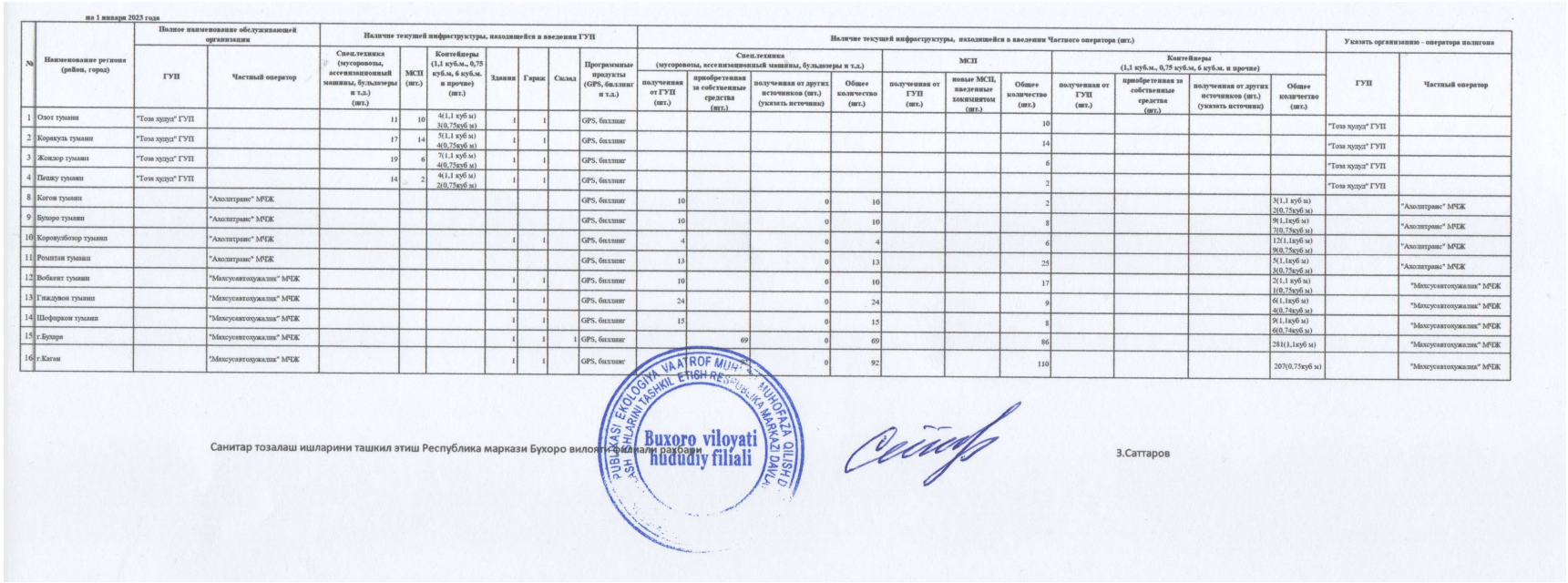
# Appendix 13. Fauna of the Subproject Area

Figure 29: Chickens, Buzochi WDU
(Source: Field visits 15-17 December 2022)

Figure 30: Chickens, cattle and domestic sheep, Jarqoq WDU
(Source: Field visits 15-17 December 2022)

Figure 31: Navbahor WDU's facilities illegally used by local population
(Source: Field visits 15-17 December 2022)

# Appendix 14. Solid Waste Management Operators



на 1 января 2023 года

| № | Наименование региона (район, город) | Полное наименование обслуживающей организации | | Наличие текущей инфраструктуры, находящейся в введении ГУП | | | | | | | Наличие текущей инфраструктуры, находящейся в введении Частного оператора (шт.) | | | | | | | | | | | Укажить организацию - оператора полигона | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ГУП | Частный оператор | Спец.техника (мусоровозы, ассенизационный машины, бульдозеры и т.д.) (шт.) | МСП (шт.) | Контейнеры (1,1 куб.м., 0,75 куб.м, 6 куб.м. и прочие) (шт.) | Здания | Гараж | Склад | Программные продукты (GPS, биллинг и т.д.) | Спец.техника (мусоровозы, ассенизационный машины, бульдозеры и т.д.) | | | МСП | | | Контейнеры (1,1 куб.м., 0,75 куб.м, 6 куб.м. и прочие) | | | | ГУП | Частный оператор |
| | | | | | | | | | | | получения от ГУП (шт.) | приобретенная за собственные средства (шт.) | получения от других источников (шт.) (указать источник) | Общее количество (шт.) | получения от ГУП (шт.) | новые МСП, введенные локимитом (шт.) | Общее количество (шт.) | получения от ГУП (шт.) | приобретенная за собственные средства (шт.) | получения от других источников (шт.) (указать источник) | Общее количество (шт.) | | |
| 1 | Олот тумани | "Тоза худуд" ГУП | | 11 | 10 | 4(1,1 куб м) 3(0,75куб м) | 1 | 1 | | GPS, биллинг | | | | | | | 10 | | | | | "Тоза худуд" ГУП | |
| 2 | Коракуль тумани | "Тоза худуд" ГУП | | 17 | 14 | 5(1,1 куб м) 4(0,75куб м) | 1 | 1 | | GPS, биллинг | | | | | | | 14 | | | | | "Тоза худуд" ГУП | |
| 3 | Жондор тумани | "Тоза худуд" ГУП | | 19 | 6 | 7(1,1 куб м) 4(0,75куб м) | 1 | 1 | | GPS, биллинг | | | | | | | 6 | | | | | "Тоза худуд" ГУП | |
| 4 | Пешку тумани | "Тоза худуд" ГУП | | 14 | 2 | 4(1,1 куб м) 2(0,75куб м) | 1 | 1 | | GPS, биллинг | | | | | | | 2 | | | | | "Тоза худуд" ГУП | |
| 8 | Когон тумани | | "Ахолитранс" МЧЖ | | | | | | | GPS, биллинг | 10 | | 0 | 10 | | | 2 | | | | 3(1,1 куб м) 2(0,75куб м) | | "Ахолитранс" МЧЖ |
| 9 | Бухоро тумани | | "Ахолитранс" МЧЖ | | | | | | | GPS, биллинг | 10 | | 0 | 10 | | | 8 | | | | 9(1,1куб м) 7(0,75куб м) | | "Ахолитранс" МЧЖ |
| 10 | Коровулбозор тумани | | "Ахолитранс" МЧЖ | | | | 1 | 1 | | GPS, биллинг | 4 | | 0 | 4 | | | 6 | | | | 12(1,1куб м) 9(0,75куб м) | | "Ахолитранс" МЧЖ |
| 11 | Ромитан тумани | | "Ахолитранс" МЧЖ | | | | | | | GPS, биллинг | 13 | | 0 | 13 | | | 25 | | | | 5(1,1куб м) 3(0,75куб м) | | "Ахолитранс" МЧЖ |
| 12 | Вобкент тумани | | "Мехсувавтохўжалик" МЧЖ | | | | 1 | 1 | | GPS, биллинг | 10 | | 0 | 10 | | | 17 | | | | 2(1,1 куб м) 1(0,75куб м) | | "Мехсувавтохўжалик" МЧЖ |
| 13 | Гиждувон тумани | | "Мехсувавтохўжалик" МЧЖ | | | | 1 | 1 | | GPS, биллинг | 24 | | 0 | 24 | | | 9 | | | | 6(1,1куб м) 4(0,74куб м) | | "Мехсувавтохўжалик" МЧЖ |
| 14 | Шофиркон тумани | | "Мехсувавтохўжалик" МЧЖ | | | | 1 | 1 | | GPS, биллинг | 15 | | 0 | 15 | | | 8 | | | | 9(1,1куб м) 6(0,74куб м) | | "Мехсувавтохўжалик" МЧЖ |
| 15 | г.Бухара | | "Мехсувавтохўжалик" МЧЖ | | | | 1 | 1 | 1 | GPS, биллинг | | 69 | 0 | 69 | | | 86 | | | | 281(1,1куб м) | | "Мехсувавтохўжалик" МЧЖ |
| 16 | г.Каган | | "Мехсувавтохўжалик" МЧЖ | | | | 1 | 1 | | GPS, биллинг | | 92 | 0 | 92 | | | 110 | | | | 207(0,75куб м) | | "Мехсувавтохўжалик" МЧЖ |

Санитар тозалаш ишларини ташкил этиш Республика маркази Бухоро вилояти филиали рахбари

Buxoro viloyati hududiy filiali

З.Саттаров

Figure 32: Solid waste management operators of the project area
(Source: Bukhara Branch of the Republican center for sanitary cleaning)

# Appendix 15. Bukhara Province Public Health and Wellbeing Service's Reports

## Acoustic Level Test Report

Заключение: Результаты проведенного анализа, решение Величина создаваемого шума превышена в ночное время согласно СанПина № 0008-20.

Сан врач: Т.Хакимов

Республики Узбекистан
Минстество здровоохрнения
Бухарской обл УСЭБ и ОЗ

Утвердаю
Приказ Миндзрав Республики
Узбекистан от 25 января 2021 года за
№ 14 16 х/ш

ПРОТОКОЛ № 23
Измерений Шума и Выбрация
От « 19» апрель 2023 года

1.Место проведения измерения Бухарская область Қаракулбазарский район
(Наименование объекта,цех,участок,отделение,адрес)

2. Измерения проводились в присутствии представителя обследуемого Объекта

3. Средства измерения ВШВ -003М3(**измеритель шума и вибрации №43901 от 17.04.2014**
( Наименование,тип,страна-производителя,зав.номер)

4.Сведения о государственной проверке 2022 г 22 ноября №698131-2022
(дата и номер сертификата соответствия)

5 .Нормативно-Техническая документация,в соответствии с которой проводились измерения СанПин РУз №0008-20г

6.Основные источники шума и характер создаваемого или шума Уличный И транспортный

