"Avtoyulinvest" Agency under the Committee for Roads
Uzbekistan

Bukhara Road Network Improvement Project, Phase 2

Environmental and Social Impact Assessment and Paris Alignment and Climate Finance Assessment for Bukhara Road Network Improvement Project, Phase 2: M37 Corridor Improvement Project – Phase I



Draft Report

PART I

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Acronyms

AADT	Annual Average Daily Traffic
AAQ1-AAQ13	Air Quality Monitoring Station
AIIB	Asian Infrastructure Investment Bank
AoI	Area of Influence
BBs	Building Blocks
CEE	Center for Environmental Expertise under the National Committee on Ecology and Climate Change of Uzbekistan
CO	Carbon Monoxide
CCKP	World Bank Climate Change Knowledge Portal
dBA	Decibel
EHS	Environmental, Health, and Safety
EIA	Environmental Impact Assessment
ESEL	Environmental and Social Exclusion List
ESIA	Environmental and Social Impact Assessment
ESF	Environmental and Social Framework
ESMP	Environmental and Social Management Plan
ESP	Environmental and Social Policy
ESS	Environmental and Social Standards
EU	European Union
FAO	The Food and Agriculture Organization
FGD	Focus Group Discussion
FHH	Female-headed Household
GAP	Gender Action Plan

GBV/SEA/SH	Gender-Based Violence (GBV), Sexual Exploitation and Abuse (SEA), and Sexual Harassment (SH)
GC-FID	Gas Chromatography System with Flame Ionization Detector
GHG	Greenhouse Gases
GIIP	Good International Practice
GIS	Geographic Information Systems
GRM	Grievance Redress Mechanism
HH	Household
ICTPs	International Conventions, Treaties, and Protocols
IFC	International Financial Corporation
IFC PS	International Financial Corporation Performance Standard
ILO	International Labor Organization
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
KII	Key Informant Interview
LAeq	A-weighted equivalent continuous sound level
LAmax	A-weighted maximum sound level
LMP	Labor Management Plan
MDB	Multilateral Development Bank
MPC	Maximum Permissible Concentrations
N1-N13	Noise Level Monitoring Station
NDCs	Nationally Determined Contributions
NO2	Nitrogen Dioxide
OHS	Occupational Health and Safety
PAPs	Project-affected Persons
PM 2.5/ PM10	Particulate Matter

PMO	Project Management Office
PPE	Personal Protective Equipment
PPM	AIIB Project-affected People's Mechanism
RAP	Resettlement Action Plan
ROW	Right-of-way
SEP	Stakeholder Engagement Plan
SO2	Sulfur Dioxide
SS1-SS20	Soil Monitoring Station
UNFCCC	United Nations Framework Convention on Climate Change
UK	United Kingdom
UV	Ultraviolet
WA	Water Sampling Location
WB	World Bank
WHO	World Health Organization

EXECUTIVE SUMMARY

The Government of Uzbekistan together with Asian Infrastructure Investment Bank (AIIB) is preparing *M37 Corridor Improvement Project – Phase I* (the Project) within Navoi and Bukhara Provinces and the construction of a new western bypass of Bukhara city. The project aims to improve road condition, enhance safety, and increase efficiency and overall traffic circulation along this key corridor.

M37 Corridor Improvement Project – Phase I (the Project) covers the M37 highway from km 207 to km 276, about 69 km. It runs through Kyzyltepa district in Navoi Province and through Gijduvon, Vobkent and Bukhara districts in Bukhara Province. The highway is rehabilitated and upgraded to a dual carriageway, with two lanes in each direction and three lanes in each direction in the larger settlements. About 12 km of new road is built: a western bypass of Bukhara city of about 7.5 km, and a connection of about 4.5 km to the Bukhara Ring Road. About eight new junctions, where roads cross at different levels, are also built. The work is divided into two construction contracts (Lots 1 and 2). The Committee for Roads is responsible for the Project, which is being prepared with the Asian Infrastructure Investment Bank (AIIB). The rest of the M37 (km 276 to 365) is not covered by this ESIA.

Table 1: Key Project Parameters

Location	69 km of the M37 highway (km 207 to km 276) in Kyzyltepa district (Navoi Province) and Gijduvon, Vobkent and Bukhara districts (Bukhara Province)
New road	About 12 km: a western bypass of Bukhara city (about 7.5 km) and a connection to the Bukhara Ring Road (about 4.5 km)
Road standard	Category IB dual carriageway: two lanes in each direction, three in the larger settlements; design speed 120 km/h in rural sections; concrete pavement in rural sections and asphalt in settlements
Junctions	8 junctions where roads cross at different level (grade-separated interchanges)
Construction	Two construction contracts (Lots 1 and 2); about 36 months
Traffic today	Up to about 65,000 vehicles a day near Bukhara; 10–25% are heavy vehicles
Land acquired	About 92 hectares, almost all of it farmland; no homes are demolished
Affected by land acquisition	179 owners and users: 105 farming households, 57 owners of roadside businesses, 4 households with fences or outbuildings affected, and 13 public facilities
Trees removed	About 11,351 trees and shrubs in Lots 1–2; 10 seedlings are planted for each one removed
Consultation	87 women in four group discussions, discussions with men and with government departments, and a household survey of 234 households
Cost of managing environmental and social effects	About US$5.0 million, including about US$2.76 million for the Resettlement Action Plan (State Budget)

Today the M37 carries up to about 65,000 vehicles a day near Bukhara, 10–25% of them heavy vehicles. Between km 212 and km 276, 30 road accidents were recorded in 2025, with 4 deaths, all of pedestrians, and 30 injured; 43% of all recorded accidents

happened at night, and the road has almost no lighting, pedestrian crossings or footpaths in the settlements. The Project is expected to improve road safety and travel, and to create local jobs during construction, including for women. Several hundred workers are needed at the peak of construction, and most unskilled and semi-skilled jobs are expected to go to people from the local districts. Households surveyed expect lower travel costs (70%), better access (55%), time savings (36%) and business growth (25%).

Purpose of ESIA: The purpose of this Environmental and Social Impact Assessment (ESIA) is to identify, predict, and evaluate potential negative environmental and social impacts associated with the project. The ESIA describes the main risks, the measures that will avoid, reduce and manage them, how people were and will be consulted, how they can make a complaint, and the next steps. It will also develop mitigation measures to minimize these impacts while enhancing positive outcomes. This approach aims to ensure that the project is sustainable and compliant with national Uzbekistan environmental laws and policies, as well as the environmental and social safeguard standards set forth by the AIIB Environmental and Social Policy (ESP).

Categorization: The project is classified as Category A in accordance with the AIIB ESP, which assigns Category A to projects likely to have significant adverse environmental and social impacts that are irreversible, cumulative, diverse, or unprecedented. This classification reflects the significant and largely irreversible physical and economic displacement associated with the greenfield construction of the approximately 12 km western bypass of Bukhara and approximately eight new grade-separated interchanges along the project corridor, affecting residential, agricultural, and commercial entities, together with the permanent conversion of agricultural land to infrastructure use and the removal of approximately 11,351 trees within Lots 1–2 alone. The impacts are further considered diverse and cumulative in nature, given that the project spans two provinces and four districts, Kyzyltepa (Navoi Province), Gijduvon, Vobkent, and Bukhara (Bukhara Province), and involves multiple, concurrent environmental and social risk domains, including land acquisition and resettlement, biodiversity, cultural heritage, and community health and safety, across a large and varied project footprint.

Baseline studies: The assessment combined a review of existing information with surveys and measurements in 2026. Plants and animals were surveyed in spring (March to May), with the most intensive coverage along the new bypass and targeted surveys at junctions, canal crossings and tree lines along the existing road. A joint tree and asset inventory was carried out in April. Air quality, noise, water and traffic were measured in May and June. A household survey covered 234 households in the four districts, and consultations were held in June and July. Each effect was rated by its extent, duration, likelihood and size, and by how sensitive the people or resources affected are. Measures were then designed to avoid, reduce or compensate the effects that matter most.

Consultations: Stakeholder consultations were carried out during ESIA in June–July 2026 in four project districts in Bukhara and Navoi Provinces. Plants and animals were surveyed in spring (March to May), with the most intensive coverage along the new bypass and targeted surveys at junctions, canal crossings and tree lines along the existing road. A joint tree and asset inventory was carried out in April. Air quality, noise, water and traffic were measured in May and June. A household survey covered 234 households in the four districts, and consultations were held in June and July. Each effect was rated by its extent, duration, likelihood and size, and by how sensitive the people or resources affected are. Measures were then designed to avoid, reduce or compensate the effects that matter most.

Land, property, and livelihoods: The most significant social effect is land acquisition. Most of it is at the new bypass and the new junctions, where land not previously used for roads is needed. About 179 households, including farmers and roadside businesses, are affected under the RAP. Some farmland is permanently converted to road use, and some households and businesses lose land, buildings, trees or income. Under the RAP:

- affected owners are told in advance and their property is valued individually;
- compensation is at full replacement cost and is paid before works start in each affected section;
- farmers and businesses that lose income receive livelihood support, including help to relocate and re-register businesses and priority access to construction jobs;
- vulnerable households, including women-headed households, receive extra help;
- affected people are consulted throughout and can make a complaint at any time.

Farmers and businesses that are not eligible for compensation under the RAP but lose income temporarily because of the works, for example through interrupted irrigation or blocked access, can submit a claim through the grievance mechanism. Numbers and entitlements are provided in RAP.

Traffic, access and road safety: Construction will bring more heavy traffic, and works may temporarily block access to homes, businesses, farmland, irrigation canals, schools, health facilities, mosques and markets, and may divide settlements. Contractors must:

- follow a traffic management plan, approved before work starts, with routing, signs, flagging, speed control, advance notice of diversions, and limits on heavy vehicles near schools at school times;
- prepare an access plan for each contract, keeping access open or providing a signed alternative for every affected home, business, field, canal, school, health facility and community service, and restoring it afterwards;
- survey local roads used for diversions before and after the works, and repair any damage.

Once the road opens, the design provides pedestrian crossings, signs and lighting, especially near schools and settlements, and livestock crossings.

Workers, jobs and women: Construction will create local jobs, including for women. Workers from outside the area could put pressure on communities and create risks of harassment and gender-based violence. Contractors must follow a Labor Management Plan with a worker code of conduct, safe working conditions and a separate complaint process for workers. The Gender Action Plan sets minimum shares of women in contractors' workforces (10% of unskilled and semi-skilled jobs, 25% of professional and technical jobs and 30% of administrative and community liaison jobs), gives women direct and equal access to compensation, and provides a confidential route for complaints about harassment and violence.

Community health, safety and cultural heritage: Work sites are secured, dust and noise are controlled, and communicable disease prevention is required for the workforce. Two cemeteries near the bypass are avoided with a protected buffer zone. If archaeological remains are found, work stops until they are assessed. Near the historic center of Bukhara, the condition of historic buildings is surveyed and vibration is monitored before and during construction.

Effects on the environment and how they will be managed: The route lies in the historic Zarafshan River oasis, mostly flat farmland, orchards, canals and settlements. Measurements in May and June 2026 show that air quality and noise along the route currently meet national standards at the monitoring points, although sulfur dioxide readings are close to the national limit and above the World Health Organization guideline.

Habitats and wildlife: Most land along the route is farmland, orchards, canals and settlements that people have used for a long time. No natural habitat or habitat of exceptional value has been identified within the construction footprint. Two species listed in the Red Book of Uzbekistan were recorded: the Zarafshan pheasant and the Bukhara tit. To protect them:

- a survey for the pheasant is carried out before clearance, with work stopped and the authorities notified if it is found;
- shelterbelt clearance in the tit's habitat is timed outside the breeding season (April–June), and mature trees are kept where possible;
- checks for active nests and bat roosts are carried out before trees or bridge structures are removed or worked on, and an ecologist can halt work locally;
- canal margins are protected.

Bats were seen foraging along canals and tree lines, but their species could not be identified, so roost checks are required before works.

Trees: About 11,351 trees and shrubs, mostly orchard and ornamental trees, are removed in Lots 1–2. The design was optimized to reduce this, and fewer trees are affected than under earlier options. Trees are counted and their condition recorded before removal, and felling needs permission from the authorities. For each tree or shrub removed, 10 seedlings are planted and maintained for at least two years, and their survival is monitored. Owners are compensated for privately owned trees. Each contractor prepares a tree management and planting plan for its contract.

Dust and noise: Contractors must control dust (water spraying and vehicle speed limits) and noise (restricted hours for noisy equipment) and install noise barriers where monitoring shows they are needed. Noise and vibration are monitored near bridge works and near the historic center.

Rivers, canals and water: Works at the Zarafshan River crossing are sited to avoid the river margin where feasible, with water quality controls. Canal works are scheduled with the water user associations to avoid critical irrigation periods, with a temporary irrigation bypass whenever flow must be interrupted. Fuel, waste and wastewater are controlled at work sites and camps. The design includes drainage and other measures to cope with heavier rainfall and heat.

Climate: The design includes drainage and other measures to cope with heavier rainfall and heat. [Add the conclusion of the Paris Alignment and Climate Finance Assessment: expected emissions and whether the Project is aligned with the Paris Agreement.

Gender: The household survey (234 respondents across the four project districts) identified consistent gender-specific vulnerabilities, including limited women's control over household income and financial decisions, barriers to women's access to compensation payments reported by 18.4% of households, and constrained mobility and safety concerns, particularly after dark. A dedicated Gender Action Plan (GAP) has been prepared, comprising 19 activities addressing women's representation in project institutions, differentiated employment targets for contractors (10% unskilled and semi-skilled, 25% professional and technical, 30% administrative and community-liaison positions), equitable and direct access to compensation, identification of informal female-run enterprises and de facto female-headed households in the RAP, survivor-centered GBV/SEA/SH prevention and referral mechanisms, and outcome-level monitoring of compensation, livelihood restoration, and grievance resolution for women benchmarked against male Project-Affected Persons. Dedicated Gender Specialist positions have been established within both the PIU and the Project Management Consultant team.

How significant the effects are after mitigation: After the measures are applied, land acquisition and the permanent barrier effect of the widened road on community access remain of medium significance. All other effects are expected to be low. No high effects are expected.

Table 2: Main effects and expected significance after mitigation

Main effect	Main measures
Land acquisition and displacement	Compensation at full replacement cost before works; livelihood support; extra help for vulnerable households
Permanent barrier effect of the widened road	Crossings, underpasses and access points built into the design
Traffic, access and road safety	Traffic management plan; access plan for each contract; school-zone measures
Loss of trees and habitat	Optimized design; 10 seedlings for each tree removed; checks before clearance; timing outside breeding season
Dust, noise and vibration	Dust suppression; restricted hours; noise barriers where needed; monitoring
Workers from outside the area, harassment and violence	Code of conduct; separate complaint routes; women's facilities and employment measures
Rivers, canals and irrigation	Works scheduled with water user associations; temporary irrigation bypass; river margin avoided
Cultural heritage	Buffer around two cemeteries; chance-find procedure; vibration monitoring near the historic center

Management and monitoring: The Committee for Roads, through the Avtoyulinvest Agency, is responsible for environmental and social performance. It sets up a Project Management Office with environmental and social specialists, including a gender specialist. A Project Management Consultant (the supervising consultant) supervises the contractors and reviews the site plans each contractor prepares for its contract: traffic, access, tree management and planting, labor, worker camps and safety. An Environmental and Social Management Plan turns the measures in the ESIA into a system of responsibilities, timing and costs, with training for the Project Management Office, the supervising consultant and the contractors. The RAP deals with land acquisition and compensation, the Labor Management Plan with workers, the Gender Action Plan with women, and the Stakeholder Engagement Plan with consultation and complaints.

Monitoring has two parts: compliance monitoring, which checks that the measures are carried out, and environmental quality monitoring of air quality, noise, surface water quality and biodiversity at about 14 locations along the route. Contractors take the measurements and the supervising consultant checks their work. An independent, certified monitoring agency reports every six months on compliance, environmental quality, complaints and any corrective action, and the reports go to the AIIB. The estimated cost of environmental and social management is about US$5.0 million, including RAP.

Information, consultation and disclosure: The ESIA, the RAP, the Stakeholder Engagement Plan, the Labor Management Plan and the Gender Action Plan are published in local languages before the Project is considered for approval. Consultation continues throughout: meetings before works start in each district, individual meetings with affected households, women-only meetings, and notices at least 3 days before

works start in each section. Progress on the promises made is reported back to communities.

Grievance Redress Mechanism: A Grievance Redress Mechanism (GRM) will be established prior to commencement of construction activities, providing project-affected people and workers with separate, accessible channels to raise concerns or complaints related to the project, including a specific pathway for GBV/SEA-related complaints. The GRM will be operated at the field level by the PMC, with oversight by the PMO, and will apply defined response timelines, differentiated between general grievances and a survivor-centered protocol for GBV/SEA cases, to ensure grievances are addressed in a timely manner. The GRM will remain functional throughout construction and operation, including during the defect's liability period, and will be publicized to communities along the corridor and bypass through the ongoing consultation and disclosure activities.

Affected people can make a complaint about anything related to the Project: in person, by phone, in writing (letter, email, SMS or the grievance form), through complaint boxes, or anonymously. Complaints can be given to mahalla leaders, district khokimiyat representatives, or staff of the Project Management Office and the supervising consultant.

- Project Management Office: +998 71 207-67-68 or +998 71 200-02-04; info@uzavtoyul.uz.
- Complaints are acknowledged within 2 days. Most are answered within 5 days, and complex cases can take up to 30 days.
- In each settlement, a committee led by the mahalla leader, with the Women's Committee representative, considers complaints first. Unresolved complaints go to a project-level committee.
- Workers have their own complaint process. Complaints about harassment or violence follow a separate, confidential route that puts the survivor's safety and choices first.
- Complainants may go to courts at any time and, after making a good-faith effort through the project process, may also contact the AIIB, including its Project-affected People's Mechanism.
- No one may be punished for making a complaint.

Next steps:

- Publication and consultation: The ESIA and its plans are published and discussed with communities, including public hearings where national rules require them.
- Approvals: The Project needs national environmental approval (an environmental permitting certificate) before civil works start, permits for tree felling, and the AIIB's approval decision.

- Finalizing safeguard instrument: The RAP, the environmental and social management plan and the contractors' plans (traffic, access, tree management and planting, labor, worker camps and safety) are finalized and approved.
- Before construction starts: Compensation is paid in each affected section, grievance committees are set up with contact details posted, all workers sign the code of conduct, pre-clearance surveys are done, and notices are issued.
- During construction: Monitoring, reporting and consultation continue, and the complaints process stays open.

1. INTRODUCTION

1.1. Project Background

The Republic of Uzbekistan is undergoing sustained economic growth and regional integration, driven by expanding trade, industrial development, and increasing mobility demands. Efficient transport infrastructure is a critical enabler of this growth, supporting domestic connectivity, access to markets, and regional cooperation. The national road network, particularly international corridors, plays a key role in facilitating movement of goods and people across regions and borders. The M37 national highway is one of the strategic transport corridors in Uzbekistan, forming part of the broader regional network connecting central Uzbekistan with western regions and neighboring countries. The corridor serves both national and international traffic, including freight transport, and is essential for linking major economic centers such as Samarkand, Navoi, and Bukhara.

Despite its importance, significant sections of the M37 corridor are currently in poor to fair condition, with deteriorated pavement, limited safety features, and insufficient capacity to accommodate increasing traffic volumes. These constraints contribute to longer travel times, increased vehicle operating costs, and elevated road safety risks. In addition, the absence of a completed bypass around Bukhara results in traffic congestion within urban areas, affecting both mobility and local environmental conditions.

To address these challenges, the Government of the Republic of Uzbekistan (GoU), through the Committee for Roads (RC), is preparing the *M37 Corridor Improvement Project – Phase I* (the Project). The project involves the rehabilitation and upgrading of approximately 69 km of the existing M37 international highway in Kyzyltepa district of Navoi Province and Gijduvon, Vobkent, and Bukhara districts of Bukhara Province, together with the construction of a new western bypass around Bukhara City. The project aims to improve road condition, enhance safety, and increase efficiency and overall traffic circulation along this key corridor.

The RC serves as the line authority responsible for all motor vehicle roads in the Republic of Uzbekistan and acts as the Executing Agency for the project. The RC is responsible for the management, coordination, and implementation of the project, including environmental and social compliance, stakeholder coordination, and supervision of design and construction activities.

The Asian Infrastructure Investment Bank (AIIB) is considering financing for the project. In line with AIIB's Environmental and Social Framework (ESF), an Environmental and Social Impact Assessment (ESIA), including a Paris Alignment and Climate Finance Assessment, is being prepared to evaluate potential environmental and social risks and

impacts associated with the project and to define appropriate mitigation and management measures.

The project involves upgrading the existing dual carriageway to meet technical category IB standards, with a typical configuration of four lanes (2x2) across the project corridor with six lanes (3x3) in the large settlements, improved shoulders, and a paved median. The works will also include construction of missing links, grade-separated interchanges, acceleration and deceleration lanes, and local access roads to maintain connectivity for adjacent communities. These improvements are expected to enhance traffic flow, reduce accident risks, and support regional economic development.

The project is subdivided into multiple sections (Lots) to facilitate design, procurement, and implementation. The alignment traverses predominantly agricultural landscapes with localized settlements and infrastructure interfaces, requiring careful consideration of environmental sensitivities and social impacts, including land acquisition, livelihood disruption, and community safety.

The preparation of this ESIA is undertaken to ensure that the project complies with national regulatory requirements and international lender standards, including AIIB ESF, and reflects good international industry practice. The assessment supports informed decision-making and contributes to the sustainable development of transport infrastructure in Uzbekistan.

1.2. Scope and Objectives of the ESIA

This ESIA report presents a comprehensive evaluation of the potential environmental and social (E&S) risks and impacts associated with the proposed project. It integrates environmental and social considerations into the project planning and decision-making process to ensure sustainable development in line with international good practice and applicable national requirements.

1.2.1. Scope of the ESIA

The scope of the ESIA encompasses the identification, prediction, and evaluation of potential impacts arising from the project across its lifecycle, including planning, construction, operation, and, where relevant, decommissioning phases. The assessment considers a wide range of environmental and social components, including but not limited to:

- Land use and land acquisition
- Geology and soil conditions
- Air quality and greenhouse gas emissions
- Noise and vibration
- Surface water and groundwater resources
- Biodiversity and ecosystems

- Cultural heritage
- Community health, safety, and security
- Occupational health and safety (OHS)
- Labor and working conditions
- Socio-economic conditions, including livelihoods and vulnerable groups
- Stakeholder engagement and grievance mechanisms.

The ESIA also assesses the project's compliance with applicable national legislation of Uzbekistan, as well as relevant international standards and lender requirements, including the AIIB Environmental and Social Framework (ESF).

1.2.2. Objectives of the ESIA

The primary objective of the ESIA is to ensure that the project is developed in an environmentally and socially sound and sustainable manner by avoiding, minimizing, mitigating, or compensating adverse impacts while enhancing positive outcomes. Specifically, the ESIA aims to:

- Review the project and its feasible alternatives, including a comparative assessment of environmental and social considerations.
- Identify environmental and social receptors and resources within the project area of influence that may be affected by project activities.
- Establish baseline environmental and social conditions through a combination of desk-based studies and field surveys.
- Assess potential environmental and social impacts associated with the project during all phases (pre-construction, construction, and operation).
- Evaluate compliance with national regulatory requirements, international best practices, and AIIB ESF, including conducting a gap analysis where applicable.
- Identify and engage with stakeholders, including project-affected people, and disclose relevant project information and ESIA findings.
- Incorporate stakeholder feedback into the assessment through meaningful consultation processes.
- Develop appropriate mitigation measures to avoid, reduce, or offset adverse impacts, and enhance positive impacts.
- Prepare an Environmental and Social Management Plan (ESMP), including monitoring and reporting frameworks.
- Assess climate-related risks and opportunities, including conducting Paris Alignment and Climate Finance Assessment following *AIIB's Methodology for Assessing the Alignment of AIIB Investment Operations with the Paris Agreement*[1].

[1] Methodology for Assessing the Alignment of AIIB Investment Operations with the Paris Agreement, Asian Infrastructure Investment Bank, 2023.

In addition to this ESIA report, the following key environmental and social safeguard instruments have been prepared as part of the overall assessment and management framework:

(i) ESIA, including the Environmental and Social Management Plan (ESMP)
(ii) Stakeholder Engagement Plan (SEP)
(iii) Labor Management Plan (LMP)
(iv) Gender Action Plan (GAP)
(v) Resettlement Action Plan (RAP).

1.3. Study Methodology

1.3.1. Overall Approach

The ESIA for the M37 Corridor Improvement Project – Phase I has been undertaken in accordance with the AIIB Environmental and Social Policy (ESP), relevant Environmental and Social Standards (ESS1 and ESS2), applicable national legislation of the Republic of Uzbekistan, and international good practice, including IFC Performance Standards.

The ESIA is based on a combination of primary data (field surveys, stakeholder consultations, site inspections) and secondary data (existing reports, national statistics, spatial datasets, and previous studies). The approach ensures that both biophysical and socio-economic conditions are adequately characterized and that potential project impacts are assessed in a comprehensive and evidence-based manner.

The methodology explicitly distinguishes between two project components with different impact profiles: the greenfield bypass of Bukhara city, where a new alignment introduces potential impacts on previously undisturbed or semi-natural environments; and the existing road rehabilitation corridor, where impacts are largely associated with upgrading within or adjacent to an already modified environment. This distinction guided the level of baseline detail, survey intensity, and impact assessment focus applied to each component throughout the methodology described in Sections 1.3.2–1.3.8.

1.3.2. ESIA Process and Workflow

The ESIA methodology involves a systematic and step-by-step approach, following a sequential process:

(1) Screening and Scoping: Identification of key environmental and social issues, sensitive receptors, and regulatory requirements, and definition of the Project Area of Influence (AoI). For the greenfield bypass, the AoI was expanded beyond the immediate footprint to capture ecological connectivity and indirect impacts, and the alignment was subdivided into 10 sections to support detailed biodiversity assessment and spatially explicit analysis. For the rehabilitation



corridor, the AoI focused on the existing right-of-way and adjacent receptors, with emphasis on community, traffic, and construction-related impacts.

(2) Baseline Data Collection and Analysis: Establishment of existing environmental and socio-economic conditions through desk studies and field surveys.

(3) Impact Identification and Assessment: Systematic identification and evaluation of potential impacts during construction and operation phases.

(4) Mitigation and Enhancement Measures: Development of measures in accordance with the mitigation hierarchy.

(5) Residual Impact Evaluation: Assessment of impacts remaining after mitigation.

(6) Management and Monitoring Planning: Preparation of ESMP, monitoring indicators, and institutional arrangements.

This workflow integrates GIS-based spatial analysis, field verification, and stakeholder input throughout the process.

1.3.3. Data Collection

1.3.3.1. Secondary Data Collection

A comprehensive desk review was undertaken to compile relevant information on: physical environment (climate, air quality, hydrology, soils); biological environment (habitats, biodiversity, protected areas); socio-economic conditions (demographics, land use, infrastructure); and legal and institutional frameworks.

Sources included government datasets, statistical reports, scientific literature, spatial datasets, and satellite imagery. This review enabled identification of data gaps and informed the design of field surveys.

1.3.3.2. Primary Data Collection

Field surveys were conducted to validate and supplement secondary data, focusing on areas potentially affected by the project. The surveys covered:

- Physical environment: air quality, noise, soil, hydrology
- Biological environment: habitats, flora, fauna, sensitive ecosystems
- Socio-economic conditions: land use, livelihoods, infrastructure, community services.

Field investigations included site inspections and transect surveys, direct observations and measurements, GPS-based mapping and photographic documentation, and consultations with local communities and authorities. Primary data collection was tailored to reflect the differing characteristics of the project components: the bypass corridor received detailed structured biodiversity sampling, habitat mapping, and ecological verification across its 10 survey sections, allowing systematic spatial coverage and repeat sampling; the rehabilitation corridor's fieldwork focused on verification of existing conditions, identification of sensitive receptors, and assessment

of potential construction and operational impacts within an already modified landscape.

Geographic Information Systems (GIS) were used to map project components and alignment, define the AoI, identify environmentally and socially sensitive areas, and support impact assessment and mitigation planning. Ground-truthing was undertaken to validate spatial data and refine mapping outputs. GIS was also used to design and optimize biodiversity sampling locations and to spatially link field survey results with impact assessment outputs.

1.3.4. Biodiversity Survey Design and Methodology

Biodiversity surveys were designed and implemented in accordance with the biodiversity survey plan prepared during the inception stage, which defined survey locations, methods, and sampling intensity along the greenfield bypass.

The survey design incorporated the following key elements:

- The bypass alignment was divided into 10 sections, each representing a discrete sampling unit to ensure spatial coverage.
- Survey locations, including transects, observation points, camera trap stations, and aquatic sampling points, were pre-defined using GIS and verified through field reconnaissance.
- The AoI for biodiversity surveys extended beyond the immediate road footprint to include adjacent habitats and ecological features (e.g., irrigation canals, vegetation corridors).

Field surveys were undertaken across multiple taxa using standardized methodologies, including:

- Diurnal and nocturnal transect surveys for birds and mammals
- Targeted herpetofauna surveys within suitable microhabitats
- Camera trapping for medium and large mammals
- Point-based bird observations and bat surveys
- Aquatic and semi-aquatic assessments in canals and drainage systems
- Vegetation sampling using belt transects (50×5 m plots)

Each survey method was repeated across multiple visits to capture temporal variability and improve detection probability. Field survey methodologies across taxa are provided in Appendix 12.

1.3.5. Stakeholder Engagement and Socio-Economic Surveys

Stakeholder engagement was conducted as per the following methodology: consultations with local communities along the project corridor; focus group discussions; key informant interviews; and engagement with local authorities and institutions. These

activities supported identification of social risks and impacts, understanding of community perceptions, and validation of baseline socio-economic conditions.

In addition to general socio-economic data collection, the ESIA incorporates targeted methodologies for assessing land acquisition, livelihood impacts, labor risks, and gender dimensions, in line with relevant international good practice. Consistent with the distinction established in Section 1.3.1, these methodologies were applied differently across the two project components: for the greenfield bypass, emphasis was placed on identification of land ownership, land use, and livelihood dependence, including agricultural land, informal land use, and seasonal dependence, to support preparation of site-specific Resettlement Action Plans (RAPs); for the rehabilitation corridor, the assessment focused on potential temporary impacts, access restrictions, impacts on roadside businesses, and community safety during construction.

The socio-economic assessment methodology included household-level surveys and asset inventories; census of affected persons and land users (where alignment is defined); focus group discussions, including separate consultations with vulnerable groups and women; and key informant interviews with local authorities and community representatives.

Data collected through these activities provided the basis for assessing economic and physical displacement, livelihood risks, and vulnerability, and for developing appropriate mitigation and compensation measures.

A project-level Grievance Redress Mechanism (GRM) was established as part of the ESIA process and is operational during baseline data collection, stakeholder consultations, and resettlement planning, to capture and address concerns at early stages.

1.3.6. Traffic and Transportation Assessment Methodology

Traffic and transportation assessment was undertaken to evaluate existing traffic conditions, road safety risks, and potential impacts of the Project on road users and surrounding communities. The methodology combined field surveys, observational studies, and stakeholder inputs. The assessment included the following components:

1.3.6.1. Traffic Counts Survey

Traffic surveys were conducted at representative locations along the project corridor to establish baseline traffic conditions. The surveys recorded: traffic volume by vehicle type; temporal variation (peak and off-peak periods); traffic composition, including heavy vehicles and non-motorized users. These data were used to assess existing capacity, forecast traffic growth, and evaluate potential impacts during construction and operation.

1.3.6.2. Road Safety Audit

A road safety audit was undertaken to identify existing safety risks and potential hazards associated with the project design. The audit included: field inspection of road conditions and alignment; identification of accident-prone locations; assessment of pedestrian crossings, access points, and roadside activities; evaluation of visibility, signage, and traffic control measures. Attention was given to sensitive receptors such as settlements, schools, markets, and intersections.

1.3.6.3. Beneficiary and Road User Survey

Surveys of road users and local communities were conducted to understand travel patterns, perceptions of safety, accident risks, key concerns related to traffic conditions, and expectations regarding road improvements. These surveys complemented technical traffic data and supported identification of community-specific risks and mitigation measures. The methodology also distinguishes between the greenfield bypass and rehabilitation corridor. The results of these assessments informed the identification of traffic-related impacts, road safety risks, and development of mitigation measures, including traffic management plans and road safety improvements.

1.3.7. Social, Resettlement, Labor, and Gender Methodologies

The ESIA includes dedicated methodological approaches for resettlement planning, labor management, and gender analysis, aligned with AIIB ESS2 and international good practice.

1.3.7.1. Resettlement Planning Methodology

Resettlement planning follows a structured methodology based on: screening of land acquisition requirements based on available design; identification of affected land parcels and users, including formal and informal occupants; asset inventory and valuation surveys; socio-economic profiling of affected households.

Where detailed alignment information is available, site-specific RAPs are prepared, while in areas of design uncertainty a framework approach is applied, to be refined at later stages. The methodology explicitly recognizes and includes informal, seasonal, and non-registered land users as eligible for compensation and assistance in accordance with ESS2, as well as affected assets such as trees, crops, and access routes.

1.3.7.2. Labor Management Methodology

Labor-related risks were assessed through: analysis of workforce requirements and labor sourcing; identification of risks related to labor influx, working conditions, and occupational health and safety; assessment of community–worker interactions and

associated risks, including risks related to gender-based violence, sexual exploitation and abuse, and sexual harassment (GBV/SEA/SH).

The Labor Management Plan (LMP) was developed based on this assessment and includes: labor categorization (direct, contracted, primary supply workers); worker grievance mechanisms; codes of conduct and training requirements; measures addressing labor influx and community health and safety.

The LMP establishes binding requirements for contractors, including Codes of Conduct addressing GBV/SEA/SH, mandatory worker training, and enforcement mechanisms.

1.3.7.3. Gender Analysis and Gender Action Plan (GAP)

Gender considerations were integrated through: collection of sex-disaggregated socio-economic data; targeted consultations with women and vulnerable groups; assessment of gender-differentiated project impacts (e.g., mobility, access to services, livelihoods).

The Gender Action Plan (GAP) was developed to enhance equitable access to project benefits, address risks related to gender-based violence and harassment, promote inclusive participation in consultations, and employment opportunities. These methodologies informed the identification of social risks and the development of targeted mitigation and enhancement measures presented in subsequent chapters.

1.3.8. Impact Assessment Methodology

Impact assessment integrates findings from biodiversity, socio-economic, traffic, and labor assessments to ensure that environmental and social risks are evaluated in an integrated manner. Impact assessment was carried out using a risk-based approach, consistent with AIIB requirements and good international practice. The process included:

(i) Impact Identification: Potential environmental and social impacts were identified as interactions between project activities and environmental/social receptors.
(ii) Impact Evaluation: Each impact was assessed based on magnitude, spatial extent, duration, frequency, likelihood, sensitivity of receptors.
(iii) Impact Significance: The significance of impacts was determined by combining impact magnitude and receptor sensitivity, allowing classification into different levels of significance.

Impact types considered direct impacts, indirect impacts, and cumulative impacts. This approach ensured comprehensive evaluation of both immediate and long-term effects.

Mitigation measures were developed following the mitigation hierarchy: avoid impacts where feasible; minimize impacts that cannot be avoided; restore or rehabilitate affected environments; compensate or offset residual impacts.

Residual impacts were evaluated after applying mitigation measures, considering magnitude and extent, duration and reversibility, likelihood of occurrence, and environmental and social context. This step ensures that remaining risks are clearly understood and managed.

Findings from the impact assessment informed ESMP development, definition of monitoring indicators and monitoring plan, and refinement of project design to reduce impacts.

1.3.9. Limitations and Assumptions

The methodology acknowledges:

- design-stage uncertainties in some project sections,
- reliance on available secondary data in certain areas,
- seasonal constraints for specific surveys.

Where uncertainties exist, a precautionary approach has been applied, and additional studies are recommended where necessary. In addition, for the rehabilitation corridor, baseline conditions are influenced by long-term anthropogenic modification, and therefore the assessment focuses on incremental impacts rather than baseline transformation.

1.4. Study Team

The ESIA assignment has been implemented by Global Business Services under a structured organizational framework designed to ensure clear allocation of responsibilities, technical accountability, and full compliance with the AIIB ESF. All safeguard-critical tasks, including screening and scoping, impact assessment, determination of ESS applicability, and preparation of ESS2 instruments are led, validated, and approved by the designated Key Experts. Government entities and external institutions contribute to data collection and technical inputs only and do not perform independent ESIA assessment or decision-making functions.

1.5. Document Structure

This ESIA report consists of two parts: Part I and Part II. Part I is organized into nine chapters, while Part II contains 17 appendices. Following this Executive Summary, next chapters provide contextual information on the project:

- Executive Summary.
- *Chapter I (Introduction)* overviews the project, ESIA scope and objectives, methodology, study team, and document structure.
- *Chapter II (Project Description)* describes the existing situation in the project sites, the technical design summary, the construction methodology, and the operation of the project facilities upon commissioning.
- *Chapter III (Regulatory Framework and Gap Analysis)* describes the relevant Uzbek regulations, policies, and standards, the lender's requirements for the ESIA process and the project design, and applicable international standards.

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

- *Chapters IV and V (Environmental and Social Baseline Conditions)* describes the project area's physical conditions, biological environment, and socio-economic conditions.
- *Chapter VII (Stakeholder Engagement)* describes consultations undertaken for the project and the stakeholder participation plan during the project implementation.

The impact assessment is organized in three chapters:

- *Chapter VI (Environmental and Social Impact Assessment)* describes the project's design, construction, and operation's impacts and risks on the area's physical, ecological, and socioeconomic environment.
- *Chapter VIII (Grievance Redress Mechanism)* provides the framework for reporting, recording, and responding to stakeholder complaints.
- *Chapter IX (Environmental and Social Management Plan)* details management and mitigation measures to be carried out during the project'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.

2. PROJECT DESCRIPTION

2.1. Project Location

The project is the rehabilitation and upgrading of 69 km of the existing M37 international highway, together with the construction of a new western bypass around Bukhara City. The project is in Navoi and Bukhara Provinces in southwestern Uzbekistan and covers the M37 road section between approximately km 207 and km 276.

The M37 highway is a major national and international transport corridor extending from the Samarkand direction through Navoi and Bukhara Provinces. The project section starts near the interchange in the Kyzyltepa district in Navoi Province and continues southwest into Bukhara Province through Gijduvon, Vobkent, and Bukhara districts, terminating near the Bukhara City.

The total project corridor length is approximately 69 km and crosses predominantly rural and peri-urban areas, including district centers, roadside settlements, and agricultural landscapes. In total, the corridor directly interacts with approximately 41 mahallas (local communities), making local access, settlement connectivity, and road safety important design considerations.

In addition to rehabilitation of the existing alignment, the project includes approximately 7.5 km of new western bypass alignment located to the west of Bukhara city. This greenfield bypass intersects with the existing A380 Road (A380b section), which connects Bukhara with Khorezm Province, the Republic of Karakalpakstan, and Kazakhstan. A further 4.5 km greenfield connection section links the existing M37 alignment with the Bukhara ring road, completing the missing bypass link around the city.

The project corridor passes through predominantly flat desert and irrigated agricultural landscapes characteristic of the Bukhara oasis and the surrounding semi-arid plains. In the northern and central sections near Kyzyltepa, Gijduvon, Vobkent, and Bukhara District, the alignment crosses densely cultivated agricultural lands and settlement areas.

The project location map is presented in Figure 1.

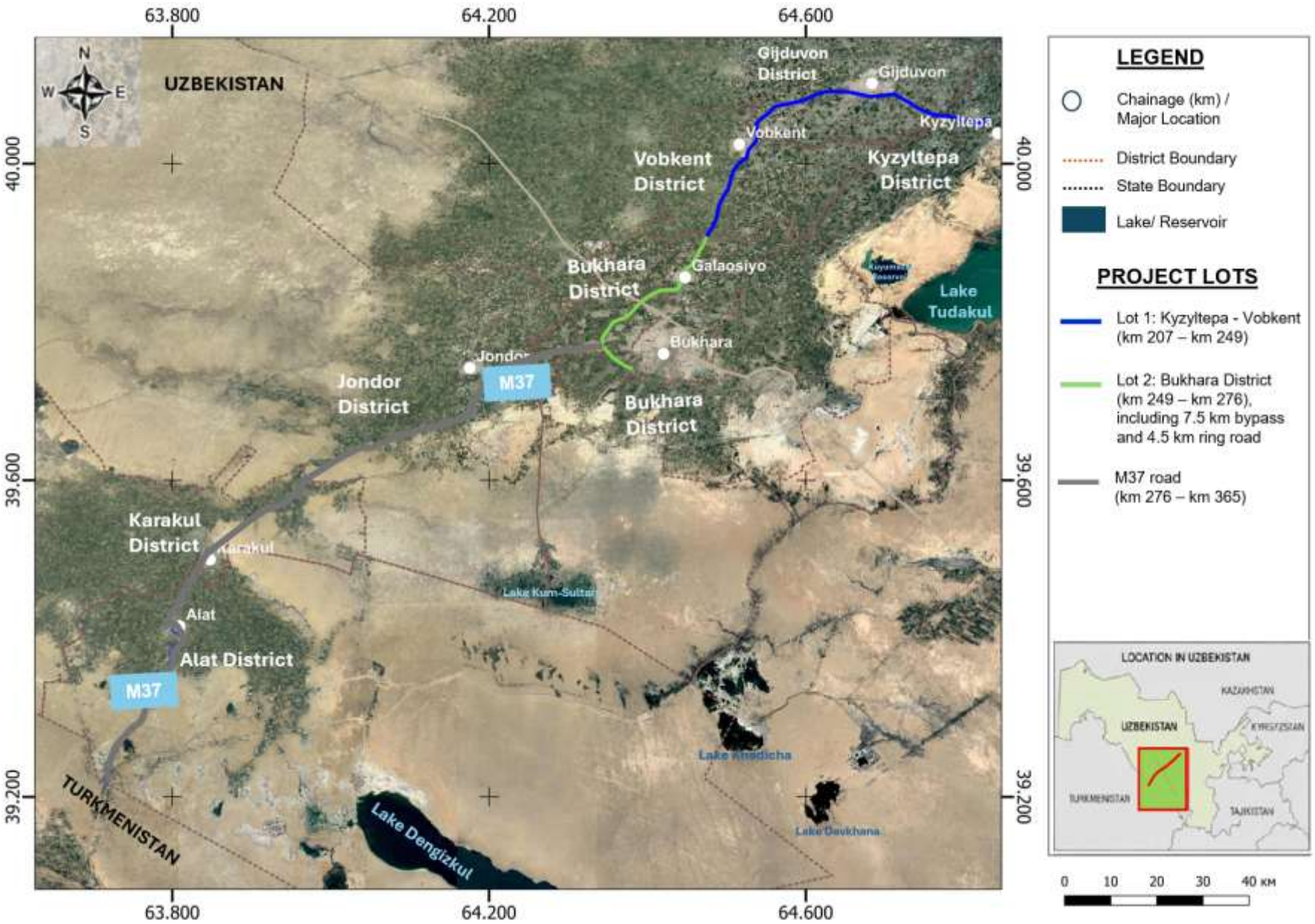


Figure 1: Project Location Map
(Source: Project Design)

2.2. Need for the Project

The *M37 Corridor Improvement Project – Phase I* is required to improve the operational condition, safety, and transport efficiency of one of Uzbekistan's most important national and international road corridors. A significant portion of the existing M37 section between km 207 and km 276 has experienced pavement deterioration, rutting, cracking, shoulder failures, drainage deficiencies, and reduced road safety conditions due to long-term operation, increasing traffic volumes, and heavy freight movement. Several sections of the corridor pass through populated settlements and district centers where uncontrolled access points, insufficient pedestrian facilities, and limited traffic management measures create additional risks for local communities and road users.