7.Количество работающих человек замеры проводились в точек_____

8.Эскиз помещения (территории,рабочего места,ручной машины) с Нанесением источниеков шума и указанием стрелци мест установки и ориентации микрофонов (датчики),Порядковые номера точек замеров, В населенных пунктах

| Тартиб сони | Эслиз бўйича нуқталар | Ўлчов жойи (саноат ёки қишлоқ хўжалик объектлари учун манбанинг тури, марказги ва паспорт маълумотлари) | Қўшимча маълумотлар (ўлчов ўтказиш шарти, таъсуротни ип-вактида қанча таъсир этиш) | Шовқин характери | | | | | | Транспортлардан | Силкиниш турлари | | | Шовқин босимининг даражаси ( тебраниш тезлигида Дб ва ўртача геометрик частотали октава майдонида Гц – ларда) | | | | | | | | | | | | | Шовқин даражаси/шовқинни эквивалент даражаси | Йул қўйиладиган миқдори ДБС |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Спектор и бўйича | | Вактинчалик характеристикаси | | | | | Умумий | | | | | | | | | | | | | | | | |
| | | | | Кенг йўналишли | Бир маромли | Доимий | Тебранувчан | Алохида тўлкинли | Баландлик метр | | Транспорт | Технология ускуналаридан | Локал жойлашган | 2 | 4 | 8 | 16 | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| | | Допустимый Уровень шума от $07^{00}$ до $23^{00}$ | | | | | | | | | | | | | | | | 90 | 75 | 66 | 59 | 54 | 50 | 47 | 45 | 43 | 55 | |
| 1 | | Уровень шума на территории школы №4 Бузачи | | | | | | | | | | | | | | | | 52 | 42 | 50 | 42 | 46 | 38 | 30 | 26 | 21 | 44 | |
| | | Норма | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | | Уровень шума на территории дет сада №7 Бузачи | | | | | | | | | | | | | | | | 53 | 44 | 46 | 43 | 47 | 36 | 32 | 24 | 22 | 46 | |
| | | Норма | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | | Уровень шума на территории УРВ Бузачи точка 1 | | | | | | | | | | | | | | | | 48 | 44 | 46 | 41 | 45 | 34 | 33 | 25 | 22 | 46 | |
| | | Норма | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | | Уровень шума на территории УРВ Бузачи точка 2 | | | | | | | | | | | | | | | | 48 | 43 | 48 | 42 | 44 | 35 | 30 | 24 | 23 | 45 | |
| | | Норма | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | Уровень шума на территории школы №3 Навбахор | | | | | | | | | | | | | | | | 35 | 40 | 38 | 46 | 44 | 32 | 36 | 28 | 20 | 50 | |
| | | Норма | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | Уровень шума на территории дет сад №8 Навбахор | | | | | | | | | | | | | | | | 42 | 45 | 41 | 44 | 42 | 35 | 37 | 26 | 23 | 50 | |
| | | Норма | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | Уровень шума на территории УРВ Навбахор точка 1 | | | | | | | | | | | | | | | | 46 | 41 | 38 | 47 | 43 | 33 | 34 | 38 | 34 | 55 | |
| | | Норма | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | Уровень шума на территории УРВ Навбахор точка 2 | | | | | | | | | | | | | | | | 48 | 42 | 40 | 48 | 45 | 38 | 36 | 40 | 38 | 58 | |
| | | Норма | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | Уровень шума на территории школы №5 Жаркоқ | | | | | | | | | | | | | | | | 32 | 33 | 44 | 40 | 32 | 30 | 28 | 25 | 22 | 32 | |
| | | Норма | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | Уровень шума на территории дет сад №9 Жаркоқ | | | | | | | | | | | | | | | | 33 | 36 | 45 | 38 | 33 | 30 | 28 | 26 | 24 | 35 | |
| | | Норма | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Тартиб сони | Эквив. буйича иктислар | Участ жойи (саноат ёки кишлок хужалик объектлари учун минбанинг тури, маркаси ва паспорт | Кушимча маълумотлар (ишловчилар сони, таъсирланган ишчилар сони, канча тавар этади) | Шовкин характери | | | | | | Транспортларда | Силкинши турлари | | | Шовкин босимининг даражаси ( тебраниш тезлигида Дб ва уртача геометрик частотали октава майдонида Гц – ларда) | | | | | | | | | | | | | Шовкин эквивалентловчисини | Йул куйиладиган миклори ДБС |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Спектори буйича | | Вактинчалик характеристикаси | | | | | Умумий | | | | | | | | | | | | | | | | | |
| | | | | Кенг булмаган | Бир маромли | Доимий | Тебранувчан | Алохида | | | Транспорт технологияси | Технологияси ускуналаридан | Ловкал жойлашган | 2 | 4 | 8 | 16 | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| | | Допустимый Уровень шума от $07^{00}$ до $23^{00}$ | | | | | | | | | | | | | | | | 90 | 75 | 66 | 59 | 54 | 50 | 47 | 45 | 43 | 55 | |
| 11 | | Уровень шума на территории УРВ Жарқоқ точка 1 | | | | | | | | | | | | | | | | 36 | 38 | 44 | 39 | 35 | 33 | 32 | 24 | 22 | 36 | |
| | | Норма | | | | | | | | | | | | | | | | - | - | - | - | - | - | - | - | - | - | |
| 12 | | Уровень шума на территории УРВ Жарқоқ точка 2 | | | | | | | | | | | | | | | | 35 | 38 | 43 | 40 | 34 | 30 | 32 | 25 | 23 | 36 | |
| | | Норма | | | | | | | | | | | | | | | | - | - | - | - | - | - | - | - | - | - | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Допустимый Уровень шума от $23^{00}$ до $07^{00}$ | | | | | | | | | | | | | | | | 83 | 67 | 57 | 49 | 44 | 40 | 37 | 35 | 33 | 45 | |
| 13 | | Уровень шума на территории школы №4 Бузачи | | | | | | | | | | | | | | | | 34 | 36 | 38 | 40 | 38 | 42 | 36 | 32 | 30 | 48 | |
| | | Норма | | | | | | | | | | | | | | | | - | - | - | - | - | - | - | - | - | 3 | |
| 14 | | Уровень шума на территории дет сад №7 Бузачи | | | | | | | | | | | | | | | | 33 | 36 | 38 | 42 | 38 | 41 | 36 | 34 | 32 | 45 | |
| | | Норма | | | | | | | | | | | | | | | | - | - | - | - | - | - | - | - | - | - | |
| 15 | | Уровень шума на территории УРВ Бузачи точка 1 | | | | | | | | | | | | | | | | 42 | 46 | 40 | 42 | 46 | 37 | 35 | 30 | 26 | 42 | |
| | | Норма | | | | | | | | | | | | | | | | - | - | - | - | - | - | - | - | - | - | |
| 16 | | Уровень шума на территории УРВ Бузачи точка 2 | | | | | | | | | | | | | | | | 42 | 45 | 38 | 40 | 43 | 36 | 34 | 28 | 25 | 46 | |
| | | Норма | | | | | | | | | | | | | | | | - | - | - | - | - | - | - | - | - | 1 | |
| 17 | | Уровень шума на территории школы №3 Навбахор | | | | | | | | | | | | | | | | 35 | 40 | 38 | 46 | 44 | 32 | 36 | 28 | 20 | 50 | |
| | | Норма | | | | | | | | | | | | | | | | - | - | - | - | - | - | - | - | - | 5 | |
| 18 | | Уровень шума на территории дет сад №8 Навбахор | | | | | | | | | | | | | | | | 36 | 39 | 37 | 42 | 38 | 33 | 34 | 27 | 23 | 46 | |
| | | Норма | | | | | | | | | | | | | | | | - | - | - | - | - | - | - | - | - | 1 | |

| Тартиб сони | Экспл. бўйича изоҳлар | Ўлчов жойи (саноат ёки қишлоқ хўжалик объектлари учун мулкнинг тури, маркаси ва паспорт | Қушимча маълумотлар (ишлаш шарти, таъсирини ишлатида қанча таъсир этиш) | Шовқин характери | | | | | | Транспортлардан | Силкиниш турлари | | | Шовқин босимининг даражаси ( тебраниш частотаси Дб ва ўртача геометрик частотали октава майдонида Гц – ларда) | | | | | | | | | | | | Шовқин эквивалент даражаси дБА | Ўлчаш қайд қилинган |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Спектори бўйича | | Вақтинчалик характеристикаси | | | | | Умумий | | | | | | | | | | | | | | | | | |
| | | | | Кенг йўналишли | Бир маромли | Доимий | Тебранувчан | Алоҳида | | | Транспорт технологияси | Технология ускуналаридан | Локал жойлашган | 2 | 4 | 8 | 16 | 31,5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| | | Допустимый Уровень шума от $23^{00}$ до $07^{00}$ | | | | | | | | | | | | | | | | 83 | 67 | 57 | 49 | 44 | 40 | 37 | 35 | 33 | 45 | |
| 19 | | Уровень шума на территории УРВ Навбахор точка 1 | | | | | | | | | | | | | | | | 38 | 36 | 34 | 40 | 35 | 37 | 34 | 30 | 28 | 45 | |
| | | Норма | | | | | | | | | | | | | | | | - | - | - | - | - | - | - | - | - | - | |
| 20 | | Уровень шума на территории УРВ Навбахор точка 2 | | | | | | | | | | | | | | | | 39 | 38 | 35 | 41 | 36 | 36 | 34 | 32 | 28 | 44 | |
| | | Норма | | | | | | | | | | | | | | | | - | - | - | - | - | - | - | - | - | - | |
| 21 | | Уровень шума на территории школы №5 Жарқоқ | | | | | | | | | | | | | | | | 50 | 36 | 46 | 32 | 38 | 38 | 34 | 30 | 22 | 47 | |
| | | Норма | | | | | | | | | | | | | | | | - | - | - | - | - | - | - | - | - | 2 | |
| 22 | | Уровень шума на территории дет сад №9 Жарқоқ | | | | | | | | | | | | | | | | 44 | 38 | 43 | 38 | 34 | 35 | 33 | 30 | 26 | 46 | |
| | | Норма | | | | | | | | | | | | | | | | - | - | - | - | - | - | - | - | - | - | |
| 23 | | Уровень шума на территории УРВ Жарқоқ точка 1 | | | | | | | | | | | | | | | | 40 | 38 | 42 | 37 | 34 | 36 | 34 | 32 | 28 | 43 | |
| | | Норма | | | | | | | | | | | | | | | | - | - | - | - | - | - | - | - | - | - | |
| 24 | | Уровень шума на территории УРВ Жарқоқ точка 2 | | | | | | | | | | | | | | | | 40 | 37 | 40 | 36 | 34 | 36 | 35 | 33 | 26 | 43 | |

Зав Сан гиг лаборатории Хаитова Д.У

Врач лаборант: Жалилов К.Г.

## Air Quality Test Report

**Хулоса:** В результатах анализа было установлено, что количество газов (NO2) в атмосферном воздухе превышает требования Санитарных правил и норм № 0293 – 11

Санитар Врач: Хакимов. Т

Ўзбекистон Республикаси
Соғлиқни Сақлаш вазирлиги

Бухоро вилят СЭО ва ЖСБ

Ўзбекистон Республикаси
Соғлиқни сақлаш вазирининг
2021 йил 25 январдаги № 14 -сонли
буйруғи билан тасдиқланган 9 х/ш-
рақамли тиббий ҳужжат шакли

АТМОСФЕРА ХАВОСИНИ ТЕКШИРИШ БЎЙИЧА № 2883-3098 СОНЛИ
БАЁННОМА ( протоколи)(108)
" 19 " 04 2023 й.