The current road condition increases travel time, vehicle operating costs, fuel consumption, and accident risks, while reducing the reliability of passenger and freight movement between central Uzbekistan and western border crossings. These constraints negatively affect regional economic productivity, agricultural supply chains, and access to markets and social services for rural communities located along the corridor.

The project is also required to complete the western bypass of Bukhara city. At present, transit and heavy freight traffic passes through urban sections of Bukhara, creating congestion, road safety concerns, air and noise pollution, and additional pressure on densely populated residential areas and the historic urban environment and cultural heritage assets of Bukhara. Construction of the new bypass section will provide an alternative route for transit vehicles, reduce heavy traffic within the city, and improve traffic circulation between the M37 corridor, the A380 road, and the Bukhara ring road.

The project will enhance regional and international connectivity by strengthening the transport link between regions, supporting trade flows and regional economic integration. Improved road conditions will facilitate more efficient movement of goods and passengers, improve access to employment and services, and support broader socioeconomic development in Navoi and Bukhara provinces. From a strategic planning perspective, the project supports national transport modernization objectives and the GoU's broader infrastructure development program aimed at improving international transport corridors, reducing logistics costs, and strengthening regional competitiveness.

Without the project, continued deterioration of the existing M37 corridor would result in increasing maintenance costs, worsening traffic congestion, higher road safety risks, and reduced efficiency of passenger and freight transport. The absence of the western bypass would continue to place heavy transit traffic within Bukhara city, contributing to congestion, environmental nuisance, community safety concerns, and additional pressure on the historic urban environment and cultural heritage assets of city of Bukhara. Therefore, the project is necessary to maintain strategic transport connectivity and improve long-term regional mobility.

2.3. Project Information

2.3.1. Project Implementation Structure and Sequencing

Executing Agency and Implementation Structure

The M37 Corridor Improvement Project – Phase I is an investment financed by the AIIB. The Executing Agency for the project is the Avtoyulinvest Agency under Committee for Roads of the Republic of Uzbekistan, the national authority responsible for the development, maintenance, and management of the national road network. The Avtoyulinvest Agency under Committee for Roads bears overall responsibility for project implementation, including procurement of civil works and supervision contracts, environmental and social management, stakeholder engagement, and compliance with AIIB Environmental and Social Policy requirements.

A dedicated PMO has been established within the Avtoyulinvest Agency under Committee for Roads to manage day-to-day project implementation activities. The PMO is responsible for coordinating civil works procurement and contract management across project lots, overseeing the preparation and implementation of the environmental and social instruments, managing relationships with contractors and construction supervision consultants, and providing the primary point of contact for AIIB supervision missions. The PMO includes designated Environmental and Social Officers responsible for environmental and social compliance during construction and maintaining environmental and social reporting to AIIB.

AIIB provides investment financing and exercises oversight through periodic supervision missions and review of project progress, environmental and social compliance reporting, and financial management documentation submitted by the PMO.

An independent construction supervision consultant will be engaged for each civil works contract to provide day-to-day technical supervision of construction activities, verify contractor compliance with design specifications and environmental and social requirements, and certify works for payment. Construction supervision consultants will work in close coordination with the PMO Environmental and Social Officer to ensure environmental and social management provisions are implemented by contractors in the field.

Project Scope Covered by this ESIA

The M37 project comprises rehabilitation of approximately 69 km of the existing M37 national highway across two construction lots (Lots 1–2) and construction of a new Bukhara western bypass alignment of approximately 12 km, including a missing link connection to the Bukhara Ring Road.

The present ESIA has been prepared to cover Lot 1 and Lot 2 of the rehabilitation corridor, for which detailed engineering design has been completed, and bidding documents are at an advanced stage of preparation. Lot 1 covers the rehabilitation corridor from Kyzyltepa district (Navoi Province) through Gijduvon district to the Vobkent district boundary (approximately km 207–km 249), and Lot 2 covers the corridor through Vobkent and Bukhara districts (km 249 – km 276).

Project Sequencing

Civil works for Lots 1 and 2 and the bypass will be tendered and mobilized as procurement is completed and contracts are awarded.

Each construction lot will be implemented under a separate civil works contract, procured in accordance with the AIIB Procurement Policy. The overall construction programme for Lots 1 and 2 and the bypass is expected to extend over approximately 36 months from the date of contract commencement.

Environmental and social management obligations, including ESMP implementation, grievance mechanism operation, community liaison, and monitoring and reporting, apply from the date of contractor mobilization for each lot and continue through the construction period and into the post-construction monitoring phase as specified in the ESMP.

2.3.2. Design Standards and Criteria

The engineering design is based on applicable Uzbek national road design standards (SHNK/KMK series covering motorways, bridges, earthworks, tunnels, and construction acceptance procedures, listed in Appendix 1) and the Law on Motorways[2] (No. ZRU-117), supplemented by international good practice where relevant.

The project is designed as a Category IB highway for high-capacity, high-speed traffic, with a design speed of 120 km/h in rural sections (reduced locally in settlements), a dual carriageway (2x2 lanes, expanding to 2x3 in high-demand settlement sections), and a standard lane width of 3.75 m. Median and shoulder configurations follow Category IB requirements, with cross-sections adapted to rural and settlement conditions.

Pavement design varies by context:

- Rigid pavement (cement concrete) is applied in rural sections to support high traffic loads and reduce long-term maintenance requirements.
- Flexible pavement (asphalt) is applied in urban and settlement areas to facilitate utility access, staged construction, and ease of repair.

[2] Law on Motorways, No. ZRU-117, 02.10.2007, https://lex.uz/uz/docs/1254492 (accessed June 2026)

The design incorporates standard safety measures, including median separation, guardrails, signage, lighting, and pedestrian facilities in populated areas. Site-specific adjustments are made to accommodate transitions between rural and urban environments, existing infrastructure constraints, and safety considerations. Certain parameters remain subject to refinement during detailed design.

2.3.3. Scope of the Project

The project involves the rehabilitation and upgrading of approximately 69 km of the M37 corridor (km 207–276). To facilitate implementation, the project is divided into two procurement lots.

Table 3: Project Lots

Road	Lot 1	Lot 2
Section	km 207 – 249	km 249 – 276
Section length	42 km	27 km (incl. 12 km bypass)
Road category	IB	IB
Carriageway's lanes	2 x 2	2 x 2

(Source: Project Design)

The scope includes widening the existing road to dual carriageway standard, localized geometric improvements, junctions and grade-separated crossings, and a greenfield bypass and connection segment in Lot 2 (~7.5 km bypass plus ~4.5 km connection to the Bukhara ring road), designed to divert traffic away from Bukhara's UNESCO World Heritage sites.

The corridor will carry 2×2 lanes generally (2×3 in large settlements such as Gijduvon, Vobkent, and Galaosiyo), with cement concrete pavement on the main carriageway (30-year design life) and asphalt pavement in settlements (20-year design life). Grade-separated interchanges are planned at key intersections and populated areas; at-grade junctions and U-turns remain in some sections, posing localized safety risk for this road category. Pedestrian crossings and bus stops (new and widened) are provided near intersections, and cattle crossings have been installed to address social/livestock concerns. Utility relocation (water, electricity, gas) is included where needed for construction safety.

The typical cross-section is 25.1 m (combined) or 35.7–45.7 m (separated configuration); both are used across the corridor and shown in Appendix 1, along with the lot-by-lot engineering parameters.

2.3.4. Alignment and Design Characteristics by Lots

2.3.4.1. Overall Alignment Configuration

The alignment strategy prioritizes upgrading the existing M37 corridor, with widening and geometric correction generally undertaken within or immediately adjacent to the current right-of-way; deviations are limited and occur mainly to improve geometry or accommodate junctions. The alignment transitions functionally from rural sections (high-speed, controlled access, widely spaced junctions) through peri-urban sections (increased junction density) to urban/settlement sections (expanded cross-sections with additional lanes, sidewalks, lighting, and pedestrian infrastructure, at reduced operating speeds).

Lot 1 is rehabilitation-dominated, involving widening, localized realignment, and junction improvements within the existing corridor. Lot 2 combines rehabilitation with a greenfield bypass, diverting transit traffic from Bukhara and connecting to the A-380 and Bukhara ring road.

The alignment interacts with local/regional roads, railway lines (at-grade and grade-separated crossings), and irrigation/drainage networks, which influence geometry and require crossing and access management measures. Lot-specific alignment layouts are provided in Appendix 1.

2.3.5. Intersection and Crossing Design

The project incorporates grade-separated interchanges, at-grade intersections, and railway crossings to ensure safe traffic movement.

- Grade-separated interchanges (predominantly partial cloverleaf configurations) are provided at major junctions in Lots 1 and 2 and along the Lot 2 bypass, reducing conflicts between crossing traffic and improving safety and capacity.
- At-grade intersections are used mainly in rural sections to maintain local access, supported by signage, markings, channelization, and speed control near settlements.
- Railway crossings occur via both existing at-grade crossings and grade-separated overpasses, depending on local conditions.
- The Lot 2 bypass introduces new junction configurations and controlled access points to divert transit traffic while maintaining local connectivity, with junction layout based on operational and safety needs rather than uniform spacing.

A summary of interchanges and crossings by lot is provided in Table 4; detailed interchange geometry, exact locations, and land take per interchange are provided in Appendix 1.

Table 4: Road Intersections and Crossings by Lot and Needed Land Take

Lot	Alignment Type	Grade-Separated Interchanges	Indicative Land Take (ha)	At-Grade Road Intersections	Railway Crossings
Lot 1	Rehabilitation	8	~2.98–7.12 per interchange	Local access roads	---
Lot 2	Mixed (rehabilitation + greenfield bypass)	5	~4.55–5.86 per interchange	Local access roads	---

(Source: Project Design)

2.3.6. ROW and Land Requirements

The project will be implemented primarily within the existing M37 corridor, with widening and localized realignment required to accommodate the upgraded road standard.

2.3.6.1. ROW Characteristics

The project will be implemented primarily within the existing M37 corridor, with widening and localized realignment required to meet the upgraded road standard. The right-of-way (ROW) requirements vary along the alignment depending on cross-section, terrain, and surrounding land use, with wider footprints needed in settlement areas, at junctions and interchanges, and where geometric improvements are required; the design follows a corridor-based approach, minimizing deviations from the existing alignment where feasible.

Permanent land acquisition is required where the existing ROW is insufficient, occurring in settlement/peri-urban areas with widened cross-sections; grade-separated interchanges and junctions; sections requiring geometric improvements (e.g., curve realignment, embankment widening); and the greenfield bypass and connection segment in Lot 2, where a new corridor is established. Acquisition in rural sections is generally linear and limited, with localized footprint expansion at interchanges (ramps, loops, associated structures).

Temporary land occupation will be required for contractor camps and site offices, material storage and laydown areas, temporary access roads and diversions, staging areas, and potential borrow/spoil disposal sites.

Affected land use and assets: the alignment traverses agricultural, roadside, peri-urban, and urban land. Across Lots 1 and 2, inventories indicate approximately 11,351 affected plants (including orchard and ornamental trees), with vegetation losses both linear (along the corridor) and localized (at junctions, interchanges, overpasses); affected agricultural land uses including orchards and vineyards; and a limited number of affected structures, including residential buildings, auxiliary structures (livestock shelters, greenhouses), and one commercial unit. Crossings with irrigation systems and canals pose risks to agricultural production, requiring specific measures to restore access and

water supply. ROW also intersects utilities (electricity, gas, water), requiring relocation coordinated with relevant agencies.

All affected assets, including land, crops, trees, and structures, will be subject to detailed census, asset inventory, and valuation as part of the RAP, in accordance with national legislation and AIIB ESS2 requirements. No land acquisition or displacement will occur prior to the preparation, disclosure, and implementation of the RAP. Detailed asset inventories are provided in RAP.

2.3.7. Earthworks

Earthworks are a major component of the project, required to achieve the proposed road geometry, pavement structure, drainage profile, and long-term stability across both the rehabilitated M37 sections and the new bypass. Works include excavation, grading, embankment formation, subgrade preparation, side slope shaping, and drainage excavation, along with related activities at culverts, bridge/interchange approaches, utility relocations, and temporary access roads and construction support areas.

Given the predominantly flat desert and semi-desert terrain of the Kyzylkum landscape, deep cut sections are expected to be limited; earthworks will mainly involve embankment formation, platform widening, subgrade preparation, and drainage/slope shaping.

Engineering quantities are currently available only for Lots 1–2 (~1.51 million m³ and ~1.02 million m³ respectively, or ~35,900–37,600 m³/km).

Table 5: Earthwork Estimate

Lot	Length, km	Rate, m³/km	Earthworks, m³
Lot 1	42	~35,900	1,507,727.35
Lot 2	27*	~37,600	1,015,926.7
Total:	69	---	~5,193,654–6,528,654 m³

Note: The calculated earthworks for Lot 2 by the Design Institute do not include a 4.5 km connecting link to the Bukhara Ring Road.

These estimates support preliminary assessment of borrow demand, spoil generation, transport requirements, and construction-related disturbance, and are indicative only; final quantities and cut-and-fill balances will be confirmed during detailed engineering design.

2.3.8. Green Landscape Design

The project design incorporates a green landscape component along selected corridor sections, particularly within settlement and peri-urban areas, including roadside tree planting, green strips between pedestrian areas and the carriageway, landscaped medians (where space permits), and vegetation around junctions and public-use areas

(e.g., bus stops, pedestrian crossings). Integrated with sidewalks, lighting, and drainage, these elements are intended to provide visual improvement, partial dust/noise attenuation, road safety enhancement through pedestrian-traffic separation, and environmental benefits including microclimate regulation and partial compensation for vegetation loss. Detailed planting schemes and species selection will be defined during detailed design.

2.3.9. Drainage Design

The drainage design for the M37 road is intended to ensure effective management of surface runoff, protection of the road structure, and maintenance of natural and artificial drainage patterns along the corridor. The design is based on applicable national standards and is adapted to the predominantly flat terrain and irrigated landscape of the project area. The system includes:

- longitudinal drainage (side drains and urban channels)
- cross-drainage structures (culverts and small bridges)
- integration with irrigation and drainage networks.

At the current preliminary design stage, detailed hydraulic calculations, final quantities of culverts and drainage structures, and drainage protection works are still being refined by the Design Institute. Nevertheless, the preliminary drainage design is intended to provide adequate hydraulic capacity, minimize flooding and erosion risks, and maintain continuity of agricultural and drainage water flows along the corridor.

2.3.9.1. Longitudinal Drainage

Longitudinal drainage is provided along the road alignment to collect and convey runoff from the carriageway, shoulders, and adjacent areas. The system includes:

- Side drains along rural sections, typically unlined or lined depending on soil conditions and flow velocity.
- Urban drainage channels in settlement areas, designed to accommodate higher runoff volumes and interface with existing local drainage systems.
- Embankment protection measures, including masonry or concrete lining in areas susceptible to erosion.

In settlement areas, drainage design is integrated with roadside infrastructure, including sidewalks and service areas, to ensure safe conveyance of stormwater without affecting adjacent properties.

2.3.9.2. Cross-Drainage Structures

Cross-drainage structures are incorporated into the preliminary road design to maintain existing hydrological connectivity and avoid obstruction of natural runoff, irrigation canals, and agricultural drainage flows along the project corridor. These include:

- culverts, drainage crossings, and small bridge structures distributed along the alignment in accordance with local hydrological and irrigation conditions
- crossings at irrigation canals, drainage collectors, and agricultural water management channels, which are common along the project corridor, particularly within Lots 1–2
- drainage structures at low-lying sections and localized runoff pathways to reduce the risk of water accumulation and localized flooding
- extension, rehabilitation, or replacement of existing cross-drainage structures where required to accommodate the upgraded road profile and widened embankment.

The preliminary sizing and arrangement of cross-drainage structures are based on existing drainage patterns, expected flow conditions, topography, irrigation network connectivity, and hydraulic capacity considerations. Final hydraulic parameters, structure dimensions, and spacing will be confirmed during detailed engineering design.

2.3.10. Utilities Relocation

The project corridor is expected to interact with existing utility infrastructure located within or adjacent to the current right-of-way. Utility interactions are expected to occur primarily in settlement and peri-urban sections, where underground services are more densely distributed, junctions and widened cross-sections, where additional land take extends beyond the existing corridor, and areas with existing roadside infrastructure such as sidewalks, bus stops, and drainage systems.

In rural sections, utility conflicts are expected to be less frequent and primarily associated with linear crossings of pipelines. All relocation works will be coordinated with the relevant utility operators and carried out in accordance with applicable technical and safety standards. Detailed utility mapping is not yet available and will be confirmed during detailed design in coordination with relevant service providers. Temporary service disruptions may occur during construction but will be managed to minimize impacts.

2.3.11. Road Safety Features and Traffic Management Measures

The project incorporates a comprehensive set of road safety features intended to improve operational safety, reduce accident risks, and support safe traffic movement under varying environmental, climatic, and traffic conditions. The design includes the following key road safety components:

- Traffic Signs and Road Signage: Regulatory, warning, directional, and informational signs will be installed along the corridor to provide guidance to road users. Signage is expected to include speed limits, intersection warnings, pedestrian crossings, hazard notifications, and directional information. Signs will

be designed to maintain visibility and reflectivity under both daytime and nighttime conditions.

- Pavement Markings: Lane markings, edge lines, directional arrows, pedestrian crossing markings, and other traffic control markings will be applied throughout the corridor. Reflective and durable materials are proposed to maintain visibility under low-light and desert conditions where dust accumulation may affect road visibility.
- Median Separation and Safety Barriers: The preliminary design incorporates central median barriers and roadside safety barriers at selected locations, including interchanges, embankments, bridge approaches, and sections requiring additional traffic protection measures.
- Guardrails: Guardrails are incorporated at selected locations to improve roadside safety and reduce the risk of vehicle departure from the carriageway, particularly near structures, embankments, and elevated sections.
- Road Lighting: Lighting is proposed at intersections, interchanges, settlement sections, pedestrian crossings, bus stop areas, and other high-risk locations to improve nighttime visibility and enhance safety for both motorists and pedestrians. Preliminary design quantities currently indicate approximately 21.4 km of lighting in Lot 1 and 9.2 km in Lot 2.
- Pedestrian Safety Infrastructure: Settlement sections incorporate pedestrian safety features including sidewalks, designated pedestrian crossings, roadside lighting, and channelized crossing areas intended to improve safety in urbanized and peri-urban sections of the corridor.
- Livestock and Access Control Measures: Selected sections of the corridor may include fencing, controlled access arrangements, and livestock crossings to reduce the risk of uncontrolled animal entry onto the roadway, particularly in rural and semi-desert areas.
- Bus Stops and Local Access Management: Bus stop areas and local access points are incorporated into the preliminary design to support safer interaction between local and transit traffic.
- Traffic Monitoring and Enforcement Infrastructure: The preliminary design includes provision for a Weigh-in-Motion (WIM) station within Lot 2 to support axle-load control and traffic monitoring.

2.4. Analysis of Alternatives

2.4.1. Do-nothing Scenario

The do-nothing scenario represents a baseline condition in which the proposed rehabilitation and upgrading of the M37 corridor is not implemented. Under this scenario, the existing road infrastructure would remain in its current condition, with only routine maintenance undertaken as per available budgets and institutional capacity.

(a) Transport Efficiency and Economic Implications

Without project implementation, the M37 corridor would continue to operate with existing deficiencies, including deteriorated pavement conditions, insufficient lane capacity in high-traffic segments, and constrained traffic flow through settlements. Travel times would likely increase due to progressive road degradation and growing traffic demand, particularly for regional and international freight movement.

(b) Road Safety Conditions

Existing safety risks, including substandard road geometry, lack of controlled crossings, limited pedestrian infrastructure, and mixed traffic within populated areas, would persist or worsen. Accident rates are likely to increase over time as traffic volumes grow and road conditions decline. The absence of grade-separated interchanges, safe crossings, and traffic calming measures in settlements would continue to expose both motorists and vulnerable road users to elevated risks. Existing deficiencies related to pedestrian crossings, roadside lighting, livestock control measures, and median separation would also remain unresolved under the do-nothing scenario.

(c) Environmental Implications

From an environmental perspective, the do-nothing scenario avoids the direct impacts associated with construction activities, such as land disturbance, vegetation clearance, noise, dust emissions, and temporary habitat disruption. Over the longer term, deteriorating road conditions typically lead to increased vehicle emissions due to inefficient driving conditions (e.g., stop-and-go traffic, poor surface quality), thereby contributing to higher greenhouse gas emissions and local air pollution.

(d) Social Considerations

The do-nothing scenario would avoid land acquisition, physical and economic displacement, and other resettlement-related impacts associated with the project. However, it would also forgo potential social benefits, including improved access to services, enhanced connectivity between rural communities and urban centers, and increased road safety for local populations. Communities located along the existing alignment would continue to experience traffic congestion, noise, and safety hazards without mitigation measures.

(e) Climate Resilience and Long-Term Sustainability

Maintaining the current infrastructure without upgrading would limit the corridor's resilience to climate-related risks, including increased frequency of extreme heat and heavy precipitation events. Existing drainage systems and pavement structures are unlikely to withstand projected climate stress, leading to more frequent damage, higher maintenance costs, and potential service disruptions.

(f) Institutional and Strategic Alignment

The do-nothing scenario would not align with national transport development strategies or international financing objectives aimed at improving regional connectivity, road safety, and climate-resilient infrastructure. It would also fail to meet the expectations of international lenders regarding modernization of critical transport corridors.

While the do-nothing scenario avoids immediate environmental and social impacts associated with construction, it is not considered a viable long-term option. It would result in continued deterioration of infrastructure, increased safety risks, reduced economic efficiency, and limited resilience to climate change. The absence of intervention would ultimately lead to higher cumulative costs and foregone development benefits compared to the proposed project.

2.4.2. Design Alternatives

The analysis of alternatives presented in Table 6 compares three design options developed during project preparation. Option 1 reflects the initial concept of full infrastructure development along the existing alignment, while Option 2 extends this approach to include the construction of a greenfield bypass and missing link to the Bukhara Ring Road. During the design review, the Bank requested optimization of the proposed solution to avoid overdesign and ensure alignment with the principles of impact avoidance and minimization, particularly in relation to land acquisition and vegetation loss. In response, Option 3 was developed as an optimized design that selectively incorporates necessary infrastructure elements while reducing the overall footprint, resulting in lower land take, fewer affected assets, and reduced tree cutting compared to the original concepts.

Table 6: Alternative Analysis

Design Parameter	Option 1: Full Infrastructure on Existing Alignment	Option 2: Full Infrastructure + Bypass + Missing Link	Option 3: Optimized Design (Selected Option)
Scope	Construction of full new infrastructure along the existing alignment, including maximum number of grade-separated interchanges and full cross-section elements.	Rehabilitation and construction of full infrastructure to both existing alignment and new bypass, including missing link to Bukhara Ring Road and major interchanges.	Optimized combination of rehabilitation and selective new construction (bypass and missing link), avoiding unnecessary infrastructure elements.
Routing	Only existing route from Kyzyltepa district to Bukhara Ring Road crossing	The route design comprises the following components: ▪ The existing route from the Kyzyltepa district to Bukhara Ring Road crossing. ▪ A western bypass of Bukhara, approximately 8 km long. ▪ A 4.5 km section connecting the existing M37 road with the Bukhara ring road.	The route design comprises the following components: ▪ The existing route from the Kyzyltepa district (Navoi Province) to the Bukhara district (Bukhara Province). ▪ A western bypass of Bukhara, approximately 8 km long. ▪ A 4.5 km section connecting the existing M37 road with the Bukhara ring road.
Design Approach	Uniform, maximum-standard design regardless of local conditions. Implementation sequencing is constrained by the uniform full-standard design approach, which requires comprehensive mobilization across the full corridor length before phased delivery is practicable.	Expansion of full-design approach across both existing and new alignments. Implementation sequencing is complex due to the simultaneous delivery requirements of multiple design components, existing alignment rehabilitation, new bypass construction, and missing link, which creates interdependencies between contract packages and limits flexible phasing.	Context-sensitive design tailored to traffic demand, settlement density, and spatial constraints. The selected option incorporates targeted widening in settlement areas, localized six-lane urban cross-sections, selective grade-separated interchanges, controlled-access measures, livestock crossings, and safety infrastructure. The optimized design approach supports flexible implementation sequencing, allowing individual lots to be tendered and constructed as detailed designs and bidding documents are finalized, rather than requiring simultaneous mobilization across the full corridor.
Technical Feasibility	Technically feasible but overdesigned relative to corridor needs, resulting in unnecessary construction and operational complexity.	Technically feasible but introduces complexity due to integration of multiple design elements (existing alignment, bypass, and large interchanges), which may reduce overall efficiency.	Technically sound and balanced, improving geometry and eliminating key constraints while maintaining efficient operation.

Design Parameter	Option 1: Full Infrastructure on Existing Alignment	Option 2: Full Infrastructure + Bypass + Missing Link	Option 3: Optimized Design (Selected Option)
Geometric Design Efficiency	High-standard geometry but not optimized, leading to excessive widening in constrained areas.	Mixed performance due to complex junctions and integration of multiple alignments, potentially reducing driving comfort.	Improved alignment and smoother geometry, enhancing driving conditions and operational efficiency.
Traffic Performance	High theoretical capacity but inefficient utilization in low-demand sections.	Improved regional connectivity but reduced operational efficiency in complex sections.	Capacity aligned with demand, improving travel time reliability and reducing congestion.
Construction Complexity	High due to extensive widening, interchanges, and service roads along entire corridor.	Very high due to combined construction of upgraded alignment, bypass, and complex interchanges.	Moderate to high; focuses on priority interventions and targeted structures while avoiding continuous corridor-wide expansion.
Land Requirement	Significant land acquisition required due to full-width cross-section and continuous service roads, including impacts on adjacent residential and agricultural land. Following full design, the total width of the road is ~45.7 m at maximum. With existing road width 20 m, the net additional land take is 45.7 − 20 = 25.7 m across the full cross-section (approximately 12.85 m per side). Total new land take over 69 km: 25.7 m x 69,000 m = ~177 ha.	Very high land requirement due to full-width widening of the existing alignment combined with additional land take for the greenfield bypass and missing link sections. On the existing alignment (69 km), the full design cross-section of ~45.7 m applies, consistent with Option 1: 45.7 m – 20 m = 15.7 m x 69,000 m = ~177 ha In addition, the Bukhara western bypass and missing link (~12 km of greenfield alignment) require a new corridor of approximately 45.7 m width: 45.7 m x 12,000 m = ~55 ha of new land. Total estimated new land take under Option 2: approximately: 177 ha + 55 = ~232 ha, the highest of the three options and reflecting the dual-alignment nature of this option.	Reduced land acquisition through optimization of interchange layouts, localized widening, and avoidance of unnecessary continuous service roads; additional land acquisition remains primarily associated with the bypass and ring road connection sections. The total anticipated impact on land is 92,277 hectares. This includes 0.009 hectares of non-residential land associated with households (homestead plots), 0.379 hectares of commercial land, and 91.84 hectares of agricultural land, which comprises 3.17 hectares of state-reserved agricultural land. Additionally, there are 0.049 hectares of public land occupied by structures, including existing public infrastructure and facilities.
Tree Cutting/ Vegetation Loss	Very high, estimated at approximately 30,000 trees in Lots 1 and 2 due to continuous widening.	Very high (approximately 20,000 in Lots 1 and 2), affecting both existing and new alignments, including trees and agricultural vegetation.	Reduced to approximately 11,351 plants in Lots 1 and 2 due to minimized footprint, a reduction of approximately 62% relative to Option 1 and 43% relative to Option 2 but still have an impact on trees and agricultural vegetation from construction of new bypass sections.
Resettlement Impacts (ESS2)	High due to extensive widening in settlements and provision of service roads.	Very high due to impacts along both existing alignment and new bypass areas.	Reduced through avoidance of densely populated areas and minimization of widening but still have an impact from construction of new bypass sections. Sidewalk alignments will be

Design Parameter	Option 1: Full Infrastructure on Existing Alignment	Option 2: Full Infrastructure + Bypass + Missing Link	Option 3: Optimized Design (Selected Option)
			adjusted during detailed design to minimize demolition of fences and front yards.
Affected Structures	Higher number, including residential and commercial assets: ~110 structures, combined area ~0.70 ha.	Highest number due to dual alignment impacts: ~144 structures, combined area ~0.92 ha.	Lower; impacts limited to essential areas only, , a total of 67 affected private and public structures with a combined affected area of approximately 0.43 ha
Impact on Community Infrastructure	High likelihood of affecting schools, utilities, and local access roads.	Higher likelihood due to expanded footprint.	Minimized through alignment refinement and localized design adjustments.
Road Safety	High design standard but increased conflict points due to extensive access and service roads.	Moderate; some sections introduce safety risks due to inconsistent geometry.	Improved safety through controlled access, grade-separated interchanges, median barriers, guardrails, pedestrian infrastructure, livestock crossings, and road lighting integrated into settlement and high-risk sections.
Environmental Footprint (Overall)	High due to extensive land disturbance and vegetation removal.	Very high due to combined impacts of existing and new alignments.	Reduced environmental footprint through selective widening, optimization of interchange layouts, minimized unnecessary infrastructure, and concentration of major interventions within priority sections.
Climate Resilience and Drainage	Limited optimization of drainage and resilience measures despite extensive footprint.	Improved regional drainage integration but higher disturbance footprint and complexity.	Improved drainage performance, climate resilience considerations, and runoff management integrated into optimized road and settlement cross-sections.
Community Access	Continuous widening along the full existing corridor creates extended and prolonged access disruption across the full 69 km rehabilitation section; service road provision partially mitigates impacts but increases land take and affected assets adjacent to settlements.	Dual-component construction across both existing alignment and new bypass creates simultaneous access disruption at multiple locations; complex traffic management requirements during construction; highest risk of temporary community severance.	Targeted widening and localized interventions minimize continuous access disruption; controlled-access bypass diverts transit and heavy freight traffic away from settlement areas, improving local road safety and access conditions during operation; construction-phase access management is more manageable due to concentrated rather than corridor-wide intervention.
Irrigation and Canal Crossings	Multiple canal crossings required along the full rehabilitation corridor; maximum	Highest number of canal crossings due to dual alignment covering both existing corridor and	Canal crossings consistent with Option 1 for rehabilitation sections; bypass introduces

Design Parameter	Option 1: Full Infrastructure on Existing Alignment	Option 2: Full Infrastructure + Bypass + Missing Link	Option 3: Optimized Design (Selected Option)
	widening footprint increases disturbance at each crossing location; risk of temporary irrigation disruption during construction at all crossing points.	new bypass; bypass introduces additional crossings of major collector canals in the Bukhara peri-urban zone; highest overall risk of irrigation disruption and aquatic habitat disturbance.	additional crossings at canal convergence zone but alignment is optimized to minimize crossing lengths; irrigation continuity provisions and canal reinstatement requirements incorporated into the ESMP.
Biodiversity	High habitat disturbance along the full corridor; maximum vegetation removal (~30,000 trees in Lots 1–2); continuous widening maximally disrupts shelterbelt and canal ecological corridors throughout the rehabilitation alignment; no greenfield component but highest rehabilitation footprint.	Very high biodiversity impact due to dual alignment; bypass introduces additional greenfield disturbance to previously uncultivated agricultural land in addition to full rehabilitation corridor impacts; highest combined impact on ecological corridors, canal habitats, and orchard stepping-stone networks.	Reduced biodiversity impact through footprint minimization (~11,351 affected plants in Lots 1–2, a 62% reduction relative to Option 1); bypass impacts on greenfield sections partially offset by reduced widening impacts in rehabilitation sections; ecological connectivity of shelterbelt and canal network partially maintained through targeted rather than continuous widening; biodiversity assessment confirmed Modified Habitat classification throughout with no Critical Habitat identified.
Cultural Heritage	Transit and heavy freight traffic remains within Bukhara city; continued pressure on the UNESCO World Heritage Site setting and buffer zone from traffic congestion, vibration, and associated urban environmental impacts; no bypass component to divert traffic.	Bypass component diverts transit traffic from Bukhara city, reducing direct pressure on the UNESCO World Heritage Site; however, maximum infrastructure scale across dual alignment increases visual and physical impact on the peri-urban landscape surrounding the historic city.	Bypass diverts transit and heavy freight traffic from Bukhara city, directly reducing traffic pressure, vibration, noise, and air quality impacts on the UNESCO World Heritage Site and its buffer zone; optimized design minimizes new infrastructure footprint in the peri-urban landscape adjacent to the historic city; selected option best balances heritage protection with transport efficiency objectives.

(Source: Project Design)

2.5. Analysis of Associated Facilities

2.5.1. Definition and Approach

In accordance with the AIIB ESF, associated facilities are defined as facilities or activities that are not funded as part of the project, directly and significantly related to the project, carried out or planned contemporaneously, and necessary for the project to be viable and functional.

The identification of associated facilities was carried out through review of project design documentation and engineering layouts, consultation with design engineers and the project proponent, and screening of infrastructure elements required for operation of the upgraded M37 corridor.

Each facility was assessed against the following criteria:

- whether it is financed under the project
- whether it is required for project functionality
- whether it is dependent on the project
- whether it would be developed or expanded specifically due to the project.

The assessment distinguishes between project components (integral parts of the project scope, Section 2.3), associated facilities (external but functionally linked infrastructure), and ancillary facilities (temporary or contractor-related facilities addressed under construction impacts).

2.5.2. Screening of Potential Associated Facilities

Based on the above screening, the following categories of associated facilities have been identified:

(a) Bukhara Ring Road Connection (Missing Link):
The connection of the M37 corridor to the Bukhara Ring Road is included within the project design and scope (Section 2.3). Therefore, it is considered an integral project component and is assessed within this ESIA. However, any future improvements or expansions of the ring road outside the defined project footprint, if undertaken separately but required for project functionality, will be screened to determine whether they qualify as associated facilities.

(b) External Utility Networks (Off-site Infrastructure)
The project may require relocation or connection to external utility systems, including electricity supply lines, gas pipelines, drinking water networks, and irrigation canals. Where such infrastructure is located outside the project footprint and is required specifically for construction or operation of the project, it may qualify as an associated facility.

At the current stage, the locations and scope of off-site utility interventions have not been finalized. These will be screened during detailed design through supplemental environmental and social instruments. Where associated facilities are confirmed, potential land acquisition and livelihood impacts will be addressed in accordance with AIIB ESS2 (Involuntary Resettlement).

(c) Borrow Areas, Quarries, and Material Supply Sources

Construction of the project will require significant volumes of materials (e.g., aggregates, sand, etc.). Preliminary design quantities indicate substantial demand for construction materials associated with earthworks, embankment formation, pavement works, drainage structures, concrete works, and road infrastructure components. Licensed borrow areas and quarries supplying these materials will be considered associated facilities only if:

- they are dedicated primarily to the project
- their development or expansion is directly linked to project demand.

Existing commercial sources supplying multiple projects will not be considered associated facilities. The specific sources of materials have not yet been identified and will be determined during contractor mobilization. Where borrow areas, quarries, or other material supply facilities qualify as associated facilities under AIIB ESS1, they will be subject to environmental and social screening and due diligence in accordance with the applicable requirements of AIIB ESS1 and ESS2.

(d) Asphalt and Concrete Batching Plants (Off-site)

Existing commercial plants supplying multiple projects are not considered associated facilities. The preliminary design includes substantial cement concrete pavement works, asphalt pavement sections, sidewalk paving, and associated concrete structures, which may require dedicated material production and supply facilities during construction. However, batching plants newly established specifically for the project and located outside the project footprint may qualify as associated facilities under AIIB ESS1 and will be screened and assessed in accordance with applicable ESS1 and ESS2 requirements prior to use by the project.

At the current stage, no large-scale associated facilities have been definitively confirmed. Due to the preliminary design status of the project and the absence of finalized contractor arrangements, candidate facilities will be screened during detailed design and construction planning to determine whether they meet the definition of associated facilities under AIIB ESS1. Where applicable, environmental and social risks and impacts will be assessed and managed in accordance with the AIIB ESF and good international industry practice.

2.5.3. Railway Crossings

The project includes several interfaces with existing railway infrastructure, including existing at-grade railway crossings and grade-separated road crossing structures incorporated within the project design. These interventions are located within the defined project right-of-way and form part of the integrated road upgrading works.

At the current stage, no separate off-site railway upgrades or independent railway infrastructure works directly linked to the project have been identified. Should such requirements arise during detailed design or coordination with railway authorities, they will be screened against the definition of associated facilities under the AIIB ESF.

2.5.4. Interface with A380 Highway

The project includes grade-separated road interfaces and interchange connections with the A380 highway as part of the proposed road upgrading works. The design of this crossing is incorporated within the project scope and right-of-way and is therefore considered an integral component of the project.

No separate upgrades or external works on the A380 highway outside the project footprint have been identified as necessary for project operation. Accordingly, the A380 highway is not considered an associated facility. Any future off-site work, if identified, will be screened in accordance with the AIIB ESF.

2.6. Construction Methodology

2.6.1. Workforce and Labor Requirements

Construction of the project will be implemented under a contractual arrangement, with detailed construction planning prepared prior to mobilization. A Construction Execution Plan (CEP) will define construction sequencing, workforce deployment, logistics, and site-specific management measures, consistent with good international practice, national legislation requirements, and the AIIB ESF.

The workforce will vary depending on construction stage and location, with peak workforce expected to reach several hundred workers distributed across multiple work fronts. Multiple construction teams are expected to operate simultaneously along different sections of the corridor to meet the project schedule. Workforce composition and numbers will be finalized during detailed design and mobilization.

The workforce will include skilled personnel (engineers, machine operators, supervisors), semi-skilled workers (technical assistants), and unskilled labor (general construction activities). Table 7 provides estimates of workforce per Lot.

Table 7: Workforce Estimate

Workforce Category	Estimated Number per Lot	Estimated Total for 2 Lots
Management and engineering staff	10–12	20–24
Environmental, social, OHS and traffic safety staff	5–6	10–12
Survey and laboratory staff	5–6	10–12
Machine and equipment operators	20–30	40–60
Drivers and transport personnel	20–30	40–60
Skilled construction workers	20–30	40–60
Semi-skilled workers / technical assistants	20–30	40–60
Unskilled labor	80–100	160–200
Security, camp and welfare staff	20–30	40–60
Total estimated workforce:	200–274	400–548

(Source: ESIA's estimate)

The peak workforce is preliminarily estimated at approximately 200–274 workers per Lot, or 400–548 workers across two lots. This includes management and engineering personnel, environmental and social staff, OHS and traffic safety personnel, machine operators, drivers, skilled and semi-skilled construction workers, and unskilled labor.

2.6.2. Equipment, Vehicles, and Materials

2.6.2.1. Construction Equipment and Vehicles

Construction activities will require a range of heavy machinery and transport equipment. The types and quantities of equipment will depend on construction methodology, sequencing, and the number of active work fronts. Construction of the two lots will involve a combined fleet of more than 80 pieces of equipment and vehicles, drawn from the following main categories:

- Earthworks and grading equipment (excavators, bulldozers, graders, wheel loaders) will be used for cut/fill, subgrade preparation, and material handling.
- Paving and concrete equipment (asphalt pavers, concrete slipform pavers, concrete mixer and pump trucks) will be used for pavement and structural concrete works.
- Compaction equipment (vibratory and pneumatic rollers, plate compactors) will be used for subgrade, base, and localized compaction.
- Lifting equipment (mobile and truck cranes, larger cranes for bridges/interchanges) will be used for structural and bridge works.
- Transport and haulage (dump trucks, low-bed trailers, service pickups/light vehicles) are the largest fleet components by number, used for material and equipment transport.

- Ancillary/support equipment (water tankers, fuel tankers, mobile generators, bitumen distributors, road marking machines) will be used for dust suppression, power supply, and surface treatments.

Final equipment numbers, specifications, and deployment schedules will be determined during detailed construction planning and will be defined in the CEP and Construction Environmental and Social Management Plan (C-ESMP).

2.6.2.2. Construction Materials

The project is expected to require substantial quantities of quarry-derived construction materials, including crushed stone, gravel, sand, and aggregates for pavement layers, concrete works, drainage structures, shoulders, and ancillary road infrastructure.

Based on the approximate scope of works, comprising about 69 km of rehabilitation and about 12 km of greenfield bypass/missing link, the preliminary quarry material requirement is estimated at approximately 0.58–0.98 million m³ (equivalent to about 1.10–1.86 million tons). This estimate is indicative for assessment purposes and will depend on detailed design, i.e., final pavement design, layer thicknesses, reuse of existing materials, and embankment requirements. Table 8 illustrates preliminary quarry material estimate.

Table 8: Quarry Material Estimate

#	Component	Approximate Volume
1.	Rehabilitation of existing M37 corridor – Lots 1 and 2 (69 km)	0.37–0.63 million m³
2.	Greenfield bypass and missing link to Bukhara ring road (12 km)	0.15–0.25 million m³
3.	Structures, drainage, shoulders, and wastage allowance	0.06–0.10 million m³
	Total preliminary estimate:	0.58–0.98 million m³

(Source: ESIA's estimate)

Quarry sources will be limited to licensed facilities approved by the PMO and Supervising Engineer. Any new or expanded quarry or borrow area developed specifically for the project will be screened in accordance with Section 2.5. The project will also require substantial quantities of other construction materials, including:

- Cement and concrete for structural elements
- Asphalt materials for road surfacing
- Steel and geosynthetic materials for stabilization and structural works.

2.6.2.3. Water Consumption

Water will be required for both construction activities (e.g., compaction, concrete mixing, and dust suppression) and domestic use.

(a) Technical water

Technical water is expected to be sourced from nearby canals or other approved abstraction points or licensed suppliers, while potable water will be supplied through approved drinking water sources or transported to site. Estimated technical water requirement during construction is specified in Table 9.