Ҳаво намунаси олинадиган жой : Бухарская область, Караулбазарский район
муассаса номи, манзил, цех

бино, хона, синф ва бошқалар

Намуна олишдан мақсад по договору
Намуна олишни асословчи ҳужжатлар Сан Пин № 0293– 11
Намуна олинган куни ва вақти 17-18 .04 .2023й
Ташиш жараёнидаги шароитлар авторанспорт
Консервация услуби
Намуна олишда қўлланиладиган ўлчов воситалари Газанализатор Drager 5600, АНТ-3М, Эколаб
Намуна олиш хонасининг таърифи: майдони ____м² ҳажми ____м²
Яшайдиган ёки ишлайдиган кишилар сони_____,намуна олишдаги шароитлар

(деразалар очик, ёпиқ ва бошқа)

Технологик жараён таърифи: ишлаётган жиҳозлар (%)_____
Режими
Қўлда бажариладиган операциялар
Асосий ифлослантирувчи манбалар

Хона (территория, майдонча, иш жойи ва бош.) эскизи, ифлослантирувчи ва ҳаво намуналарини олиш нуқталари кўрсатилган. (намуна олинадиган нуқталарининг тартиб рақамлари).
Текширилаётган муассаса ҳаво намунаси олишда иштирок этган вакилнинг лавзими, фамилияси, исми-шарифи
Имзо_____

| № | Место проведения измерения | Наименование образца | | Факт. – мг/м$^3$ | Норма - мг/м$^3$ |
|---|---|---|---|---|---|
| | | Угарный газ | CO | Отс. | 5.0 |
| | | Углекислый газ | CO2 | 0,04 | 0.03-0.06 |
| | | Сернистый ангидрид | SO 2 | Отс. | 0.5 |
| | | Двух оксид азот | $NO_2$ | Отс. | 0.085 |
| 1 | **Бузочи школа №4** | Сероводород | $H_2S$ | Отс. | 0.008 |
| | | Метан | $CH_4$ | Отс. | 50.0 |
| | | Углеводороды | | Отс. | 1.5 |
| | | Пыл | $PM_{2.5}$ | 0,015 | 0.5 |
| | | Пыл | $PM_{10}$ | 0,025 | 0.5 |
| | | Угарный газ | CO | 2,33 | 5.0 |
| | | Углекислый газ | CO2 | 0,06 | 0.03-0.06 |
| 2 | **Детсад №7 Бузочи** | Сернистый ангидрид | SO 2 | Отс. | 0.5 |
| | | Двух оксид азот | $NO_2$ | 0,96 | 0.085 |
| | | Сероводород | $H_2S$ | Отс. | 0.008 |
| | | Метан | $CH_4$ | Отс. | 50.0 |
| | | Углеводороды | | Отс. | 1.5 |
| | | Пыл | $PM_{2.5}$ | 0,013 | 0.5 |
| | | Пыл | $PM_{10}$ | 0,018 | 0.5 |
| | | Угарный газ | CO | 2,33 | 5.0 |
| | | Углекислый газ | CO2 | 0,04 | 0.03-0.06 |
| 3 | **УРВ Бузочи точка 1** | Сернистый ангидрид | SO 2 | Отс. | 0.5 |
| | | Двух оксид азот | $NO_2$ | 1,34 | 0.085 |
| | | Сероводород | $H_2S$ | Отс. | 0.008 |
| | | Метан | $CH_4$ | Отс. | 50.0 |
| | | Углеводороды | | Отс. | 1.5 |
| | | Пыл | $PM_{2.5}$ | 0,014 | 0.5 |
| | | Пыл | $PM_{10}$ | 0,015 | 0.5 |
| | | Угарный газ | CO | 3,49 | 5.0 |
| | | Углекислый газ | CO2 | 0,05 | 0.03-0.06 |
| 4 | **УРВ Бузочи точка 2** | Сернистый ангидрид | SO 2 | Отс. | 0.5 |
| | | Двух оксид азот | $NO_2$ | 1,15 | 0.085 |
| | | Сероводород | $H_2S$ | Отс. | 0.008 |
| | | Метан | $CH_4$ | Отс. | 50.0 |
| | | Углеводороды | | Отс. | 1.5 |
| | | Пыл | $PM_{2.5}$ | 0,016 | 0.5 |
| | | Пыл | $PM_{10}$ | 0,020 | 0.5 |
| | | Угарный газ | CO | Отс. | 5.0 |
| | | Углекислый газ | CO2 | 0,04 | 0.03-0.06 |
| 5 | **Школа №3 Навбахор** | Сернистый ангидрид | SO 2 | Отс. | 0.5 |
| | | Двух оксид азот | $NO_2$ | 0,57 | 0.085 |
| | | Сероводород | $H_2S$ | Отс. | 0.008 |
| | | Метан | $CH_4$ | Отс. | 50.0 |
| | | Углеводороды | | Отс. | 1.5 |
| | | Пыл | $PM_{2.5}$ | 0,011 | 0.5 |
| | | Пыл | $PM_{10}$ | 0,017 | 0.5 |

| | | | | | |
|---|---|---|---|---|---|
| | | Угарный газ | CO | 2,33 | 5.0 |
| | | Углекислый газ | CO2 | 0,04 | 0.03-0.06 |
| | | Сернистый ангидрид | SO 2 | Отс. | 0.5 |
| | | Двух оксид азот | $NO_2$ | 1,53 | 0.085 |
| 6 | Детсад №8 Навбахор | Сероводород | $H_2S$ | Отс. | 0.008 |
| | | Метан | $CH_4$ | Отс. | 50.0 |
| | | Углеводороды | | Отс. | 1.5 |
| | | Пыл | $PM_{2.5}$ | 0,020 | 0.5 |
| | | Пыл | $PM_{10}$ | 0,025 | 0.5 |
| | | Угарный газ | CO | Отс. | 5.0 |
| | | Углекислый газ | CO2 | 0,08 | 0.03-0.06 |
| 7 | УРВ Навбахор точка 1 | Сернистый ангидрид | SO 2 | Отс. | 0.5 |
| | | Двух оксид азот | $NO_2$ | 0,77 | 0.085 |
| | | Сероводород | $H_2S$ | Отс. | 0.008 |
| | | Метан | $CH_4$ | Отс. | 50.0 |
| | | Углеводороды | | Отс. | 1.5 |
| | | Пыл | $PM_{2.5}$ | 0,017 | 0.5 |
| | | Пыл | $PM_{10}$ | 0,015 | 0.5 |
| | | Угарный газ | CO | 3,49 | 5.0 |
| | | Углекислый газ | CO2 | 0,06 | 0.03-0.06 |
| 8 | УРВ Навбахор точка 2 | Сернистый ангидрид | SO 2 | Отс. | 0.5 |
| | | Двух оксид азот | $NO_2$ | 0,77 | 0.085 |
| | | Сероводород | $H_2S$ | Отс. | 0.008 |
| | | Метан | $CH_4$ | Отс. | 50.0 |
| | | Углеводороды | | Отс. | 1.5 |
| | | Пыл | $PM_{2.5}$ | 0,012 | 0.5 |
| | | Пыл | $PM_{10}$ | 0,021 | 0.5 |
| | | Угарный газ | CO | 2,33 | 5.0 |
| | | Углекислый газ | CO2 | 0,07 | 0.03-0.06 |
| 9 | Школа №5 Жаркокс | Сернистый ангидрид | SO 2 | Отс. | 0.5 |
| | | Двух оксид азот | $NO_2$ | 1,34 | 0.085 |
| | | Сероводород | $H_2S$ | Отс. | 0.008 |
| | | Метан | $CH_4$ | Отс. | 50.0 |
| | | Углеводороды | | Отс. | 1.5 |
| | | Пыл | $PM_{2.5}$ | 0,013 | 0.5 |
| | | Пыл | $PM_{10}$ | 0,022 | 0.5 |
| | | Угарный газ | CO | Отс. | 5.0 |
| | | Углекислый газ | CO2 | 0,04 | 0.03-0.06 |
| 10 | УРВ Жаркокс точка 1 | Сернистый ангидрид | SO 2 | Отс. | 0.5 |
| | | Двух оксид азот | $NO_2$ | 0,77 | 0.085 |
| | | Сероводород | $H_2S$ | Отс. | 0.008 |
| | | Метан | $CH_4$ | Отс. | 50.0 |
| | | Углеводороды | | Отс. | 1.5 |
| | | Пыл | $PM_{2.5}$ | 0,011 | 0.5 |
| | | Пыл | $PM_{10}$ | 0,022 | 0.5 |

| | | | | | |
|---|---|---|---|---|---|
| | | Угарный газ | CO | Отс. | 5.0 |
| | | Углекислый газ | CO2 | 0,03 | 0.03-0.06 |
| | | Сернистый ангидрид | SO 2 | Отс. | 0.5 |
| | | Двух оксид азот | $NO_2$ | 0,57 | 0.085 |
| 11 | **УРВ Жаркөк точки 2** | Сероводород | $H_2S$ | Отс. | 0.008 |
| | | Метан | $CH_4$ | Отс. | 50.0 |
| | | Углеводороды | | Отс. | 1.5 |
| | | Пыл | $PM_{2.5}$ | 0,018 | 0.5 |
| | | Пыл | $PM_{10}$ | 0,021 | 0.5 |
| | | Угарный газ | CO | 3,49 | 5.0 |
| | | Углекислый газ | CO2 | 0,06 | 0.03-0.06 |
| 12 | **Детсад №5 Жаркөк** | Сернистый ангидрид | SO 2 | Отс. | 0.5 |
| | | Двух оксид азот | $NO_2$ | 1,34 | 0.085 |
| | | Сероводород | $H_2S$ | Отс. | 0.008 |
| | | Метан | $CH_4$ | Отс. | 50.0 |
| | | Углеводороды | | Отс. | 1.5 |
| | | Пыл | $PM_{2.5}$ | 0,012 | 0.5 |
| | | Пыл | $PM_{10}$ | 0,015 | 0.5 |

Бухоро вилоят СЭО ва ЖСБ санитария-гигиена тахлилхонаси мудири : Хаитова Д. У

Врач лаборант: Жалилов Қ.Ғ

# Appendix 16. Public Consultations

OSIYO INFRATUZILMA INVESTITSIYALAR BANKI LOYIHALARINI MUVOFIQLASHTIRISH GURUHI

ASIAN INFRASTRUCTURE INVESTMENT BANK PROJECTS COORDINATION UNIT

100035, Toshkent shahri, Niyozbek yoli ko'chasi,1
tel: (99891) 136-73-85 e-mail: po.aiib@uzsw.uz

1,Niyozbek yoli street, Tashkent, Uzbekistan, 100035
tel (99891) 136-73-85 e-mail: po.aiib@uzsw.uz

**2023 йил 20 апрель**
**BRP-1-23/116-сон**

**Қоровулбозор тумани ҳокими**
**А.А.Остоновга**

Нусхаси: "Бухоро сув таъминоти" МЧЖга

**Ҳурматли Акмал Анварович,**

Ўзбекистон Республикаси Вазирлар Маҳкамасининг 2020 йил 12 августдаги "Осиё инфратузилма инвестициялари банки иштирокида "Бухоро вилоятининг сув таъминоти ва канализация тизимларини ривожлантириш ва модернизация қилиш" лойиҳасини амалга ошириш чора-тадбирлари тўғрисида"ги 482-сон Қарори ижросини таъминлаш ҳамда Ўзбекистон Республикаси ва Осиё инфратузилма инвестициялари банки ўртасида имзоланган Қарз Битимининг ижтимоий масалалар бўйича талабларини бажариш мақсадида "Ўзсувтаъминот" АЖ лойиҳани мувофиқлаштириш гуруҳи ва лойиҳанинг сув таъминоти бўйича консультантлари томонидан Қоровулбозор туманида жамоатчилик муҳокамаларини ўтказиш режалаштирилди.