Table 9: Estimated Technical Water Requirement

Technical Water Use Category	Estimated per Lot, m³/day	Estimated Total for 2 Lots, m³/day
Dust suppression	50–120	100–240
Earthworks and compaction	25–60	50–120
Concrete works	10–30	20–60
Pavement works	10–25	20–50
Equipment and vehicle washing	5–15	10–150
Temporary facilities and site cleaning	5–10	10–20
Revegetation / landscaping support	5–15	50–150
Total technical water estimate:	110–275	260–550

(Source: ESIA's estimate)

(b) Domestic Water

Estimated domestic water requirements for the workforce during construction are presented in Table 10, based on typical consumption rates observed in comparable infrastructure projects and international good practice.

Table 10: Estimated Domestic Water Requirement for Workforce

Domestic Water Use Category	Assumed Rate, L/person/day	Estimated per Lot, m³/day	Estimated Total for 2 Lots, m³/day
Drinking water	5–7	1.0–1.9	2.0–3.8
Food preparation / canteen	10–15	2.0–4.1	4–8.2
Hand washing and basic hygiene	10–15	2.0–4.1	4–8.2
Bathing / showers	20–40	4.0–11.0	8–22
Toilet flushing / sanitation	10–20	2.0–5.5	4–11.0
Total domestic water estimate:	55–97	11–26.6	55–133

(Source: ESIA's estimate)

The above estimates are indicative and are intended to support the assessment of water demand and potential pressure on local water resources in the ESIA.

2.6.3. Temporary Facilities

Temporary facilities required for the construction phase will include construction camps, site offices, laydown and storage areas, equipment yards, temporary utilities, worker welfare facilities, fuel and material storage areas, and waste management facilities, established progressively along the corridor to support both rehabilitation works and

construction of the new bypass and connection sections. Temporary facilities will be sited within or adjacent to the project corridor where feasible, minimizing disturbance to nearby settlements, agricultural land, utilities, cultural heritage resources, and environmentally sensitive areas. Contractor-controlled sites may also include temporary access roads, traffic diversion routes, borrow and quarry areas, material stockpiles, asphalt or concrete batching plants, and equipment maintenance areas established specifically for the project.

Construction camps are expected to accommodate construction personnel, administrative staff, equipment operators, and security personnel, and may include temporary accommodation units, modular offices, workshops, parking areas, fuel storage, and, where co-located, concrete batching facilities, crushing or aggregate processing areas, and material stockpiles.

Laydown and storage areas will hold construction materials such as aggregates, sand, pipes, reinforcement steel, concrete products, asphalt materials, culverts, and barriers, ranging from small temporary storage plots to larger logistics yards associated with batching plants or equipment maintenance areas.

Batching and equipment areas may include temporary asphalt plants, concrete batching plants, crushing facilities, machinery yards, and equipment maintenance areas, along with associated fuel storage, workshops, vehicle washing areas, aggregate stockpiles, and parking for heavy machinery.

Mobile welfare facilities, including portable sanitation units, shaded rest shelters, and mobile water supply points, may also be used along active construction sections without fixed camps, given the linear nature of the works.

2.6.4. Wastewater Management

No permanent wastewater treatment facilities are proposed under the project. Wastewater generated during construction will comprise domestic and construction-related streams, managed through temporary on-site measures at camps and work areas.

Domestic wastewater will be generated from toilets, washing facilities, showers, kitchens/canteens, and worker welfare facilities located in construction camps, site offices, and mobile welfare units along the corridor. For preliminary estimation, domestic wastewater generation has been calculated using an assumed rate of 60 liters/person/day. Based on an estimated workforce of 200–274 workers per lot (Section 2.6.1), domestic wastewater generation is expected to be approximately 12.0–16.4 m³/day per Lot.

Construction-related wastewater will be generated from limited activities such as wheel washing, equipment cleaning, concrete washout, batching plant cleaning, and maintenance areas drainage, estimated at 3–6 m³/day per active Lot.

Total wastewater generation during peak construction is estimated at 15.0–22.4 m³/day per Lot and 30.0–44.8 m³/day across the project (Table 11).

Table 11: Wastewater Generation Estimate by Lot

Wastewater Category	Wastewater Estimated per Lot, m³/day	Total Estimated Wastewater for Lots 1 and 2, m³/day
Domestic wastewater	12.0–16.4	24.0–32.8
Construction-related wastewater	3.0–6.0	6.0–12.0
Total:	15.0–22.4	30.0–44.8

(Source: ESIA's estimate)

2.6.5. Earthworks

Earthworks will be undertaken progressively along the corridor, lot by lot, generally following a sequence of site clearance and topsoil stripping, excavation and embankment formation, subgrade preparation, and drainage work, with utility relocation coordinated in advance of works at affected locations. Topsoil will be stockpiled separately for potential reuse. Earthwork scope and indicative quantities by lot are shown in Section 2.3.6.

2.7. Project Operation and Maintenance

Following completion of construction, the rehabilitated and upgraded sections of the M37 corridor, including associated bridges, interchanges, drainage infrastructure, road safety installations, and ancillary facilities, will be operated and maintained by the relevant regional road authorities under the Ministry of Transport and the Committee for Roads, including the Bukhara Regional Roads and Transport Department and, where applicable, the Navoi regional road authority for sections located within Navoi Province.

The project is intended to function as a strategic national and regional transport corridor linking Bukhara Province with Navoi Province and the wider national road network. During operation, the corridor will accommodate passenger vehicles, freight transport, agricultural traffic, public transport, and transit traffic. The upgraded road is expected to improve traffic flow, travel time reliability, road safety, and resilience to climatic and environmental conditions characteristic of the desert and semi-desert environment.

Road maintenance activities are expected to be undertaken using regional maintenance depots, maintenance crews, and contracted service providers operating under the responsible road authorities. Maintenance operations may include the use of asphalt plants, maintenance vehicles, mechanical sweepers, excavators, graders, snow-clearing or sand-removal equipment, and other specialized road maintenance machinery.

3. REGULATORY FRAMEWORK AND GAP ANALYSIS

3.1. Applicable National Regulatory Framework

The project is subject to a comprehensive national legal and regulatory framework governing environmental protection, land acquisition, labor and working conditions, road safety, public participation, and cultural heritage. This framework is defined through the Constitution of the Republic of Uzbekistan, sector-specific laws, codes, and implementing regulations adopted at the national level.

Table 10 below summarizes the key applicable legislation and regulatory instruments relevant to the Project, including their core provisions and their applicability to the environmental and social aspects of the ESIA. The review focuses on those legal requirements that directly influence project design, environmental and social impact assessment, permitting, land acquisition and resettlement, labor management, stakeholder engagement, and construction and operational controls. This regulatory analysis provides the basis for assessing national compliance requirements and serves as a reference for the subsequent gap analysis against the AIIB ESS1 and ESS2. The complete list of applicable laws, regulations, and decrees, together with their key provisions, is provided in Appendix 2.

3.1.1. National Regulations and Their Applicability to the Project

Table 12: National Regulations and Their Applicability to the Project

Category	Key Instrument	Applicability to the Project
Constitutional and Overarching Legal Framework	Constitution of the Republic of Uzbekistan (as amended 2023)	Provides the constitutional basis for environmental rights, property protection, labor standards, gender equality, and grievance handling relevant to the ESIA.
Environmental Assessment and Permitting Framework	Law No. 754-XII dated 09.12.1992, On Nature Protection; Law No. ZRU-1036 dated 24.02.2025, On Environmental Expertise, Environmental Impact Assessment and Strategic Environmental Assessment; Cabinet of Ministers Resolution No. 234 dated 11.05.2026, On Measures to Introduce New Mechanisms for Environmental Impact Assessment, in force since 14.08.2026	Establishes the primary legal basis for preparation, disclosure, consultation, and approval of the EIA, including screening and categorization, and for environmental compliance across all project phases.
Natural Resources, Biodiversity, and Environmental Protection	Laws on Protected Natural Areas, Flora, Fauna; Water Code (2025); Law on Waste; Law on Protection of Atmospheric Air; Presidential Decree No. UP-5742 (2019)	Governs biodiversity screening, vegetation clearance and tree removal, fauna disturbance, water abstraction/discharge and canal crossings, air emissions, and protection of irrigated agricultural land affected by the bypass.

Category	Key Instrument	Applicability to the Project
Land Acquisition, Property Rights, and Resettlement	Land Code; Law No. LRU-781 (2022); Civil Code; Housing Code; Cabinet of Ministers Resolutions No. 97 (2006), No. 911 (2019), No. 146 (2011), No. 1047 (2018); Laws on private property (2012) and pastures (2022); Family Code; Law on Valuation (1999)	Forms the primary legal basis for permanent and temporary land acquisition, compensation, valuation, and resettlement under the RAP, including protection of property rights and compensation fund mechanisms.
Traffic, Transport, and Road Safety	Law on Traffic Safety (1999); Cabinet of Ministers Decrees No. 342 (2011) and No. 213 (2014)	Basis for road safety design, traffic management, and regulation of heavy/oversized load transport and construction logistics.
Labor, Occupational Health and Safety, and Community Safety	Labor Code (2022); Law on OHS; Cabinet of Ministers Resolution No. 454 (2025); Building Code KMK 3.01.02-00; Public Health Standard No. 0346-17; Law on mandatory social insurance (2008); Law on Fire Safety (2009); Law on protection from emergencies (2022)	Core national legal basis for the LMP, contractor OHS systems, worker welfare, accident reporting, fire safety, and emergency preparedness during construction and operation.
Public Participation and Grievance Mechanism	Law on Appeals of Individuals and Legal Entities (2014, amended 2017); related Presidential Decree	Legal basis for the project-level GRM, stakeholder engagement, and handling of complaints during ESIA preparation and implementation.
Gender, Social Protection, Vulnerable Groups, and Inclusion	Law on protection from harassment and violence (2019); Laws on social services and disability rights; UN CRPD ratification (2021); Presidential Decree No. UP-82 (2023)	Basis for GBV/SEA/SH prevention, worker codes of conduct, inclusive road design, and identification/support of vulnerable groups in socioeconomic surveys and RAP.
Waste Management and Sanitary Regulations	Law on Waste (2002); SanPiN Nos. 0297-11, 0068-96, 0128-02, 0127-02; Cabinet of Ministers Decrees No. 258 (2014), No. 295 (2014), No. 40 (2021), No. 95 (2019); Law on Licensing (2021)	Governs classification, handling, and disposal of construction, domestic, and hazardous waste, including excavation spoil, asphalt/concrete waste, and used oils.
Cultural Heritage	Laws No. 269-II (2001), No. ZRU-229 (2022); Cabinet of Ministers Decree No. 269 (2002)	Basis for cultural heritage screening, chance finds procedures, and protection of heritage resources, particularly relevant given proximity to the Bukhara UNESCO World Heritage Site.
Sanitary Protection Zones and Setback Requirements	SanPiN No. 0339-16; Building Codes ShNK 3.06.03-08 and ShNK 2.07.01-03; SanPiN No. 0350-17	Defines sanitary buffer distances, ROW and design standards, and air quality compliance requirements near settlements and sensitive receptors along the corridor.

ROW = right-of-way; ESIA = Environmental and Social Impact Assessment; RAP = Resettlement Action Plan; GBV/SEA/SH = Gender-Based Violence/Sexual Exploitation and Abuse/Sexual Harassment; EIA = Environmental Impact Assessment; LMP = Labor Management Plan; OHS = Occupational Health and Safety; GRM = Grievance Redress Mechanism

3.1.2. Screening and Categorization

In accordance with the *Decree of the Cabinet of Ministers No. 234 (effective from 14 August 2026), On Measurements of New Environmental Impact Assessment Mechanisms*, all proposed projects in Uzbekistan are subject to mandatory environmental screening and categorization at the earliest stage of project

preparation, to determine potential environmental risks, assign a project category, and establish the required scope of assessment.

Projects are classified into three categories, from Category I (significant environmental risks) to Category III (low impacts), which determine the depth of assessment required, the level of regulatory authority responsible for review, and the need for public consultation and disclosure.

The Project comprises two distinct interventions, rehabilitation of existing road sections (69 km - 12 km = ~57 km) and construction of a greenfield bypass (~12 km), expected to fall under different national categories, as summarized in Table 13.

Table 13: Project Categorization per National Regulatory Requirements

Project Component	Description	Project Category	National Regulatory Requirements
Road rehabilitation corridor	Upgrading and rehabilitation within existing right-of-way	Category III	▪ EIA ▪ Submission to territorial CEE ▪ Public consultations*
Greenfield bypass	New road alignment across agricultural and semi-natural areas	Category II (subject to final design confirmation)	▪ Full EIA ▪ Public consultations ▪ Submission to State CEE

EIA = Environmental Impact Assessment; CEE = Center for Environmental Expertise
*Following Decree of the Cabinet of Ministers #234 (Appendix 4, Chapter 2), the environmental authorities may require conducting public consultation for a project of Category III if they consider that the project may pose severe environmental and social risks, considering information provided in EIA and based on the own survey conducted by the district environmental specialist of the National Committee of Ecology and Climate Change of Uzbekistan.

The greenfield bypass presents higher environmental and social risk due to land acquisition and displacement, impacts on irrigated agricultural land, disturbance of habitats and ecological connectivity, and changes to drainage and irrigation systems. Accordingly, a precautionary approach has been adopted in the ESIA, treating the bypass as a higher-risk component throughout the assessment.

3.1.3. National EIA Procedure

The national EIA process in Uzbekistan is regulated by *Decree of the Cabinet of Ministers No. 234 (14 August 2026), On Measurements of New Environmental Impact Assessment Mechanisms.* This process is managed by the Center for Environmental Expertise (CEE), which operates under the National Committee on Ecology and Climate Change of Uzbekistan.

The Republican CEE (Tashkent) reviews Category I and II projects, while territorial CEE departments handle Category III projects. Project EIA reports are submitted through the official electronic platform: www.eco-service.uz. The EIA report review is a mandatory and fee-based procedure with defined statutory timelines by category. Review timelines are as follows:

- Category I projects: up to 7 calendar days
- Category II projects: up to 5 calendar days
- Category III projects: up to 3 calendar days

The review of the project and EIA submitted to the CEE is referred to as the "State Environmental Expertise" process and is conducted in three consecutive stages:

(i) Environmental Impact Assessment: The project proponent submits project design documentation, EIA supporting materials, records of public consultations (for higher category projects), and other relevant materials. This stage typically occurs during feasibility study and detailed design. In most cases, the CEE issues its approval at this stage, and the resulting environmental permitting certificate is sufficient to commence the project.

(ii) Statement of Environmental Impacts: Where initial documentation is insufficient, the CEE may request additional field surveys, laboratory testing, environmental monitoring data, refinement of mitigation measures, and other information. This supplementary information must be provided prior to construction approval.

(iii) Statement on Environmental Consequences: At the final stage, the CEE reviews all environmental documentation, confirms compliance with environmental standards, defines emission limits and mitigation requirements, and approves or rejects the project. The approval is formalized through an environmental permitting certificate.

Approval of the national EIA (an environmental permitting certificate) is valid for three years and may be extended for up to two additional years. EIA re-submission is required where project design changes significantly or construction does not commence within the validity period. The regulator retains the right to request updated documentation and require a revised EIA depending on the nature of changes.

Applicability to the Project: According to the applicable environmental regulation, a separate EIA is required for each procurement lot and for the greenfield bypass section. Accordingly, six national EIAs are anticipated. Each EIA must be submitted to, and the corresponding environmental permitting certificate obtained from, the CEE prior to the commencement of civil works and associated facilities (e.g., borrow pits, camps, detours). Any subsequent design changes at any project stage (feasibility study, detailed design, and construction) will trigger re-evaluation by the State Environmental Expertise and potential update of the relevant EIA documentation.

Cabinet of Ministers Decree No. 234 "On measures to implement new mechanisms for assessing environmental impact[3]" has been entered into force on 14 August 2026.

[3] Cabinet of Ministers Decree No. 234, On measures to implement new mechanisms for assessing environmental impact, dated 11 May 2026, effective from 14 August 2026, https://lex.uz/docs/8193120 (accessed July 2026)

3.2. AIIB Environmental and Social Framework

3.2.1. AIIB Environmental and Social Policy and Standards

The Environmental and Social Framework (ESF), 2021 establishes the overarching policy and mandatory requirements governing environmental and social risk management for AIIB-financed projects. The ESF aims to ensure environmental and social sustainability and to integrate environmental and social considerations into project design, decision-making, and implementation. The ESF comprises:

- Environmental and Social Policy (ESP)
- three Environmental and Social Standards (ESSs)
- Environmental and Social Exclusion List (ESEL)
- Supporting guidance and definitions.

Projects are required to apply a structured process of environmental and social assessment and management, including:

- screening and categorization
- impact assessment
- identification of mitigation measures following the mitigation hierarchy
- stakeholder engagement and information disclosure
- monitoring and adaptive management throughout the project lifecycle.

3.2.2. Screening and Categorization

In accordance with the ESF, all projects are screened and assigned to one of four categories based on the nature, scale, and significance of environmental and social risks and impacts:

- Category A: Projects likely to have significant adverse impacts that are irreversible, cumulative, diverse, or unprecedented;
- Category B: Projects with limited, site-specific impacts that are largely reversible and manageable;
- Category C: Projects with minimal or no adverse impacts;
- Category FI: Projects involving financial intermediaries.

Given the scale and characteristics of the project, including development of a greenfield bypass around Bukhara and rehabilitation and upgrading of existing road sections, the Project has been classified as Category A, requiring preparation of a full ESIA and ESMP.

3.2.3. Environmental and Social Standards

The ESF defines three Environmental and Social Standards applicable to AIIB-financed projects:

- ESS 1: Environmental and Social Assessment and Management
  ESS1 requires identification, assessment, and management of environmental and social risks and impacts throughout the project lifecycle.

- ESS 2: Land Acquisition and Involuntary Resettlement
  ESS2 applies where projects involve land acquisition or restrictions on land use resulting in physical or economic displacement.

- ESS 3: Indigenous Peoples
  Applies where indigenous peoples are present and may be affected by the project.

These standards establish requirements for baseline assessment, impact analysis, mitigation and management measures, stakeholder engagement, and monitoring and reporting.

3.2.4. Applicability of AIIB ESSs to the Project

Based on project characteristics, screening outcomes, and the nature of the proposed activities, the applicability of the AIIB ESSs to the project has been assessed. ESS1 is the primary applicable standard and forms the overarching framework for environmental and social assessment, biodiversity assessment, labor and occupational health and safety management, stakeholder engagement, social assessment, and preparation of associated management plans and frameworks. The applicability and triggering status of the AIIB ESSs are summarized in Table 14.

Table 14: Applicability of AIIB ESSs to the Project

ESS	Applicability	Triggering Status	Instruments / Measures
ESS 1	Applicable to projects involving environmental and social risks and impacts	**Yes:** The project involves significant environmental and social risks related to construction and operation of road infrastructure, including impacts on air quality, noise, biodiversity, land use, labor and occupational health and safety, community health and safety, and socioeconomic conditions. ESS1 requirements are being implemented through preparation of the ESIA, biodiversity surveys, social assessment, Labor Management Plan (LMP), Gender Action Plan (GAP), ESMP, and Stakeholder Engagement Plan (SEP).	ESIA, ESMP, LMP, GAP, biodiversity assessment, SEP
ESS 2	Applicable where land acquisition or economic	**Yes:** The project involves land acquisition for the greenfield bypass sections and may result in physical and/or economic displacement associated with permanent and temporary land requirements, access restrictions, and livelihood impacts. ESS2 requirements	RAPs, census and asset inventory, livelihood restoration measures, GRM

ESS	Applicability	Triggering Status	Instruments / Measures
	displacement occurs	will be addressed through preparation of site-specific Resettlement Action Plans (RAPs).	
ESS 3	Applicable where indigenous peoples are present in the project area	**No:** No Indigenous Peoples, as defined under ESS3, are present in the Project area or in Uzbekistan.	Not applicable

3.2.5. Environmental and Social Assessment (ESS1)

ESS1 is the primary applicable standard for the project, establishing the overarching framework for identifying, assessing, mitigating, managing, and monitoring environmental and social risks throughout the project lifecycle. It requires preparation of a comprehensive ESIA for Category A projects, assessment of direct, indirect, induced, and cumulative impacts, application of the mitigation hierarchy (avoid, minimize, restore, offset), stakeholder engagement and disclosure, and integrated environmental and social management and monitoring measures.

Key ESS1-related risks and impacts for the project include:

- Biodiversity: baseline surveys and habitat assessment focused on the greenfield bypass sections, where impacts on natural and modified habitats may occur; rehabilitation sections lie largely within already-modified environments. The mitigation hierarchy applies, including avoidance of critical habitat impacts, no net loss (or net gain where applicable), and habitat restoration.
- Physical environment: air quality, noise, vibration, soil, water resources, traffic, and community health and safety risks.
- Social: household surveys, stakeholder consultations, and gender action plan (GAP).
- Labor and OHS: preparation of the LMP, occupational health and safety measures, worker grievance mechanisms, and management of labor influx risks (pressure on local services, social conflict) and GBV/SEA/SH risks associated with workforce presence.
- Grievance redress: a project-level GRM for affected communities, a separate worker GRM, and disclosure of the AIIB Project-affected People's Mechanism (PPM).

3.2.6. Land Acquisition and Resettlement (ESS2)

ESS2 applies due to land acquisition for the bypass, and potential loss of assets, access, and livelihoods (temporary and permanent). ESS2 requires preparation of site-specific RAPs, census and asset inventory, compensation at replacement cost, livelihood restoration measures, consultation and participation of affected persons, and management of resettlement-related grievances through the project GRM.

3.2.7. Project Categorization

The categorization of the project under the AIIB ESF has been determined based on the nature, scale, and significance of its potential environmental and social risks and impacts, including direct, indirect, induced, and cumulative effects within the project Area of Influence. Particular consideration has been given to the presence of a greenfield bypass component, land acquisition requirements, biodiversity sensitivities, and community health and safety risks associated with construction and operation activities. The resulting categorization is presented in Table 15.

Table 15: Project Categorization

Item	Category	Justification
Environmental Categorization	Category A	The project includes a greenfield bypass and large-scale road rehabilitation (~69 km) across six districts in the Bukhara province and covers one district in the Navoi province, resulting in significant environmental and social impacts, including land acquisition for greenfield construction, biodiversity disturbance, and community impacts.
Involuntary Resettlement	Category A	Land acquisition and economic displacement are anticipated, particularly for the bypass.
Indigenous Peoples	Not Applicable	No indigenous peoples present in the Project area.

The ESIA has been prepared in full compliance with ESS1 and incorporates ESS2 requirements through the development of resettlement planning and stakeholder engagement processes. ESS3 is not applicable. ESIA integrates environmental and social considerations into project design and defines mitigation measures consistent with AIIB ESF requirements.

3.3. International EHS Requirements

3.3.1. IFC General EHS Guidelines

The *IFC General Environmental, Health, and Safety (EHS) Guidelines (2007)* are the primary international technical reference for identifying and managing environmental, occupational, and community health and safety risks associated with the project. These guidelines represent good international industry practice and are applicable to all phases of the project, including design, construction, operation, and decommissioning. The General EHS Guidelines are applied together with good international practice for linear infrastructure, covering air quality, noise/vibration, water and waste management, and occupational/community health and safety.

For this project, application is differentiated by risk profile: along the rehabilitation corridor, impacts are largely confined to the existing right-of-way, with focus on traffic management, dust/noise control, and construction waste; along the greenfield bypass, the higher risk profile requires additional attention to land clearance, impacts on

agricultural land and irrigation systems, habitat disturbance, and drainage/hydrological changes.

3.3.2. IFC EHS Guidelines for Roads and Highways

The *IFC Environmental, Health and Safety Guidelines for Roads and Highways* provide good international practice requirements for the planning, design, construction, and operation of road projects, and apply directly given the rehabilitation of ~69 km of the M37 and construction of ~12 km of new bypass sections west of Bukhara.

Key requirements relevant to the project include:

- alignment/right-of-way selection based on documented alternatives analysis and community consultation (informing bypass alignment and site-specific RAPs under AIIB ESS2)
- erosion and sediment control, vegetation clearance minimization, and slope stabilization during construction (particularly for embankments, bypass sections, and canal crossings)
- environmental management and reclamation of borrow pits, quarries, and asphalt/concrete plants
- biodiversity safeguards such as wildlife crossings and habitat protection where ecologically sensitive areas are affected
- community health and safety measures including access maintenance, safe crossings, and traffic management along the M37 corridor and bypass intersections
- road safety, hazardous materials, emergency response, and climate resilience planning for both construction and operation.

The Guidelines serve as the key international technical standard supplementing the AIIB ESF, IFC PS6, and Uzbekistan's national legislation.

3.3.3. IFC Performance Standard 2 – Labor and Working Conditions

The project applies to IFC PS2 on Labor and Working Conditions establishes requirements for fair treatment of workers, labor rights protection, and safe working conditions, applying to direct, contracted, primary supply, and community workers. For this project, IFC PS2 is directly applicable due to the large construction workforce expected across multiple work fronts, including civil works contractors, subcontractors, material suppliers, transport operators, quarry and borrow pit workers, asphalt plant personnel, and camp management staff.

The project involves high labor intensity and significant occupational risks associated with road construction, including heavy equipment operation, excavation, traffic interface risks, asphalt and bitumen work, work at height (e.g., when installing lighting towers), electrical risks, hazardous material handling, and contractor camp operations. PS2 therefore requires robust labor management procedures, accommodation

standards, emergency preparedness, worker training, and contractor compliance monitoring.

The standard is also particularly relevant for managing labor influx, preventing labor-related community impacts, addressing risks of GBV/SEA/SH, and ensuring accessible grievance mechanisms for workers. Contractor Codes of Conduct and enforceable labor compliance provisions are essential components of PS2 implementation.

3.3.4. ILO OHS Management System, ILO-OSH 2001

The *International Labour Organization (ILO) Occupational Safety and Health Management System Guidelines* (ILO-OSH 2001) provide an internationally recognized framework for establishing, implementing, and continuously improving occupational health and safety (OHS) management systems.

For this project, the ILO OHS framework is directly applicable due to the significant occupational risks associated with road rehabilitation, earthworks, bridge and culvert construction, asphalt works, borrow pit operations, heavy machinery use, traffic management, excavation, work near active highways, and contractor camps.

The framework is particularly relevant for ensuring safe management of construction labor, including contractor and subcontractor workforce control, site-specific risk assessments, mandatory induction and training, use of personal protective equipment (PPE), traffic safety for workers, emergency response planning, and accident prevention. It also supports compliance with AIIB ESS1 and ESS2 requirements related to labor and working conditions, labor influx management, worker grievance mechanisms, and prevention of occupational accidents and fatalities.

3.3.5. ISO 45001

ISO 45001 is an international standard for OHS management systems. It provides a structured framework for identifying workplace hazards, assessing risks, implementing preventive controls, and continuously improving worker safety performance. The standard is designed to help organizations prevent work-related injuries, illnesses, and fatalities while ensuring compliance with applicable legal and regulatory requirements. It is widely used across infrastructure and construction projects to demonstrate good international industry practice and commitment to worker welfare.

The standard is particularly relevant for contractor and subcontractor management, ensuring that all construction personnel operate under unified OHS procedures with clear responsibilities, mandatory training, use of PPE, permit-to-work systems, accident prevention measures, and emergency response protocols. It also supports management of occupational risks related to dust, noise, vibration, fuel handling, bitumen works, hazardous materials transport, confined spaces, extreme temperatures, and camp health and sanitation.

3.4. International Conventions, Treaties, and Protocols

Uzbekistan is party to a range of international conventions and protocols relevant to the Project, covering labor and OHS, biodiversity conservation, climate change, pollution prevention, land degradation, and cultural heritage protection; these complement national legislation and lender requirements. The review considers both (i) conventions ratified by Uzbekistan, which constitute binding national commitments, and (ii) selected non-ratified conventions representing recognized Good International Industry Practice (GIIP) directly relevant to the AIIB ESF (ESS1, ESS2) and IFC PS6; particularly for labor management, OHS, biodiversity, and climate resilience, where lender requirements often extend beyond national legal obligations.

The list of applicable conventions, treaties, and protocols is summarized in Appendix 2.

3.5. Regulation and Policies Gap Analysis

3.5.1. Gap Analysis Between AIIB ESF and Uzbekistan Legislation

The project is subject to both the national legal framework of Uzbekistan and the AIIB ESF. While Uzbek legislation establishes mandatory requirements for environmental assessment, land acquisition, labor, public consultation, and environmental permitting, AIIB ESF requirements are broader and more detailed in several areas, particularly with respect to social assessment, resettlement planning, livelihood restoration, biodiversity, stakeholder engagement, grievance management, and monitoring. Accordingly, where differences exist, the project will apply the more stringent requirement to establish a harmonized framework for ESIA preparation and implementation. The gap analysis has been prepared on that basis and presented in Table 16.

Overall, Uzbekistan's legal framework provides a substantial basis for environmental permitting, land acquisition, labor, biodiversity protection, and grievance handling. However, the AIIB ESF is broader and more detailed in several areas central to the M37 road project, particularly integrated social assessment, ESS2 sequencing, treatment of informal users, livelihood restoration, entitlement definition, gender analysis and GAP, biodiversity management for greenfield construction, cumulative impact assessment, project-specific grievance mechanisms, and structured monitoring and reporting. Accordingly, the project will apply the more stringent requirement wherever differences arise.

Table 16: Gap Analysis Between AIIB ESF and Uzbekistan Legislation

#	Aspect	AIIB ESF Requirements	Applicable Uzbek Legislation Requirement	Identified gaps and harmonized framework for the Project
1.	Environmental and social policy framework	AIIB ESF includes ESP, three ESSs, and the ESEL. ESS1 requires integrated environmental and social assessment and management. ESS2 covers land acquisition and involuntary resettlement. ESS3 covers Indigenous Peoples.	Uzbek framework includes the Constitution, Law on Nature Protection, Law on Environmental Expertise, Environmental Impact Assessment and Strategic Environmental Assessment (2025), Law on Environmental Control, Land Code, Law No. 781 on land acquisition with compensation, Labor Code, and sectoral laws on biodiversity, heritage, water, air, waste, and grievances.	National law provides a strong environmental and legal base, but AIIB is broader and more explicit on integrated environmental and social management. The project will comply with Uzbek law and additionally apply AIIB ESS1 and ESS2 requirements in full. ESS3 is not triggered for this Project.
2.	Screening and categorization	AIIB screens projects at the earliest stage and classifies them A, B, C, or FI based on the component with the highest environmental or social risk and impact. Category A requires full ESIA.	Uzbek system classifies projects into Categories I, II, III, IV under Resolution No. 541 and the 2025 EIA law.	National screening is environment-centered and does not fully mirror AIIB's integrated environmental and social categorization logic. For the project, AIIB categorization prevails for ESIA scope. Given the greenfield bypass, land acquisition, biodiversity sensitivity, and cumulative risks, the project is treated as **AIIB Category A**.
3.	Scope of ESIA	AIIB requires ESIA proportionate to risk and impact, covering direct, indirect, induced, and cumulative impacts; alternatives; baseline; social risks; climate risks; stakeholder engagement; ESMP; and monitoring.	Uzbek EIA content includes baseline environmental information, project description, impacts, alternatives, mitigation, emergencies, and certain consultation records. Social assessment requirements are not developed to the same level as AIIB.	The national EIA framework is narrower than AIIB ESS1. The ESIA for the M37 road will therefore include full environmental and social baseline, social impact assessment, cumulative and indirect impacts, climate considerations, stakeholder engagement, and ESMP, even where these exceed the minimum national format.
4.	Environmental and Social Management Plan (ESMP)	AIIB requires ESMP for Category A and B projects, including mitigation, monitoring, institutional responsibilities, budgets, indicators, and adaptive management.	Uzbek EIA requires mitigation and environmental management measures, but not always in the detailed implementation-oriented format expected by AIIB.	A full ESMP will be prepared for the Project, including construction and operation measures, contractor obligations, monitoring indicators, institutional roles, and reporting arrangements.
5.	Analysis of alternatives	AIIB requires alternatives analysis, including no project option, alignment/design alternatives, technology/engineering	Uzbek EIA requires some consideration of alternatives, but typically with less emphasis on structured comparison of environmental and social outcomes.	The project ESIA will include explicit analysis of alternatives, including bypass alignment, rehabilitation design options, traffic and safety

#	Aspect	AIIB ESF Requirements	Applicable Uzbek Legislation Requirement	Identified gaps and harmonized framework for the Project
		options, and environmental and social trade-offs.		implications, biodiversity and irrigation constraints, and the no-project scenario.
6.	Stakeholder engagement and disclosure	AIIB requires meaningful consultation proportionate to the risks, timely disclosure, informed participation, and continued engagement during implementation. For Category A, draft E&S documents must be disclosed early enough for meaningful comment.	Uzbek law requires public consultation mainly in national EIA procedure for higher categories and provides general grievance rights under the Law on Appeals.	National requirements are narrower than AIIB. The Project will implement a SEP, meaningful consultations, disclosure of draft documents, continued consultation during implementation, and specific outreach to affected and vulnerable groups.
7.	Project-level grievance redress mechanism (GRM)	AIIB requires project-level GRM for affected people and disclosure of AIIB's Project-affected People's Mechanism (PPM). Worker grievances should also be addressed through an appropriate mechanism.	Uzbek law provides a general right to appeal to state bodies and establishes procedures for submission and review of complaints, but not a project-specific GRM architecture.	A project-specific GRM will be established and operational before surveys and implementation activities that may affect people. It will include channels for communities, vulnerable groups, and a separate worker GRM, while also disclosing the AIIB PPM.
8.	Social assessment	AIIB ESS1 requires assessment of social risks and impacts, including livelihoods, access, community health and safety, vulnerable groups, labor influx, and distribution of benefits and burdens.	Uzbek EIA law does not set out a comparably detailed social assessment methodology within the national EIA process. Some social matters are addressed through sector laws and land acquisition rules.	A full social assessment will be undertaken as part of the ESIA and SIA, including socioeconomic baseline, traffic and road safety, access disruption, irrigation and agricultural impacts, vulnerable groups, labor influx, and community health and safety.
9.	Land acquisition and involuntary resettlement	AIIB ESS2 applies to physical and economic displacement caused by involuntary land acquisition or restrictions on land use. It requires avoidance and minimization, compensation at replacement cost, assistance, livelihood restoration where needed, and resettlement planning.	Uzbek law includes the Land Code, Law No. 781 on land acquisition for public needs with compensation, Civil Code, compensation regulations, and related property-rights laws.	National law is substantial, but AIIB is broader in terms of livelihood restoration, treatment of informal users, and resettlement planning detail. The project will prepare site-specific RAPs consistent with ESS2 and apply stricter rules where differences exist.
10.	ESS2 sequencing	AIIB requires resettlement planning and implementation before displacement impacts occur. Compensation and assistance must be delivered before taking land or restricting access.	Uzbek law requires compensation in land withdrawal cases, but implementation sequencing and safeguard integration may be less explicit than AIIB.	For the project, no land acquisition, site clearance, or construction will commence in a section until the corresponding RAP has been prepared, disclosed, approved, and implemented in accordance with ESS2.

#	Aspect	AIIB ESF Requirements	Applicable Uzbek Legislation Requirement	Identified gaps and harmonized framework for the Project
11.	Eligibility of affected persons	AIIB ESS2 covers persons with formal legal rights, persons with claims recognizable under law, and persons without recognizable legal rights who occupy or use land prior to the cut-off date.	Uzbek law focuses primarily on legally recognized rights and official records, although compensation and other protections may extend in practice depending on the case.	The project will apply the broader AIIB ESS2 approach. Informal, seasonal, and non-registered users identified before the cut-off date will be treated as eligible for appropriate compensation and/or assistance.
12.	Compensation at replacement cost	AIIB requires compensation at full replacement cost without depreciation and with associated transaction costs where applicable.	Uzbek law provides compensation mechanisms, but the replacement-cost concept is not always as fully articulated or consistently applied as under AIIB ESS2.	The project will use replacement cost as the governing standard for RAP implementation, including structures, crops, trees, and other eligible assets.
13.	Livelihood restoration	AIIB ESS2 requires livelihood restoration where project impacts affect income sources or means of livelihood. This may include transitional support, assistance to restore earning capacity, and targeted measures for vulnerable groups.	Uzbek law focuses more strongly on compensation for acquired assets and losses than on a structured livelihood restoration framework.	The project will include livelihood restoration measures in RAPs where impacts affect agricultural production, irrigation-dependent land use, vineyards, orchards, roadside businesses, access, or other income sources.
14.	Entitlement matrix	AIIB practice under ESS2 requires a clear, disclosed entitlement framework linking types of impacts and categories of affected persons to compensation and assistance.	Uzbek law provides compensation rules but does not require an entitlement matrix in the same project-level disclosure format.	A project-specific entitlement matrix will be prepared and disclosed in RAP documentation, covering permanent and temporary impacts, land, structures, crops, trees, businesses, access restrictions, informal users, and vulnerable groups.
15.	Gender analysis and GAP	AIIB expects assessment of differential impacts on women and men where relevant and proportionate, and project design should address gender-related risks and opportunities. AIIB also maintains corporate emphasis on Gender Action Plans in projects where appropriate.	Uzbek legislation includes equality and protection laws, but national EIA procedure does not require a standalone gender analysis or GAP in the same way.	The project will undertake gender analysis as part of the social assessment and prepare a Gender Action Plan where relevant, including measures on safe mobility, consultation participation, employment practices, and GBV/SEA/SH risk management.
16.	Labor management	AIIB ESS1 requires assessment and management of labor and working-condition risks. Good practice includes labor management procedures, worker GRM, OHS, non-discrimination, prohibition of child and forced labor, and contractor management.	Uzbekistan has a strong labor framework through the Labor Code, OHS law, social insurance law, and related norms, but national EIA does not itself require a standalone LMP.	The project will prepare and implement an LMP, including labor categorization, codes of conduct, worker GRM, contractor obligations, OHS, accommodation standards if relevant, and prevention of child/forced labor and GBV/SEA/SH.

#	Aspect	AIIB ESF Requirements	Applicable Uzbek Legislation Requirement	Identified gaps and harmonized framework for the Project
17.	Community health and safety	AIIB ESS1 requires management of community exposure to project risks, including traffic, road safety, emergency events, labor influx, hazardous materials, and communicable disease risks.	Uzbek law covers traffic safety, public health, labor, OHS, and some sanitary controls, but AIIB is more integrated and project-specific.	The project will include dedicated community health and safety measures, including traffic management, road safety improvements, access protection, emergency access, camp controls, and communication with communities.
18.	Traffic and road safety	AIIB ESS1 requires assessment of road safety and traffic-related risks where relevant to the project.	Uzbek legislation includes the Law on Traffic Safety and related regulations on transport safety and large/heavy loads.	The project will undertake traffic counts, road safety audit, beneficiary/road-user surveys, and traffic management planning, and will integrate findings into design and ESMP.
19.	Biodiversity and ecosystem services	AIIB ESS1 requires identification and assessment of impacts on biodiversity and ecosystem services and application of the mitigation hierarchy. For critical habitats, there are stringent conditions, including no measurable adverse impacts on critical habitat values and no reduction in populations of endangered or critically endangered species.	Uzbek law protects flora, fauna, protected areas, water, and environmental resources, but the legal framework is less explicit than AIIB on critical habitat, no net loss/net gain, and ecosystem-services language.	The project will apply AIIB biodiversity requirements in full, including habitat screening, critical habitat assessment where required, mitigation hierarchy, biodiversity management measures, and special controls for the greenfield bypass.
20.	Greenfield construction / habitat conversion	AIIB requires stronger scrutiny where greenfield construction may affect natural or modified habitats, agricultural land, ecosystem connectivity, or sensitive receptors.	Uzbek law regulates land withdrawal and environmental permitting but does not frame greenfield road construction through the same integrated habitat-risk lens as AIIB.	For the bypass, the ESIA will apply a more stringent framework, including section-based biodiversity surveys, irrigation and drainage assessment, farmland access assessment, and targeted mitigation for habitat and agricultural impacts.
21.	Cumulative, indirect, and induced impacts	AIIB ESS1 requires assessment of direct, indirect, induced, and cumulative impacts where material.	Uzbek national EIA generally focuses more on project-level direct impacts.	The project ESIA will explicitly assess cumulative, indirect, and induced impacts, especially for land use change, traffic redistribution, urban edge development, agricultural access, and ecological connectivity around the bypass.
22.	Climate change and resilience	AIIB ESF requires consideration of climate risks and climate-related impacts where relevant to project design and operation. The 2024 ESF update remains in effect, and the core ESS framework continues.	Uzbek law includes environmental and sectoral regulations, but climate-risk integration into EIA is generally less explicit than under AIIB.	The project ESIA will include climate risk and resilience assessment and integrate outcomes into design and ESMP, including heat, flooding/drainage, and road durability considerations.

#	Aspect	AIIB ESF Requirements	Applicable Uzbek Legislation Requirement	Identified gaps and harmonized framework for the Project
23.	Monitoring and reporting	AIIB requires regular monitoring of environmental and social performance and submission of periodic reports on implementation of ESMP, RAP, and other plans.	Uzbek law provides for state monitoring and inspection but does not impose the same project-owner reporting structure to AIIB.	The project will prepare periodic environmental and social monitoring reports, including ESMP, RAP, GRM, stakeholder engagement, labor, biodiversity, and health and safety performance.
24.	Information on AIIB PPM	AIIB requires disclosure of the AIIB PPM so affected people know they may raise concerns directly with AIIB if project-level mechanisms do not resolve them.	Uzbek law provides access to national grievance channels, but not to an international lender accountability mechanism.	The project will disclose both the project GRM and the AIIB PPM in consultation materials and public information.
25.	Worker grievance mechanism	AIIB good practice and project documents require worker-specific grievance arrangements in addition to community GRM.	Uzbek labor law provides general labor rights and dispute procedures, but not necessarily a project-specific worker GRM in ESIA documentation.	The project will establish and maintain a worker GRM as part of the LMP and contractor management system.
26.	Cultural heritage and chance finds	AIIB ESS1 requires assessment of impacts on cultural heritage and management of chance finds where relevant.	Uzbek legal framework includes laws on cultural heritage and archaeological heritage and relevant implementing rules.	The Project will include cultural heritage screening, and a chance finds procedure consistent with Uzbek law and AIIB requirements, particularly given the wider Bukhara context.

AIIB = Asian Infrastructure Investment Bank; ESF = Environmental and Social Framework; ESS = Environmental and Social Standard; AIIB PPM = Project-affected People's Mechanism; GRM = Grievance Redress Mechanism; RAP = Resettlement Action Plan; ESMP = Environmental and Social Management Plan; ESIA = Environmental and Social Impact Assessment; ESEL = AIIB Environmental and Social Exclusion List; LMP = Labor Management Plan; GBV/SEA/SH = Gender-Based Violence/Sexual Exploitation and Abuse/Sexual Harassment; OHS = Occupational Health and Safety; EIA = Environmental Impact Assessment; E&S = Environmental and Social; SEP = Stakeholder Engagement Plan

3.5.2. Gap Analysis between National and International EHS Standards

The project will apply both the applicable regulatory requirements of Uzbekistan and relevant international Environmental, Health and Safety (EHS) standards. For good international practice, the main reference is the IFC General EHS Guidelines. They are intended to be used together with project-specific risk assessment, and where applicable Uzbek regulation requirements differ from international standards, the more stringent level or measure should generally be applied where feasible and appropriate.

3.5.2.1. Air Quality Standards

The national standard for ambient air quality is Public Health Regulation *SanPiN No. 0053-23*[4] *– Permissible Hygienic Standards for Harmful and Toxic Substances, Producer Microorganisms, Bacterial Preparations and Aeroions in the Atmospheric Air of Residential Areas*. It prescribes maximum permissible concentrations (MPCs) for ambient concentrations of pollutants in residential areas, expressed across four averaging periods: instantaneous (20–30 minutes), 24-hour average, monthly average, and annual average. The 24-hour average is defined in the regulation as the arithmetic mean of all discrete spot measurements taken throughout the day.

All ambient air quality monitoring in Uzbekistan is carried out by licensed sanitary-hygienic laboratories that function as state institutions under the Committee for Sanitary-Epidemiological Wellbeing and Public Health, the Ministry of Health and the National Committee on Ecology and Climate Change. These laboratories are legally required to assess and report their monitoring results in accordance with SanPiN standards. Their official conclusions serve as the authoritative national regulatory findings.

The primary international reference is the WHO Global Air Quality Guidelines[5] (2021 edition), which provides health-based guideline values and interim targets for the six key ambient air pollutants of greatest public health concern: PM2.5, PM10, NO_2, SO_2, CO, and O_3.

The IFC General EHS Guidelines require projects to prevent or minimize emissions and apply Good International Industry Practice (GIIP). IFC EHS Guidelines are largely aligned with WHO Guidelines for air quality and are treated as equivalent for the purposes of this analysis. Where any divergence exists, the more stringent value is applied.

Table 17 compares the relevant national and international standards and specifies the standard to be applied for air quality monitoring on the project.

[4] Decree of the of the Head of Committee for Sanitary and Epidemiological Wellbeing and Public Health under the Ministry of Health of the Republic of Uzbekistan, No. 18 dated 07.08.2023. Public Health Regulation SanPiN No. 0053-23 – Permissible Hygienic Standards for Harmful and Toxic Substances, Producer Microorganisms, Bacterial Preparations and Aeroions in the Atmospheric Air of Residential Areas. https://lex.uz/docs/6676993. (accessed May 2026)
[5] WHO global air quality guidelines. Particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide. Geneva: World Health Organization; 2021. https://www.who.int/publications/i/item/9789240034228 (accessed May 2026)

Table 17: Ambient Air Quality Standards

Indicator	National standard SanPiN No. 0053-23	WHO Global Air Quality Guidelines*	Harmonized framework for the Project
SO_2	0.05 mg/m³ (annual) 0.2 mg/m³ (24-hour)	40 µg/m³ (24-hour mean)	0.04 mg/m³ (24-hour) (WHO Global Air Quality Guidelines)
NO_2	0.04 mg/m³ (annual) 0.06 mg/m³ (24-hour)	0.010 mg/m³ (annual) 0.025 mg/m³ (24-hour) 0.200 mg/m³ (1-hour)	0.010 mg/m³ (annual) 0.025 mg/m³ (24-hour) (WHO Global Air Quality Guidelines)
NO	0.06 mg/m³ (annual) 0.25 mg/m³ (24-hour)	---	0.06 mg/m³ (annual) 0.25 mg/m³ (24-hour) (SanPiN No. 0053-23)
CO	3.0 mg/m³ (24-hour) 5.0 mg/m³ (instantaneous)	4.0 mg/m³ (24-hour) 10.0 mg/m³ (8-hour)	3.0 mg/m³ (24-hour) (SanPiN No. 0053-23)
PM2.5	0.035 mg/m³ (annual) 0.06 mg/m³ (24-hour)	0.005 mg/m³ (annual) 0.015 mg/m³ (24-hour)	0.015 mg/m³ (24-hour) (WHO Global Air Quality Guidelines)
PM10	0.05 mg/m³ (annual) 0.3 mg/m³ (24-hour)	0.015 mg/m³ (annual) 0.045 mg/m³ (24-hour)	0.015 mg/m³ (annual) 0.045 mg/m³ (24-hour) (WHO Global Air Quality Guidelines)
O_3	0.045 mg/m³ (month) 0.1 mg/m³ (24-hour)	60 µg/m³ (peak season) 100 µg/m³ (8-hour)	0.1 mg/m³ (24-hour) (SanPiN 0053-23)
Benzene (C_6H_6)	0.06 mg/m³ (24-hour) 0.3 mg/m³ (instantaneous)	No safe threshold (IARC Group 1 carcinogen)	0.06 mg/m³ (24-hour) (SanPiN 0053-23)

*WHO guidelines values originally published in µg/m³ have been converted at 1 µg/m³ = 0.001 mg/m³ for direct comparison.

Ambient air quality monitoring is performed by a state-licensed laboratory, following the analytical methods required for each pollutant according to SanPiN No. 0053-23 (Table 18).

Table 18: Applicable Survey and Analytical Methods

Pollutant	National Method Standard used by State Laboratories	Analytical Method	Averaging Period(s) Required
SO_2 (Sulfur Dioxide)	GOST 12.1.016-79; MU No. 2207-80	Spectrophotometric / electrochemical	24-hour mean (hourly spot sampling); instantaneous
NO_2 (Nitrogen Dioxide)	GOST 12.1.016-79; MUK 4.1.2468-09	Chemiluminescence or electrochemical NO_2-specific sensor	24-hour mean (hourly spot sampling); instantaneous; 1-hour
CO (Carbon Monoxide)	GOST 12.1.016-79	Electrochemical / NDIR	24-hour mean; instantaneous

Pollutant	National Method Standard used by State Laboratories	Analytical Method	Averaging Period(s) Required
PM2.5 (Fine Particles)	ISO 16000-37 or equivalent; gravimetric filter	Gravimetric (filter-based low-volume sampler) or optical continuous	24-hour integrated; annual mean (seasonal campaigns)
PM10 (Coarse Particles)	ISO 16000-37 or equivalent; gravimetric filter	Gravimetric (filter-based) or optical continuous	24-hour integrated; annual mean (seasonal campaigns)
O_3 (Ozone)	MU No. 1639-77	UV photometry or electrochemical	24-hour mean (hourly spot sampling); 8-hour peak (for WHO assessment)
Benzene (C_6H_6)	MU No. 4834-88	Gas chromatography (GC-FID)	24-hour mean; instantaneous

GC-FID = Gas Chromatography with Flame Ionization Detection; MU/MUK = methods in Russian; WHO = World Health Organization; PM = particulate matter

The project's noise-level baseline monitoring campaign will be conducted in accordance with the national framework. Baseline surveys will be carried out by locally licensed laboratories, which are government-accredited public institutions operating under Uzbek legislation and national accreditation standards. The test results will be interpreted independently, following a harmonized framework (Table 16), regardless of the laboratory's conclusions from the analyses conducted. Monitoring during the operational phase of the M37 corridor will be arranged by the territorial Road Departments of Navoi and Bukhara Provinces, which are government subdivisions legally required to comply with Uzbek regulatory standards.

3.5.2.2. Noise Standards

In Uzbekistan, noise level is regulated by the following regulations:

- *SanPiN No. 0325-16[6]: Sanitary Standards for Acceptable Noise Levels at the Workplace, 2016:* This regulation establishes permissible noise parameters for residential areas, public buildings, and surrounding territories. It sets allowable equivalent continuous sound pressure levels (LAeq) and maximum sound levels (LAmax) for daytime (07:00–23:00) and nighttime (23:00–07:00) periods, with specific limits defined for residential buildings, hospitals, schools, and adjacent outdoor areas.
- *SanPiN No. 0008-20[7]: Sanitary Standards on Permissible Noise in Residential, Public Buildings, and Surrounding Areas, 2020:* This regulation establishes permissible

[6] Public Health Regulation SanPiN No. 0325-16: Sanitary Standards for Acceptable Noise Levels at the Workplace. 01.02.2016. https://www.med.uz/fergana/documents/detail.php?ID=50994 (accessed May 2026)
[7] Decree of the Minister of Health of the Republic of Uzbekistan No. 0008-20 dated 29.12.2020. Public Health Regulation SanPiN No. 0008-20: Sanitary Standards on Permissible Noise in Residential, Public Buildings, and Surrounding Areas. https://lex.uz/docs/5192581 (accessed May 2026)

noise parameters for residential areas, public buildings, and surrounding territories. It sets allowable equivalent continuous sound pressure levels (LAeq) and maximum sound levels (LAmax) for daytime (07:00–23:00) and nighttime (23:00–07:00) periods, specifies methods for noise measurement and control, and prescribes measures for mitigating adverse effects of noise on human health and wellbeing. Specific limits are defined for residential buildings, hospitals, schools, and adjacent outdoor areas. Under SanPiN #0008-20, LAeq is the primary compliance metric, and it is the energy-equivalent (time-averaged, not arithmetic) level for the entire period. Specifically: daytime (07:00–23:00) is LAeq ≤ 55 dBA and nighttime (23:00–07:00) is LAeq ≤ 45 dBA. The LAeq values to report for 24 hours are the energy-average (logarithmic mean: $10 \cdot \log_{10}(\Sigma 10\text{^}(L_i/10)/n)$) across all hourly readings within each period, not the maximum single-hour LAeq reading. The standard also establishes a separate LAmax limit of 70 dBA daytime and 60 dBA nighttime.

The relevant international standards and guidelines are:

- *WHO Guidelines for Community Noise*
  The WHO Guidelines for Community Noise address health protection from environmental noise sources including road traffic and provide recommended guideline values for specific receptor categories:

  - Health care facilities and hospitals: ≤35 dB LAeq inside rooms (≈45 dB external)
  - Schools and educational buildings: ≤35 dB LAeq inside (≈45–50 dB external)
  - Residential areas (outdoor): ≤55 dB LAeq (daytime) and 45 dB(A) (night)
  - Orphanages and social care: ≤35 dB inside (45–50 dB external)
  - Agricultural receptors: ≤55 dB LAeq (daytime)
  - Industrial and commercial areas: ≤60 dB LAeq (daytime).

- *The IFC General EHS Guidelines:* The IFC General EHS Guidelines require noise prevention and control where project activities generate noise affecting receptors beyond the project site boundary. The Guidelines recommend that noise levels at the nearest sensitive receptor do not exceed 55 dB(A) LAeq during daytime hours and 45 dB(A) LAeq during nighttime hours for residential, institutional, and educational receptors. For occupational noise, the Guidelines require that no worker be exposed to a noise level greater than 85 dB(A) as an 8-hour time-weighted average without appropriate hearing protection. The IFC EHS Guidelines are referenced under AIIB's ESP as a benchmark for good international industry practice (GIIP).
- *ILO Regulation on Protection of workers against noise and vibration in the working environment:* This convention establishes international requirements for the protection of workers from occupational noise and vibration hazards, including exposure limits, monitoring obligations, and requirements for hearing conservation programs. The convention specifies that no worker should be

exposed to noise levels exceeding 85 dB(A) as a daily personal noise exposure without protection measures.

A comparison of national and international standards applicable to this project is presented in Table 19.

Table 19: Standards for Noise

Indicator	National standards		International standard		Harmonized framework for the Project, LAeq
Outdoor residential areas	55 dB(A) LAeq (07:00–23:00) 45 dB(A) LAeq (23:00–07:00)	SanPiN No. 0008-20	55 dB(A) LAeq daytime / 45 dB(A) nighttime	WHO Guidelines for Community Noise	55 dB(A) daytime / 45 dB(A) nighttime – SanPiN No. 0008-20 and WHO aligned
Schools (indoors, during class)	40 dB(A) LAeq	SanPiN No. 0008-20	35 dB(A) LAeq	WHO Guidelines for Community Noise	35 dB(A) LAeq – WHO Guidelines applied (more stringent)
Schools (outdoor playgrounds)	55 dB(A) LAeq	SanPiN No. 0008-20	55 dB(A) LAeq	WHO Guidelines for Community Noise	55 dB(A) LAeq – national and international aligned
Hospitals	35 dB(A) LAeq (07:00–23:00) 25 dB(A) LAeq (23:00–07:00)	SanPiN No. 0008-20	30 dB(A) LAeq daytime and evening	WHO Guidelines for Community Noise	30 dB(A) LAeq daytime – WHO Guidelines applied (more stringent for daytime)
Industrial, commercial, and traffic areas	60 dB(A) LAeq	SanPiN No. 0008-20	70 dB(A) LAeq (24h)	WHO Guidelines for Community Noise	60 dB(A) LAeq – national standard applied (more stringent)
Workplace / occupational noise	91 dB(A) – 95 dB(A) (during work with noisy equipment)	SanPiN No. 0325-16	85 dB(A) LAeq 8-hour TWA	ILO Standard: Protection of workers against noise and vibration in the working environment	85 dB(A) LAeq 8-hour TWA – ILO standards applied (more stringent)

WHO = World Health Organization; ILO = International Labour Organization Standard; TWA = time-weighted average

The national regulatory framework for noise monitoring in Uzbekistan applicable to road infrastructure projects comprises two standards:

(i) GOST 23337-2014[8] – Methods for measuring noise in residential areas and public buildings

[8] GOST 23337-2014. Noise. Methods for measuring noise in residential areas and inside residential and public buildings. https://files.stroyinf.ru/Data/587/58773.pdf (accessed May 2026)

GOST 23337-2014 establishes methods for measuring noise in residential areas and public buildings. It was developed as a non-equivalent adaptation of ISO 1996-1:2016 and ISO 1996-2:2017, sharing the same conceptual basis and measurement parameters.

(ii) GOST 20444-2014[9] – Methods for determining noise characteristics of transport flows

GOST 20444-2014 establishes methods specifically for determining noise characteristics of transport flows on roads, highways, and railways. The standard was also developed as an adaptation of *ISO 1996-1:2003 and ISO 1996-2:2007* (*Acoustics — Description, Measurement and Assessment of Environmental Noise*). It defines the primary noise characteristics of transport flows as LAeq assessed for daytime and nighttime periods (clause 4.3), with octave band equivalent sound pressure levels as an additional parameter (clause 4.4).

Compared to international practice, GOST 20444-2014 is broadly consistent with the traffic noise measurement approach described in *ISO 1996-2:2017* and the *WHO Environmental Noise Guidelines*, both of which similarly require concurrent traffic characterization alongside noise level measurement. Two gaps exist relative to international good practice:

- GOST 20444-2014 does not specify a minimum number of replicate measurement periods required to establish a statistically representative noise characteristic, whereas ISO 1996-2 requires sufficient temporal replication to demonstrate statistical reliability of the derived LAeq.
- GOST 23337-2014 and GOST 20444-2014 does not address seasonal representativeness.

In summary, the project noise level baseline monitoring campaign will be conducted with reference to the national framework established by GOST 23337-2014 and GOST 20444-2014. The test results will be interpreted independently, following a harmonized framework, regardless of the conclusions drawn by the laboratory based on the analyses conducted. Monitoring during the operational phase of the M37 corridor will be arranged by the territorial Road Departments of Navoi and Bukhara Provinces, which are government subdivisions legally required to comply with Uzbek regulatory standards in all their activities and be conducted by local licensed laboratories operating under Uzbek legislation and national accreditation standards.

3.5.2.3. Vibration Standards

In Uzbekistan, vibration monitoring in workplaces and public buildings is regulated by a framework of public health and sanitary regulations (SanPiN) and construction norms (KMK/ShNK) designed to limit exposure to harmful occupational factors. The primary

[9] GOST 20444-2014. Noise. Traffic Flows. Methods of Noise Characteristic Determination. https://files.stroyinf.ru/Data2/1/4293767/4293767501.pdf (accessed May 2026)



regulation governing this area is *SanPiN No. 0326-16*[10] *– Sanitary Standards for General and Local Vibration in Workplaces*. This regulation defines the acceptable levels of both local (hand-arm) and general (whole-body) vibration in workplaces. This regulation is used for hygienic assessment to prevent vibration sickness and worker fatigue. Under this regulation, employers are obliged to conduct regular monitoring of workplace working conditions, particularly where harmful factors are present.

Internationally recognized standards and guidelines relevant to vibration assessment and monitoring for road and highway projects include the following:

- *ISO 2631-1: Mechanical vibration and shock – Evaluation of human exposure to whole-body vibration*
  Defines methods for measuring and evaluating human exposure to whole-body vibration (0.5 to 80 Hz) regarding health, comfort, and perception, primarily for seated or standing individuals. It sets standards for frequency weighting and measurement axes for vibration in vehicles, machinery, and buildings to prevent injury, particularly low-back pain.

- *ISO 4866:2010: Mechanical vibration and shock*
  Establishes methods for the measurement and evaluation of vibration effects on structures.

- *BS 5228-2:2009: Code of practice for noise and vibration control on construction and open sites*
  Provides guidance for managing vibration to protect people, buildings, and structures in the vicinity, or working on construction sites. Focuses on mitigating the impact of vibration from activities that produce high vibration levels, such as piling, blasting, breaking, and other construction operations on humans and structures.

- *BS 6472: Guide to evaluation of human exposure to vibration in buildings*
  Provides guidance on the evaluation of human exposure to vibration in buildings and the likelihood of complaints from building occupants.

- *DIN 4150-3: German standard for assessing vibration impacts on structures and preventing building damage*
  DIN 4150-3 provides commonly accepted thresholds for avoiding structural damage to buildings. Typical peak particle velocity limits at the foundation level are:
  - Industrial and heavy commercial buildings: approximately 20–50 mm/s
  - Residential and light commercial buildings: approximately 5–20 mm/s

[10] Public Health Regulations SanPiN No. 0326-16 – Sanitary Standards for General and Local Vibration in Workplaces. 01.02.2016. https://www.med.uz/fergana/documents/detail.php?ID=53206 (accessed May 2026)



- Particularly sensitive structures, including historic buildings and structures of high cultural value: approximately 3–8 mm/s.

These standards are commonly applied for assessment of construction vibration associated with road rehabilitation, earthworks, compaction, bridge and culvert construction, heavy vehicle movement, and contractor operations. Humans are generally sensitive to vibration at relatively low levels. According to BS 5228-2 and BS 6472, vibration may become perceptible at approximately 0.14 mm/s peak particle velocity (PPV) under highly sensitive conditions and around 0.3 mm/s PPV in normal residential environments. At approximately 1.0 mm/s PPV, vibration may generate complaints from nearby residents, while vibration levels around 10 mm/s PPV are generally considered intolerable for prolonged exposure.

National standards of Uzbekistan should be applied together with relevant international standards, with the more stringent requirement adopted where necessary to protect both human receptors and structural integrity.

3.5.2.4. Surface water, stormwater, and runoff quality

National requirements derive from the Water Code, environmental legislation, waste legislation, and applicable discharge and sanitary rules protecting surface water bodies and irrigation/drainage systems.

The IFC General EHS Guidelines require prevention of contaminated runoff, erosion, sediment transport, accidental spills, and unmanaged wastewater discharges during construction. They also require site-specific stormwater and spill management measures.

National law regulates protection of water bodies, but international EHS guidance is more explicit on construction-phase stormwater, erosion, sediment, and spill-prevention controls. The project will apply a stricter integrated approach including drainage continuity, silt control, spill response, controlled refueling, no uncontrolled discharge, and restoration of irrigation and drainage connectivity.

Table 2 of Public Health Regulation No. O'zDSt 951:2011, Water Sources for Drinking and Domestic Use – Hygienic and Technical Requirements and Rules, specifies ten indicators that surface water sources must meet if used for drinking and domestic use. Under this national standard, surface water sources used for drinking water fall into three categories depending on quality and composition (Table 20).

Table 20: Standard for Water Quality of Surface Sources for Drinking and Domestic Use

No.	Indicator	Standard requirements by category		
		1	2	3
1.	Turbidity, mg/dm^3	20	1,500	10,000
2.	Color, units	30	50	100

No.	Indicator	Standard requirements by category		
		1	2	3
3.	Odor, units	2	3	4
4.	Iron (Fe), mg/dm^3	0.3	1.0	3.0
5.	Manganese (Mn), mg/dm^3	0.1	1.0	2.0
6.	Fluorine (F), mg/dm^3	0.7	0.7	0.7
7.	Permanganate index (PMI)	7.0	15.0	20.0
8.	Coliform bacteria count per 1 dm^3	1,000	10,000	50,000
9.	pH	6.5-8.5	6.5-8.5	6.5-8.5
10.	BOD, mg/dm^3	3.0	5	7

The previously used *Public Health Regulation No. 0318-15, Hygienic and Anti-Epidemic Requirements for Protection of Water Bodies in Uzbekistan*, has been officially repealed, as confirmed by the national regulatory database (screenshot in Figure 14a). This repeal indicates that the previous hygienic requirements for water protection are no longer in effect. *Public Health Regulation SanPiN #0318-15 has been replaced by Public Health Regulation No. 0083-24* (effective 22.11.2024) and *Resolution of the Cabinet of Ministers No. 361* (dated 12.06.2025 and effective 01.10.2025), which introduce updated requirements for wastewater discharge and pollutant limits in surface water bodies.

Table 1 of Public Health Regulation No. O'zDSt 951:2011 – Water Sources for Drinking and Domestic Use – Hygienic and Technical Requirements and Rules specify nine indicators that groundwater sources must meet if used for drinking and domestic purposes. Under this national standard, groundwater sources used for drinking water fall into three categories depending on quality and composition as specified in Table 21.

Table 21: National Standard for Ground Water Quality

Indicator	Standard requirements by category		
	1	2	3
Turbidity, mg/dm^3	1.5	1.5	10.0
Color	20	20	30
pH (Hydrogen ion concentration)	6-9	6-9	6-9
Iron (Fe), mg/dm^3	0.3	5.0	10.0
Manganese (Mn), mg/dm^3	0.1	1.0	2.0
Hydrogen sulfide (H2S), mg/dm^3	-	-	3.0
Fluorine (F), mg/dm^3	0.7	0.7	0.7
Permanganate index (PMI)	2.0	5.0	10.0
Coliform bacteria count per 1 dm^3	3	100	1000

3.5.2.5. Soil Quality Standards

Uzbekistan applies sanitary and environmental norms for soil quality and contamination control, including standards for harmful substances in soil and obligations under environmental and waste laws. For instance, the following regulations stipulate requirements for soil quality:

- *Public Health Regulation SanPiN #0183-05, Hygienic Requirements for Soil Quality in Populated Areas with the Specific Natural Climatic Conditions of Uzbekistan*
- *Public Health Regulation SanPiN #0191-05, Maximum Permissible Concentrations and Approximate Permissible Concentrations of Exogenous Harmful Substances in the Soil*.

The IFC General EHS Guidelines require prevention of soil contamination from fuels, lubricants, chemicals, waste, and other hazardous materials, together with containment, good storage, spill prevention, and remediation where contamination occurs. The corresponding international standards for soil quality monitoring include the following:

- *The Food and Agriculture Organization (FAO), Global Soil Partnership: Standard Operating Procedures and Soil Testing Methods*
- *WHO Permissible Limits for Heavy Metals in Plants and Soil (specifies maximum levels of chemical elements in soil)*
- *EU Directive 86/278/EEC "On the protection of the environment, particularly in the soil, when sewage sludge is used in agriculture" (1986)*.

Table 22 compares the relevant national and international standards and specifies the standard to be applied for soil quality monitoring on the project.

Table 22: Standards for Soil Quality

Indicator	National Standards	FAO Global Soil Partnership	WHO	EU Council Directive	Applicable Standard
pH	6-9	6.0 – 7.5	---	---	6.0 – 7.5 (Global Soil Partnership)
Cu	3 mg/kg	---	36 mg/kg	50 to 140 mg/kg	3 mg/kg (Public Health Regulation № 0191-05)
Pb	32 mg/kg	---	85 mg/kg	50 to 300 mg/kg	32 mg/kg (Public Health Regulation № 0191-05)
Zinc	23 mg/kg	---	50 mg/kg	150 to 300 mg/kg	23 mg/kg (Public Health Regulation № 0191-05)
NO_3	130 mg/kg	---	---	---	130 mg/kg (Public Health Regulation № 0191-05)

Cu = copper; Pb = lead; Zn = zinc; NO_3 = nitrate; mg = milligram; kg = kilogram; WHO = World Health Organization; FAO = Food and Agriculture Organization

National standards exist, but international EHS guidance is stronger on preventive site management and contaminated-land response. The project will require contractors to implement fuel and chemical storage controls, segregated maintenance areas, topsoil protection, contaminated soil handling procedures, and reinstatement of agricultural soils after work.

3.5.2.6. Solid Waste Management

The IFC General EHS Guidelines require application of the waste hierarchy, minimization of waste generation, segregation, safe storage, licensed transport and disposal, and special controls for hazardous materials and hazardous waste.

Uzbekistan has a detailed framework under the Law on Waste (Law No. 362-II dated 05.04.2002) and specific sanitary and waste-handling regulations, including separate controls for municipal waste, construction waste, hazardous waste classification, storage, and disposal.

National law is detailed, but international EHS guidance is stronger on hierarchy, minimization, documentation, and risk-based handling. The project will apply both systems: national legal compliance for collection, transport, and disposal through authorized operators, and international GIIP for waste minimization, reuse/recycling where feasible, hazardous-waste segregation, and auditable waste tracking.

3.5.2.7. Wastewater Management

The key regulation of wastewater management was Public Health Regulation SanPiN No. 0318-15; however, it has been withdrawn and replaced by the *Decree of the Cabinet of Ministers of Uzbekistan No. 361, 06.12.2025, Measures to Improve the Wastewater Discharge Regulation System*, which came into force on October 1, 2025. This regulation introduces updated national requirements aimed at strengthening control over wastewater discharges, improving environmental protection of surface water bodies, and ensuring modernization of municipal wastewater treatment capacities. The regulation requirements align with international and include the following key provisions:

- Establishment of Wastewater Discharge Standards (Article 1): The regulation approves maximum permissible concentrations (MPCs) for key pollutants in wastewater discharged from domestic treatment facilities, including Biochemical Oxygen Demand (BOD_5), Chemical Oxygen Demand (COD), Suspended solids, Total nitrogen, Phosphates. For these uses, MPCs are established for 59 specified indicators, of which five are related to microbiology tests.

- Limits on Pollutants in Surface Water Bodies (Article 1): General concentration limits are set for drinking water bodies, recreational and domestic water bodies, fisheries, and irrigation water. For these uses, MPCs are established for 59 specified indicators, of which five are related to microbiology tests.
- Protected Zones and Discharge Restrictions (Article 2): Discharges within 1-km protection zones and segments with <500 m downstream flow distance are allowed only under strict compliance with Appendix 2. This protects vulnerable tributaries from local toxicity and eutrophication.
- Dilution Coefficient in Compliance Assessment (Article 2): The regulation mandates accounting for the assimilation capacity of receiving water bodies using dilution coefficients and hydrological monitoring. This aligns with good hydrological modeling practice.
- Increased Financial Penalties for Exceedances (Article 2).
- Effective October 1, 2025, compensatory payments will be applied for the discharge of pollutants into municipal sewer systems.
- Coordination of Revised Discharge Indicators (Article 3) between the National Committee on Ecology and Climate Change, Ministry of Health, and Ministry of Housing and Communal Services, ensuring legal coherence.
- Restrictions in Sewerage Overload Conditions (Article 7): When municipal sewerage networks are overloaded industrial enterprises are prohibited from adding wastewater loads. This prevents treatment failures and environmental emergencies.

Relevant international standards include:

- *EU Council Directive 91/271/EEC concerning urban wastewater treatment*
  Specifies recommended values for biochemical oxygen demand (BOD), chemical oxygen demand (COD), total suspended solids (TSS), total phosphorus, and total nitrogen.
- *WHO microbiological quality guidelines for wastewater use in agriculture* and *Compendium of standards for wastewater reuse in the Eastern Mediterranean Region.*

Since the project does not involve wastewater treatment, a comparison of national and international standards was not made. However, a brief review of the MPC limits shows they align with international standards.

3.5.2.8. Occupational Health and Safety

Comparison of national and international OHS regulations is provided in Table 23 and confirmed that national OHS regulation is aligned with relevant international requirements.

Table 23: Comparison of National and International OHS Regulations

#	OHS Requirement	National Regulation	International Regulation
1.	OHS management system	Article 14, Law on Occupational Safety and Health Article 209, Labor Code	ILO-OSH-2001, ISO-45001
2.	OHS Policy	Article 14, Law on Occupational Safety and Health Article 209, Labor Code	ILO-OSH-2001, ISO-45001, ILO-C155, ILO-C187
3.	OHS Work Program	Employer obligations under the Labor Code and Law on Occupational Safety and Health require planning and implementation of preventive OHS measures; formal annual OHS programs	ILO-OSH-2001, ILO-C155, ILO-C187
4.	Non-discrimination of Workers	Articles 3 and 4, Labor Code	ILO-C100, ILO-C111
5.	Minimum Age for Employment is 15	Article 118-121, Labor Code	ILO-C138
6.	Personal Protective Equipment	Articles 352 and 355, Labor Code	ISO-45001, ILO-C155, ILO-C167
7.	Medical Examination	Article 360, Labor Code Article 17, Law on Occupational Safety and Health	ILO-C155, WHO occupational health principles
8.	First Aid and First-Aid Facilities	Article 365, Labor Code	ILO-C155, ILO-C167
9.	Hazard Identification and Risk Assessment	Articles 355, 359, and 361, Labor Code	ISO-45001, ILO-C155, ILO-C167
10.	Safety Protocols	Articles 359 and 361, Labor Code	ISO-45001, ILO-C155, ILO-C167
11.	OHS Training and Instruction	Article 19, Law on Occupational Safety and Health	ISO-45001, ILO-C155, ILO-C167
12.	Incident Investigation, Recording, and Reporting	Articles 302-311, Labor Code	ISO-45001, ILO-C155, ILO-C167
13.	Emergency Preparedness and Response	Law on Protection of Population and Territories from Natural and Technogenic Emergencies, No. ZRU-790 Employer obligations under Labor Code and Law on fire safety, No. ZRU-226	ISO-45001, ILO-C155, ILO-C174
14.	OHS Monitoring and Internal Control	Article 355, Labor Code Law on Occupational Safety and Health	ILO-C155, ILO-C187
15.	Supervision and Oversight of OHS Management System	Article 14, Law on Occupational Safety and Health Article 209, Labor Code	ILO-OSH-2001, ILO-C155, ILO-C187
16.	Complaint management system	Law on appeals of individuals and legal entities, No. ZRU-378	ILO-C187, ILO-C190, AIIB ESS1 and ESS2, IFC PS2

IFC's EHS Guidelines on Occupational Health and Safety will also be applied to the project activities along with the Uzbekistan applicable legislation and require contractors and PMC to act as construction supervision consultants to protect the health and safety of workers and other project personnel. Preventive and protective measures will be introduced starting from (i) eliminating the hazard, (ii) controlling the hazard at its source through the use of engineering controls, (iii) minimizing the hazard through the design of safe work systems and administrative or institutional control measures, to (iv) provision of personal protective equipment.

4. ENVIRONMENTAL BASELINE CONDITIONS

4.1. Physical Environment

4.1.1. Climate

The project road corridor is located within south-central Uzbekistan and extends across the arid plains of the Kyzylkum desert zone, traversing portions of Kyzyltepa district of Navoi Province and Bukhara Province. The alignment generally follows the existing M37 international highway corridor between the Bukhara–Navoi regional boundary and the Bukhara Ring Road connection, including the proposed greenfield bypass and associated interchanges. The project area is characterized by flat to gently undulating desert terrain, sparse natural vegetation, saline soils in some locations, and strong continental climatic conditions typical of inland Central Asia.

Climatic conditions within the Kyzyltepa district section of the project corridor are generally similar to those observed across Bukhara Province due to the shared desert and semi-desert geographical setting of the Kyzylkum region.

The climate of the project area is governed by its inland geographical position, remoteness from maritime influences, high solar radiation, and the dominance of desert and semi-desert landscapes. According to the Köppen–Geiger climate classification, the climate of the project area, including Kyzyltepa district of Navoi Province and Bukhara Province, is classified as cold desert climate (BWk), characterized by extremely hot and dry summers, relatively cold winters, low annual precipitation, high evaporation rates, and significant seasonal and daily temperature fluctuations.

4.1.1.1. Geographic and Climatic Setting

The project corridor lies within the Turan lowlands and the broader Kyzylkum desert system, where climatic conditions are strongly continental and arid. Summers are long, extremely hot, and dry, while winters are relatively short and cold with occasional snowfall and frost events. The annual climatic regime is dominated by:

- high solar radiation
- low relative humidity during summer
- low and unevenly distributed precipitation
- strong seasonal winds and episodic dust storms
- high evaporation exceeding annual rainfall.

The climate is also characterized by substantial daily temperature amplitudes, particularly during spring and autumn periods when daytime temperatures may remain high while nighttime temperatures decrease significantly.

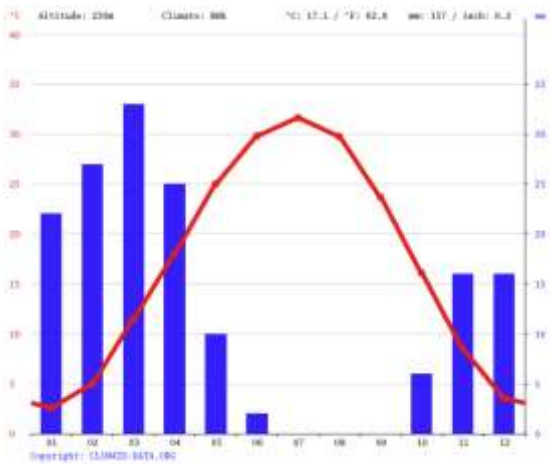
4.1.1.2. Seasonal Variability of Temperature

Air temperatures vary substantially between seasons, with July generally the hottest month and January the coldest. Average summer daytime temperatures commonly exceed +35°C (periodically above +45°C during heatwaves), while winter temperatures may fall below −10°C during cold air incursions from northern continental regions. The average annual air temperature in the Bukhara region is approximately 16–17°C, with a pronounced long-term warming trend consistent with broader regional climate change across Central Asia (Figure 2).

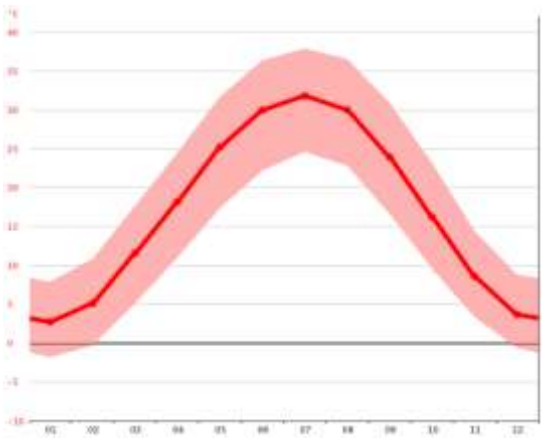
	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature °C (°F)	2.6 °C (36.7) °F	5 °C (41) °F	11.5 °C (52.7) °F	18.1 °C (64.5) °F	25 °C (77.1) °F	29.8 °C (85.7) °F	31.6 °C (89) °F	29.8 °C (85.6) °F	23.7 °C (74.7) °F	16.1 °C (61) °F	8.5 °C (47.3) °F	3.6 °C (38.4) °F
Min. Temperature °C (°F)	-1.9 °C (28.5) °F	-0.4 °C (31.2) °F	5 °C (41.1) °F	10.9 °C (51.6) °F	17.3 °C (63.2) °F	22.2 °C (71.9) °F	24.6 °C (76.3) °F	22.8 °C (73.1) °F	16.7 °C (62) °F	9.5 °C (49.2) °F	3.3 °C (37.9) °F	-0.8 °C (30.6) °F
Max. Temperature °C (°F)	7.9 °C (46.1) °F	10.8 °C (51.5) °F	17.7 °C (63.8) °F	24.5 °C (76) °F	31.6 °C (88.8) °F	36.3 °C (97.3) °F	37.7 °C (99.9) °F	36.3 °C (97.3) °F	30.7 °C (87.2) °F	23 °C (73.4) °F	14.4 °C (57.9) °F	8.8 °C (47.8) °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(%)	67%	61%	52%	43%	31%	23%	22%	23%	30%	43%	62%	66%
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

Data: 1991 - 2021 Min. Temperature °C (°F), Max. Temperature °C (°F), Precipitation / Rainfall mm (in), Humidity, Rainy days. Data: 1999 - 2019: avg. Sun hours

Figure 2: Annual Mean Climatic Indicators in Bukhara Province
(Source: Climate-Data.org[11])



(a) Average Monthly Weather in Bukhara Region
(Source: Climate-Data.org)



(b) Average Monthly Temperature in Bukhara Region
(Source: Climate-Data.org)

The summer season (June-September) is dominant, with spring and autumn transitional periods showing high daily variability and winters bringing periodic frost and short-duration snow. Pavement surface temperatures during summer may substantially

[11] Climate-Data.org. Climate Bukhara (Uzbekistan). https://en.climate-data.org/asia/uzbekistan/buxoro/bukhara-671/ (accessed May 2026).

exceed ambient air temperature, an important consideration for road material selection and pavement resilience.

Figure 3 shows the long-term annual temperature trend in Bukhara Province (1979–2024, ERA5 reanalysis data), with mean annual temperatures rising steadily from 13.6°C to 17.2°C over the 45-year record, confirming progressive regional warming and increasing aridity across the Kyzylkum desert zone (see also Section 4.1.1.7 for heatwave-specific risks and implications).

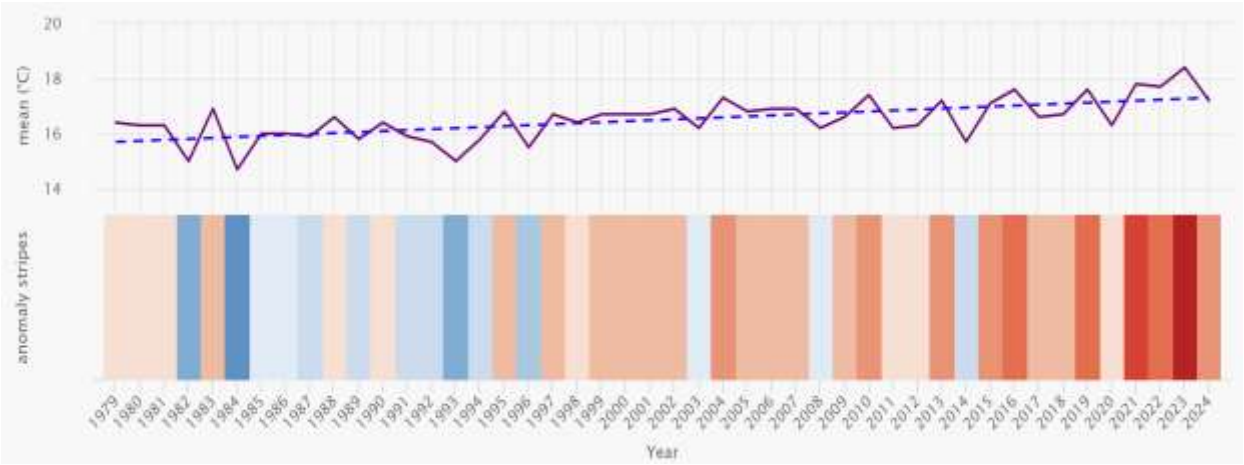


Figure 3: Long-Term Annual Temperature Change in Bukhara Province (1979–2024)
(Source: Meteoblue based on ERA5 climate reanalysis data[12])

Recent climatic observations indicate increasing frequency and duration of extreme heat conditions. Heatwaves are becoming more common and more intense, particularly during late spring and summer periods. Such conditions may significantly affect construction scheduling, labor productivity, and occupational health and safety.

Snowfall is generally limited and short in duration due to the arid continental climate; stable snow cover rarely persists, though seasonal frost and periodic freeze-thaw cycles occur in winter, contributing to pavement deterioration and seasonal maintenance requirements. Maximum seasonal frost penetration depth is approximately 20–40 cm (per ShNK 2.01.01-22[13]), with approximately 15–25 freeze-thaw cycles per year, predominantly between November and February, parameters that inform subbase thickness, drainage layer specifications, and winter construction scheduling.

4.1.1.3. Precipitation and Rainfall Regime

The project area lies within one of the driest regions of Uzbekistan. Annual precipitation in Bukhara Province is generally low, ranging from approximately 120 to 180 mm depending on location and year-to-year variability, concentrated mainly in winter and

[12] Meteoblue. Simulated historical climate & weather data for Bukhara, based on ERA5 reanalysis datasets. https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/bukhara_uzbekistan_1217662 and https://www.meteoblue.com/en/climate-change/bukhara_uzbekistan_1114929 (accessed May 2026).
[13] Building Code No. ShNK 2.01.01-22, Approval of Urban Planning Norms and Rules "Climatic and physical-geological data for design," https://mc.uz/uploads/mcuz_5064970383794.pdf, https://lex.uz/docs/6363141

spring, with March and April are typically the wettest months, while July and August are driest. Rainfall events are often short but may occasionally occur as localized intense storms, causing temporary flooding, erosion, and sediment transport at low-lying areas and drainage crossings, an important consideration for drainage sizing and erosion control. Evaporation rates substantially exceed annual precipitation, contributing to arid soil conditions and limited natural vegetation cover.

Figure 4 shows long-term annual precipitation variability in Bukhara Province (1979–2024, ERA5 reanalysis data), with the trend line indicating a gradual long-term decline; the accompanying anomaly stripe diagram (brown = below-average, green = above-average years) shows alternating wetter and drier years but an overall trend toward increasing aridity, consistent with broader desertification observed across the region and with climate change projections for Uzbekistan indicating more frequent drought conditions in desert areas including Bukhara Province.