Шу муносабат билан Сиздан 2023 йил 2-4 май кунлари ушбу тадбирларни ташкил этишда амалий ёрдам беришингизни сўраймиз.

Тадбирларнинг қисқача кун тартиби илова қилинади.

Ҳурмат билан,

**Гуруҳ раҳбари** **Э. Искандаров**

Ижр.: С.Мухамедалиева (998 97 714 44 89)

Figure 33: PCU Letter to Karaulbazar District Administration on upcoming public consultations

*Проект развития водоснабжений в Бухарской области при финансировании Азиатским Банком Инфраструктурных Инвестиций*

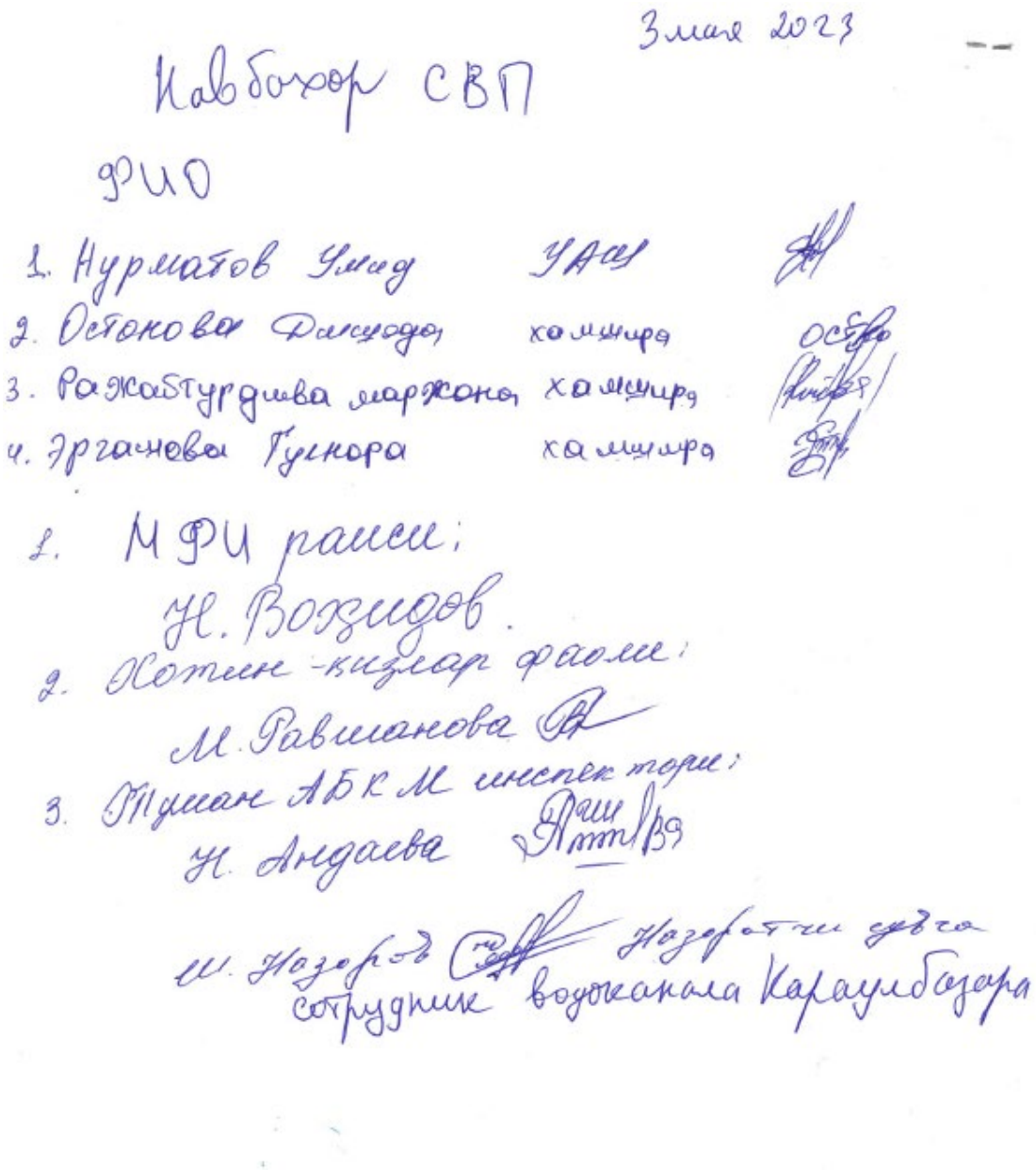
Дата: 3 мая 2023

Населённый пункт: Навбахор

**Лист регистрации участников** Школа

| № | Ф.И.О. участника | Контакты | | Подпись |
|---|---|---|---|---|
| | | Адрес проживания | Телефон | |
| 1 | Xodjayeva O | direktor | | |
| 2 | Kuseneva U | | | |
| 3 | Fayzullayeva N | | | |
| 4 | Ismailova E | | | |
| 5 | Ismailova A | | | |
| 6 | Avezova M | | | |
| 7 | Esmailova Z | | | |
| 8 | Yuldasheva N | | | |
| 9 | Jumaturdiyeva | | | |
| 10 | Turdiyeva D | | | |
| 11 | Yavanturdiyeva | | | |
| 12 | Murdieva D | | | |
| 13 | Davlatova O | | | |
| 14 | Raxmonova | | | |
| 15 | Geldiyev sh | | | |
| 16 | Akkiyeva N | | | |

Figure 34: Public consultations in Navbahor, meeting no. 2, May 03.2023


3 мая 2023

Навбахор СВП

ФИО

1. Нурматов Умид — УАМ
2. Остонова Фируза — хокимият
3. Раджабгурдиева маржона — хокимият
4. Эргашева Гулнора — хокимият

1. МФЙ раиси: Н. Вохидов.
2. Хотин-кизлар фаоли: М. Равшанова
3. Тузилган АБКМ инспектори: Ш. Андаева

Ш. Назаров — Назаров Ш. сотрудник водоканала Караулбазара

Figure 35: Public consultations in Navbahor, meeting no. 3, May 03.2023

**Qorovulbozor tumanining ichimlik suvi ta'minoti va kanalizatsiya tizimida yirik loyiha amalga oshiriladi**

"Buxoro suv ta'minoti" MCHJ Axborot xizmati • March 29, 2023

Kuni-kecha Qorovulbozor tuman hokimligi majlislar zalida **"Buxoro viloyatida suv ta'minoti va kanalizatsiya tizimini rivojlantirish va modernizatsiya qilish"** loyihasi doirasida jamoatchilik muhokamasi bo'lib o'tdi.

Muhokamada qayd etilishicha, Turkiyaning **"TUMAS-SEURECA"** Konsorsiumi tomonidan Qorovulbozor tumanida ichimlik suvi tizimini rekonstruksiya va modernizatsiya qilish bo'yicha loyiha qidiruv ishlari amalga oshirilmoqda.

Loyiha asosida, tumanning **"Navbahor"**, **"Bo'zachi"** hamda **"Jarqoq"** mahallalaridagi 3 **ta** suv taqsimlash inshootlari rekonstruksiya qilinadi va **68,3 km.** masofada ichimlik suvi tarmoqlari qurish belgilangan. Dastlabki hisob-kitoblarga ko'ra **3,3 mln. AQSH dollari** miqdorida qurilish-montaj ishlari amalga oshiriladi.

**Deputatlar, MFY raislari o'zlarini qiziqtirgan barcha savollariga mutaxassislar tomonidan kerakli javoblarni olishdi.**

Mazkur loyihaning navbatdagi bosqichlariga asosan Buxoro viloyatining **Buxoro, Jondor, Romitan, Peshko'** va **Olot tumanlarida** ham bir qator ishlar rejalashtirilgan bo'lib, har bir xududda jamoatchilik muhokamalari o'tkazilishi rejalashtirilgan.

*«Buxoro suv ta'minoti» MCHJ axborot xizmati*

Figure 36: Public consultation on 29.03.2023

Public consultation meeting with public representatives, representatives of local district administration, Bukhara Suv Taminoti, PCU, Tumas-Seureca Consortium's design engineers, and other consultant conducted on 29.03.2023.

**Mass media narratives about subproject activities**

**Қоровулбозор туман ҳокимлиги матбуот хизмати** is in **Qorovulbozor, Bukhoro, Uzbekistan**.
March 30 at 12:26 AM ·

⚡⚡Қоровулбозорда ичимлик суви таъминоти ва канализация тизимида йирик лойиҳа амалга оширилади.

Бугун, туман ҳокимлиги мажлислар залида "Қоровулбозор туманида сув таъминоти ва канализация тизимини ривожлантириш ва модернизация қилиш" лойиҳаси доирасида жамоатчилик муҳокамаси бўлиб ўтди.

Муҳокамада туман ҳокимининг ўринбосари, Халқ депутатлари туман Кенгаши депутатлари, "Бухоро сувтаъминот" корхонаси директорининг ўринбосари ҳамда ҳорижлик экспертлар гуруҳи иштирок этишди.

Муҳокамада қайд этилишича, Туркиянинг "TUMAS-SEURECA" Консорциуми томонидан туманимизда ичимлик суви тизимини реконструкция ва модернизация қилиш бўйича лойиҳа қидирув ишлари амалга оширилмоқда.

Лойиҳа асосида, "Навбаҳор", "Бўзачи" ҳамда "Жарқоқ" маҳаллаларидаги 3 та сув тақсимлаш иншоотлари реконструкция қилинади ва 68,3 км масофада ичимлик суви тармоқлари қуриш белгиланган. Дастлабки ҳисоб-китобларга кўра 3,3 млн АҚШ доллари миқдорида қурилиш-монтаж ишлари амалга оширилади.