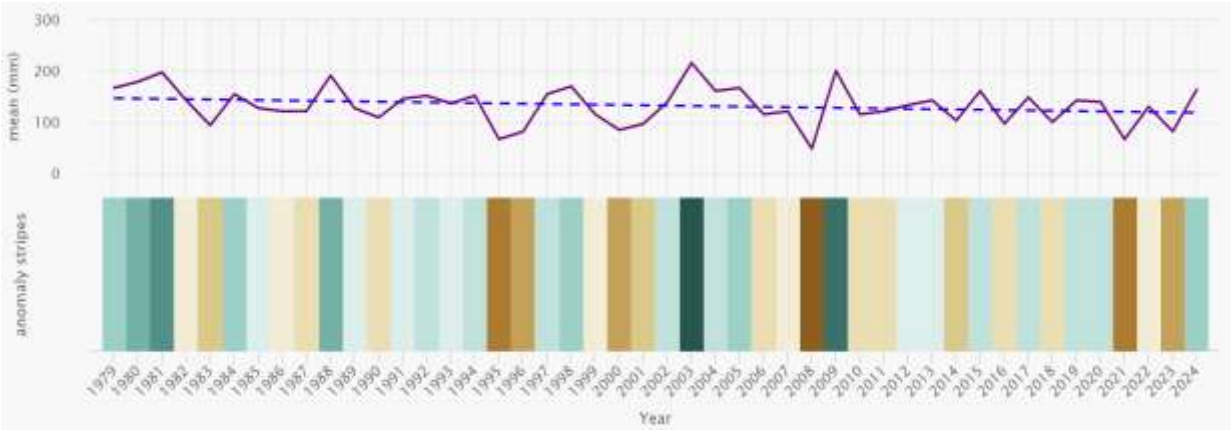


Figure 4: Long-Term Annual Precipitation Change in Bukhara Province (1979–2024)
(Source: Meteoblue based on ERA5 climate reanalysis data)

4.1.1.4. Relative Humidity and Atmospheric Conditions

Relative humidity in the project area varies considerably throughout the year, closely tied to seasonal temperature changes, generally highest in winter (exceeding 70%) and lowest in summer (approximately 35–40%) (Figure 5). Low summer humidity combined with elevated temperatures significantly increases evaporation rates and contributes to frequent dust generation and dry soil conditions. Atmospheric pressure follows a similar seasonal pattern, generally decreasing in summer due to thermal low-pressure systems forming over the desert territories of Central Asia.

Low humidity and dry conditions, combined with construction earthworks, create high dust generation potential requiring active dust suppression throughout the construction season, and are important considerations for construction water demand, worker heat stress exposure, and vegetation restoration/landscaping success rates.

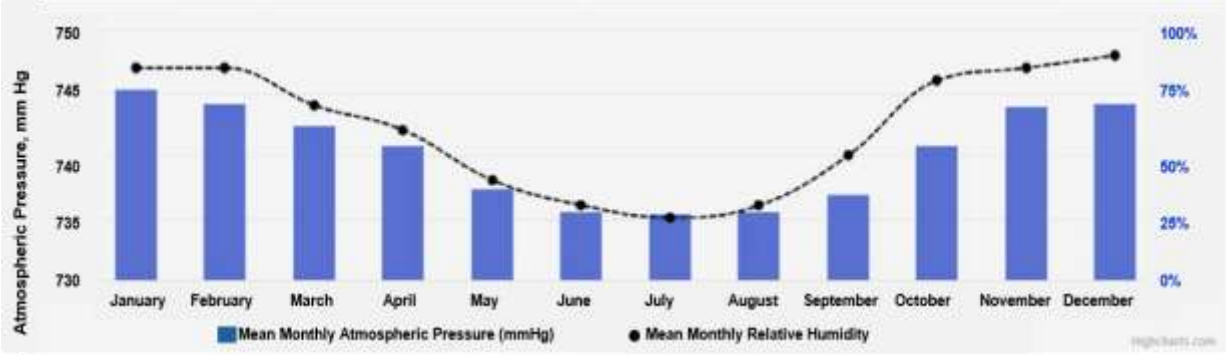


Figure 5: Monthly Relative Humidity and Atmospheric Pressure in Bukhara Province
(Source: adapted from WorldData[14])

4.1.1.5. Wind Patterns and Dust Storms

Wind conditions in the project area are influenced by open desert terrain and the absence of significant topographic barriers. The predominant wind directions are generally from the north and northwest (Figure 6), consistent with regional atmospheric circulation patterns across the Kyzylkum desert. Average annual wind speeds are typically around 3–4 m/s, although stronger winds occur during spring and summer periods, with associated risks of dust transport, sandstorm events, and wind-blown soil erosion.

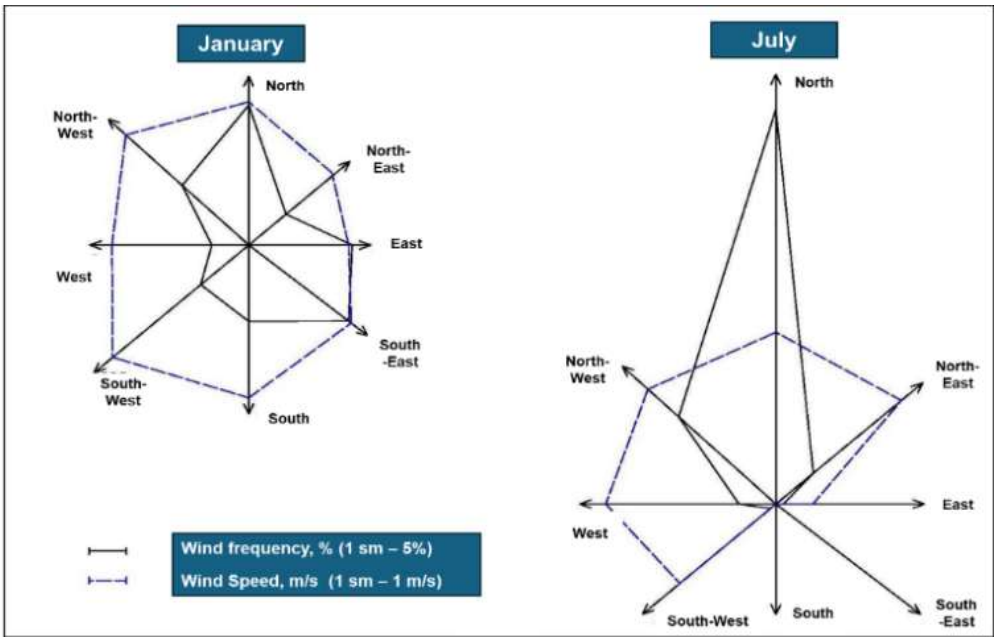


Figure 6: Predominant Wind Directions in the Project Area
(Source: Uzbek Building Code ShNK 2.01.01-22[15])

[14] WorldData.info, Climate of Bukhara, Uzbekistan. https://www.worlddata.info/asia/uzbekistan/climate-bukhara.php (accessed May 2026)
[15] Uzbek Building Code ShNK 2.01.01-22, Approval of Urban Planning and Building Code "Climate and Physical-geological Data for Project Design," 19.12.2022, https://mc.uz/uploads/mcuz_5064970383794.pdf (accessed May 2026).

Sand and dust storms are common seasonal phenomena in Bukhara Province, associated with arid desert conditions, sparse vegetation cover, strong seasonal winds, and prolonged drought periods. These events occur most frequently during spring and summer and may be further exacerbated by climate change, rising temperatures, and declining precipitation.

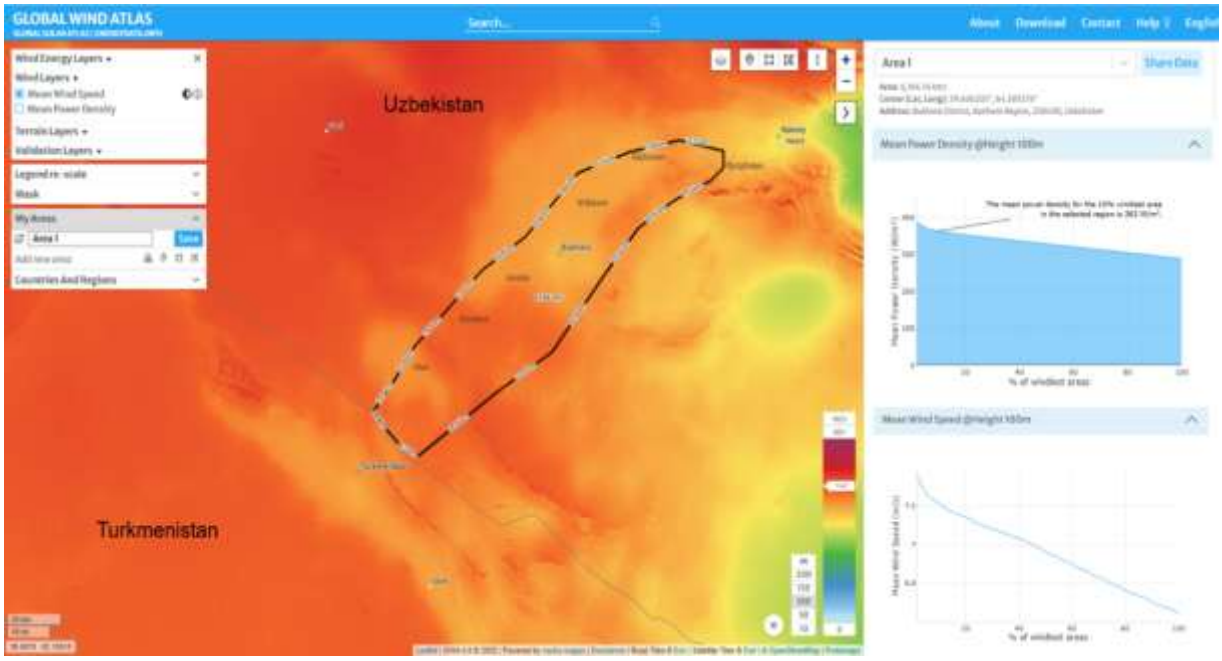


Figure 7: Average Wind Speed in the Project Area
(Source: Global Wind Atlas[16])

4.1.1.6. Sunshine and Solar Radiation

The project area receives very high levels of solar radiation year-round due to low cloud cover and desert climatic conditions; Bukhara Province is among the sunniest regions in Uzbekistan, with annual sunshine duration commonly exceeding 3,500–3,700 hours. Sunshine peaks in summer (May–August), with daily averages exceeding 12–13 hours and monthly totals exceeding 400 hours (Figures 8–9), before declining substantially in winter due to shorter daylight hours and seasonal atmospheric conditions.

High solar radiation contributes to elevated pavement temperatures, rapid evaporation, increased heat stress risk, accelerated drying of exposed soils, and high dust generation potential, key considerations for construction planning, worker exposure, and long-term pavement performance. High solar radiation and extreme summer temperatures require climate-resilient pavement specifications (modified bitumen, high-temperature performance grade) for the rehabilitated and new carriageway.

[16] Global Wind Atlas. Global Wind Atlas 3.0, developed by DTU Wind Energy and the World Bank Group in partnership with Energy Sector Management Assistance Program (ESMAP), https://globalwindatlas.info/ (accessed May 2026).

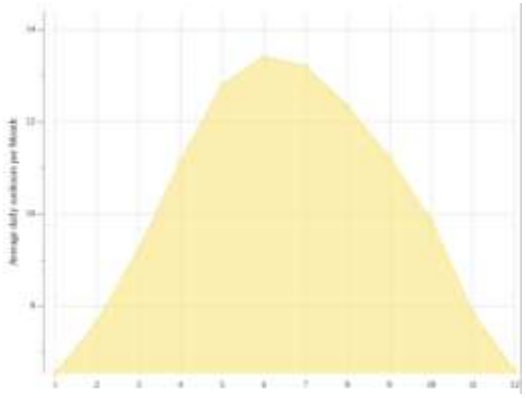


Figure 8: Average Daily Sunshine by Month in Bukhara Province
Source: Climate-Data.org

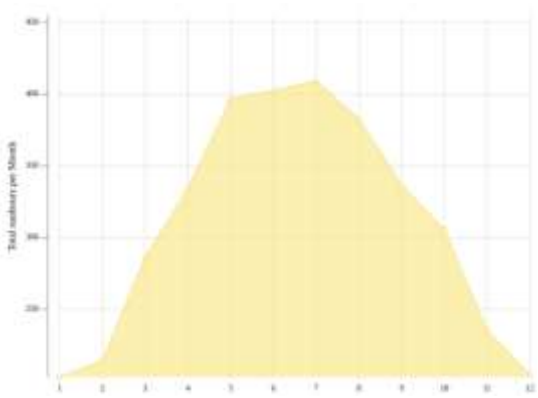


Figure 9: Total Monthly Sunshine Duration in Bukhara Province
Source: Climate-Data.org

4.1.1.7. Heatwaves and Climatic Anomalies

The Bukhara region has experienced increasingly frequent climatic anomalies in recent decades, including prolonged heatwaves, unusually high spring temperatures, drought conditions, intense dust storms, and short-duration extreme rainfall events. During severe heatwave episodes, air temperatures in Bukhara Province have exceeded +45°C, well above long-term averages, raising risks to worker health and safety, water demand, wildfire susceptibility in vegetated areas, and infrastructure performance, including asphalt softening, rutting, and thermal degradation of pavement materials if not addressed through climate-resilient design. Climate projections for Central Asia indicate continued warming and increasing variability, further intensifying aridity and heat stress in the project area.

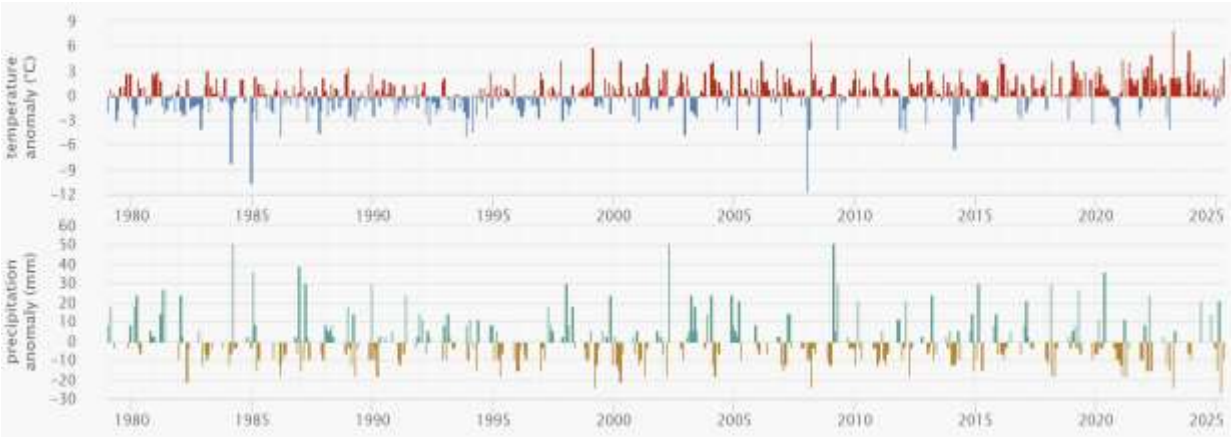


Figure 10: Monthly Temperature and Precipitation Anomalies, Bukhara Province (1980–2025)
(Source: Meteoblue based on ERA5 climate reanalysis data)

Figure 10 illustrates monthly temperature and precipitation anomalies in Bukhara Province (1980–2025) based on ERA5 climate reanalysis data, with red/blue shading indicating warmer/cooler-than-average periods and green/brown shading indicating

wetter/drier periods. The figure shows increasing climatic variability and a growing prevalence of warmer, drier conditions in recent decades, consistent with observed regional climate change trends. These observed conditions and projected trends have informed project design elements including pavement specifications, drainage design, erosion protection, and occupational health and safety planning.

4.1.1.8. Climate Change Projections and Paris Alignment

A dedicated Paris Agreement Alignment and Climate Finance Assessment has been prepared for the Project, providing a full quantitative evaluation of projected climate conditions under CMIP6 SSP2-4.5 and SSP5-8.5 scenarios to 2100, consistent with Uzbekistan's Updated Nationally Determined Contribution (NDC 3.0)[17] and the AIIB Joint MDB Methodology.

Headline projections (*World Bank Climate Change Knowledge Portal, CMIP6 multi-model ensemble median, 1995–2014 baseline*) indicate mean annual temperature increases of +1.8°C to +5.3°C by end-century depending on scenario, with hot days (>45°C) rising from near-zero historically to up to ~14 days/year under SSP5-8.5 by 2080–2099, a significant risk given existing summer temperatures already regularly exceed 40°C. Annual precipitation shows only modest projected increases (+19 to +25 mm), but rainfall intensity and short-duration extreme events are projected to increase, raising peak flows at drainage crossings independent of total volume change, a key consideration for culvert and canal-crossing design, particularly in Lots 1–2 and the Lot 2 bypass.

Climate vulnerability increases progressively from north to south as aridity intensifies irrigated sections (Lots 1–2) face drainage exceedance and thermal stress on asphalt in settlements, and the bypass area faces urban heat island effects and embankment erosion.

Climate data, scenario detail, section-by-section vulnerability profiles, and adaptation measures are provided in Paris Agreement Alignment and Climate Finance Assessment.

4.1.1.9. Greenhouse Gas Emissions Baseline

The GHG emissions assessment, prepared as part of the Paris Alignment and Climate Finance Assessment Report, establishes the baseline (without-project) GHG emissions profile of the M37 corridor, based on a traffic count survey conducted in May 2026 at 13 stations across two lots, supplemented by transport department data (January–March 2026). AADT and PCU equivalents were calculated per Uzbek building codes ShNQ 45-2007 and ShNQ 2.05.02-23 respectively. The full traffic count dataset, GHG calculation model, methodology, and emission factors are presented in Paris Agreement Alignment and Climate Finance Assessment Report.

[17] https://unfccc.int/sites/default/files/2025-11/Uzbekistan%20Third%20NDC.pdf

Traffic volumes decrease progressively from north to south, from a peak AADT of ~64,800 vehicles/day near Bukhara (Lot 2) to ~27,900 vehicles/day. The corridor-average demand-weighted AADT applied for the baseline is 24,428 vehicles/day. The fleet is dominated by passenger cars (95.5%), with trucks and tractors (3.1%), buses/minibuses (1.2%), and motorcycles/bicycles (0.2%) making up the remainder.

Emission factors follow IPCC 2006 Guidelines (Volume 2) and UK Government GHG Conversion Factors 2024, on an IPCC AR5 GWP_{100} basis, adjusted for the existing road's higher roughness (IRI ~6–7 m/km, compared to ~2–3 m/km under the with-project condition), consistent with HDM-4 vehicle operating cost analysis for the corridor.

Total baseline operational GHG emissions are estimated at 333,336 tCO_2e/year in the opening year (2026). Passenger cars account for ~81% of baseline emissions despite their lower per-vehicle emission factor (0.180 $kgCO_2e$/veh-km), reflecting their dominant fleet share; trucks and tractors contribute ~17% despite representing only 3.1% of traffic, due to their substantially higher per-vehicle emission factor (0.900 $kgCO_2e$/veh-km).

With-project operational and construction-phase emissions, and the net GHG balance over 2026–2050, are presented in Paris Agreement Alignment and Climate Finance Assessment.

4.1.2. Relief and Topography

The project corridor lies within the central Turan Plain, part of the Bukhara plain system within the broader Kyzylkum desert region, extending across Bukhara Province and the adjoining Kyzyltepa district of Navoi Province. The landscape is flat to gently undulating desert and semi-desert terrain shaped by long-term aeolian and alluvial processes, with no mountainous terrain, steep slopes, or deeply incised valleys, conditions generally favorable for linear infrastructure development.

Elevations along the corridor range from approximately 190 m to 266 m above sea level, rising gradually from the southwestern sections (~190–210 m) toward the northeastern sections near Vobkent and Gijduvon (~250–266 m), with most of the alignment lying within 200–240 m (Figure 11). The overall gradient is gentle, with local microrelief variation limited to irrigation/drainage canals, road embankments, reclaimed agricultural fields, localized sand accumulations, and settlement-related land modification.

The corridor transitions from heavily modified, irrigated agricultural and urbanized terrain near Bukhara to more open semi-desert terrain with sparse vegetation and isolated sandy/saline patches within the bypass and greenfield sections west of Bukhara. No significant geomorphological hazards (landslides, rockfalls, unstable slopes) were identified given the flat topography; localized risks are instead associated with wind

erosion, sand encroachment, and seasonal surface water accumulation in exposed or poorly drained areas.



Figure 11: Topography and Elevation of the Project Corridor
(Source: adapted from Topographic Map Database[18])

Generally flat terrain reduces the need for major cut-and-fill and slope stabilization works, though localized earthworks, embankment strengthening, drainage shaping, and erosion protection may be required at desert-sand, irrigation-crossing, and low-lying sections.

4.1.3. Geology

The project corridor lies within the central and western Turan Plain, part of the stable Turan Plate platform overlain by Mesozoic and Cenozoic sedimentary deposits, predominantly unconsolidated alluvial, aeolian, lacustrine, and desert sediments associated with the Kyzylkum desert. The project corridor is characterized mainly by Quaternary alluvial and aeolian formations linked to the historical Amudarya and Zarafshan river systems and long-term desertification, comprising sandy and loamy desert deposits interbedded with clayey horizons, saline soils, and locally gravelly alluvial materials. In irrigated agricultural zones near settlements and canals, the natural profile has been substantially modified by cultivation, irrigation, and land levelling.

Geomorphologically, the corridor traverses flat desert and semi-desert plains with minor undulating relief from aeolian and alluvial processes. Near-surface soils and sediments commonly include aeolian sands and sandy loams, loess-like silty soils, alluvial silts, saline and weakly gypsiferous deposits, locally compacted clayey horizons with variable

[18] Topographic Map Database, Bukhara Topographic Map, https://ru-ru.topographic-map.com/ (accessed May 2026).

bearing capacity, takyr-like compacted clay surfaces, and occasional gravelly alluvial deposits near drainage crossings and paleo-channels.

These conditions are generally suitable for road rehabilitation and linear infrastructure development, though localized engineering constraints may arise from loose sandy materials, saline soils, shallow groundwater in irrigated areas, and wind erosion/dust susceptibility on exposed surfaces, potentially affecting pavement stability, embankment performance, drainage behavior, and construction material handling, and requiring localized stabilization, compaction control, and erosion protection during construction.

No major geological faults, unstable slopes, landslide-prone terrain, karst formations, or significant geological hazards were identified within the project footprint, which lies within relatively stable lowland desert terrain. The broader Bukhara region remains influenced by regional tectonic processes associated with Central Asian seismic zones. A regional geological map is presented in Appendix 5.

4.1.4. Seismicity

The seismic and tectonic setting of Uzbekistan is shaped by the ongoing interaction of the Eurasian, Indian, Arabian, and African tectonic plates, with regional tectonic evolution associated primarily with the collision of the Indian and Eurasian Plates, which produced the Tien Shan mountain system and associated active fault systems across Central Asia. The project corridor, however, lies within the relatively stable lowland areas of Bukhara Province and adjoining Kyzyltepa district (Navoi Province), part of the Turan Plate platform, a comparatively lower seismic hazard zone than the Tien Shan orogenic belt affecting eastern and southeastern Uzbekistan.

Nevertheless, the region remains subject to regional seismic influences. The Gazli seismic zone in northwestern Bukhara Province, located approximately 80–100 km northwest of parts of the corridor, produced two of the strongest recorded earthquakes in the country (1976 and 1984, magnitudes ~7.0–7.3), demonstrating that strong seismic events can occur within western Uzbekistan.

Given the linear nature of the M37 corridor and the presence of bridges, culverts, and embankments, seismic considerations are incorporated into engineering design in accordance with applicable Uzbek construction norms and international standards, with geotechnical investigations and seismic-resistant design measures applied during detailed design and construction to ensure infrastructure stability and operational safety. A seismic zoning map of Uzbekistan and regional seismic characteristics are presented in Appendix 5.

4.1.5. Soils

4.1.5.1. Regional Soil Conditions

The project corridor lies within the arid Kyzylkum desert landscapes of Bukhara Province and adjoining Kyzyltepa district, where soils reflect arid climatic conditions, aeolian and alluvial processes, and long-term irrigation and agricultural land use. Regional soils are dominated by desert and semi-desert complexes:

- sandy desert soils associated with aeolian deposits
- desert alkali and saline soils developed on alluvial and proluvial sediments
- grey-brown desert and semi-desert soils with sandy or loamy textures
- takyr and takyr-associated clayey soils in low-lying depressions
- irrigated meadow-alluvial soils within agricultural oasis areas
- anthropogenically disturbed roadside and settlement soils affected by cultivation, traffic, and infrastructure development.

The distribution of major soil groups across Bukhara Province (lots 1 and 2) is presented as red line in Figure 12.

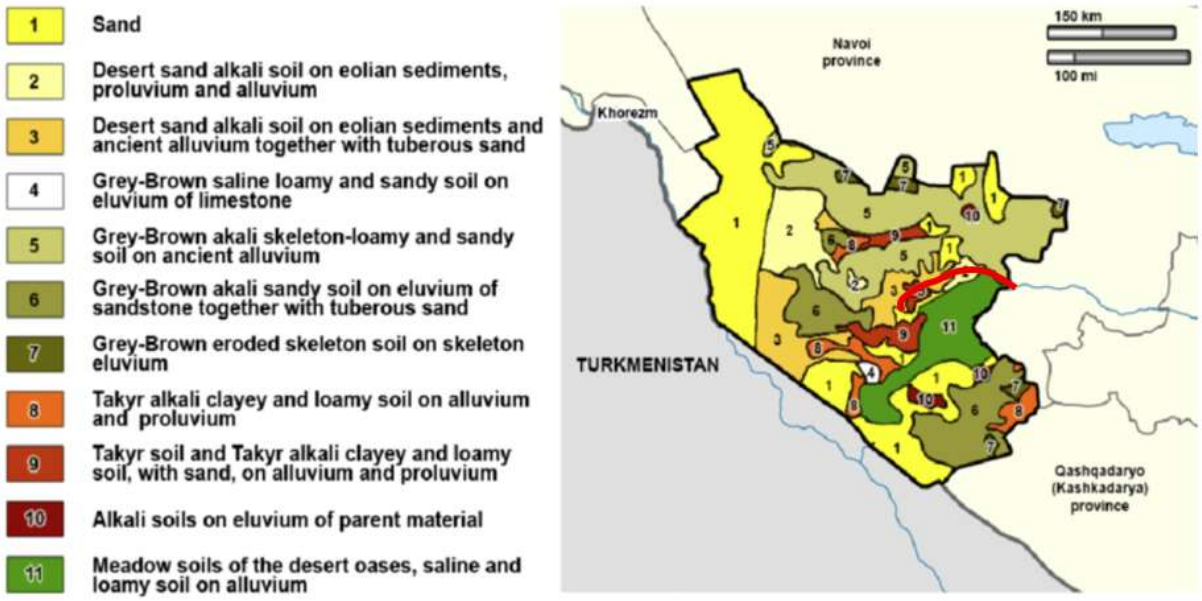


Figure 12: Soil Map of Bukhara Province with the M37 Project Corridor
(Source: Adapted from Groll, M. (2015), based on regional soil classification datasets and cartographic compilation available through ResearchGate)

Western and central corridor sections are dominated by sandy/grey-brown desert soils with low organic matter and high wind erosion susceptibility where vegetation is disturbed; irrigated oasis areas near settlements show secondary salinization from shallow groundwater and irrigation return flows.

Soil salinity and alkalinity represent important environmental characteristics throughout much of the project area. Elevated soil salinity is common in irrigated agricultural lands

and desert transition zones due to intense evaporation, limited natural drainage, and historical irrigation practices. Salinized soils may exhibit reduced fertility, sparse vegetation cover, and may increase susceptibility to degradation when disturbed.

Gypsiferous and Collapsible Soil Hazards: Gypsiferous and collapsible (loess-type) soil horizons, widespread in arid Central Asia, pose geotechnical risks including embankment subsidence, foundation settlement, and collapse under wetting, particularly at canal crossings, bridge abutments, and interchange locations. Existing regional data cannot resolve their distribution along the corridor; detailed geotechnical investigations (gypsum content, double oedometer collapse testing, bearing capacity) are recommended during detailed design at these locations.

Existing Roadside Contamination: A contextual assessment (absence of heavy industry, moderate traffic volumes, arid/windy dispersion conditions, no visible contamination indicators during field survey) indicates low risk of significant soil contamination along the rehabilitation corridor. Standard ESMP precautions (PPE, contaminated material segregation, spill response, halt-and-notify protocols for anomalous soil) will apply.

Wind Erosion and Dust Generation: From an engineering and environmental perspective, the prevailing soil conditions along the M37 corridor may contribute to increased dust generation during earthworks and vehicle movement; susceptibility of exposed soils to wind erosion; localized erosion of embankments and drainage channels; salinity-related constraints for vegetation restoration; and reduced fertility and limited natural regeneration capacity in disturbed desert areas.

4.1.5.2. Soil Survey

Greenfield Bypass and Missing Link Sections: Project-specific soil quality investigations were undertaken by the Bukhara Regional Agrochemical Analysis Centre (April 2026) at 12 sampling stations along the proposed bypass alignment, selected to represent the principal landforms, soil types, and areas of anticipated earthwork intensity, with particular attention to proximity to irrigation infrastructure. Samples were analyzed for humus, mobile phosphorus, exchangeable potassium, chloride salinity, total nitrogen, and pH, in accordance with national standards (methodology and station-level results in Appendix 6; sampling locations shown in Figure 13).

Results indicate uniformly low-to-moderate organic matter content (0.78–1.25% humus) across the alignment, consistent with intensively cultivated irrigated soils typical of the Bukhara oasis rather than degraded or marginal land. Phosphorus and potassium availability are variable, with five of twelve stations recording low phosphorus values that may constrain vegetation establishment during reinstatement without supplementary fertilization. Total nitrogen is low at most stations, reinforcing the likely need for fertility amendment during topsoil reinstatement and landscaping.

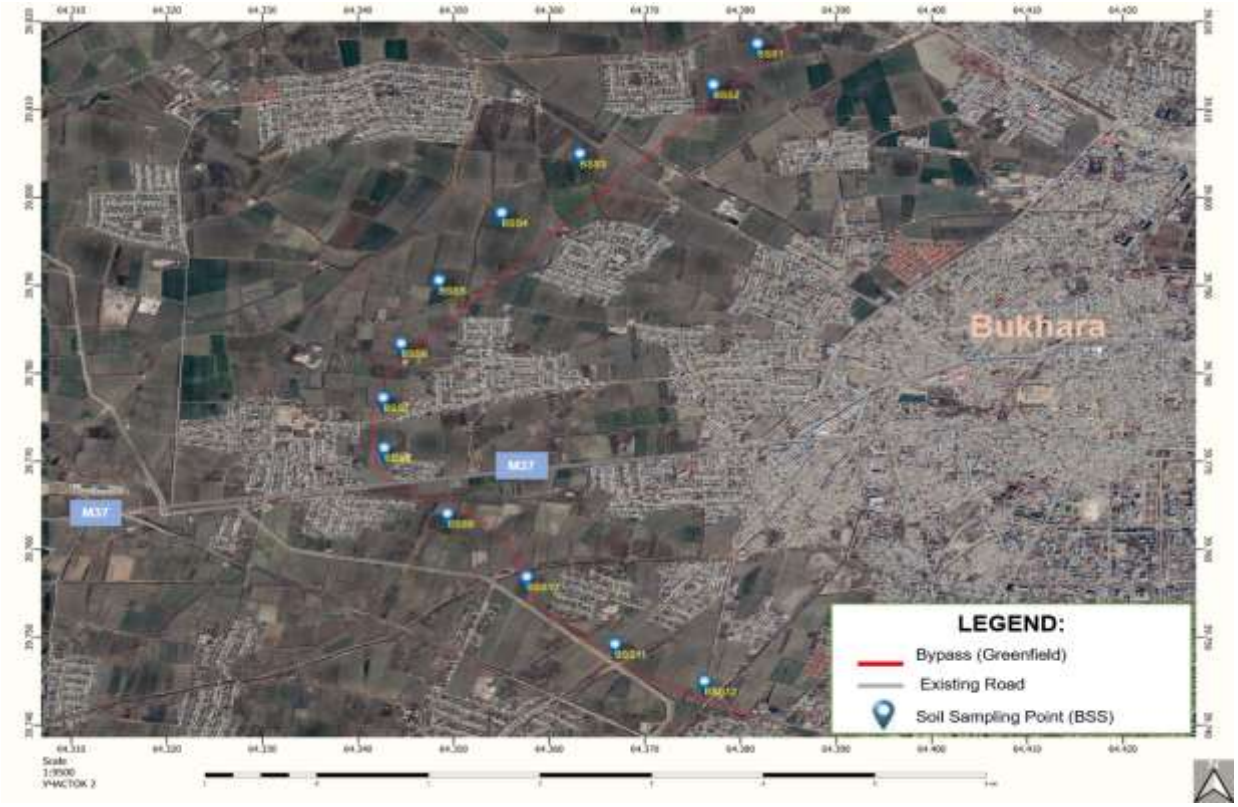


Figure 13: Soil Sampling Location within the Bypass Sections
(Source: ESIA)

All 12 stations (Figure 13) are classified as weakly saline; no moderate or severe salinity constraint was identified, indicating that salinity management is not expected to be a significant construction or reinstatement issue along the bypass, in contrast to parts of the rehabilitation corridor. Nonetheless, the productive surface soil layer remains vulnerable to compaction, erosion, and fertility loss during construction and will require systematic topsoil stripping, stockpiling, and reinstatement management.

All soil samples were collected from the 0–30 cm surface horizon, representative of topsoil/agricultural conditions but not of subsoil properties relevant to embankment fill quality, cut slope stability, drainage design, and foundation conditions.

4.1.6. Land Use

Land use within the project area is characterized by a combination of irrigated agricultural landscapes, rural settlements, transport infrastructure, and sparsely vegetated desert and semi-desert areas typical of central Uzbekistan. The M37 corridor extends through Kyzyltepa, Vobkent, and Bukhara districts, traversing both densely cultivated irrigated zones associated with the Zarafshan River system.

The dominant land use transition along the corridor runs in intensively irrigated agricultural and peri-urban land in the north-eastern sections: Kyzyltepa–Gijduvon–Vobkent–Bukhara. This spatial gradient is illustrated in Figure 14, presenting land use and land cover within the 1 km AoI along the full M37 corridor in Bukhara Province.

4.1.6.1. Land Use Along the Existing Rehabilitation Corridor

The rehabilitation sections lie predominantly within an already established transport corridor, characterized by existing road infrastructure, roadside settlements, agricultural lands, and associated utility and irrigation systems, reflecting the M37 road's historical role as a principal regional route connecting Bukhara Province with neighboring regions. The following land use categories were identified during the baseline survey:

(a) Agricultural Land Use

Agriculture is the dominant land use along the corridor, accounting for most of the 1 km AoI by area within Kyzyltepa, Gijduvon, Vobkent, and Bukhara districts, forming a mosaic of cultivated fields, settlements, local roads, and small industrial or storage areas. Agricultural intensity decreases westward, where desert and semi-desert land cover becomes increasingly dominant. Characteristic uses include irrigated cotton and wheat cultivation, orchards and horticultural plots (concentrated near Gijduvon, Vobkent, and northern Bukhara), shelterbelts and roadside vegetation, agricultural drainage/irrigation infrastructure, scattered farmsteads and seasonal agricultural structures.

Land Tenure: Land tenure is characterized predominantly by state ownership with long-term leasehold arrangements under the Land Code of Uzbekistan. There is no private freehold ownership in Uzbekistan. Agricultural land is held by registered farming enterprises under long-term state leases (typically 30–49 years), conferring use rights but not rights to sale, mortgage, or subdivision. Residential and commercial plots within settlements are generally held under permanent use rights or long-term lease registered in the State Cadaster. Roadside commercial establishments typically hold commercial leases. Irrigation and drainage infrastructure are state-owned, managed respectively by water management organizations. This tenure framework informs land acquisition modalities and compensation eligibility under the RAP (AIIB ESS2).

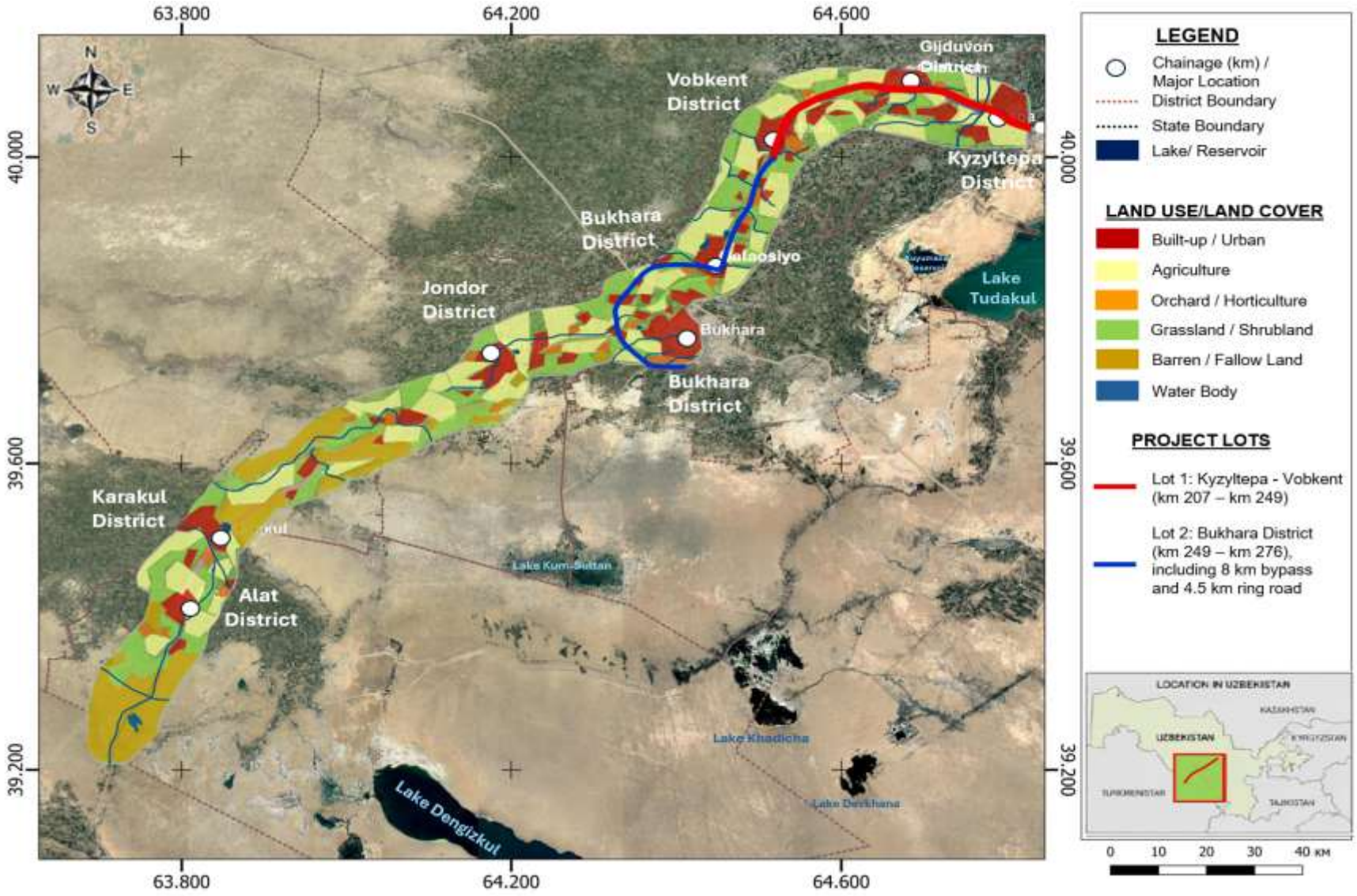


Figure 14: Land Use Map within 1 km Buffer Zone
(Source: ESIA)

Seasonal Land Use Variation: Land use within the agricultural zones exhibits notable seasonal variation linked to the irrigation calendar and predominant crop rotation practices, which is relevant to the timing and scheduling of construction activities. The primary cropping season extends from March–April (land preparation and planting) through September–October (harvest), with the period of maximum agricultural activity coinciding with the active irrigation season (April–October). Key seasonal patterns include:

- Cotton, the dominant industrial crop along the corridor, is planted in April–May and harvested in September–October, representing the period of highest labour and economic activity on agricultural plots.
- Winter wheat is sown in October–November and harvested in June, with fields fallow during July–September following harvest.
- Orchards and horticultural plots require year-round management, but peak labour demand occurs during spring flowering and summer, autumn harvest periods.
- Agricultural fields may be fallow during November–February, reducing agricultural land use sensitivity during this period.

Construction works within or adjacent to active agricultural areas should therefore be scheduled, where feasible, to minimize overlap with peak cropping periods, particularly cotton planting (April–May) and harvest (September–October), to reduce disruption to agricultural livelihoods and income

(b) Urban and Settlement Areas

Settlement and peri-urban land uses are concentrated near Kyzyltepa, Vobkent, Galaosiyo, Bukhara's peri-urban areas, containing residential neighborhoods, commercial facilities, public institutions, service infrastructure, local markets, and roadside businesses, generally concentrated along the existing M37 alignment. Bukhara city is by far the largest urban area along the corridor. Ribbon-type roadside commercial development is common within settlement areas, with higher land use intensity and concentration of community infrastructure.

Short-term commercial land leases (up to three years) are available through open electronic auctions (*E-AUKSION*) for light structures or seasonal trade. Seasonal trade and catering terraces are separately regulated under Cabinet of Ministers Resolution No. 478[19], allowing use of adjacent public areas without standard auction procedures via one-year renewable *E-ijara* contracts; light structures on public land are governed by the Land Code's temporary lease provisions for non-capital structures, which prohibit capital construction and require mandatory dismantling upon lease expiry.

[19] Cabinet of Ministers Resolution No. 478, 31 July 2025, On measures to further simplify the organization of the seasonal use of adjacent territories by business entities, https://lex.uz/docs/7659063 (accessed June 2026)

(c) Industrial and Infrastructure Land Use

Localized industrial and infrastructure land uses occur near Bukhara's urban areas and along sections of the existing M37 corridor, including transport depots, fuel stations, warehouses, utility corridors, railway crossings, irrigation infrastructure, and roadside service facilities. Notable features within the AoI include Bukhara International Airport, the Kagan railway junction, and various utility transmission corridors. The project also intersects existing regional transport infrastructure, including A380 highway, district roads, and access roads connecting settlements and agricultural/ cultivated areas.

(d) Water Bodies and Irrigation Infrastructure

Land use across the AoI is strongly shaped by irrigation systems essential for agriculture and settlement in this arid environment. Major surface water features include the Zarafshan River, Amu-Bukhara Canal and Parallel Canal, Vabkentdarya Canal, Chorbakr Canal, and Collector Canal after Sakovich, alongside numerous secondary/tertiary irrigation and drainage channels; important water bodies include Lake Tudakul and Kuyumazar Reservoir. These features serve irrigation regulation, drainage, and ecological functions and are identified as sensitive environmental receptors.

The rehabilitation works will be implemented predominantly within or adjacent to the existing transport corridor. Nevertheless, widening works, intersection upgrades, temporary construction facilities, and ancillary works may result in localized land use disturbance along adjacent roadside areas. The most sensitive land use receptors along the corridor include irrigated agricultural lands, settlement and peri-urban areas, roadside commercial zones, shelterbelt vegetation strips, and irrigation canals and associated infrastructure.