Яна бир лойиҳага асосан туманнинг канализация тармоғи тубдан янгиланади.

5 дона канализация насос станцияси қурилиб, 49 км канализация тармоғи тортилади. Бундан ташқари суткалик қуввати 2,1 минг м/куб бўлган канализация тозалаш иншооти куриш режалаштирилган. Ушбу ишларни амалга оширишда 10 млн АҚШ доллари миқдорида маблағ йўналтирилиши белгиланмоқда.

Бугунги муҳокамада ушбу жараёнлар ҳақида батафсил маълумотлар бериб ўтилди.

Депутатлар ўзларини қизиқтирган барча саволларга мутахассислар томонидан керакли жавобларни олишди.

✍ Қоровулбозор тумани ҳокимлиги матбуот хизмати

Figure 37: Subproject design narrative in local mass media (in Uzbek)
(Source: Face Book page of Local Administration of Karaulbazar Administrative District, https://www.facebook.com/qorovulbozor.uz/)

Figure 38: Public consultations in Navbahor settlement
(Source: Field visits, May 02-05, 2023)

Figure 39: Community consultations in Jarqoq settlement
(Source: Field visits, May 02-05, 2023)

Figure 40: Public consultations in Buzochi settlement, office of local administration
(Source: Field visits, May 02-05, 2023)

Figure 41: Consultation with affected household head in Jarqoq settlement
(Source: Field visit, December 15, 2022)

Figure 42: Consultation with affected family in Jarqoq settlement
(Source: Field visit, May 02-05, 2023)

# Appendix 17. Project-level GRM

Below is a GRM procedure Uzsuvtaminot JSC adopted within the Bukhara Region Water Supply and Sewerage Project.

JSC "Uzsuvtaminot"

**Operating procedures for grievance management**

of the Bukhara Region Water Supply and Sewerage Project

## I. General Provisions

1. This operating procedure has been adopted by the JSC "Uzsuvtaminot" as a guidance in resolving appeals and complaints of people associated with implementation of the Bukhara Region Water Supply and Sewerage Project (BRWSSP) financed with the loan of the Asian Infrastructure Investment Bank (AIIB)[1]. The project will be implemented in two cities- Bukhara and Kagan, and nine districts of Bukhara region: Bukahara, Zhondor, Kagan, Karaul bazar, Peshku, Rometan.

2. The "Uzsuvtaminot" is an Implementing Agency (IA) for the BRWSSP. Under the IA, a Project Coordination Unit (PCU) is established at the central level for the project implementation. The PCU, with support of the LLC "Bukhoro suvtaminoti", will coordinate the project implementation at two cities and nine project districts of Bukhara region. The PCU has a social and environmental specialist. The IA will engage contractors and a supervision engineer to support implementation of the BRWSSP, who will also be involved in resolution of complaints within their roles and duties. The Contractors and supervision engineer will also have staff responsible for safeguards monitoring and compliance, including for receiving people's complaints and/or inquiries, reporting to the PCU and facilitating their resolution.

## II. Objective and scope of the GRM

3. The PCU has set up a project-level Grievance Redress Mechanism (GRM) following the policy requirements of AIIB[2] and laws of the Republic of Uzbekistan[3]. The GRM shall respond to the inquires, and resolve appeals and complaints of people who believe they have been or are likely to be adversely affected by social and environmental impacts of the project activities, and/or have complaints about the project's information disclosure and public consultation process.

4. The project-level GRM shall respond to the inquiries and resolve appeals and complaints of people in prompt, impartial and mutual consensus manner at the project level. This will help to response to the issues of citizens, to track a problem and avoid

[1] AIIB Loan Number L0314A approved on 3 April 2020. Project Effectiveness on November 26, 2020 and expected close date 30 December 2025.

[2] AIIB's Environmental and Social Framework, Approved February 2016 (Amended February 2019); AIIB Policy on the Project-affected people's mechanism, 7 December 2018.

[3] The Law of the Republic of Uzbekistan "On Appeals of individuals and legal entities" No. LRU-378 dated December 3, 2014 (No. LRU-445 as amended from 09 November 2017).

1

potential escalation of project affected people's complaints, and risks for delay and complaint related to the costs in the project implementation[4].

5. The appeals/complaints eligibility for handling through the project-level GRM shall meet the following criteria: (i) issues related to the project's social, involuntary resettlement and environmental impacts and performance outcomes, and (ii) issues, related to the project's information disclosure and public consultations process. Appeals/complaints, related to crime, fraud and corruption issues, will be registered in the grievance logbook, however they are not eligible for handling under the project-level GRM and shall be handled as defined by laws of the Republic of Uzbekistan and relevant policies of the AIIB.

6. The project-level GRM does not override the complainants' rights to demand grievance redress as defined by national legislation. The complainant at one's discretion may choose to seek the complaint consideration through the judicial system of the Republic of Uzbekistan at any time of the grievance redress process provided hereby.

## III. Guiding principles

7. The followings shall guide the grievance redress process:

(i) ***Impartiality***: The receipt and resolution of grievances shall be guided by the key principles of impartiality. The decision ought to be based on objective criteria, rather than on bias and prejudice. The parties reviewing the grievance shall be impartial and free of conflict of interest in relation to the grievance and / or the parties involved; in case of any interest, such members shall inform their relations to the case or the complainant, and be replaced for the subject case.

(ii) ***Awareness***: The customers and public shall be made aware of the Project-level GRM, the process of the grievance resolution and members of the Grievance Redress Committee. The IA shall disseminate such information for public attention through its website, newspapers and media, as well as project disclosure and public consultations activities.

(iii) ***Accessibility:*** The GRM shall be easily accessible including in terms of physical location, language, and culturally appropriate to people. The appeals and complaints of project affected people, or any other entities, can be received in various modes The informational documents and announcements shall be non-technical and in language understood by people.

*(iv)* ***Timeliness:*** All appeals and grievances, irrespective of their nature and size shall be resolved, and corrective actions should be taken within a reasonable and shortest timeline.

[4] E.g., unresolved complains escalated to the court may pose risk to project works suspension, delays and costs as well as reputation risks to the project implementing unit.

(v) ***Participation:*** The complainants and / or their representatives shall be part of the resolution process, and be provided opportunities to be heard, and informed about the grievance process. All process should be documented.

(vi) ***Feedbacks:*** Provide timely feedback to inquiries and the complainant in each phase of grievance redress process including the basis of the decision; the parties involved in the grievance redress process; information and documents collected and reviewed; and the next steps in case of accepting or rejecting the proposed resolution.

(vii) ***Gender and social inclusiveness:*** The grievance redress process shall consider social and gender roles, needs and constraints of men and women. The project staff shall be trained and aware of the gender-sensitive approaches. Confidentiality and discretion are particularly important in gender-sensitive cases.

## IV. Forms of lodging grievances / appeals

8. The following include the forms of lodging grievances / appeals:

(i) Grievances and appeals can be submitted orally or in written, or in electronic forms;
(ii) Grievances and appeals, received by contact numbers, as well as by telephone "hotline" are taken into account, registered and considered as oral messages;
(iii) Grievances and appeals, received from the Telegram messenger, through the official website or to the official e-mail address are registered in the form of electronic appeals and are considered in the prescribed manner;
(iv) Grievances and appeals can be in the form of statements, suggestions and complaints.
(v) Individuals and legal entities can apply individually or collectively.
(vi) Grievances and appeals can be submitted in the state official language and other languages.

9. In the grievance or appeal of an individual and / or legal entity, should indicate the surname, name (patronymic, if available) of the individual, information of his / her place of residence and the essence of the appeal, contact person and his/her contact information must be indicated.

10. If the complainant wishes to remain anonymous, and grievance or appeal received anonymously, such cases shall be registered and verified. The GRC at Tier 1 evaluates, if it is legitimate according to situation presented in the anonymous grievance or appeal, and act on behalf of the complainant, evaluate and resolve the issue. If the arguments stated in the grievance are not confirmed, a conclusion is drawn up about this, where the reasons of terminating the redress of the current grievance are stated. A conclusion of terminating the grievance redress is confirmed by GRC members, after that the complaint is removed from control.

11. It is possible, that anonymous grievances or appeals may become more difficult to consider, resolve the issue and protect the interest of the complainant. Therefore, the complainants, raising anonymous grievances or appeals shall provide sufficient facts and data to enable the GRC to investigate the case. The feedback and decision made, the actions planned and implemented regarding the anonymous grievances and appeals, shall be (i) printed and posted on the information boards of the regional "Suvtaminot" and relevant Khokimiyat, and (ii) send back to the same source, where the anonymous grievance or appeal has been received from ( e.g. unknown media account), if applicable.

12. The GRC members, involved in implementing the GRM, make sure, that confidentiality / anonymity is respected.

13. Outcomes of all grievances and appeals, and their resolution process will also be documented in the grievance database and reflected in the project periodic progress reports.

## V. Institutional Structure of the GRM

14. The JSC "Uzsuvtaminot", as an Implementing Agency will be responsible for effective operation of the project-level GRM, will establish a data base of all received grievances and ensure monitoring of its consideration, analysis and reporting in the project implementation, social and environmental safeguards reports. Other stakeholders of the project, as the LLC "Bukhoro suvtaminoti", contractor(s), supervision and project management consultants shall take an active part in resolving grievances and appeals.

15. Contractor(s), supervision and project management consultants, and district "Suvtamionot" shall register and report each case of grievance they received from complainants, to the PCU under the "Uzsuvtaminot", who will have a general database of all grievances and monitoring their status, as described below.

### 5.1. Grievance Focal Persons

16. The Grievance Focal Persons (GFP) at the district level: Each of the district level of "Suvtaminot" will assign one of its staff as a coordinator (GFP) for the subject district. The district level coordinator (GFP) shall ensure that all received grievances are registered and shall facilitate their resolution at the district level (GRM Tier 1). They will provide information about each received grievance and their resolution process and status to the coordinator (GFP) at the PCU level.

17. The coordinator (GFP) at the PCU level: the Social and Environmental Specialist of the PCU will act also as a GFP at the central level at PCU. The GFP at the PCU level will have the general database of all received and redressed grievances both at Tier 1 and Tier 2 of the GRM. The GFP at the PCU level will coordinate the redress of

grievances at Tier 2, monitor and report on grievance redress both in Tier 1 and Tier 2.

18. Contact details of the coordinators (GFPs) at the district level, as well as contact information of the GRCs at the district level and central level at PCU will be indicated in the websites of "Uzsuvtaminot" and LLC "Bukhoro suvtaminoti", as well as in the project information dissemination materials for public consultation during all stages of the project implementation.

19. The coordinators (GFPs) of the district level, contractor and PCU staff if relevant shall respond directly to the appeals, inquiries, and grievances promptly with use of informal approaches and within business ethics to resolve the issues promptly. This includes, as possible, discuss with complainant their inquiries, concerns and / or grievances and to provide them responses or find solution informally at the source of the problem. As required, they can transfer the complainant and the case to the district level GFP.

20. If required, the district level GFP shall coordinate with the project team including the contractor(s), construction supervision consultant and the PCU, to respond to the inquiries, appeals or grievance regress of the citizens promptly. If the matter cannot be responded by district level GFPs, it will be handled through the two-tier project-level GRM as follows.

21. A two-tier project-level GRM has been be established on 26 November 2020.

### 5.2. Tier-1: Local Grievance Redress Committee

22. The Tier 1 Grievance Redress Committee (GRC) will comprise of:

- supervision engineer (with E&S staff in charge);
- representative of the contractors (member);
- head of the makhalla foundation (member);
- representative of district "Suvtaminot".

*Representative of district "Suvtaminot" as a GFP for the subject district*

23. If necessary, appropriate specialists may be involved to consider applications for appeals, or the GRC will send an appeal to the relevant party to resolve the issue raised in the prescribed manner. In particular, depending on the nature of the appeal, it can be submitted for consideration to state authorities and local authorities (khokimiyat, meeting of citizens of the mahalla), contracting and water supply organizations (LLC "Bukhoro suvtaminoti"), as well as specially authorized state bodies (Goskomekologiya, CSSEN, Goskomzemgeodezkadastr, etc.).

24. The aggrieved persons (complainant) can contact with any GRC representative and they will be responsible for receiving, hearing and resolving the grievances at this level.

25. GRG will consider and make a decision on the grievance within fifteen (15) days from the date of receipt and when additional study is required, a request for additional documents - within a period of up to one month.

26. The grievance is considered within fifteen days from the date of receipt, with the exception of those proposals, that require additional study, about which communicated in written form to the individual or legal person who made the proposal. In some cases, JSC "Uzsuvtaminot" or PCU may shorten the period for considering the appeal.

27. If the complaint cannot be considered and / or decision cannot be made at this level, or if the complainant is not satisfied with the proposed resolution, the GRC should forward the case to the PCU at central "Uzsuvtaminot" level.

### 5.3. Tier-2: Second Level Grievance Redress Committee

28. The Tier-2 includes the GRC at the PCU central level at "Uzsuvtaminot" that was formed on 1 April 2021 and include the followings[5]:
    - Project Coordinator, PCU (Mr. Iskandarov E.), Chairperson
    - social and environmental specialist, PCU (Mr. Karabaev A.), member
    - chief specialist of Bukhara region khokimiyat department (Zhumaev T.), member
    - head of the department for the coordination of works on land acquisition and compensation of the Bukhara region khokimiyat (Toirov A.), member
    - staff of the information service of LLC "Bukhoro suvtaminoti" (Sharipov D.), member

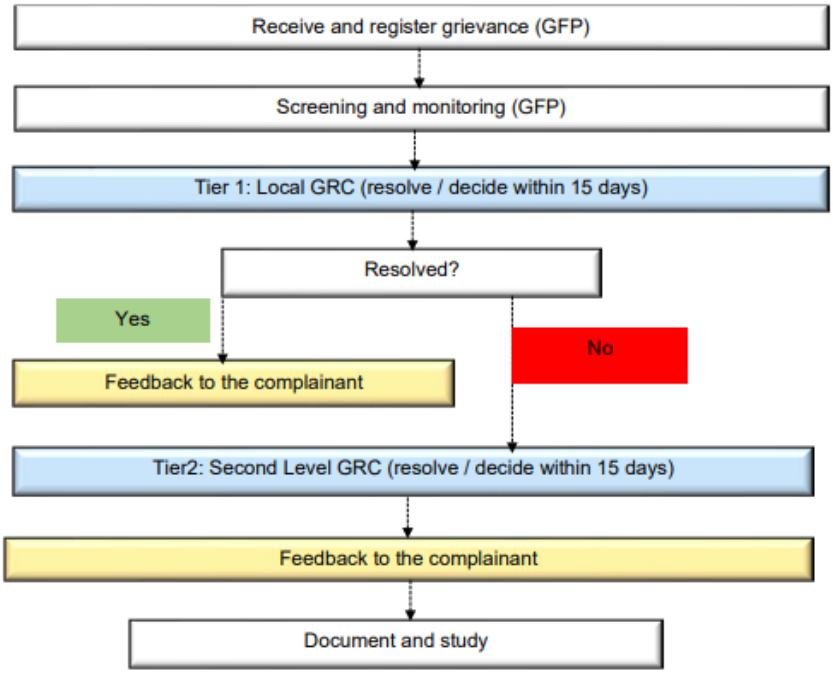
29. In necessary cases, appropriate experts shall be involved to consider appeals following the procedures envisaged in national laws and regulations.

30. The GRC at this level considers the appeals and complaints within fifteen (15) days upon the receipt. If the appeal / complaint cannot be resolved at this level, or if the complainant is not satisfied with the proposed solution, the case may be brought to the court as defined by jurisdiction of the Republic of Uzbekistan. The court is outside of the project-level GRM's jurisdiction.

31. Figure 1. presents the complaints resolution process in sequential order.

[5] The exact GRC members for each subproject will be specified in the ESIA/ESMP/RAP for that subproject.

*Figure 1. Grievance redress in sequential order*




## VI.Grievance Redress Actions

32. The grievance redress process, depending on the complexity of the issue, includes the following actions:

33. Receiving grievances. The GFP at the district level shall receive appeals and complaints directly from the complainant or made through any staff of the project, members of the GRC at the local level or second level GRC at PCU. In case a complaint is lodged through the project staff members, members of the GRC at the local level or GRC at PCU central level, or other respective agencies, they shall forward it to the subject district GFP to register, coordinate, and document the complaint resolution process. Attachment 1 has a sample of a complaints lodging template.

(i) **Registration of grievances.** The district level GFPs should register a grievance in appeals / complaint registry logbooks for their respective districts. The GFP at PCU level should maintain an electronic database of all the received grievances and appeals. A simple excel sheet can be used for this purpose, which also allows sorting, filtering, and conditional formatting (Attachment 2. provides a sample of a grievance logbook).

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(ii) **Screening and confirmation.** The district level GFPs should assess the received appeals / grievances, if it is related to the project's operations and eligible for the redressal through the Project's GRM.

- If the appeal / grievance is eligible for this GRM scope, the district level GFP shall inform the complainant accordingly. Within five (5) days of receipt of the appeals / grievances, the district level GFP shall:
  - Send acknowledgment of receiving a complaint to the complainant, informing about accepting it for consideration, the next steps, and expected date of response to the complainant; and / or
  - Request the complainant to provide clarifications / information, if required.
- If the appeal /grievance is ineligible for this GRM scope, the district level GFP shall inform the complainant accordingly that the subject grievance cannot be considered through the project GRM, and
  - within a period not later than five days from the date of receipt by letter, it shall be sent to the relevant authorities with a message about this to the applicant, in writing or in electronic form[6].

(iii) **Grievance / problem statement formulation.** Clarify the claims of the complainant(s) and formulate a clear, precise and comprehensive problem / grievance statement including information such as:

- who, how many are affected;
- what happened, when, and where;
- what is a claim / resolution is expected by the complainant.

(iv) **Data collection and analysis.** Collect and analyze information, document the appeals / grievances through relevant approaches such as:

- collection and review of documents, background information (e.g. documents, photos, video materials, meeting notes);
- meetings with the complainant, any other relevant stakeholders, and conduct joint site visits; if the appeals / grievances contain circumstances that require study on the spot, as well as in other necessary cases, considering the appeals/grievance, must ensure that the appeals / grievance is considered on-site;
- subject to the nature of the case, engage the relevant government and independent experts, hold meeting with the experts and complainant, seek further clarifications, and prepare records of meetings;
- at this stage, when more information is collected and analyzed, check if the grievance/problem formulation is the same or need to make changes, if necessary.

(v) **Document process.** The GFPs both at the district level and the PCU level should document the appeals / grievances and information collected for each case and submit to the GRCs at the local / regional level and second level at PCU, if relevant.

[6] It is prohibited to unreasonably transfer an appeal for consideration to others or send it to those bodies or officials whose decisions or actions (inaction) are being appealed. If the requests do not contain the necessary information to send them to the relevant authorities, then they are returned to the applicant with a reasoned explanation no later than five days.

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(vi) **Hearing the grievance and identifying resolution options.** Based on collected and analyzed information, conduct the grievance hearing with participation of the complainants and / or their representative(s) to consider grievance resolution options[7].

(vii) **Develop and select resolution options.** Develop options and select the one, that is feasible to implement and accessible / acceptable for all in consensus manner.

- To assess **feasibility** these questions can be used:
  - Can it be implemented in a reasonable time?
  - Can it be done within cost limits?
  - Will it work reliably?
  - Will it use staff and equipment efficiently?
  - Is it flexible enough to adapt to changing conditions?
- To assess **accessibility / acceptability**, these questions can be used:
  - Do the implementers support the solution, perceiving it as worth their time and energy?
  - Are the risks manageable?
  - Will the solution benefit the persons affected by the problem?

(viii) **Get confirmation from the complainant.** Receive written consent or disagreement of the complainant with the proposed solution. Have a meeting, discus the option and its outcome with the complainant.

(ix) **Develop and implement a timebound action plan.** If the complainant agreed to the proposed solution, prepare timebound action plan, indicate required resources, and responsible parties to implement the decision made for the grievance resolution. An action plan shall indicate the necessary actions and consider the following questions:

- What actions or changes will occur?
- Who will carry out these changes?
- By when will they take place, and for how long?
- What resources (e.g., money, staff) are needed to carry out these changes?
- Communication (who should know what?)

(x) **Complaint Closing and Reporting.** Upon execution of the timebound action plan:

- send a written confirmation to the complainant about the undertaken actions and outcomes; have a meeting with the complainant to ensure that complainant's claims have been addressed in full and no further action is required, confirmed through a meeting protocol with the complainant;
- prepare the grievance closing report with all documents filed for the case. The essential components of a problem report include the following:
  - executive summary[8];
  - background;
  - review and assessment;
  - course of action, recommendation, and schedule;
  - conclusion.

[7] May consider using the negotiation and diplomatic approaches, especially when grievances turn into conflict management or cases are complicated.
[8] No need to prepare an executive summary if it is a simple complaint.