4.1.6.2. Land Use within Greenfield Bypass Sections

Unlike the rehabilitation sections, located predominantly within the existing M37 transport corridor, the proposed western bypass and missing link connection to the Bukhara Ring Road involve construction through agricultural and peri-urban lands outside the current highway footprint, with greater interaction with existing cadastral land plots, irrigation infrastructure, and agricultural land users.

The greenfield sections are located primarily west and southwest of Bukhara city within intensively cultivated irrigated agricultural areas. Land tenure is predominantly state-leased agricultural land, with a mixture of registered agricultural plots and individual land parcels. Existing land use within these sections is dominated by:

- irrigated agricultural fields under active cultivation (primarily cotton and wheat)
- cultivated land plots registered within the national cadastral system
- orchards and horticultural plots
- irrigation and drainage canals integral to local agricultural water management

- peri-urban residential areas and local settlement clusters
- local agricultural access roads and field tracks.

Review of cadastral mapping and satellite imagery (Figures 15–19) indicates the bypass and missing link sections traverse multiple registered agricultural land plots of varying sizes across six communities in Bukhara district: Shekhoncha, Dekhcha, Shergiron, Robotipoyon, Kulonkhona, and Zarmanok. The land use pattern is highly fragmented, reflecting the intensive irrigated agricultural structure characteristic of the Bukhara oasis peri-urban zone. The western bypass passes through peri-urban agricultural landscapes interspersed with expanding residential areas, with several alignment sections situated between existing neighborhoods, cultivated fields, and irrigation infrastructure, resulting in a mixed agricultural-residential pattern of high land use intensity. The missing link connection similarly traverses irrigated agricultural land and intersects multiple irrigation and drainage channels integral to local plot configuration and settlement distribution.

The inventory identifies 39 land plots in the greenfield bypass section (Bukhara district) that may be affected by the proposed greenfield bypass and missing link alignments. This information was validated by local authorities using the list of farmers and "*dehkans*" outlined in the following regulatory documents and physical inventories conducted by "Daverloyiha" Land Management Institute:

- Presidential Resolution No. F-21 dated 17 March 2025, regarding the Change of Land Use Category for Certain Agricultural Land Plots.
- Presidential Resolution No. F-15 dated 5 March 2026, regarding the Change of Land Use Category for Certain Agricultural Land Plots.
- Other relevant national and local regulations.

The cadastral inventory confirms that the greenfield bypass sections will require permanent withdrawal of productive agricultural land. The most sensitive land use receptors within the proposed greenfield sections are irrigated agricultural land plots, peri-urban residential areas, irrigation and drainage infrastructure, local agricultural access roads, and fragmented agricultural land holdings.

The RAP provides full assessment of impacts on affected households, land users, agricultural producers, businesses, and other project-affected persons, including land acquisition requirements, livelihood impacts, access restrictions, and impacts on productive assets, together with applicable compensation, livelihood restoration, and mitigation measures in accordance with national legislation and AIIB ESS2.



Figure 15: Cadastral Land Use Map – Western Bypass, Section I
(Source: Based on National Cadastral Mapping[20])



Figure 16: Cadastral Land Use Map – Western Bypass, Section II
(Source: Based on National Cadastral Mapping)



Figure 17: Cadastral Land Use Map – Western Bypass, Section III
(Source: Based on National Cadastral Mapping)

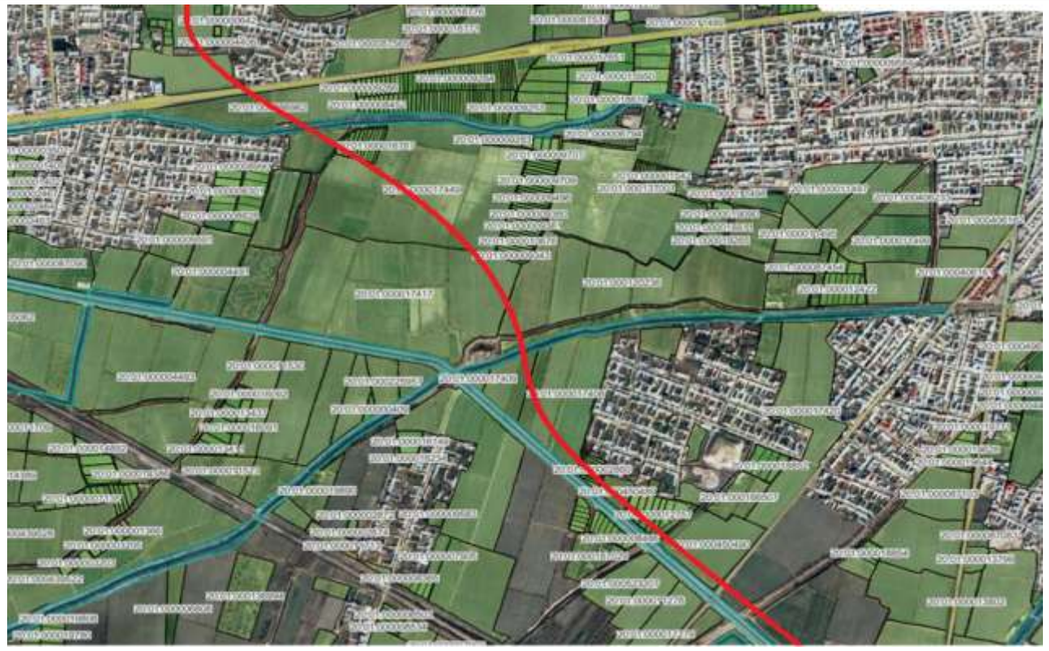


Figure 18: Cadastral Land Use Map – Missing Link to Bukhara Ring Road, Section I
(Source: Based on National Cadastral Mapping)

[20] Open Cadastral and Spatial Data Portal, Cadaster Agency under the National Committee of the Republic of Uzbekistan for Sustainable Urbanization and Housing Market Development, https://open.ngis.uz/#/openmap (accessed May 2026).



Figure 19: Cadastral Land Use Map – Missing Link to Bukhara Ring Road, Section II
(Source: Based on National Cadastral Mapping)

4.1.7. Water Resources

4.1.7.1. Regional Water Resources and Hydrological Conditions

The project corridor traverses the central part of the Bukhara oasis within Bukhara Province and extends into the Kyzyltepa district of Navoi Province. The regional hydrological environment is arid to semi-arid, with very limited natural surface water and strong dependence on regulated irrigation supplied primarily from the Zarafshan River basin through major canals and collector-drainage networks. Natural perennial rivers are generally absent across most of the project area; surface water is predominantly represented by artificial irrigation canals, drainage collectors, reservoirs, and seasonal conveyance structures, with availability strongly shaped by irrigation practice and seasonal agricultural demand.

The project corridor passes through Kyzyltepa district (Navoi Province) and the districts of Gijduvon, Vobkent, and Bukhara in Bukhara Province, forming part of the irrigated agricultural zone of western Uzbekistan, where irrigation infrastructure is essential to agriculture, settlements, and the local economy. The regional hydrological setting and major surface water features are presented in Figure 20.

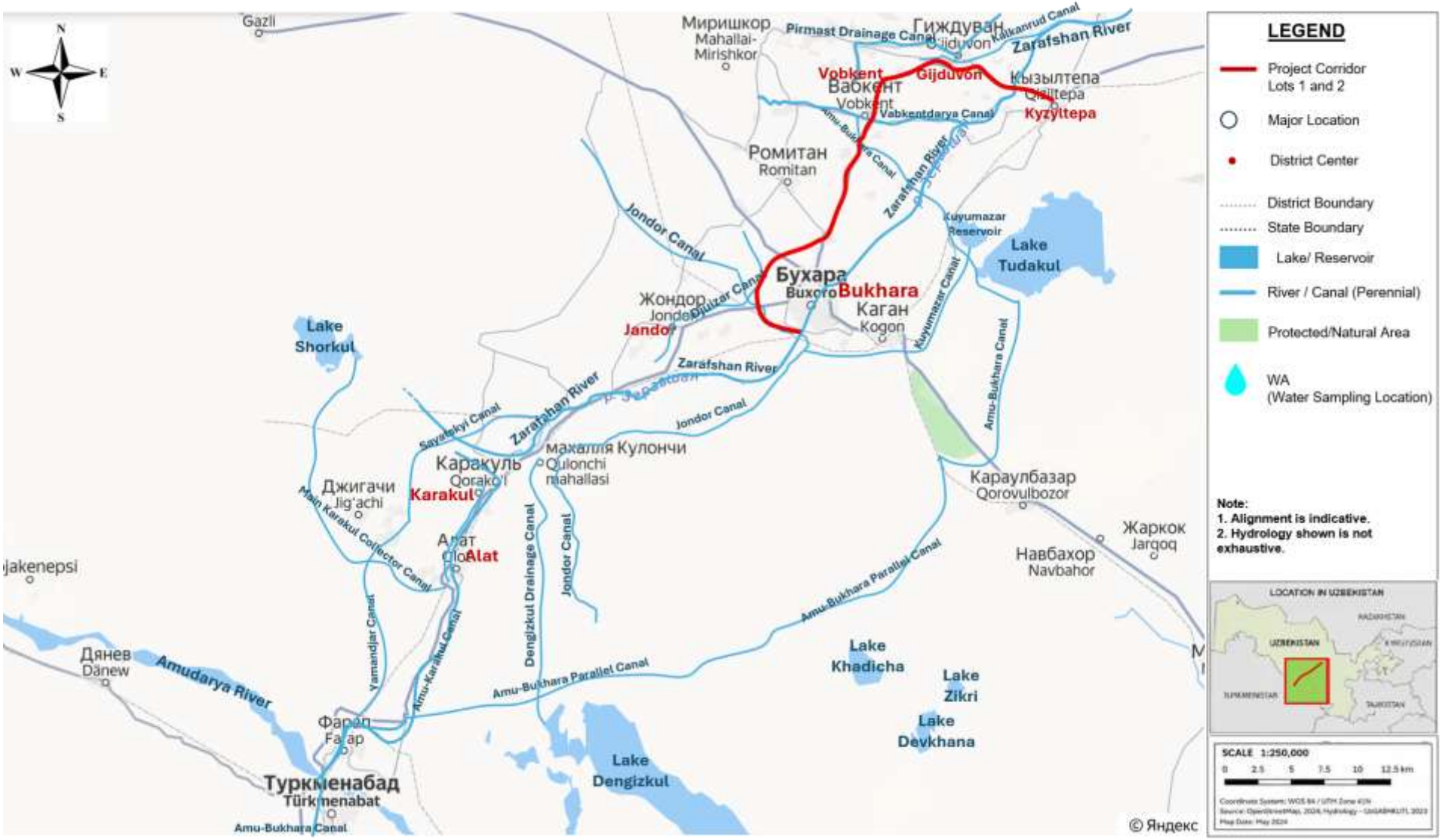


Figure 20: Major Surface Water Resources and Irrigation Infrastructure along the M37 Project Corridor
(Source: Yandex Map, ESIA)

The hydrological regime is dominated by an extensive network of irrigation canals and drainage collectors intersecting the project corridor, including the Amu-Bukhara Canal, Amu-Bukhara Parallel Canal, Kuyumazar Canal, Vabkentdarya Canal, Pirmast Drainage Canal, and Sayatskyi Canal, and numerous smaller secondary and tertiary irrigation canals. Several reservoirs and lakes, such as Tudakul Reservoir and Kuyumazar Reservoir are also located within the broader hydrological influence zone of the project area, performing irrigation regulation, drainage, and ecological functions.

These irrigation canals, drainage collectors, and hydraulic structures are critical to sustaining agricultural productivity in the Bukhara oasis and represent sensitive environmental and economic receptors where crossed by, or adjacent to, both the rehabilitation and greenfield sections of the Project, requiring consideration during detailed design and construction planning. Many canals operate seasonally, with peak flows during the spring and early autumn irrigation period and substantially reduced flows in smaller channels outside this season.

Groundwater conditions are similarly shaped by long-term irrigation: shallow water tables may occur locally near canals, fields, and drainage collectors, with commonly elevated mineralization due to natural salinity, evaporation, and irrigation return flows typical of desert and semi-desert western Uzbekistan.

Rehabilitation Section: The rehabilitation corridor crosses numerous irrigation canals, drainage channels, culverts, and water conveyance structures integrated into the regional irrigation network, including several crossings of the Zarafshan River. The river is the most significant natural watercourse in the project area and an important regional resource for downstream irrigation and agriculture.

Existing bridges over the Zarafshan River and other hydraulic structures along the corridor will be rehabilitated as part of the Project. The rehabilitation section is closely associated with established water management infrastructure, with irrigation canals, collector-drainage channels, and associated bridge and culvert structures forming part of the engineered irrigation network of the Bukhara oasis.

Proposed Bypass Section: The greenfield bypass west of Bukhara City and the missing link connection to the Bukhara Ring Road traverse agricultural land containing established, highly interconnected irrigation and drainage infrastructure supporting cultivated lands surrounding Bukhara city. Major surface water features intersecting or located near the bypass alignment include the Djuizar Canal, Chorbakr Canal, Shakhrud Canal, and associated smaller irrigation and drainage channels (Figures 21 and 22). Given the close spatial interaction between the proposed alignment and existing irrigation infrastructure, these canals and hydraulic systems represent particularly important receptors within the bypass section.



Figure 21: Surface Water Infrastructure along the Proposed Bypass Section
(Source: Yandex Maps, ESIA)

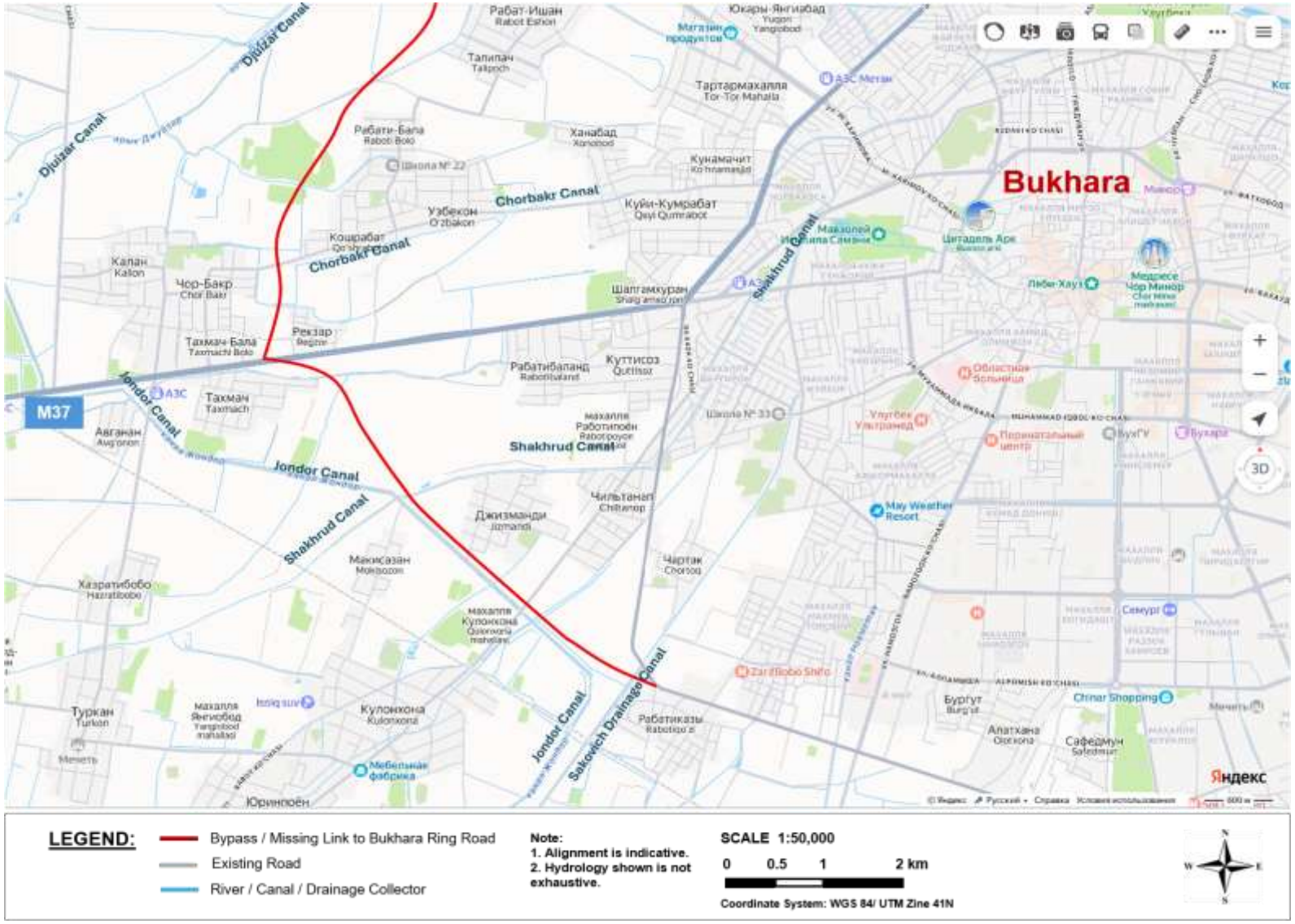


Figure 22: Surface Water Infrastructure along the Proposed Missing Link Connection to the Bukhara Ring Road
(Source: Yandex Maps, ESIA)

4.1.7.2. Surface Water Quality Monitoring

A baseline surface water quality monitoring campaign was conducted between 20 May and 1 June 2026 by the accredited laboratory of the Public Health and Wellbeing Service (Bukhara Province), a licensed environmental and sanitary laboratory. Fifteen water samples (stations WA1–WA15) were collected from irrigation canals, rivers, reservoirs, and drainage channels across the project-affected districts of Kyzyltepa (Navoi Province) and Gijduvon, Vobkent, and Bukhara (Bukhara Province), geo-referenced by GPS. Photographs of water sampling and laboratory testing are provided in Appendix 7.

The spatial distribution of the monitoring stations is presented in three complementary figures:

- Figure 23 (rehabilitation corridor, stations WA1–WA6, Kyzyltepa to Bukhara)
- Figure 24 (bypass/missing link cluster, stations WA10–WA15, Bukhara district)
- Figure 25 (full network, WA1–WA6, in regional hydrological and infrastructure context).

As illustrated in Figure 23, all sampled water bodies are embedded within the irrigated agricultural corridor, in sharp contrast to the surrounding arid desert, underscoring the region's dependence on managed irrigation and the environmental sensitivity of these canal systems as project receptors. A distinct cluster of six stations falls within the Bukhara district bypass and missing link area (Figures 24–25), reflecting the high density of irrigation and drainage infrastructure in this peri-urban agricultural zone and its close interaction with the proposed greenfield alignment.

All sampled water bodies are open surface water, sampled during the active irrigation season (peak-flow baseline conditions), across three mobilizations: 20–21 May 2026 (WA1–WA6, northern corridor; air 29–30°C, water 8–9°C). The elevated air temperature during the final round confirms sampling occurred during a seasonally critical period for irrigation demand and water quality stress; water temperatures remained stable throughout (8–9°C). GPS coordinates and sampling conditions for 12 stations (6 stations in bypass and 6 in rehabilitation corridor) are provided in Appendix 7.

Each sample was analyzed for a standard physicochemical suite, including odour, colour, turbidity, transparency, pH, ammonia, nitrite, nitrate nitrogen, total hardness, TDS (dry residue), chlorides, sulfates, calcium, magnesium, total iron, fluoride, and petroleum products, per applicable Uzbekistan standards.

Overall, all 12 GPS-referenced stations were assessed by the accredited laboratory as not meeting applicable sanitary norms for open water bodies, confirming that surface water quality across the entire corridor is already compromised under pre-project baseline conditions. Full station-by-station results and sampling station details are provided in Appendix 7.

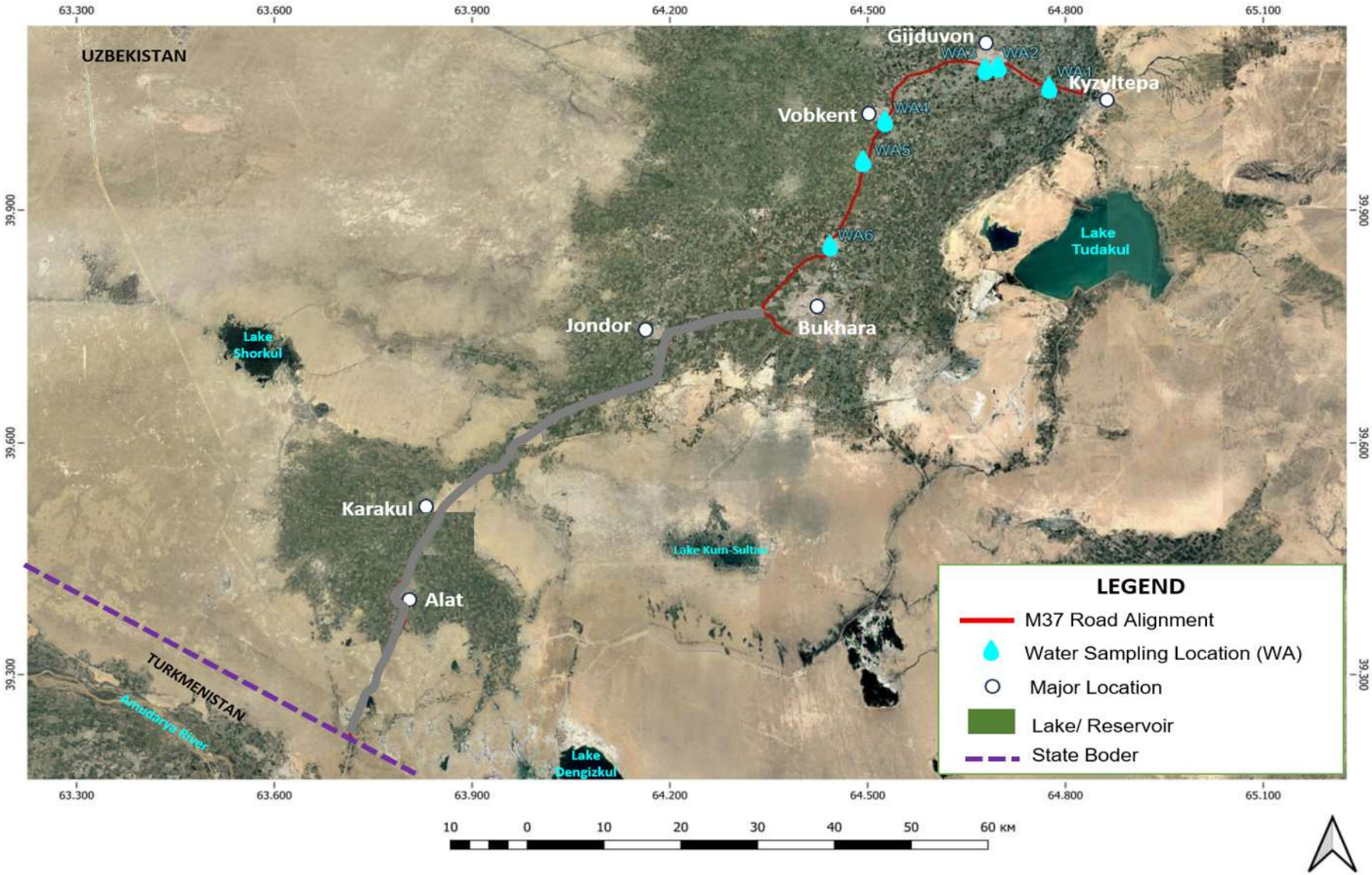


Figure 23: Satellite Imagery Overview of Surface Water Sampling Stations WA1–WA6 along the M37 Rehabilitation Corridor
(Source: Satellite imagery of 2024, ESIA)

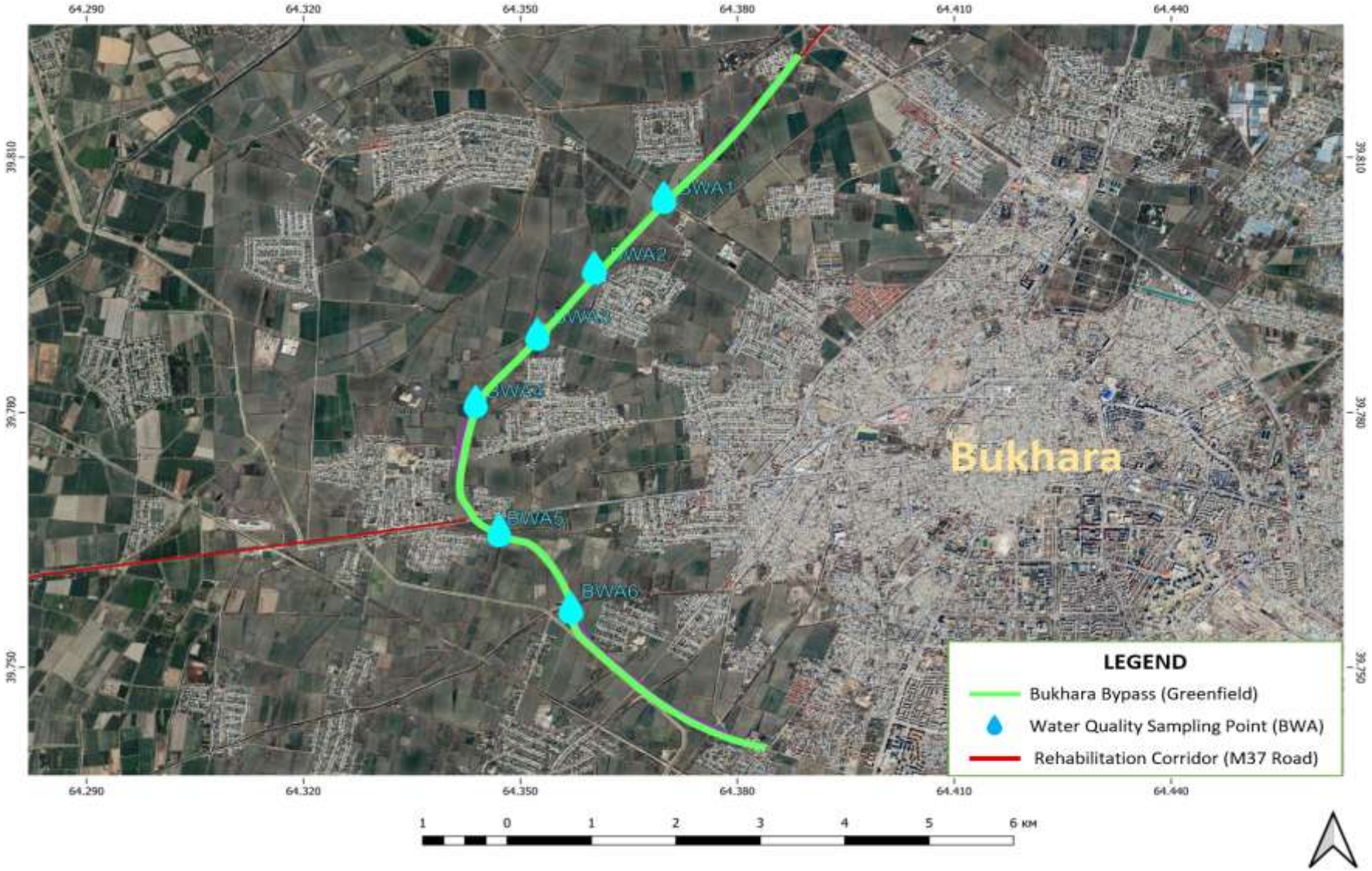


Figure 24: Satellite Imagery Overview of Surface Water Sampling Stations BWA1–BWA6 in Bypass Section
(Source: Satellite imagery of 2024, ESIA)

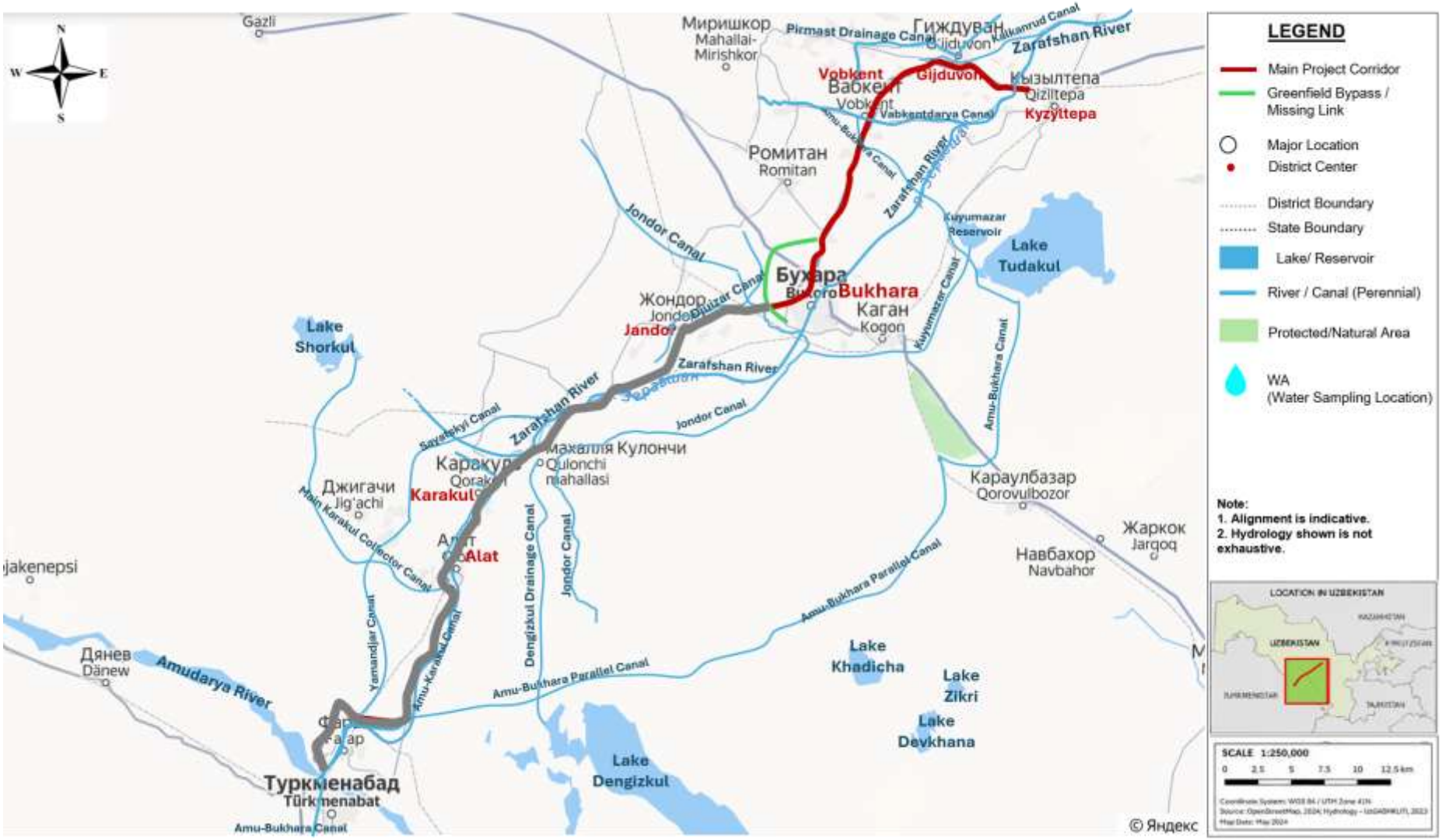


Figure 25: Surface Water Quality Monitoring Network (WA1–WA15) in Regional Hydrological and Infrastructure Context
(Source: Yandex Maps, 2024, ESIA)

Review of baseline survey and overall conditions revealed the following findings:

- Water quality across the network is consistently turbid and moderately to highly mineralized, reflecting the arid, irrigation-dependent character of the Bukhara oasis rather than project-related impact. All 12 stations showed uniform turbidity (15–16 mg/L), colour[21] (25–28°), and odour intensity (2 scores[22]), consistent with silt mobilization and sediment loading typical of irrigation-season canal water. Ammonia and nitrite nitrogen were below detection at all stations, confirming no acute organic or sewage pollution at baseline; nitrate nitrogen ranged from 12.2 mg/L (BWA3) to 17.7 mg/L (WA5), consistent with background agricultural fertilizer loading.
- Mineralization indicators, TDS, hardness, chlorides, and sulfates, were elevated network-wide, with 14 of 15 stations exceeding 1,000 mg/L TDS, reflecting cumulative Amudarya source-water salinity, arid evaporative concentration, irrigation return flows, and the region's gypsum-bearing geology. Station BWA3 (*Dekhcha Zahkash II, Bukhara bypass cluster*) recorded the highest values across all four indicators (TDS 1,216 mg/L; hardness 32.0 mg-ekv/L; chlorides 175.0 mg/L; sulfates 252 mg/L) and should be designated a priority monitoring station during construction, given its location within the active bypass/missing link zone. Elevated chlorides were also recorded at WA5 (152.6 mg/L) and BWA3 (175 mg/L), indicating localized saline drainage influence in bypass section.
- pH values ranged from 5.5 to 7.0, with a broad north-to-south decline apparent across most of the network, from neutral pH (7.0) at the northern rehabilitation stations to more acidic conditions (pH 5.5–6.0) at most of the Bukhara bypass cluster stations, with BWA5 (Canal II – Shergiron MFY, Bukhara District) recording the lowest pH of 5.5, with the exception of Station BWA3 (Dekhcha Zahkash II, Bukhara District), which recorded a neutral pH of 7.0, consistent with the buffering effect of its elevated hardness (32.0 mg-ekv/L, the highest across all bypass stations) maintaining neutral pH despite the highest dissolved mineral loading recorded across all monitored stations (TDS 1,216 mg/L). This gradient, together with the concentration of infrastructure-dense, more acidic and mineralized stations in the bypass cluster, indicates that the bypass/missing link section presents the greatest pre-existing water quality sensitivity along the corridor and warrants the most rigorous construction-phase canal protection, spill prevention, and sediment control measures.

[21] Colour is measured on the platinum-cobalt (Hazen) scale and expressed in degrees (°), where one degree corresponds to the colour produced by 1 mg/L of platinum in the form of chloroplatinate ion. The national standard permissible limit for drinking water colour is 20° (GOST 3351); the measured value of 25-28° marginally exceeds the drinking water standard, consistent with the surface irrigation canal character of the sampled water body. Colour at this level indicates pollution (not significant) and is typical of irrigation canal water carrying suspended fine sediment and organic matter.
[22] Odour intensity is assessed on a five-point organoleptic scale in accordance with GOST 3351 and Uzbekistan national sanitary standards, where: 0 = no odour detectable; 1 = very faint odour, detectable only by experienced analyst; 2 = faint odour, detectable by a non-specialist upon careful attention; 3 = noticeable odour, easily detected and likely to cause objection; 4 = distinct odour causing strong objection; 5 = very strong odour, making water completely unusable. A score of 2 (faint) is within the permissible limit for surface water used for irrigation purposes and is typical of irrigation canal water containing organic matter and fine suspended sediment. The permissible limit for drinking water is 2 points; for irrigation water supply the threshold is generally 3–4 points.

4.1.8. Air Quality

4.1.8.1. Existing Ambient Air Quality Conditions

The project corridor traverses arid and semi-arid territories of Navoi and Bukhara provinces (Kyzyltepa through Gijduvon, Vobkent, and Bukhara districts). Baseline ambient air quality reflects a combination of regional climatic factors (hot, dry summers, low precipitation, periodic dust and sandstorms contributing to naturally elevated background particulate concentrations), wind erosion from exposed soils and desert surfaces, and anthropogenic sources.

The anthropogenic source of air emissions along the existing M37 corridor is vehicular traffic. Existing traffic flows include passenger vehicles, heavy-duty freight transport, agricultural machinery, and international transit traffic. Localized emissions are concentrated near settlements, intersections, roadside commercial areas, and urbanized sections passing through or adjacent to Kyzyltepa, Gijduvon, Vobkent, and Galaosiyo. Traffic contributes both exhaust emissions (PM10, PM2.5, NO_x, SO_2, CO, VOCs) and fugitive dust from degraded pavement and unpaved shoulders.

Regional background air quality is additionally influenced by industrial and processing facilities located outside the road right-of-way but contributing to broader ambient conditions, particularly near Bukhara and Kagan districts, including the Bukhara Oil Refinery and associated hydrocarbon processing, gas and petrochemical infrastructure, cement and construction material production, metal processing, thermal power generation (e.g., Aksa Enerji thermal power plant), cotton processing, and paint/coating manufacturing (Figure 29). Agricultural activity (cultivation, harvesting, machinery movement, occasional residue burning) and rural household sources (small boilers, generators) contribute seasonal and localized variation.

These facilities are generally located outside the immediate road right-of-way but may contribute to broader regional background air quality conditions, particularly in industrialized and urbanized areas around Bukhara and Kagan districts. Due to the linear nature of the project corridor and the predominance of open desert and agricultural landscapes, localized traffic-related emissions remain the dominant air quality influence directly adjacent to the existing roadway.

Ambient air quality and meteorological monitoring in Uzbekistan is undertaken by Uzhydromet, which operates stations in Bukhara city, Karaulbazar, and Navoi city (Figure 26). The Bukhara city station generally shows compliance with national standards, while the Karaulbazar station has periodically recorded exceedances, associated with concentrated industrial and wastewater emission sources (Bukhara Oil Refinery, brick manufacturing, gypsum processing, and the Karaulbazar penal institution's wastewater facility).

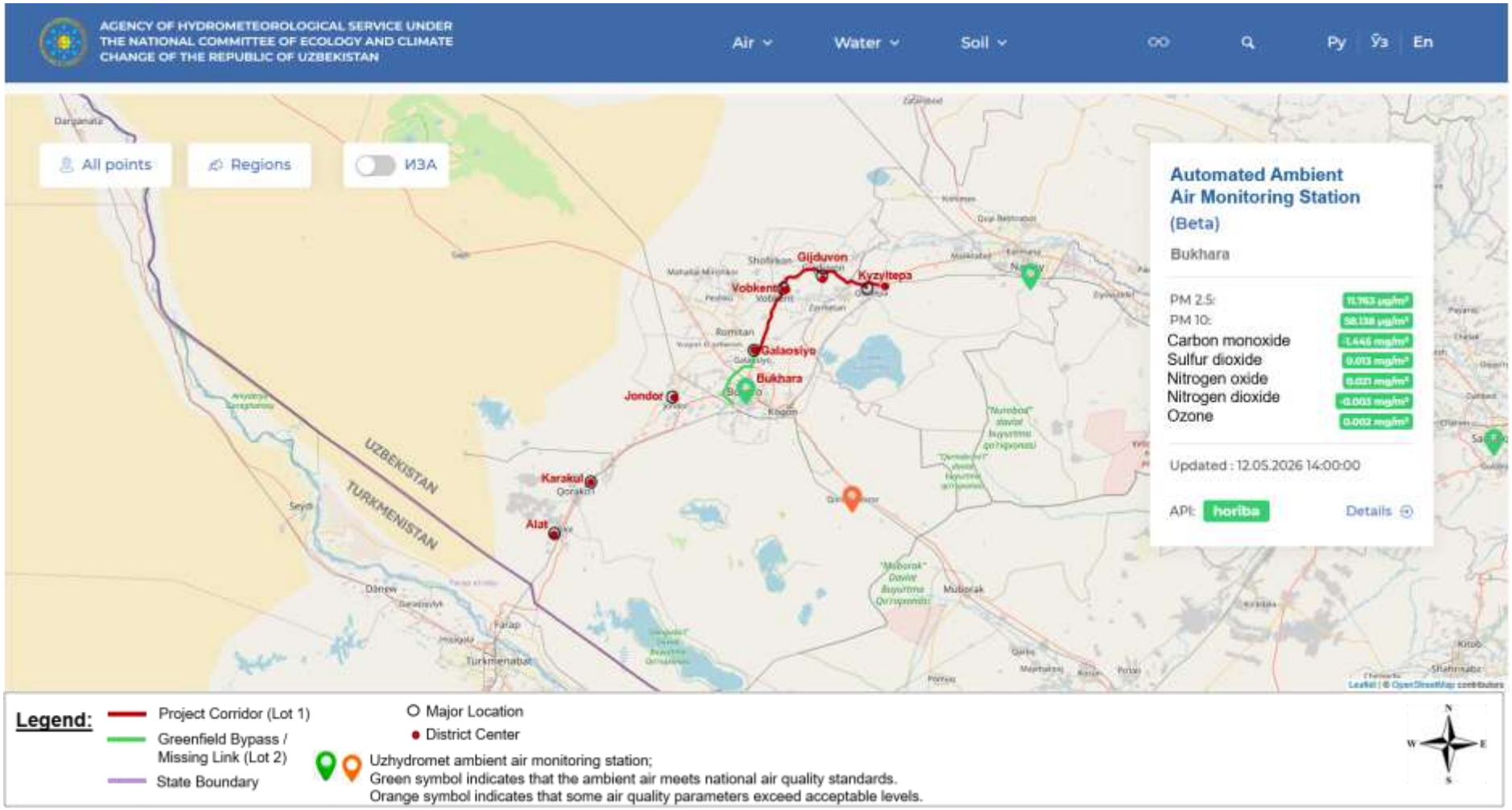


Figure 26: Location of Uzhydromet Ambient Air Quality Monitoring Stations in Relation to the M37 Project Corridor
(Source: Adapted from Uzhydromet Ambient Air Monitoring Platform[23] and Mapping Based on Project Alignment Data)

[23] Ambient Air Monitoring Platform. Agency of Hydrometeorological Service under the National Committee on Ecology and Climate Change of Uzbekistan. monitoring.meteo.uz (accessed May 2026)

To supplement national monitoring data, the IQAir platform was reviewed (Figure 27) for May 2026. Although ambient air quality in the project region was generally classified "moderate," PM2.5 was indicated as the principal pollutant of concern, exceeded the WHO annual air quality guideline value by approximately 1.8 times, and attributed to regional desert dust, dry conditions, traffic emissions, and localized industrial/urban sources.

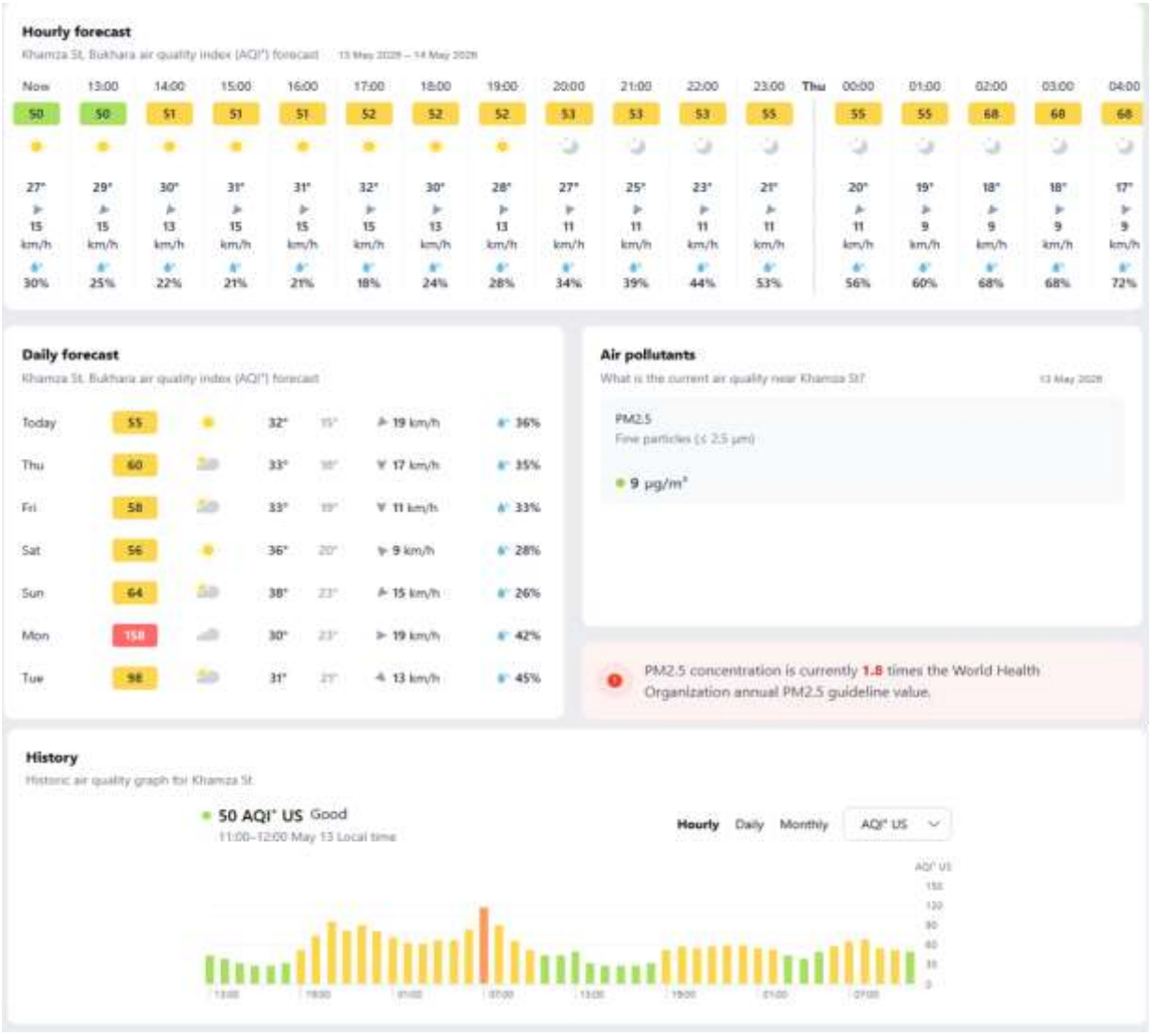


Figure 27: IQAir Ambient Air Quality Monitoring Information for Bukhara City
(Source: IQAir Platform[24])

Figure 28 shows the regional distribution of these conditions along the corridor, confirming predominantly "moderate" air quality with localized variation from dust transport, traffic, and industrial influences.

[24] IQAir. 2026, Real-time Air Quality and AQI Information for Bukhara, Uzbekistan. https://www.iqair.com/uzbekistan/bukhara/bukhara/khamza-st (accessed May 2026)



Figure 28: Regional Ambient Air Quality Conditions Along the M37 Project Corridor Based on IQAir Platform
(Source: IQAir Platform, May 2026 and Mapping Based on Project Alignment Data)

Baseline conditions differ between project components: along the rehabilitation corridor, localized transport emissions and re-suspended dust from degraded pavement/shoulders are dominant, given existing traffic and adjacent settlements; along the greenfield bypass (agricultural/peri-urban, west of Bukhara), existing traffic is comparatively lower, and baseline conditions are more influenced by natural dust generation, agricultural land use, and regional background emissions.

4.1.8.2. Area of Influence and Sensitive Receptors

The baseline review identified sensitive receptors near the M37 alignment and bypass area, including educational institutions, health facilities, residential communities, cultural/religious sites, agricultural areas, and irrigation infrastructure. The project Area of Influence (AoI) for air quality assessment is defined as: 500 m from the footprint for greenfield bypass sections and earthworks-intensive areas; 200 m from the rehabilitation corridor; and 200 m around auxiliary facilities (batching plants, borrow pits, camps, laydown areas).

More than 45 representative natural and human sensitive receptors (Appendix 8) were identified within or bordering the AoI, several within 50 m of the alignment, particularly in Kyzyltepa, Gijduvon, Vobkent, and Bukhara districts, including schools, pre-schools, colleges, and medical facilities; roadside settlements and households; agricultural lands, orchards, vineyards, and greenhouses; cultural/religious sites (mosques, cemeteries); and irrigation infrastructure associated with the Zarafshan River system. Along the bypass, sensitive receptors include nearby settlements, schools, medical facilities, greenhouses, agricultural land, and scattered residential properties. A representative register of sensitive receptors, including those located within 50 m of the corridor, is provided in Appendix 8.

4.1.8.3. Ambient Air Quality Monitoring (Gaseous Pollutants)

A 24-hour ambient air quality monitoring campaign was conducted 10–17 May 2026 (air temperature 19–30°C, clear weather) by the public health service laboratory at 10 locations (AAQ; spatial distribution is shown in Figure 29), selected for proximity to sensitive receptors (schools, colleges, medical facilities) and representative roadside exposure. Full station list, coordinates, and distances are provided in Appendix 9.

Monitoring covered carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen oxide (NO), ozone (O_3), and benzene (C_6H_6), using a Dräger X-am 5600 gas analyzers (infrared sensor for benzene; electrochemical sensors for the remaining gases).

The air temperature during the monitoring ranged from 19°C to 30°C in clear weather. Laboratory protocols and representative photographs from the monitoring campaign are provided in Appendix 9.

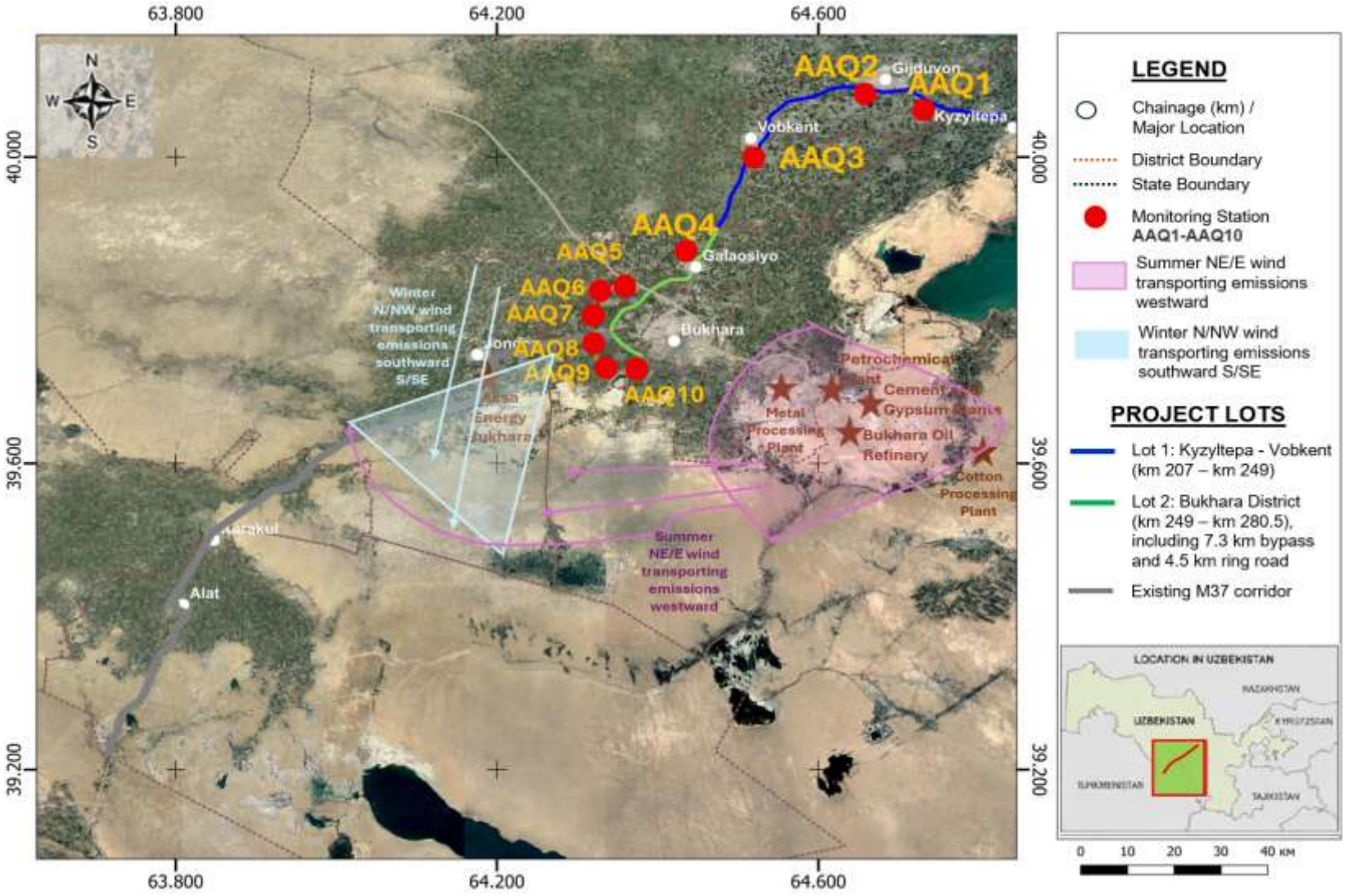


Figure 29: Ambient Air Quality Monitoring Locations Along the Rehabilitation and Bukhara Bypass Sections of the Project Corridor
(Source: Google Earth imagery and ESIA mapping based on ambient air quality monitoring locations and project alignment data, 2026)

24-hour ambient air quality monitoring campaign and comparison with applicable standards, and indicates the following:

- Carbon Monoxide (CO), Nitrogen Oxide (NO), and Ozone (O_3) concentrations were compliant with national standards (SanPiN No. 0053-23) at all 10 stations, well within permissible limits (CO: 0.046–0.058 mg/m³ vs. 3.0 mg/m³ MPC; NO: 0.0014–0.0017 mg/m³ vs. 0.25 mg/m³ MPC; O_3: 0.053–0.058 mg/m³ vs. 0.1 mg/m³ MPC), indicating limited traffic-related combustion accumulation during the monitoring period.
- Sulfur Dioxide (SO_2) concentrations (0.045–0.049 mg/m³) complied with the national MPC (0.05 mg/m³) but exceeded the WHO 24-hour guideline (0.040 mg/m³) at all 10 stations – the most significant finding of the gaseous monitoring campaign, likely reflecting combined traffic, domestic heating, and local industrial influences. The highest daytime reading (0.051 mg/m³) was recorded at AAQ10 (Bukhara Bypass, Kulonkhona community); nighttime concentrations at AAQ1 (0.035 mg/m³), AAQ2 (0.036 mg/m³), and AAQ6 (0.035 mg/m³) remained within the WHO guideline, while AAQ10 nighttime was at exactly the guideline threshold (0.040 mg/m³).
- Benzene (C_6H_6) concentrations (0.047–0.057 mg/m³) complied with the national standard (0.06 mg/m³) at all 10 stations but reached the highest proportions of the limit at AAQ2 (0.057 mg/m³, 95% of limit) and AAQ3 (24-hour average 0.055 mg/m³, 92%; daytime 0.057 mg/m³, 95%) in the rehabilitation section. Within the bypass cluster, AAQ5 and AAQ6 recorded the highest proportions at 87% and 88% of the limit respectively. These near-limit concentrations likely reflect the combined influence of existing traffic activity and localized combustion sources along the M37 corridor. Since benzene is a WHO Group 1 carcinogen with no established safe threshold, these concentrations warrant attention in the health impact assessment.

Full daytime, nighttime, and 24-hour test results for 10 stations on five parameters are provided in Appendix 9.

4.1.8.4. Particulate Matter Monitoring (PM 2.5 and PM10)

Particulate matter monitoring was conducted 5–8 June 2026 (under ambient conditions: ~30°C, ~51% relative humidity) by the Bukhara Department of the National Committee on Ecology and Climate Change, at 9 locations (PMM1–PMM9) distinct from the gaseous monitoring stations, spanning both rehabilitation and bypass sections (spatial distribution is shown in Figure 30). Measurements used EKOLAB[25] optical aerosol analyzers, cross-verified against gravimetric filter sampling. Laboratory protocols and photographs taken during particulate matter monitoring are provided in Appendix 9.

[25] ECOLAB Gaza Analyzer Specifications, NPP GazoAnalit LLC, Smolensk, Russia, https://gazoanalit.ru/catalog/perenosnye/ekolab-plyus/ (Accessed May 2026)

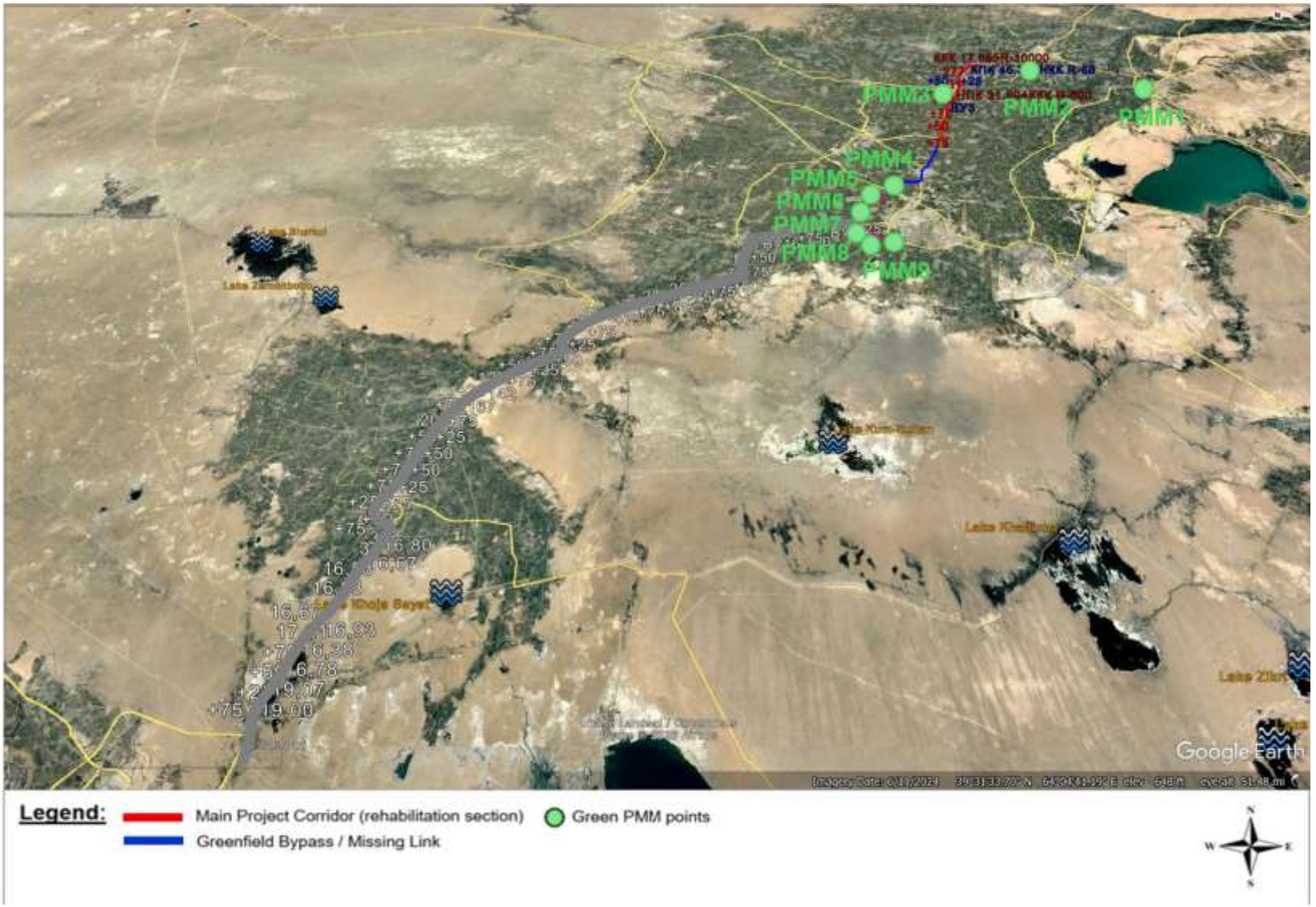


Figure 30: Particulate Matter Monitoring Locations Along the Rehabilitation and Bukhara Bypass Sections of the Project Corridor
(Source: Google Earth imagery and ESIA mapping based on ambient air quality monitoring locations and project alignment data, 2026)

Monitoring locations spanned both the rehabilitation and bypass sections of the M-37 corridor to ensure representative characterization of baseline conditions. Monitoring results are presented in Table 24.

Table 24: Particulate Matter Monitoring (PM 2.5 and PM10)

No.	Location	GPS Coordinates	Distance to M37 Road, meters	Parameter	24-hour Average Monitoring Concentration		Applicable Standard
					Day, mg/m³	Night, mg/m³	
1	Bukhara district, Aminobod settlement, next to the road	39°48'11.99"N 64°22'8.95"E	17	PM 2.5	0.001	0.002	0.015 mg/m³ (24-hour) (WHO Global Air Quality Guidelines)
				PM 10	0.003	0.005	0.045 mg/m³ (24-hour) (WHO Global Air Quality Guidelines)
2	Bukhara district, Rabot-Eshon settlement, next to the cemetery	39°47'44.56"N 64°21'39.57"E	45	PM 2.5	0.001	0.003	0.015 mg/m³ (24-hour) (WHO Global Air Quality Guidelines)
				PM 10	0.012	0.013	0.045 mg/m³ (24-hour) (WHO Global Air Quality Guidelines)
3	Bukhara district, Chor-Bakr settlement, nearest household	39°46'25.67"N 64°20'24.90"E	77	PM 2.5	0.003	0.002	0.015 mg/m³ (24-hour) (WHO Global Air Quality Guidelines)
				PM 10	0.002	0.004	0.045 mg/m³ (24-hour) (WHO Global Air Quality Guidelines)
4	Bukhara district, Shergiron community, nearest household	39°46'6.13"N 64°20'36.72"E	42	PM 2.5	0.001	0.003	0.015 mg/m³ (24-hour) (WHO Global Air Quality Guidelines)
				PM 10	0.004	0.005	0.045 mg/m³ (24-hour) (WHO Global Air Quality Guidelines)
5	Bukhara district, Takhmach settlement, near a residential area	39°45'53.92"N 64°20'46.67"E	86	PM 2.5	0.005	0.003	0.015 mg/m³ (24-hour) (WHO Global Air Quality Guidelines)
				PM 10	0.010	0.018	0.045 mg/m³ (24-hour) (WHO Global Air Quality Guidelines)
6	Bukhara district, Kulonkhona community, near a residential area	39°45'4.83"N 64°21'50.31"E	106	PM 2.5	0.003	0.006	0.015 mg/m³ (24-hour) (WHO Global Air Quality Guidelines)
				PM 10	0.011	0.014	0.045 mg/m³ (24-hour) (WHO Global Air Quality Guidelines)
7	Kyzyltepa district, Buston microdistrict,	40° 3'12.51"N 64°49'30.85"E	42	PM 2.5	0.002	0.004	0.015 mg/m³ (24-hour) (WHO Global Air Quality Guidelines)

No.	Location	GPS Coordinates	Distance to M37 Road, meters	Parameter	24-hour Average Monitoring Concentration		Applicable Standard
					Day, mg/m³	Night, mg/m³	
	Kyzyltepa District Technical School No.2			PM 10	0.005	0.008	0.045 mg/m³ (24-hour) (WHO Global Air Quality Guidelines)
8	Gijduvon district, Gulistonobod community, residential area	40° 5'22.44"N 64°39'32.56"E	5	PM 2.5	0.010	0.013	0.015 mg/m³ (24-hour) (WHO Global Air Quality Guidelines)
				PM 10	0.012	0.017	0.045 mg/m³ (24-hour) (WHO Global Air Quality Guidelines)
9	Vobkent district, Shakarkent community, residential area	40° 1'19.05"N 64°31'53.03"E	6	PM 2.5	0.005	0.007	0.015 mg/m³ (24-hour) (WHO Global Air Quality Guidelines)
				PM 10	0.013	0.018	0.045 mg/m³ (24-hour) (WHO Global Air Quality Guidelines)

(Source: Laboratory analysis, 2026 and Harmonized Framework for Air Quality Monitoring,

The survey revealed the following:

- All PM2.5 and PM10 daytime and nighttime concentrations were below the WHO 24-hour benchmarks (0.015 mg/m³ and 0.045 mg/m³ respectively) at 9 stations:
  - PM2.5 ranged 0.001–0.010 mg/m³ (day) and 0.002–0.013 mg/m³ (night), with the highest values at PMM8 (Gijduvon, near the road), approaching 67–87% of the WHO benchmark, consistent with its proximity to the carriageway and higher local traffic density.
  - PM10 ranged 0.002–0.017 mg/m³ (day) and 0.004–0.018 mg/m³ (night), highest at PMM5 (Bukhara) and PMM9 (Vobkent), remaining at ~40% of the benchmark.
- Night-time concentrations consistently exceeded daytime values for both pollutants at most stations, attributable to reduced atmospheric mixing height and lower wind speeds overnight, typical of arid, low-wind conditions.
- The PM2.5:PM10 ratio was consistently low (PM2.5 = 15–60% of PM10), indicating the coarse fraction dominates baseline particulate loading, characteristic of wind-blown dust and road resuspension rather than combustion-derived fine particles.

PM monitoring was conducted over a continuous 24-hour period at each station. The distances from the M37 road vary considerably across stations, from 5 m (PMM8, Gijduvon) to 106 m (PMM6, Kulonkhona), which directly influences the relative contribution of road traffic emissions to measured concentrations. Stations located within 20 m of the carriageway (PMM1 at 17 m, PMM8 at 5 m, PMM9 at 6 m) capture near-road concentrations where traffic-related resuspension is the dominant source;

stations at 40–106 m represent a more mixed signal of traffic, residential, and background sources.

The monitoring period coincides with weekday working days during the early summer dry season, when traffic volumes on the M37 corridor are broadly representative of typical operating conditions. However, the monitoring was not specifically designed to capture peak traffic hours as a discrete period – the 24-hour average approach integrates both peak (daytime) and off-peak (nighttime) conditions, which is consistent with the WHO 24-hour guideline methodology applied. As a result, peak-hour concentrations at roadside stations may be underestimated relative to the 24-hour average.

The very low PM2.5:PM10 ratio (15–60%) across all stations indicates that the dominant particulate fraction is coarse and consistent with wind-blown dust and road surface resuspension, rather than combustion-derived fine particles. This strongly suggests that background dust mobilization from arid soils in summer conditions contributes substantially to measured PM10 concentrations, particularly at stations further from the road. The baseline results should therefore be interpreted as characterizing combined ambient and traffic-influenced conditions under typical early-summer operating conditions. These limitations are relevant to the construction-phase impact assessment, which conservatively assumes that construction activities will add to this existing baseline loading rather than displace it.

4.1.8.5. Summary of Baseline Air Quality Conditions

Baseline ambient air quality conditions along the M37 corridor reflect arid desert climatic conditions, regional dust transport, existing traffic, agricultural activity, and localized industrial and urban emission sources within Bukhara and Navoi provinces. Project-specific monitoring (May–June 2026 at 19 locations by two different state licensed laboratories), supplemented by Uzhydromet and IQAir regional data, indicates the following baseline air quality conditions:

- Gaseous pollutants (24-hour monitoring, May 2026, stations AAQ1–AAQ13): Concentrations of CO, NO_2, O_3, and benzene complied with national standards at all 10 stations. SO_2 concentrations (0.044–0.058 mg/m³) were below the national 24-hour MPC of 0.05 mg/m³ but exceeded the WHO 24-hour benchmark of 0.040 mg/m³ at all stations, representing the only pollutant-level exceedance recorded. Benzene concentrations at several stations approached 82–95% of the national MPC, with the highest proportions recorded at AAQ2 and AAQ3 in the rehabilitation section; given benzene's WHO Group 1 carcinogen classification with no established safe threshold, these near-limit concentrations warrant attention.
- Particulate matter (24-hour monitoring, June 2026, Stations PPM1–PPM9): All 9 stations (PPMs) complied with WHO 24-hour PM2.5 (0.015 mg/m³) and PM10 (0.045 mg/m³) benchmarks. The highest PM2.5 values were recorded at PMM8

(Gijduvon, 5 m from road), approaching 87% of the WHO benchmark at night, consistent with road proximity and local traffic density. Regional IQAir data indicate annual mean PM2.5 exceeds the WHO annual guideline by ~1.8 times, confirming particulate matter as a longer-term regional concern despite short-term compliance during the monitoring campaign.

- Spatial pattern: Gaseous pollutant concentrations, particularly SO_2 and benzene, are broadly comparable between the rehabilitation and bypass sections, reflecting the influence of existing M37 traffic along the full corridor. The rehabilitation section shows slightly higher benzene concentrations consistent with higher traffic density in the northern corridor, while the bypass section shows the highest individual SO_2 daytime reading (AAQ10, 0.051 mg/m³). Particulate matter concentrations reflect both road proximity and background dust loading from arid soils, with the coarse fraction dominant at all stations, indicating wind-blown dust as a major contributor alongside traffic-related resuspension..

4.1.9. Noise and Vibration Level

4.1.9.1. Existing Acoustic Conditions

The project corridor traverses predominantly rural and peri-urban environments within Bukhara Province and the Kyzyltepa district of Navoi Province, where the existing acoustic environment is shaped by road traffic, local commercial activity, agricultural operations, railway movements in certain locations, and community activity within settlements along the M37 corridor.

The existing M37 highway already functions as a major regional and international transport corridor linking central Uzbekistan with the neighboring regions, and traffic-generated noise, from heavy goods vehicles, intercity buses, agricultural machinery, and passenger vehicles, represents the dominant continuous anthropogenic noise source across most rehabilitation sections, particularly in settlements where residential buildings, shops, roadside services, and markets are located close to the road edge. Secondary sources contribute localized temporal variation, particularly within district centers and densely settled roadside communities, including roadside commercial activity, local markets, agricultural and irrigation equipment, localized industrial/workshop activity, railway operations where present, and community and household activity.

The acoustic environment varies considerably along the project corridor depending on surrounding land use, traffic density, settlement patterns, and distance from the roadway. The following four general acoustic zones were identified:

- Urban and peri-urban sections near Bukhara city, Galaosiyo city, Gijduvon, and Vobkent district centers, characterized by higher traffic intensity and mixed commercial activities.

- Rural settlements and villages located directly adjacent to the existing M37 alignment, where traffic-related noise represents the principal anthropogenic noise source.
- Agricultural and irrigated land areas with generally low background noise conditions except for intermittent agricultural equipment operations.
- Desert and sparsely populated sections characterized by relatively low ambient noise levels and limited continuous anthropogenic activity.

The greenfield bypass and missing link sections west of Bukhara city currently pass through areas with comparatively lower baseline noise conditions than the existing M37 corridor because of reduced traffic intensity and lower levels of urban development. Existing acoustic conditions in these areas are primarily associated with local roads, agricultural machinery, scattered rural activities, and occasional vehicle movements.

Vibration conditions along the existing M37 corridor are associated mainly with heavy vehicle movement on deteriorated pavement, localized pavement defects, heavy agricultural machinery, construction/maintenance activity, and railway operations where the corridor intersects or approaches rail infrastructure. Baseline vibration was characterized qualitatively through field observations, pavement condition review, and identification of dominant vibration-generating activities; the most pronounced conditions occur within settlements immediately adjacent to the roadway, where pavement deterioration and heavy traffic increase dynamic loading and ground vibration. Within the proposed greenfield bypass and missing link sections, baseline vibration is presently limited, associated mainly with local roads, agricultural machinery, and occasional vehicle movement, reflecting the absence of a major transport corridor within the proposed alignment.

4.1.9.2. Area of Influence and Sensitive Receptors

The AoI for noise and vibration reflects the expected spatial extent of potential construction- and operation-related acoustic impacts associated with rehabilitation of the existing M37 corridor and development of the new bypass and missing link sections:

- Noise AoI: up to 200 m from the road alignment and associated construction activities, particularly where sensitive receptors are present.
- Vibration AoI: within 50–100 m of the alignment, depending on proximity to heavy construction activity, sensitive structures, pavement conditions, and local ground characteristics.

The 200 m noise AoI reflects the distance beyond which traffic-generated and construction noise from a road corridor of this type is expected to attenuate to levels approaching or below applicable daytime standards under typical propagation conditions, given geometric spreading, ground absorption, and intervening terrain/vegetation, absent significant topographic amplification or highly reflective surfaces. The AoI encompasses the construction footprint and operational corridor;

adjacent settlements and roadside communities; temporary construction facilities; haul routes and material transport corridors; temporary access roads and detours; areas surrounding bridge works, drainage structures, and intensive earthworks; and areas potentially affected by operational traffic noise.

Sensitive receptors were identified through field verification, land use review, and stakeholder consultation during environmental and social screening, with concentrations identified in Kyzyltepa, Gijduvon, Vobkent, Bukhara district centers and large settlements. Several receptors, including schools, pre-schools, healthcare facilities, and residential properties, are located within less than 50 m of the project corridor; educational and community receptors occur within 100 m in several settlements; natural receptors (irrigation canals, drainage collectors, river crossings) frequently occur immediately adjacent to the alignment, in some cases within 5 m. A representative register of sensitive receptors within the noise AoI, including exact distances, is provided in Appendix 8.

The highest sensitivity to noise and vibration impacts is expected in settlements immediately adjacent to the existing M37 corridor, where receptors are positioned close to the carriageway and traffic already contributes to elevated ambient noise conditions.

4.1.9.3. Noise Level Monitoring Campaign

A dedicated ambient noise and vibration monitoring campaign was conducted 10–17 May 2026 along representative sections of the project corridor by a certified, accredited laboratory of the Public Health and Wellbeing Service, in accordance with GOST 23337-2004, GOST 20444-2014, and SanPiN No. 0008-20. Monitoring locations were selected based on proximity to sensitive receptors, representation of different land-use conditions, existing traffic intensity, rehabilitation versus bypass sections, and potential exposure to construction/operational noise.

10 monitoring stations (N1–N10) were established, 4 stations along the rehabilitation corridor, sited near educational and community facilities in Kyzyltepa, Gijduvon, Vobkent, Galaosiyo, and 6 stations within the proposed Bukhara bypass, sited at roadside sections, a cemetery, and nearby settlements/households. Spatial distribution is shown in Figure 31.

Full station coordinates and distances to the corridor are provided in Appendix 10. For rehabilitation stations, distances are measured to the existing M37 road boundary; for bypass stations, to the proposed bypass alignment boundary. The selected monitoring locations therefore reflect the distribution of sensitive receptors identified during screening and provide representative baseline coverage for both rehabilitation and greenfield bypass sections of the project corridor.

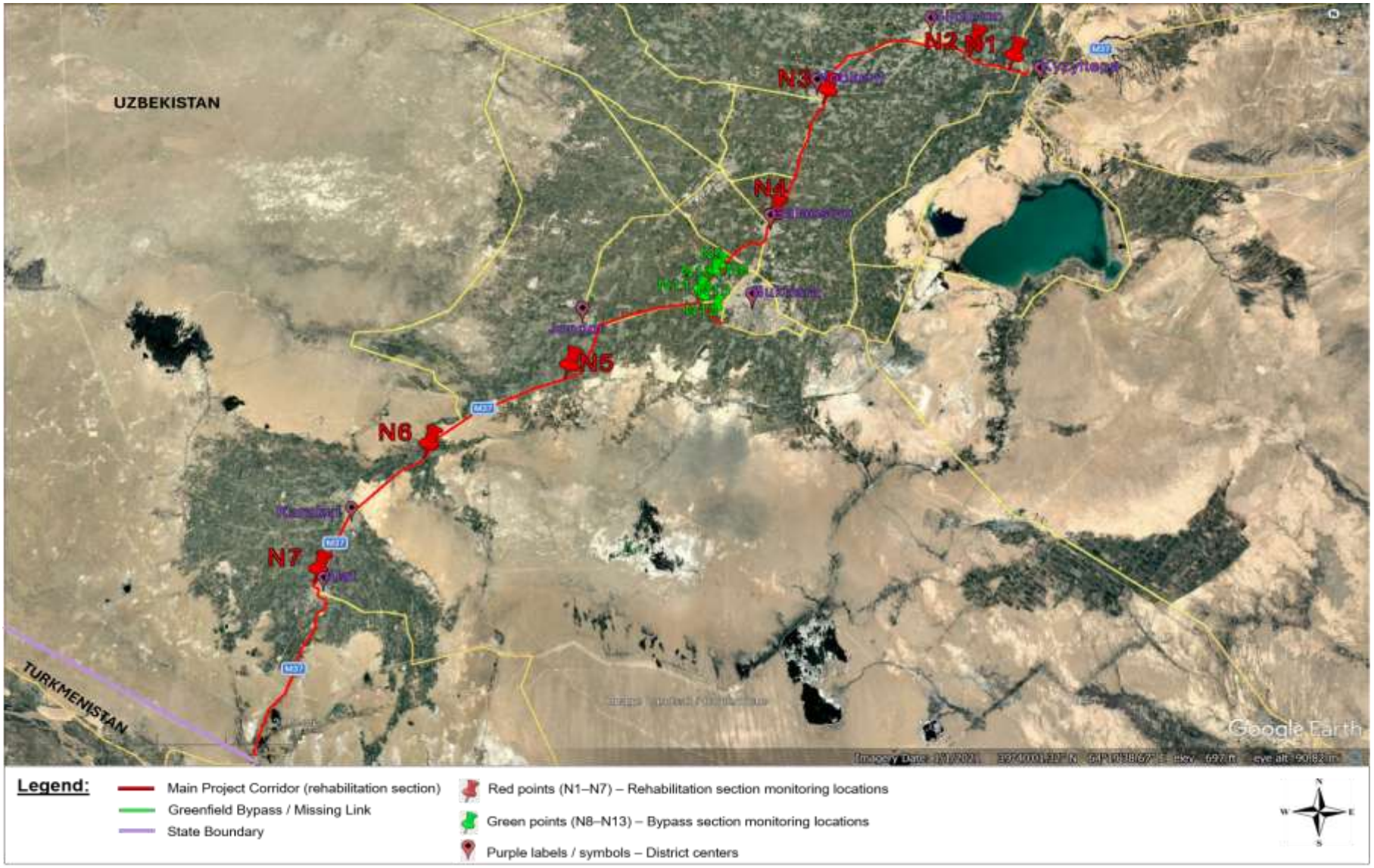


Figure 31: Noise Monitoring Locations Along the Rehabilitation and Bukhara Bypass Sections of the Project Corridor
(Source: Google Earth imagery and ESIA mapping based on noise monitoring locations and project alignment data, 2026)

Measurements were conducted over a full 24-hour period at each location (daytime 07:00–23:00, nighttime 23:00–07:00), using a calibrated ASSISTENT TOTAL[26] sound level analyzer. Equivalent continuous sound pressure levels (LAeq) were recorded at hourly intervals (24 hourly values per location; three 15-minute replicate measurements), together with octave-band sound pressure levels (31.5 Hz–8000 Hz), yielding energy-equivalent LAeq averages of 16 daytime and 8 nighttime readings per station per SanPiN No. 0008-20. The primary noise source was classified as fluctuating, non-continuous transport noise at all locations. Full octave-band data, laboratory protocols, and photographs are provided in Appendix 10.

Table 25 summarizes the results of the 24-hour monitoring campaign.

Table 25: Summary of 24-Hour Noise Monitoring Results

Station	Component	Daytime LAeq (dBA)	Nighttime LAeq (dBA)	LAmax (dBA)	Compliance Summary
N1	Rehabilitation	51.8	36.8	76.4	▪ LAeq compliant ▪ LAmax exceedance +6.4 dBA
N2	Rehabilitation	51.7	36.8	78.5	▪ LAeq compliant ▪ LAmax exceedance +8.5 dBA
N3	Rehabilitation	50.1	36.9	77.1	▪ LAeq compliant ▪ LAmax exceedance +7.1 dBA
N4	Rehabilitation	37.3	36.8	65.4	Fully compliant
N5	Bypass	51.9	36.8	78.6	▪ LAeq compliant ▪ LAmax exceedance +8.6 dBA
N6	Bypass	37.3	36.8	65.4	Fully compliant
N7	Bypass	45.7	38.2	73.3	▪ LAeq compliant ▪ LAmax exceedance +3.3 dBA
N8	Bypass	37.2	36.8	58.5	Fully compliant
N9	Bypass	37.2	36.8	69.3	Fully compliant
N10	Bypass	37.2	36.8	69.0	Fully compliant

(Source: Laboratory protocols provided by the Public Health Service laboratory and ESIA compilation, 2026)

Monitoring results were compared against reference levels (Section 3.5.2.2):

- LAeq: 55 dBA daytime / 45 dBA nighttime (SanPiN No. 0008-20, WHO-aligned)
- LAmax: 70 dBA daytime / 60 dBA nighttime (SanPiN No. 0008-20).

The monitoring results indicated the following findings:

- Across all 10 monitoring locations, both daytime and nighttime LAeq values remained within the applicable harmonized reference levels of 55 dBA for daytime and 45 dBA for nighttime. Daytime LAeq values ranged from 37.2 dBA to 51.9 dBA, while nighttime LAeq values ranged from 36.8 dBA to 38.2 dBA.

[26] ASSISTENT TOTAL Sound Level Analyzer, Specifications, "NTM-Zashchita" Instrument-making company, https://ntm.ru/products/87/7382 (accessed May 2026)

- Within the rehabilitation sections, daytime LAeq levels were generally higher than at most bypass locations, reflecting the influence of existing M37 corridor traffic and settlement proximity to the carriageway. The highest daytime LAeq values in the rehabilitation sections were recorded at N1, N2, N3 (50.1-51.8 dBA), but these remained below the 55 dBA daytime reference level.
- Despite full LAeq compliance, short-duration LAmax exceedances above the 70 dBA daytime reference level were recorded at 5 of 10 stations (N1, N2, N3, N5, N7).
  - Within the rehabilitation sections, these are consistent with the M37's established transport function, attributable to passing heavy goods vehicles, intercity buses, and agricultural machinery, and do not indicate sustained LAeq exceedance.
  - At bypass stations N5 and N7, consultations with Public Health Service officers who conducted the monitoring identified four contributing sources during the spring campaign:
    (i) Wind noise from prevailing northerly/northwesterly winds across open, unshielded terrain (consistent with the wind climate described in Section 4.1.1.5), capable of producing instantaneous peaks of 65–75 dBA.
    (ii) Episodic agricultural machinery operations: tractors, irrigation pumps, and tillage equipment active during the spring season.
    (iii) Residential construction activity observed near certain monitoring points, including masonry work, concrete mixing, and delivery vehicles.
    (iv) Individual vehicle pass-by events on local roads intersecting the bypass alignment, which generate isolated LAmax peaks even at low traffic volumes; particularly at N5, situated only 13 m from the bypass boundary.
- Hourly LAeq profiles confirm these events were discrete and non-continuous: average daytime LAeq at N5 (51.9 dBA) and N7 (45.7 dBA) remained well within the 55 dBA reference level throughout the monitoring period.
- Nighttime monitoring results across all monitoring locations remained below the applicable 45 dBA nighttime reference level (36.8–38.2 dBA), confirming generally quiet and compliant baseline nighttime acoustic conditions throughout both the rehabilitation and bypass sections.

4.1.9.4. Summary of Baseline Noise and Vibration Conditions

Baseline acoustic conditions along the M37 corridor are compliant with applicable daytime and nighttime LAeq standards at all 10 monitored locations, with the rehabilitation sections showing greater influence from existing traffic activity and the bypass section characterized by quieter agricultural and peri-urban background conditions at most locations, with the exception of N5 (Aminobod settlement, 13 m from the bypass boundary), which recorded daytime LAeq and LAmax levels comparable to the busiest rehabilitation stations.

Short-duration LAmax exceedances at 5 of 10 stations (N1, N2, N3 in the rehabilitation section; N5 and N7 in the bypass section), attributable to heavy vehicle movements in

rehabilitation sections and a combination of wind, agricultural machinery, construction activity, and local road traffic in bypass sections, are episodic rather than indicative of persistent baseline acoustic concern.

Baseline vibration conditions are most pronounced in settlements immediately adjacent to the existing roadway (pavement deterioration and heavy traffic loading) and presently limited within the greenfield bypass area, reflecting the absence of an established major transport corridor there.

4.2. Biological Environment

4.2.1. Regional Ecological and Bio-Geographical Setting

The M37 corridor traverses western Uzbekistan within Bukhara Province and the adjoining Kyzyltepa district of Navoi Province, situated within the Turan Lowland biogeographic region and predominantly within the Kyzylkum Desert ecosystem, a major Central Asian desert system spanning Uzbekistan, Kazakhstan, and Turkmenistan, characterized by highly continental climate, low precipitation, strong seasonal temperature fluctuation, high evapotranspiration, and sandy, clayey, saline, and alluvial desert substrates.

Regional ecological conditions reflect the interaction between natural desert systems and extensive irrigated agriculture associated with the Zarafshan River basin, producing a mosaic of desert/semi-desert ecosystems, irrigated oasis and agricultural ecosystems, and canal-associated anthropogenic habitats. The broader Kyzylkum region includes sandy, clay/loess, and saline (solonchak) desert types, with locally developed riparian and wetland habitats along river valleys and irrigation systems; within Bukhara Province, natural vegetation and habitat patterns have been substantially modified by long-term agricultural use, irrigation expansion, settlement, and transport infrastructure.

From an ecological perspective, the M37 corridor traverses two principal landscape settings:

(i) Irrigated agricultural and oasis landscapes dominate most of the rehabilitation corridor, particularly within Gijduvon, Vobkent, and Bukhara districts, highly modified, characterized by cultivated fields, settlements, irrigation canals, drainage collectors, planted shelterbelts, and roadside vegetation. Irrigation is fed primarily by the Zarafshan River, which crosses the rehabilitation corridor within Lot 1 (Kyzyltepa–Gijduvon section) and supplies the canal network along the northern and central corridor.
(ii) Desert and semi-desert landscapes are present at the margins of the Bukhara oasis, becoming more prominent beyond the Lots 1–2 corridor toward the southwest.

A defining ecological feature of the region is the extensive irrigation and drainage network linked to the Zarafshan River basin. Although anthropogenic in origin, these systems create localized habitat heterogeneity within an otherwise arid landscape; canal margins, reed patches, irrigated vegetation, and shelterbelts function as ecological corridors supporting movement, feeding, and refuge for birds, reptiles, small mammals, and aquatic/semi-aquatic species.