### 6.1. AIIB's Project-affected People's Mechanism

34. AIIB has project-affected people's mechanism[9]. Two or more project- affected people, who believe, they have been or are likely to be adversely affected by AIIB's project activities, and their concerns cannot be addressed satisfactorily through project-level GRM or AIIB management processes, may file a complaint for an independent and impartial review by AIIB's Project-affected People's Mechanism (PPM).
Refer for details about the process, time limits of filing complaint and types of complaints eligible for the PPM to the "Rules of procedure of the project-affected people's mechanism issued by the managing director, complaints-resolution, evaluation and integrity unit (CEIU) June 13, 2019"[10]. Below is summary:

35. The complaint may be sent to the PPM by mail, email, fax or hand delivered to PPM. The PPM can be contacted through a dedicated PPM website, via the AIIB homepage https://www.aiib.org or by contact information below:

| | |
|---|---|
| Managing director, complaints-resolution, evaluation and integrity unit | |
| Asian Infrastructure Investment Bank (AIIB) | Tower A, Asia Financial Center, No.1 Tianchen East Road, Chaoyang District, Beijing 100101 |
| Tel: | +86-10-8358-0187 |
| Fax: | +86-108358-0000 |
| Email: | ppm@aiib.org |

36. Time limits for filing complaints in general are 24 months from the project closing date or last disbursement date depending on financial modality.

37. Complaints/appeals cannot be considered by the PPM, if (i) it does not relate to a project, that has been approved for AIIB funding or for which PSI has been disclosed;(ii) it is anonymous; (iii) it makes accusations of fraud, corruption or other prohibited methods or is related to procurement; and other situations.

## VII. Monitoring and Evaluation

38. The PCU will carry out internal monitoring of the progress of grievance resolutions.

- Track and control grievance redress process to achieve their resolution, and implementation of the decisions and take remedial correction actions in midcourse as required.
- The outcomes of the monitoring shall be presented in the social safeguards monitoring reports, quarterly progress report (QPR) and other reports as defined for each subproject.
- Monitoring results will be used for GRM evaluation and lessons learned. The sample monitoring indicators may include:

[9] AIIB Policy on the Project-affected People's Mechanism Dec. 7, 2018
https://www.aiib.org/en/policies-strategies/_download/project-affected/PPM-policy.pdf

[10] https://www.aiib.org/en/policies-strategies/_download/project-affected/PPM-RofP.pdf

- No. of complaints received/redressed during the year;
- No. of complaints pending at the begin/end of the year;
- types of grievances (e.g., grouped by type of issues);
- time period required to resolve;
- complainant satisfaction level;
- adequacy of GRM and resources.

## VIII. Disclosure and Public Awareness

39. The IA will disclose the GRM in its website for attention of public. The information to public should include the contact details of the GRC at the local level and the GRC at the Second level at the PCU and channels, through which the customers can lodge their grievances, and the list of members of the GRC.

40. Information, regarding the GRM, should be communicated to the affected community at the earliest stage of the project by IA, during public consultations for social / resettlement and environmental impacts assessments, and the project engineering design and safeguard documents preparation. During these activities, information brochures, as well as verbal communication and other relevant media can be used.

**Attachment 1. Appeals and complaints lodging template**

The grievance can be submitted in paper or digital formal and include the following information on:

| | | |
|---|---|---|
| Information about the complainant/appeal/inquiry | | |
| 1. | Date and place | |
| 2. | Full name of the complainant (*surname, first name and partonic*) | |
| 3. | Contact information of the complainant (*address, phone number*) | |
| 4. | Gender and Age | |
| Information about the complaint/appeal/inquiry (*underline the relevant one*) | | |
| 5. | Describe the details of the complaint/appeal/inquiry (*add additional page and documents, if relevant*) | |
| 6. | Whether you have already taken up with any other grievance solution measures (e.g., court, ombudsmen). Yes or No. If Yes, please specify | |
| 7. | Signature of complainant (if submitted by paper, in person) | |
| 8. | Signature of the GRC team member received the complaint/appeal/inquiry | |
| 9. | Any comment by the GRC team member received the complaint/appeal/inquiry | |

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### Attachment 2. Grievance/complaints and appeals logbook

**Database on appeals and complaints of individuals and legal entities within the framework of the Bukhara Region Water Supply and Sewerage Project" (2021 year)**

| No. | Reg. number | Date received | Full name | Age | Man | Woman | Contact info *(address, phone number)* | Type of complaint /appeal | Content | Actions taken | Dates of actions taken | Status *(Resolved, Unresolved)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | |

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### Attachment 3. Sample Action Plan Template

| **Action Plan** | | | | |
|---|---|---|---|---|
| **Goal:** Resolve APs complain on … (*Insert the subject of the complaint*) | | | | |
| **Activities** | **Responsible** | **Target Date** | **Resources Needed/budget** | **Reporting by** |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

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Attachment 4. Coordinators of GRCs Tier-1 (local GRC) and Tier-2

| № | Regional water supply organization | | Information (address, tel., e-mail) | Full name. responsible persons | Contacts of responsible persons |
|---|---|---|---|---|---|
| 1. | Bukhara region | LLC "Bukhoro suv taminoti" | Bukhara city, st. Ibn Sino 111 | Shodiev Khamza Khalimovich | +99899 702 00 33 |
| 2. | Bukhara city | LLC "Bukhoro suv taminoti" branch of Bukhara | Bukhara city, st. Ibn Sino 111 | Kodirov Akmal | +99890 715 51 43 |
| 3. | Bukhara district | LLC "Bukhoro suv taminoti" branch of Bukhara district | Bukhara region, st. Faizullo Khuzhaev 188 | Sadirov Nutfullo Amrillaevich | +99891 442 49 04 |
| 4. | Kagan city | LLC "Bukhoro suv taminoti" branch of the city of Kagan | the city of Kagan, st. Gazchilar 5 | Nematov Ilyos Gulamdzhanovich | +99899 113 01 52 |
| 5. | Korovulbozor district | LLC "Bukhoro suv taminoti" branch of the Korovulbozor district | the city of Korovulbozor st. Buyuk Ipak Yuli 32 | Tulaev Anvar Izatullaevich | +99891 400 55 88 |
| 6. | Ramitan district | LLC "Bukhoro suv taminoti" branch of the Ramitan district | the city of Rometan, st. Muhammad Samosy 27 | Otaboev Maksud | +99897 305 10 11 |
| 7. | Peshku district | LLC "Bukhoro suv taminoti" branch of the Peshku district | Peshku district, st. H.Olimjon 4 | Akhmedov Matyokub | +99899 966 70 10 |
| 8. | Zhondor district | LLC "Bukhoro suv taminoti" branch of the Zhondor district | Zhondor district, st. Khalkobod 30 | Ismailov Furkat Aslonovich | +99893 455 93 62 |
| 9. | Gijduvon district | LLC "Bukhoro suv taminoti" branch of the Gijduvon district | Gijduvon district, st. Sharq 80 | Ismoilov Ibragim | +99891 444 50 00 |
| 10. | Korakul district | LLC "Bukhoro suv taminoti" branch of Korakul district | Korakul district, st. Hasanak 5 | Kholmurodov Khamza Normurodovich | +99897 238 38 78 |
| 11. | Olot district | LLC "Bukhoro suv taminoti" branch of the Olot district | Olot district, st. Dustlik 46 | Akhadov Asqad | +99893 704 28 87 |

| № | Contact details of implementing entity in Tashkent city | | |
|---|---|---|---|
| 1. | Tashkent city | JSC "Uzsuvtaminot" | Tashkent city, Niyozbek yuli street, 1<br>E-mail: uzst@exat.uz<br>Phone: (55) 503-12-55 |
| 2. | Tashkent city | Project Coordination Unit "Development and Modernization of water supply and sewerage project in Bukhara region" | Tashkent city, Niyozbek yuli street, 1<br>E-mail: pcu.aiib.uz@gmail.com<br>Phone: (90) 998-57-75 |
| 3 | Tashkent city | Social and environmental specialist of the AIIB PCU | Tashkent city, Ziyolilar street, 1<br>E-mail: a.karabaev@uzsuv.uz<br>Phone: (90) 998-57-75 |

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| № | Contact details of implementing entity in Bukhara region | | |
|---|---|---|---|
| 1. | Bukhara city | LLC "Bukhara suvtaminoti" | Bukhara city, Ibn Sino street, 111<br>E-mail: bukharavodokanal@gmail.com<br>Phone: (65) 221-13-08 |
| 2. | Bukhara city | Khakimiyat of Bukhara region | Bukhara city, I. Muminova, 1<br>E-mail:<br>Phone: (65) 224-34-85 |

# Appendix 18. Uzbek Drinking Water Quality Standard

**Нормативы показателей качества воды и методики их контроля**

*Таблица 1*

| Показатели или компоненты | Единицы измерения | Нормативы | Методы контроля |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
| **1 Микробиологические показатели** | | | |
| 1.1 Общее микробное число | К-во микробов в 1 $cm^3$ воды | Не более 100 1) | ГОСТ 18963 |
| 1.2 Число бактерий группы кишечной палочки (коли-индекс) | К-во БГКП в 1 $dm^3$ воды | Не более 3 1) 2) 4) | ГОСТ 18963 |
| 1.3 Эшерихии (Показатель свежего фекального загрязнения) | К-во эшерихий в 300 $cm^3$ воды | Отсутствие 3) 4) | ГОСТ 18963 |
| 1.4 Колифаги | К-во БОЕ в 200 $cm^3$ воды | Отсутствие 4) 6) | Методические указания, утв. МЗ РУз |
| **2. Паразитологические показатели** | | | |
| 2.1 Патогенные кишечные простейшие: цисты лямблий, дезентерийных амеб, балантидий | К-во цист в 25 $dm^3$ воды | Отсутствие 6) | Методические указания, утв. МЗ РУз |
| 2.2 Яйца гельминтов | К-во яиц и личинок в 25 $dm^3$ воды | Отсутствие 6) | То же |
| **3. Токсикологические показатели (предельно допустимые концентрации компонентов)** | | | |

O'ZSTANDART AGENTLIGI STANDARTLASHTIRISH, MUVOFIQLASHTIRISH VA PAYLAT NAZORATI BOSHQARMASI

3

Figure 43: Microbiological drinking water test

**Нормативы содержания обеззараживающих реагентов и методики их контроля**

*Таблица 2*

| Реагенты | Точка контроля | Норматив, $mg/dm^3$ | Время контакта реагента с водой в min не менее | Методы контроля |
|---|---|---|---|---|
| 1. Хлор остаточный свободный* | После резервуаров чистой воды | 0,2-0,5 | 30 | ГОСТ 18190 |
| 2. Хлор остаточный связанный | -"- | 0,8-1,2 | 60 | -"- |
| 3. Озон остаточный | После камеры смешивания | 0,1-0,3 | 12 | ГОСТ 18301 |

O'ZSTANDART AGENTLIGI STANDARTLASHTIRISH, MUVOFIQLASHTIRISH VA PAYLAT NAZORATI BOSHQARMASI

*Примечание:*

* - При проведении аминирования воды с целью пролонгирования обеззараживающего эффекта хлора в водоразводящей сети, контроль надежности обеззараживания воды в точках водоразбора проводится по концентрации не свободного, а связаного хлора, которая должна быть в пределах 0,8-1,2 $mg/dm^3$.

Figure 44: Drinking water tests for residual chloride

| *а) Неорганические компоненты* | | | |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
| 3.1 Алюминий (Al) | mg/dm$^3$ | 0,2(0,5)* | ГОСТ 18165 |
| 3.2 Бериллий (Be) | mg/dm$^3$ | 0,0002 | ГОСТ 18294 |
| 3.3 Бор (B) | mg/dm$^3$ | 0,5 | ISO9390 |
| 3.4 Кадмий (Ca | mg/dm$^3$ | 0,001 | ISO 5961 |
| 3.5 Молибден (Mo) | mg/dm$^3$ | 0,25 | ГОСТ 18308 |
| 3.6 Мышьяк (As) | mg/dm$^3$ | 0,05 | ГОСТ 4152 |
| 3.7 Никель (Ni) | mg/dm$^3$ | 0,1 | ISO 8288 |
| 3.8 Нитраты ($N0_3$) | mg/dm$^3$ | 45,0 | ГОСТ 18826 |
| 3.9 Ртуть (Hg) | mg/dm$^3$ | 0,0005 | ISO 5666/3 |
| 3.10 Свинец (Pb) | mg/dm$^3$ | 0,03 | ГОСТ 18293 |
| 3.11 Селен (Se) | mg/dm$^3$ | 0,01 | ГОСТ 19413 |
| 3.12 Стронций (Sr) | mg/dm$^3$ | 7,0 | ГОСТ 23950 |
| 3.13 Фтор (F) | mg/dm$^3$ | 0,7 | ГОСТ 4386 |
| 3.14 Хром (Cr) | mg/dm$^3$ | 0,05 | ISO 9174 |
| *б) Органические компоненты* | | | |
| 3.15 Бензол | mg/dm$^3$ | 10 | Методические указания, утв. МЗ РУз |
| 3.16 Бенз (а) пирен | mg/dm$^3$ | 0,01 | То же |
| 3.17 Полиакриламид | mg/dm$^3$ | 2,0 | ГОСТ 19355 |
| 3.18 Пестициды 5) | mg/dm$^3$ | - | Методические указания, утв. МЗ РУз |
| **4. Органолептические показатели и предельно допустимые концентрации компонентов, нормируемых по влиянию на органолептические свойства воды** | | | |
| 1 | 2 | 3 | 4 |
| 4.1 Привкус | баллы | 2 | ГОСТ 3351 |
| 4.2 Запах | баллы | 2 | То же |
| 4.3 Мутность | mg/dm$^3$ | 1,5(2,0)** | То же |
| 4.4 Цветность | градусы | 20(25)*** | То же |
| 4.5 Водородный показатель - pH | pH | 6-9 | Измеряется pH - метром |
| 4.6 Общая минерализация (сухой остаток) | mg/dm$^3$ | 1000(1500)**** | ГОСТ 18164 |
| 4.7 Железо (Fe) | mg/dm$^3$ | 0,3 | ГОСТ 4011 |
| 4.8 Жесткость общая | mg-экв/dm$^3$ | 7(10)**** | ГОСТ 4151 |
| 4.9 Марганец (Mn) | mg/dm$^3$ | 0,1 | ГОСТ 4974 |
| 4.10 Медь (Cu) | mg/dm$^3$ | 1,0 | ГОСТ 4388 |
| 4.11 Полифосфаты ($PO_4$) | mg/dm$^3$ | 3,5 | ГОСТ 18309 |
| 4.12 Сульфаты($SO_4$) | mg/dm$^3$ | 400(500)**** | ГОСТ 4389 |
| 4.13 Хлориды (C1) | mg/dm$^3$ | 250(350)**** | ГОСТ 4245 |
| 4.14 Цинк (Zn) | mg/dm$^3$ | 3,0 | ГОСТ 18293 |
| 4.15 СПАВ(ПАВ) | mg/dm$^3$ | 0,5 | ISO 7875/1-2 |
| 4.16 Фенол | mg/dm$^3$ | 0,001***** | ISO 6439 |
| 4.17 Нефтепродукты | mg/dm$^3$ | 0,1 | Методические указания, утв МЗ РУз |

O'ZSTANDART AGENTLIGI
STANDARTLASHTIRISH
MUVOFIQLASHTIRISH
VA DAVLAT NAZORATI



Figure 45: Drinking water chemistry and physical parameters analysis, part I

| | | | |
|---|---|---|---|
| 4.18 Барий | mg/dm³ | 0,1 | ГОСТ 51309 |
| 4.19 Окисляемость перманганатная | mg/dm³ | 5,0 | Титрометрическим методом |
| 4.20 Цианиды | mg/dm³ | 0,035 | Метод фотометрии |
| 4.21 Формальдегид | mg/dm³ | 0,05 | ГОСТ 22648 |
| **5. Показатели радиоактивного загрязнения** | | | |
| **1** | **2** | **3** | **4** |
| 5.1 Суммарная альфарадиоактивность | Бк/dm³ | 0,1 | ISO 9696 |
| 5.2 Суммарная бетарадиоактивнось | Бк/dm³ | 1,0 | ISO 9697 |

В случае превышения установленных значений показателей 5.1 и 5.2 проводят дополнительный контроль радионуклидного состава загрязнений в соответствии с СанПин РУз «Нормы радиационной безопасности» по нижеследующим показателям: уран-238, радий-226, радон-222, стронций-90.

Figure 46: Drinking water chemistry and physical parameters analysis, part II

**Периодичность анализа воды в разводящей сети**

*Таблица* 3

| **Количество обслуживаемого населения, тыс.человек** | **Минимальное количество проб, отбираемых из водопроводной сети в месяц** |
|---|---|
| до 10 | 2 |
| 10-20 | 10 |
| 20-50 | 30 |
| 50-100 | 100 |
| более 100 | 200 |

При обнаружении в анализируемой воде в разводящей сети микробного загрязнения, превышающего нормативы таблицы 1, проводят повторный отбор проб по этим показателям. При коли-индексе более 20 в 2-х последовательно отобранных пробах по решению органов Госсанэпиднадзора проводят исследование воды на наличие патогенных энтеробактерий, а при обнаружении колифагов в 2-х последовательно отобранных пробах - на наличие энтеровирусов. В таких случаях и с учетом эпидемиологических данных может быть рекомендовано исследование питьевой воды на наличие антигена вируса гепатита А, а также определение в питьевой воде из разводящей сети минеральных азотсодержащих веществ и хлоридов.

O'ZSTANDART AGENTLIGI
STANDARTLASHTIRISH,
MUVOFIQLASHTIRISH
VA DAVLAT NAZORATI

Figure 47: Frequency of sampling for water quality test in the network

# Appendix 19. Uzbek Water Sources Quality Standard

*Приложение В*
*(рекомендуемое)*

**Виды, содержание и периодичность проведения анализов при контроле качества питьевой воды в централизованных системах водоснабжения перед поступлением в распределительную водопроводную сеть**

| Виды и содержание анализов | Периодичность отбора проб и проведения анализов качества воды (количество анализов в течение одного года) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | подземные источники | | | | | поверхностные источники | | | | |
| | численность населения, обеспечиваемого системой водоснабжения (водопроводом) (тыс.чел.) | | | | | | | | | |
| | до 10 | 10-20 | 20-50 | 50-100 | >100 | до 10 | 10-20 | 20-50 | 50-100 | >100 |
| **Сокращенный (С):** общее микробное число, число бактерий группы кишечных палочек (коли - индекс), запах, привкус, мутность, (pH) | 12 | 12 | 24 | 24 | 52 | 52 | 90 | 120 | 180 | 720 |
| Остаточный алюминий, остаточный хлор, остаточный озон, фтор, марганец, железо, хлориды | Контроль содержания остаточного хлора при обеззараживании воды хлорированием – каждый час. Контроль содержания остаточного озона – каждый час. Контроль содержания других компонентов, вносимых в воду в процессе водоподготовки – не реже одного раза в сутки. | | | | | | | | | |
| **Общий физико - химический (ОФХ):** мышьяк, нитраты, нитриты, свинец, фтор, сухой остаток, железо, жесткость, марганец, медь, полифосфаты, сульфаты, хлориды, ПАВ, нефтепродукты | 2 | 4 | 6 | 6 | 12 | 6 | 6 | 12 | 12 | 24 |
| **Специальный вирусологический и паразитологический (СВП):** патогенные простейшие, яйца гельминтов | По указанию органов Госсанэпиднадзора | | | | | 3 | 3 | 6 | 6 | 12 |
| **Специальный токсикологический (СТ):** барий, бор, кадмий, молибден, никель, ртуть, селен, стронций, хром, цианиды, летучие галогенсодержащие углеводороды, бензол, бенз(а)-пирен, пестициды, фенол, хлорфенол, а также другие возможные загрязняющие химические вещества | 1 | 2 | 3 | 3 | 6 | 3 | 3 | 6 | 6 | 12 |
| | При обеззараживании воды хлором частоту контроля содержания хлорированных углеводородов увеличивают в 2-3 раза | | | | | | | | | |
| **Специальных радиационный (СР):** суммарные объемные альфа- и бета – активности. Радионуклидный состав | Периодичность устанавливается по решению местной администрации и центров ГСЭН с учетом радиационной обстановки, но не реже одного раза в год | | | | | | | | | |

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Figure 48: Excerpt of Uzbek Drinking Water Quality Standard (O‘zDSt 950:2011), Appendix B (Source: Uzbek Regulatory Framework Database, https://lex.uz/docs/4979438?otherlang=)

# Appendix 20. Environmental Reports Submitted to Environmental Regulator

(enclosed to this report as separate documents)

# Appendix 21. Water-borne diseases in Bukhara Province, 2019-2021

Data on water borne diseases in Bukhara Province for 2019-2021 is provided by Republican Statistics Committee on 16.06.2023

| Diseases | 2019 | 2020 | 2021 |
|---|---|---|---|
| Bacillary Dysentery | 16 | 2 | 12 |
| Acute Intestinal Infections | 1300 | 500 | 800 |
| Salmonella | 14 | 14 | 13 |
| Brucellosis | 72 | 40 | 67 |
| Hepatitis | 800 | 300 | 100 |

(Source: Republican Statistics Committee, 16.06.2023)