The wider region also contains biodiversity-sensitive wetland and desert ecosystems, contributing to regional ecological connectivity. While the M37 alignment does not directly cross such areas, their proximity and hydrological connectivity through irrigation and drainage systems warrant consideration within the biodiversity assessment.

Overall, the regional ecological setting is characterized by a predominantly modified desert–agricultural mosaic in which ecological sensitivity varies spatially according to habitat condition, water availability, vegetation structure, and connectivity with surrounding desert and wetland systems.

4.2.2. Protected Areas, KBAs and Biodiversity-Sensitive Areas

A desktop biodiversity screening was undertaken to identify protected areas, biodiversity-sensitive receptors, and ecological features of potential relevance to the project, using:

- the International Union for Conservation of Nature (IUCN) Red List
- Integrated Biodiversity Assessment Tool (IBAT)
- World Database on Protected Areas (WDPA)
- Ramsar Sites Information Service database
- Key Biodiversity Areas (KBAs) and Important Bird Areas (IBAs)
- available national biodiversity and protected area information, including the Red Book of Uzbekistan and the Uzbekistan national protected areas network.

The desktop screening buffer applied a 5 km radius around the project alignment for identification of protected areas and biodiversity-sensitive receptors directly relevant to project interactions, consistent with IFC PS6 requirements for assessment of project interactions with protected areas and biodiversity-sensitive features. The spatial distribution of designated protected areas and other biodiversity-sensitive receptors in the vicinity of the project corridor is presented in Figure 32 and Figure 33.

Screening revealed that M37 corridor (marked as red area in Figure 32) does not directly traverse any protected area, Ramsar Site, or formally designated KBA, for either the rehabilitation corridor or the greenfield bypass.

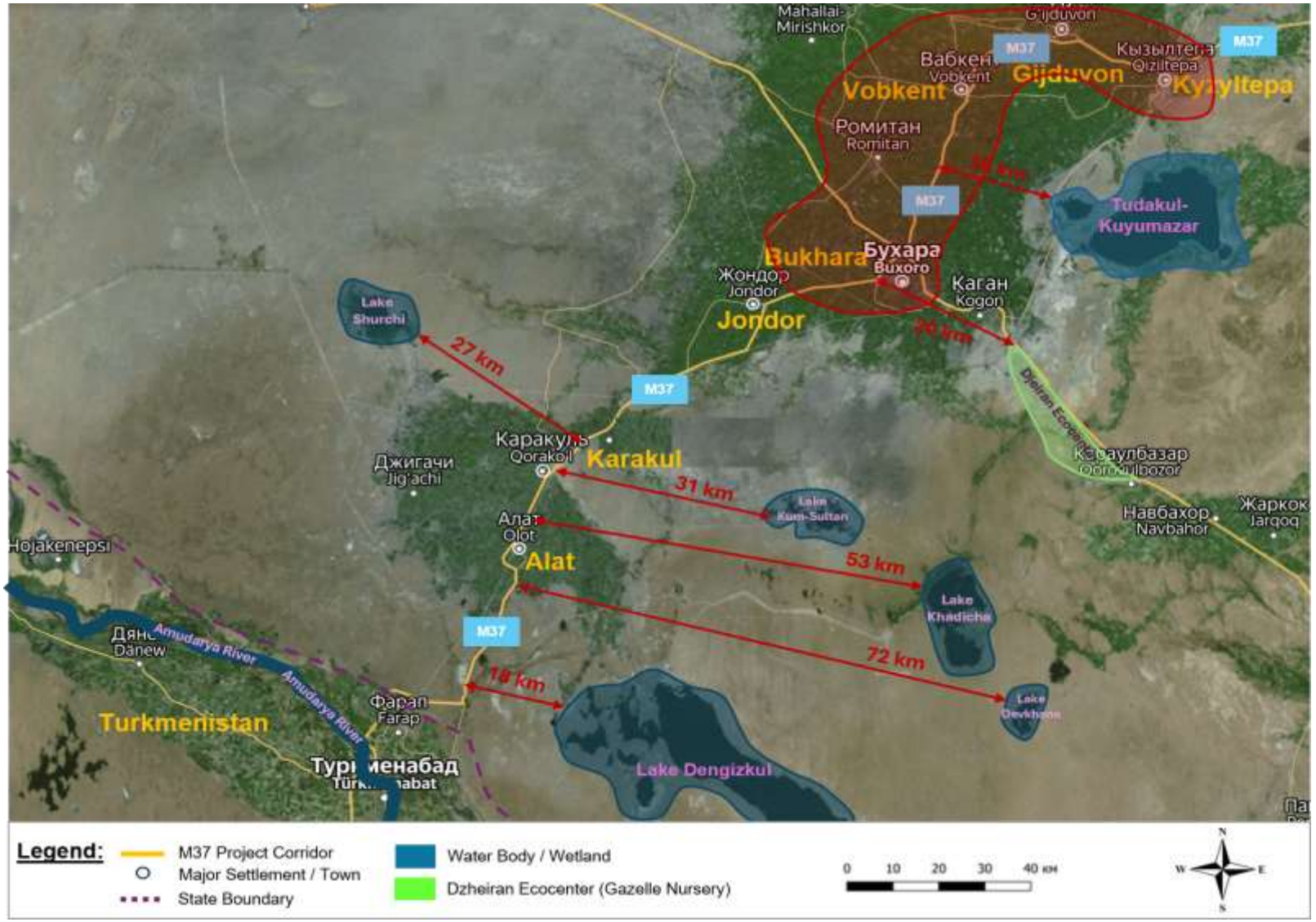


Figure 32: Biodiversity-Sensitive Areas and Ecological Receptors Relative to the M37 Corridor
(Source: Google Satellite Imagery and ESIA GIS Compilation)

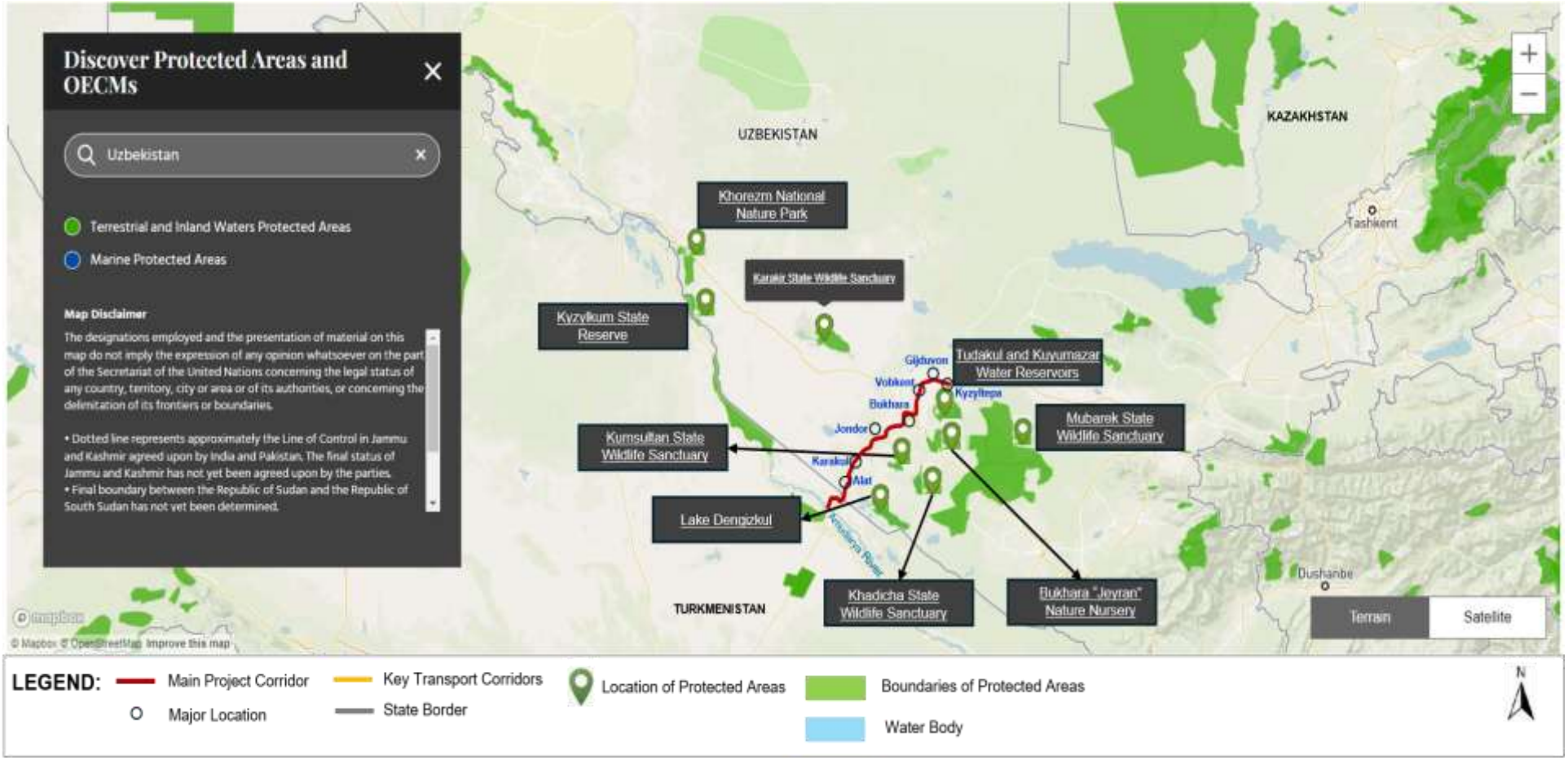


Figure 33: Formally Designated Protected Areas and OECMs in the Vicinity of the M37 Project Corridor
(Source: World Database on Protected Areas (WDPA), protectedplanet.net, accessed 2026)

Given the distances involved and the modified character of the corridor, none of the identified protected areas are directly impacted, threatened, or at risk of significant indirect impact (habitat loss, noise, dust, hydrological connectivity).

The most significant regional receptor is Lake Dengizkul, supporting migratory and resident waterfowl on the Central Asian Flyway (CAF). No direct hydrological pathway between project-affected canal crossings and Lake Dengizkul was identified.

Desktop WDPA screening additionally identified five state wildlife sanctuaries and one nature nursery in the broader region (Table 26), none within the 5 km screening buffer or intersected by the alignment.

Table 26: Summary of Identified Biodiversity-Sensitive Receptors

Biodiversity Receptor	Designation / Protection Status	Approximate Distance to M37	Ecological Relevance
Tudakul–Kuyumazar Reservoir Complex	Ramsar Wetland of International Importance (Ramsar Site)	~18–20 km (northeast of Bukhara)	Waterbird habitat, aquatic ecosystem; shoreline and wetland habitats; *Climacoptera merkulowiczii* (Red Book) documented in surrounding area
Lake Dengizkul	Ramsar Wetland of International Importance (Ramsar Site)	~18 km (south of Alat)	Migratory bird habitat; hydrological connectivity via drainage canal network; most significant regional receptor
"Djeiran Ecocenter" Nursery	National Nature Nursery (WDPA-listed)	~35 km (southeast of Bukhara city)	Designated breeding facility for *Goitered Gazelle* (Red Book); free-ranging individuals may occur in eastern AoI
Lake Kum-Sultan Wildlife Sanctuary	State Wildlife Sanctuary (WDPA-listed)	~31 km (south of project corridor)	Desert and semi-desert ecosystem; desert fauna habitat; water-dependent fauna
Lake Khadicha / State Wildlife Sanctuary	State Wildlife Sanctuary (WDPA-listed)	~53 km (south of project corridor)	Desert wetland and shoreline habitats; waterbirds and water-dependent fauna
Lake Shurchi	Undesignated – ecologically important water body	~27 km	Local desert wetland habitat; water-dependent fauna
Lake Devkhana	Undesignated – ecologically important water body	~72 km	Regional desert wetland feature; migratory and water-dependent fauna
Lake Karakyr State Wildlife Sanctuary	State Wildlife Sanctuary (WDPA-listed)	~80 km (northwest of project corridor)	Northern Kyzylkum desert ecosystem; desert fauna and flora of the Kyzylkum region

(Source: World Database on Protected Areas (WDPA), protectedplanet.net (accessed 2026); Ramsar Sites Information Service; IUCN; Red Book of Uzbekistan; ESIA GIS analysis. Distances are approximate straight-line distances from the nearest point of the M37 project alignment)

Ecological connectivity features (canals, shelterbelts, irrigated vegetation) are addressed in Section 4.2.4.3. Desktop findings informed survey prioritization: enhanced effort was directed to the bypass (greenfield character) and canal crossings.

4.2.3. Biodiversity Survey

Biodiversity baseline studies combined desktop and field-based approaches following the Inception Report methodology and IFC PS6 requirements, covering baseline ecological conditions, habitat types, flora/fauna documentation, species/habitats of conservation significance, and ecological connectivity. The biodiversity Area of Influence comprised a 250 m core survey corridor (extended to 500 m at canals and shelterbelts), considering a broader desktop screening area.

Desktop screening incorporated IUCN, IBAT, Ramsar, KBA/IBA, WDPA, GBIF, Wetlands International WPE (Central Asian Flyway) data, Uzbekistan Red Book records, and citizen-science data: 63 flora and 45 fauna occurrence records from iNaturalist/GBIF within project districts (Appendix 11), and 45–48 waterbird and migratory species with flyway range overlap from the WPE database (Appendix 11).

Field surveys (spring 2026, March–May) used a spatially differentiated approach: (i) the bypass corridor (*greenfield, ten survey sections*) received the most intensive coverage: transects, cross-transects, fixed sampling points, habitat, vegetation mapping and (ii) the rehabilitation corridor received targeted, risk-based surveys at ecologically relevant locations (interchanges, canal crossings, shelterbelt and tree-management zones), reflecting its already-modified, established transport-corridor character; general sections were covered by screening-level drive-through/walkover surveys.

Taxa-specific methods (avifauna, mammals/bats, herpetofauna, aquatic fauna, vegetation) used non-invasive transect, observation, and plot-based techniques; full protocols are in Appendix 11. Seasonal timing (spring) maximized detectability of migratory/breeding birds and flowering flora; findings were supplemented by desktop datasets and regional literature to address single-season survey limitations.

A joint tree and asset inventory was conducted by the Design Institute and ESIA survey team (24–30 April 2026) along Lots 1-2 of the rehabilitation corridor to quantify trees and structures within the construction footprint at specific design chainage locations; this inventory is presented in Appendix 11 and informs the compensatory replanting and asset replacement provisions of the RAP and ESMP.

4.2.4. Habitat Characterization and Ecological Connectivity

4.2.4.1. Bypass Corridor Habitats (Sections 1–10)

Habitat conditions across all ten bypass survey sections were assessed through satellite imagery interpretation, field verification, and vegetation/fauna mapping. Figure 34 provides overview of flora species recorded and habitat characterization in bypass sections.

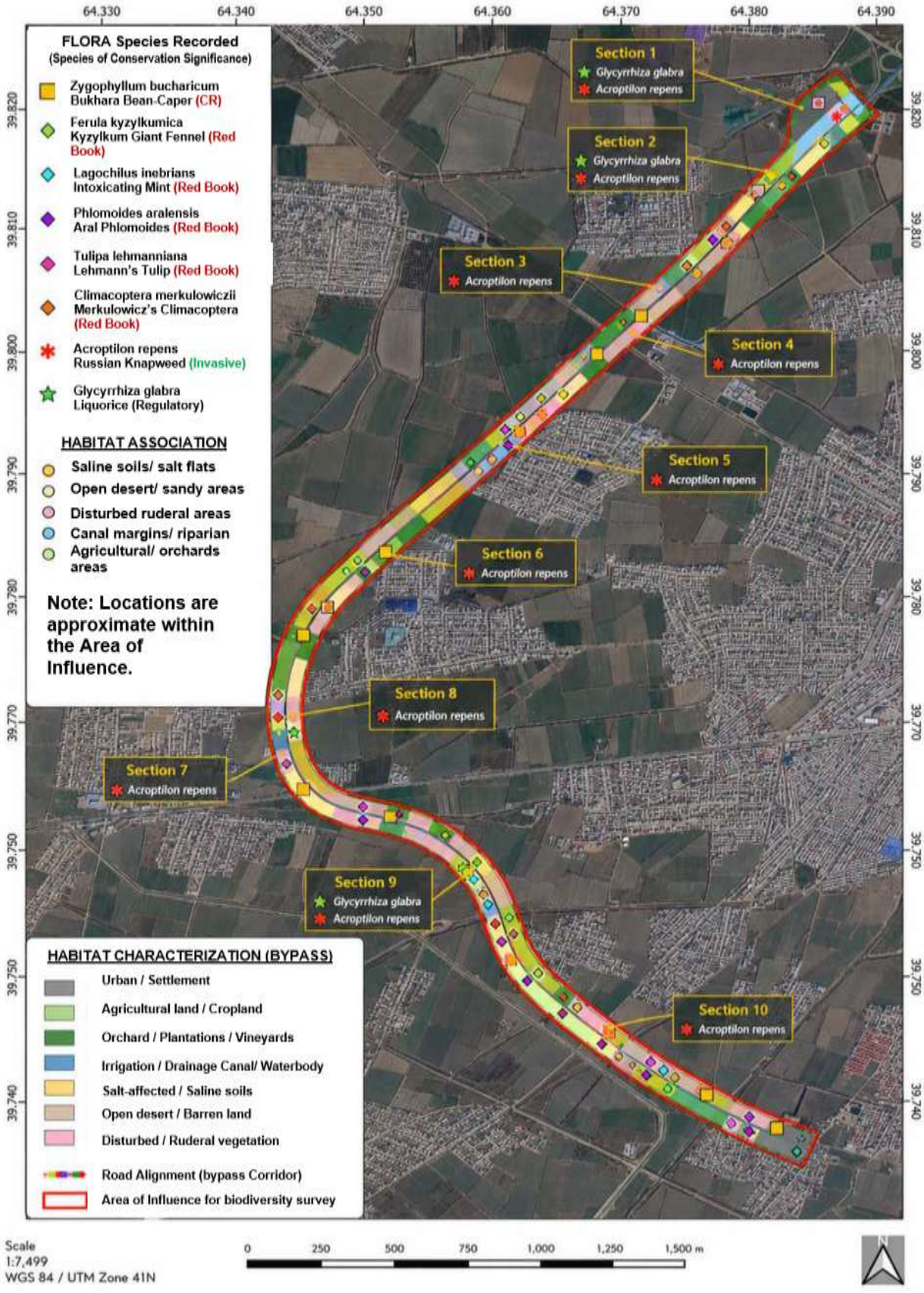


Figure 34: Flora Species Recorded and Habitat Characterization (Bypass Corridor)
(Source: ESIA biodiversity survey, spring 2026)

Full section-by-section vegetation maps, IFC PS6 classification maps, and complete tree and plant species inventories (with abundance counts) are provided in Appendix 11.

All ten bypass sections traverse an intensively cultivated, irrigated agricultural landscape typical of the Bukhara oasis, dominated by wheat, cotton, orchards (apricot, apple, cherry, plum, peach, quince), vineyards, and mulberry plantations, interspersed with reed-dominated irrigation and collector canals (*Phragmites australis* dominant) and settlement-associated disturbed land. Ecological connectivity is limited to canal margins, field-boundary tree lines, and orchard/vineyard patches functioning as stepping-stone habitat within a fragmented agricultural matrix. All ten sections are classified as Modified Habitat under IFC PS6, and no Natural Habitat or Critical Habitat was identified in any section.

Table 27: Bypass Section Summary

Section	Dominant Habitat	Conservation Flags	Classification
1.	Irrigated cropland, orchards, mulberry	---	Modified Habitat
2.	Wheat, mulberry	Glycyrrhiza glabra (canal margins); transient Zarafshan Pheasant	Modified Habitat
3.	Cropland, orchards, vineyards	---	Modified Habitat
4.	Wheat, cotton, orchards	Bukhara Tit (foraging)	Modified Habitat
5.	Wheat, lucerne, settlement-adjacent	Bukhara Tit (foraging)	Modified Habitat
6.	Wheat, lucerne, vineyards, orchards	---	Modified Habitat
7.	Orchards, vineyards, wheat	Bukhara Tit (foraging); major reed canal	Modified Habitat
8.	Cotton, mixed crops	---	Modified Habitat
9.	Wheat, vineyards, orchards	Aquatic fauna (canal convergence)	Modified Habitat
10.	Wheat, orchards, two cemeteries	Acroptilon repens (INVASIVE); aquatic fauna; link to Bukhara Ring Road	Modified Habitat

(Source: ESIA biodiversity field survey, spring 2026; full species data in Appendix 11)

Species richness per section, with conservation-significant flora highlighted, is presented in Figure 35 (Sections 1–10); total recorded trees by bypass section (individual abundance, rather than species richness) is provided in Figure 36.

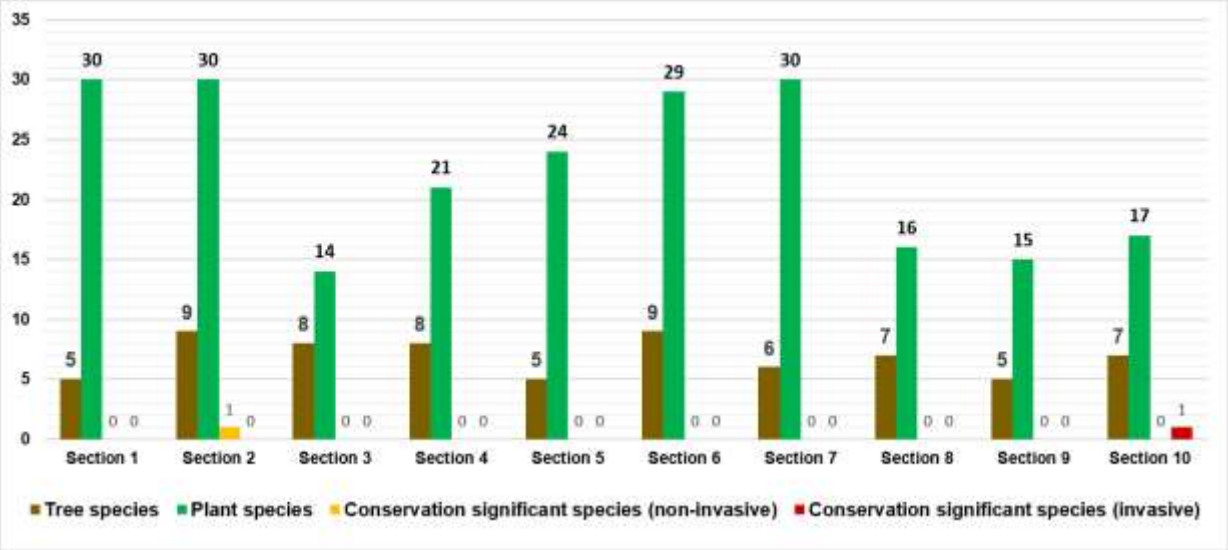


Figure 35: Tree and Plant Species by Bypass Section
(Source: ESIA biodiversity survey, spring 2026)

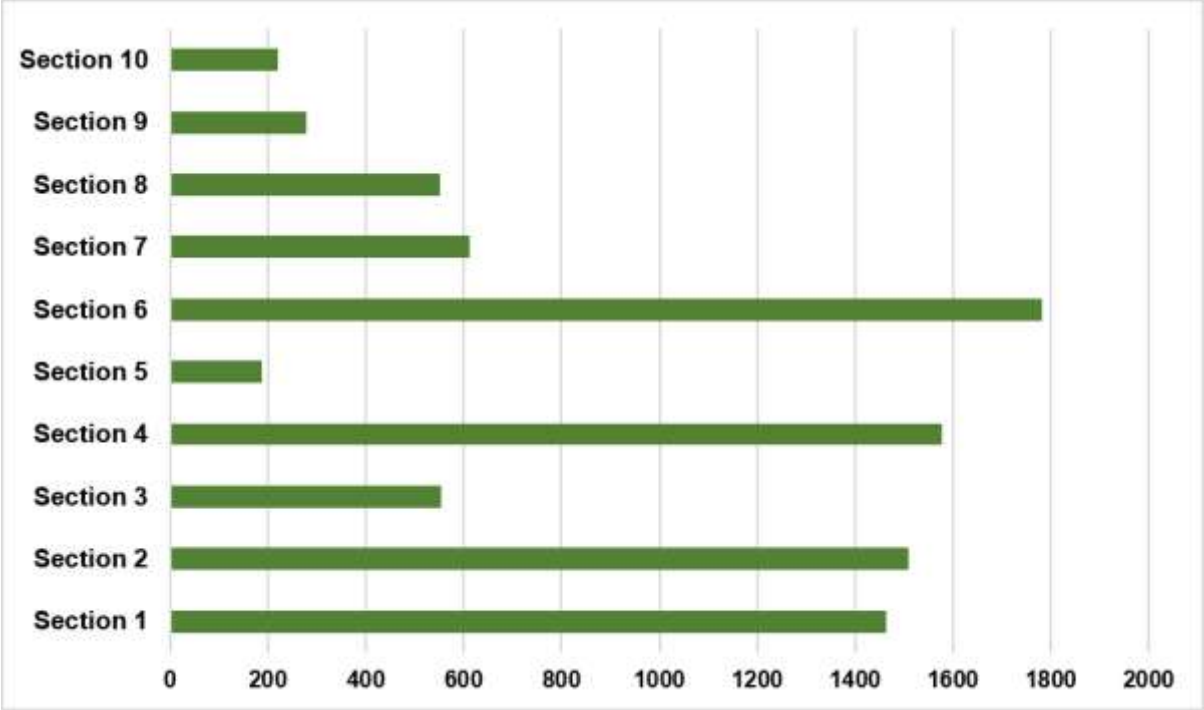


Figure 36: Total Recorded Trees by Bypass Section (individual abundance, not species richness)
(Source: ESIA biodiversity survey, spring 2026)

4.2.4.2. Rehabilitation Corridor Habitats

The rehabilitation corridor follows an established transport corridor subject to decades of anthropogenic modification (road construction, agricultural encroachment, irrigation, settlement). Habitat conditions are broadly comparable to the bypass's modified agricultural sections, with additional influence from existing road infrastructure. Given this, field surveys applied a targeted, risk-based approach rather than systematic coverage of the full 69 km, focused on six location types: interchanges/junctions, canal

crossings, shelterbelt and tree-line locations, areas requiring tree management, summarized in Table 28.

Table 28: Targeted Biodiversity Survey Location Types – Rehabilitation Corridor

Location Type	Districts / Lots	Ecological Rationale
Road interchanges and junction reconstruction areas	Kyzyltepa, Gijduvon, Vobkent, Bukhara (Lots 1–2)	Concentrated earthworks, vegetation clearance, and land-take beyond existing carriageway; potential disturbance to adjacent agricultural soils and shelterbelt vegetation
Canal crossings and hydraulic structures	All districts (Lots 1–2)	Direct interface with irrigation canals; aquatic and semi-aquatic habitat disturbance risk
Shelterbelt and roadside tree-line locations	Kyzyltepa, Gijduvon, Vobkent, Bukhara (Lots 1–2)	Linear planted vegetation providing ecological connectivity; tree removal or pruning anticipated
Areas requiring tree management or transplantation	Gijduvon, Vobkent, Bukhara (Lots 1–2)	Individual trees or clusters within the widening footprint

(Source: ESIA biodiversity survey, spring 2026)

Landscape-scale habitat gradient: The corridor transitions from intensively irrigated agricultural/peri-urban landscape in Lots 1–2 (Kyzyltepa–Bukhara; cotton and wheat dominant, extensive shelterbelts of mulberry, elm, poplar, orchards, vineyards, greenhouse clusters) sparse xerophytic vegetation, reduced shelterbelt presence, salt-tolerant canal vegetation. Notably, Artemisia and Salsola-community desert species (*Artemisia diffusa, A. turanica, Caroxylon orientale, Xylosalsola arbuscula, Carex physodes, Poa bulbosa*) were recorded at targeted survey locations, confirming these sections retain partially intact natural desert vegetation character.

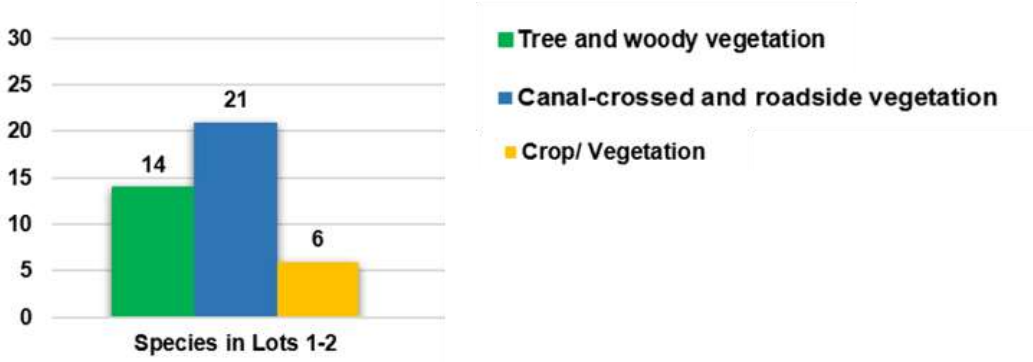


Figure 37: Species Along the Rehabilitation Corridor (Lots 1–2)
*Total species reflects the deduplicated count of species recorded across both zones
(Source: ESIA biodiversity survey, spring 2026)

Based on targeted biodiversity surveys, habitat characterization, and ecological screening conducted along the rehabilitation corridor, habitat conditions across the full alignment are classified in accordance with IFC PS6 habitat definitions; the consolidated habitat classification is presented in Table 29.

Table 29: IFC PS6 Habitat Classification – M37 Rehabilitation Corridor

Habitat Unit	IFC PS6 Category	Ecological Sensitivity
Roadside and transport corridor habitat	Modified Habitat	Low
Irrigated agricultural land	Modified Habitat	Low
Shelterbelt and roadside tree-line habitat	Modified Habitat	Low–Moderate
Orchard and fruit-tree habitat	Modified Habitat	Low–Moderate
Vineyard habitat	Modified Habitat	Low–Moderate
Greenhouse cultivation	Modified Habitat	Low
Canal-associated vegetation	Modified Habitat	Low–Moderate
Settlement and peri-urban habitat	Modified Habitat	Low

(Source: ESIA biodiversity survey and habitat assessment, spring 2026)

All habitat units identified along the rehabilitation corridor are classified as Modified Habitat under IFC PS6 definitions. No Natural Habitat and no Critical Habitat were identified along the rehabilitation corridor alignment. This finding is consistent with the long-established transport infrastructure character of the alignment and the highly modified agricultural and roadside landscape through which it passes. The most ecologically sensitive habitat units are the shelterbelt and tree-line vegetation of Lots 1–2 (Low–Moderate, connectivity function) and canal-associated reed vegetation at crossings (Low–Moderate).

Full species list from targeted rehabilitation surveys (tree and woody vegetation, canal and herbaceous vegetation, agricultural cultivation types) are provided in Appendix 11.

4.2.4.3. Ecological Corridors and Connectivity Features

Given the predominantly modified, fragmented landscape, ecological connectivity is provided primarily by artificial/anthropogenic features, the irrigation network and planted shelterbelt system, rather than natural corridors. Principal connectivity feature types were identified (Table 30), ranging from the regionally significant canal network (High connectivity value, full corridor) to localized orchard stepping-stone patches (Moderate value, Lots 1–2).

Table 30: Ecological Corridors and Connectivity Features – M37 Project Corridor

Connectivity Feature	Spatial Extent / Distribution	Connectivity Value	Project Interaction
Irrigation and collector canal network	Throughout full corridor; most dense in Lots 1–2	High	Multiple crossings; canal bank disturbance
Shelterbelt and roadside tree-line network	Continuous to semi-continuous in Lots 1–2; associated with field boundaries and road shoulders	Moderate–High	Tree removal within footprint
Orchard and mulberry plantation stepping-stone network	Distributed across bypass sections 1–8 and rehabilitation Lots 1–2	Moderate	Partial loss of orchard habitat within project footprints
Zarafshan River corridor	Crosses rehabilitation corridor at Kyzyltepa–Gijduvon section (Lot 1)	Moderate–High	Bridge rehabilitation works
Major collector canals	Concentrated in bypass sections 9–10 (Lot 2)	High	Multiple crossings in bypass and rehabilitation; concentrated earthworks

(Source: ESIA biodiversity survey and GIS analysis, spring 2026)

Irrigation network: The primary ecological corridor in an otherwise arid landscape, operating at local (canal-margin vegetation) and corridor (linking oasis patches). Highest ecological value where dense Phragmites reed beds occur (Gijduvon, Vobkent, Bukhara districts; bypass Sections 9–10 canal-convergence zone).

Shelterbelt/tree-line network (Lots 1–2): Principal terrestrial corridor for bird movement, bat foraging, and small mammal dispersal, mulberry, elm, poplar dominant, with ornamental pine/juniper at public institution frontages. The joint tree counts recorded ~5,920 affected plants in Lot 1 and ~5,431 in Lot 2, with notable concentrations at overpass and junction locations (up to ~1,200 ornamental trees at single chainages), providing the quantitative basis for compensatory replanting under the ESMP.

Zarafshan River (Lot 1 crossing): The only natural perennial watercourse in the project area; bridge structures provide nesting habitat for swallows, swifts, and potentially bats.

Connectivity sensitivity: The canal network and Lots 1–2 shelterbelt system are of highest sensitivity (continuous, difficult to restore if interrupted); the orchard stepping-stone network is of moderate sensitivity.

4.2.5. Flora Baseline

Regional context: The project corridor lies within the Kyzylkum and Lower Zarafshan botanical regions. The Institute of Botany records 764 vascular plant species (339 genera, 66 families) for Bukhara Province, of which 546 species occur in project-area districts, including 25 Red Book species and 14 Uzbekistan endemics. The dominant families reflect desert and disturbed-habitat flora: *Asteraceae, Amaranthaceae, Fabaceae, Poaceae, Brassicaceae*. Seven natural desert plant communities occur

regionally (*Artemisia, Salsola, Astragalus, Calligonum, White Saxaul, Ephemeral*, and mixed saltwort and sagebrush communities). These communities do not present within the Lots 1-2 construction footprint, which traverses modified agricultural and roadside habitats.

Survey species richness: Vascular plant surveys were conducted across the Lots 1 and 2 corridor (spring 2026), covering the rehabilitation alignment from Kyzyltepa district (Navoi Province) through Gijduvon, Vobkent, and Bukhara districts, and the greenfield bypass sections (Sections 1–10) and missing link. Approximately 92 vascular plant species were recorded across the corridor. This includes ~20 tree/woody taxa (8,736 individual trees recorded) and ~64 herbaceous and shrub taxa, with tree species richness ranging from 5 to 9 per section and herbaceous/shrub species richness ranging from 14 to 30 per section.

A total of 8,736 individual trees were recorded within the Lots 1–2 survey corridor. Of these, 11,351 plants fall within the construction footprint and are subject to removal, comprising orchard trees, ornamental trees, and roadside shelterbelts. Additional species recorded during rehabilitation corridor surveys include Paulownia sp., Pinus sp., Juniperus sp., and Thuja (*Oriental Arborvitae*), all representing managed and ornamental plantings associated with settlement areas and institutional grounds.

Habitat-Associated Flora Assemblages: The consolidated flora of the Lots 1–2 corridor groups into four habitat-associated assemblages, reflecting the irrigated agricultural and peri-urban character of the Bukhara oasis landscape:

- Canal and riparian vegetation: Phragmites australis-dominated reed beds and associated hydrophytic species along irrigation canals and drainage channels, particularly concentrated in the bypass corridor Sections 9–10 canal convergence zone.
- Agricultural and cultivated assemblage: Medicago sativa (alfalfa), Gossypium hirsutum (cotton), Triticum aestivum (wheat), and associated arable weeds on irrigated field margins adjacent to the rehabilitation corridor and bypass sections.
- Orchard and shelterbelt assemblage: Morus alba (mulberry), Populus sp. (poplar), Ulmus pumila (elm), Prunus sp. (stone fruit orchards), and Vitis vinifera (grapevine), constituting the dominant woody vegetation along both the rehabilitation and bypass corridors and providing the primary ecological corridor and stepping-stone function for fauna.
- Ruderal and desert-transition assemblage: Salsola sp., Artemisia sp., and associated annual ruderal species on roadsides, embankments, disturbed ground, and saline-margin habitats at the periphery of the irrigated zone.

The full consolidated flora species list is provided in Appendix 11. No endemic, threatened, or ecologically rare species were recorded within the Lots 1–2 construction



footprint, consistent with the Modified Habitat classification applied throughout the corridor.

Flora Species of Conservation Significance: Nine flora species were identified through combined desktop and field screening of the Lots 1–2 corridor and its 5 km Area of Influence (AoI), assessed against the IUCN Red List, Red Book of the Republic of Uzbekistan, CITES Appendices, and national legislation on plant resource collection. Three additional IUCN-listed Calligonum species (EN/VU) are documented in the broader regional context beyond the 5 km AoI in the Sundukli desert and are presented in Table 29 for completeness. Conservation significance species are consolidated in Section 4.2.7. The key findings are summarized below:

- Five Red Book of Uzbekistan species (*Ferula kyzylkumica, Lagochilus inebrians, Phlomoides aralensis, Tulipa lehmanniana, Climacoptera merkulowiczii*) were identified through desktop screening within the AoI. None were recorded within the Lots 1–2 construction footprint during spring 2026 field surveys. No direct impact is anticipated on these species from Lots 1–2 works.
- One IUCN Critically Endangered species – Zygophyllum bucharicum (Bukhara Bean-Caper, CR) – was not recorded during field surveys but is documented in desktop records as occurring in saline soils and roadside habitats. Its presence within the Lots 1–2 footprint cannot be confirmed or excluded based on completed surveys; a targeted pre-construction botanical re-survey of saline and roadside sections is recommended as a precautionary measure before earthworks commence in areas with saline substrate.
- Glycyrrhiza glabra (*Liquorice*) was recorded within the survey corridor at canal margins in Bypass Section 2. This species is Least Concern on the IUCN Red List but is subject to commercial regulation under Uzbekistan legislation on wild plant resource collection. Canal margin disturbance in Section 2 should be minimized accordingly; no Critical Habitat trigger applies.

Invasive and Introduced Flora: Two invasive or introduced flora species were recorded during field surveys within the Lots 1–2 corridor:

- Russian Knapweed (*Acroptilon repens*) was recorded within the construction footprint in Bypass Section 10 and along the rehabilitation corridor in Gijduvon district. This species is listed on regional and global invasive species databases (CABI, GBIF) and represents an active biosecurity risk during construction, as earthmoving and equipment movement can facilitate its spread into previously uninfested areas. Pre-construction biosecurity protocol and equipment hygiene measures are required, with post-construction monitoring and active control in disturbed areas.

  Paulownia sp. was recorded in managed plantation plots along the rehabilitation corridor (Lots 1–2). This is an introduced ornamental species maintained in a managed context; post-construction monitoring with conditional intervention is recommended if spreading beyond managed plots.

4.2.6. Fauna Baseline

Fauna baseline surveys (spring 2026) covered the ten bypass sections using transects, point observations, burrow/nest recording, camera trapping, aquatic sampling, and invertebrate sampling, supplemented by iNaturalist, GBIF, and Waterbird Population Estimates (WPE) desktop data (Appendix 11), with additional opportunistic records collected across all rehabilitation corridor districts (Kyzyltepa, Gijduvon, Vobkent, Bukhara). The fauna baseline covers six taxonomic groups: avifauna, mammals, herpetofauna, fish, aquatic invertebrates/crustaceans, and terrestrial insects.

A total of 53 wild fauna species were recorded across the ten bypass sections: 26 birds, 5 mammals, 4 herpetofauna, 3 fish, 1 crustacean, and 14 insects/other invertebrates, with a further one birds species recorded exclusively in the Lots 1-2 rehabilitation corridor (*Corvus orientalis, Kyzyltepa districts*), bringing the full-corridor wild species total to 54. Three domestic/livestock species (*camel, horse, sheep*) were also recorded incidentally during field surveys and are noted separately, not included in wildlife species counts.

- Avifauna (26 species, bypass) is dominated by common, disturbance-tolerant agricultural and settlement species (Rook, Magpie, Feral/Rock Dove, Myna, Eurasian Tree Sparrow), with additional raptor and waterbird diversity recorded compared to the earlier survey round, including Montagu's Harrier, Common Kestrel, Black Kite, and Western Marsh Harrier (Sections 9–10), and European Roller and Common Swift (aerial insectivores, multiple sections). Two Red Book subspecies were recorded: Zarafshan Pheasant (Section 2) and Bukhara Tit (Sections 4, 5, 7). The rehabilitation corridor additionally recorded Corvus orientalis (Kyzyltepa).
- Mammals (5 wild species, bypass) include *Common Mole Vole* (multiple sections), *Ground Squirrel* (*Spermophilus sp*., Sections 4 and 8 of bypass; rehabilitation corridor in Bukhara), Muskrat (*Ondatra zibethicus*, Section 3 of bypass), *Nutria* (*Myocastor coypus*, Section 8 of bypass), and bats (*Chiroptera*, Section 1 of bypass). Domestic camel, horse, and sheep were also recorded (Sections 3, 5, 6 of bypass and in Gijduvon, rehabilitation corridor).
- Herpetofauna: Four species recorded (*Marsh Frog, Desert Lidless Skink, Sand Lizard, Reticulate Racerunner*), concentrated at canal margins and field boundaries in Sections 2, 3, 9, and 10, none of them are Red Book-listed. Canal crossing works affecting water flow are relevant to *Marsh Frog* breeding habitat.
- Fish (3 species) were recorded in Sections 7, 9, and 10 of bypass: *Northern Snakehead (Channa argus*, Section 7, an introduced predatory species), *Western Mosquitofish (Gambusia affinis)*, and *Stone Moroko (Pseudorasbora parva),* both introduced, Sections 9–10 of bypass. The presence of introduced fish species, particularly Northern Snakehead (*Channa argus*), a highly invasive predatory species, represents a biosecurity concern at canal crossings; construction equipment should be cleaned between sites to avoid facilitating spread between drainage systems.

- Aquatic invertebrates/crustaceans: *Freshwater Shrimp (Gammarus pulex)*, plus terrestrial/aquatic insects including *Forktail damselfly, Black Garden Ant, Buff-tailed Bumblebee*, and *Buzzer Midge*. No native or Red Book-listed aquatic species were recorded.
- Bats were surveyed at dusk through visual observation using binoculars at ten fixed stations (BS1–BS10). Bats were observed in May foraging at dusk in Sections 1-8, along the margins of the canal, in orchard habitats, and within shelterbelt vegetation. These locations were consistent with rich insect foraging habitats along the irrigation canal network and the planted tree cover. Observers differentiated bats from swifts and swallows based on their flight patterns, which included erratic and fluttering movements with rapid changes in direction.

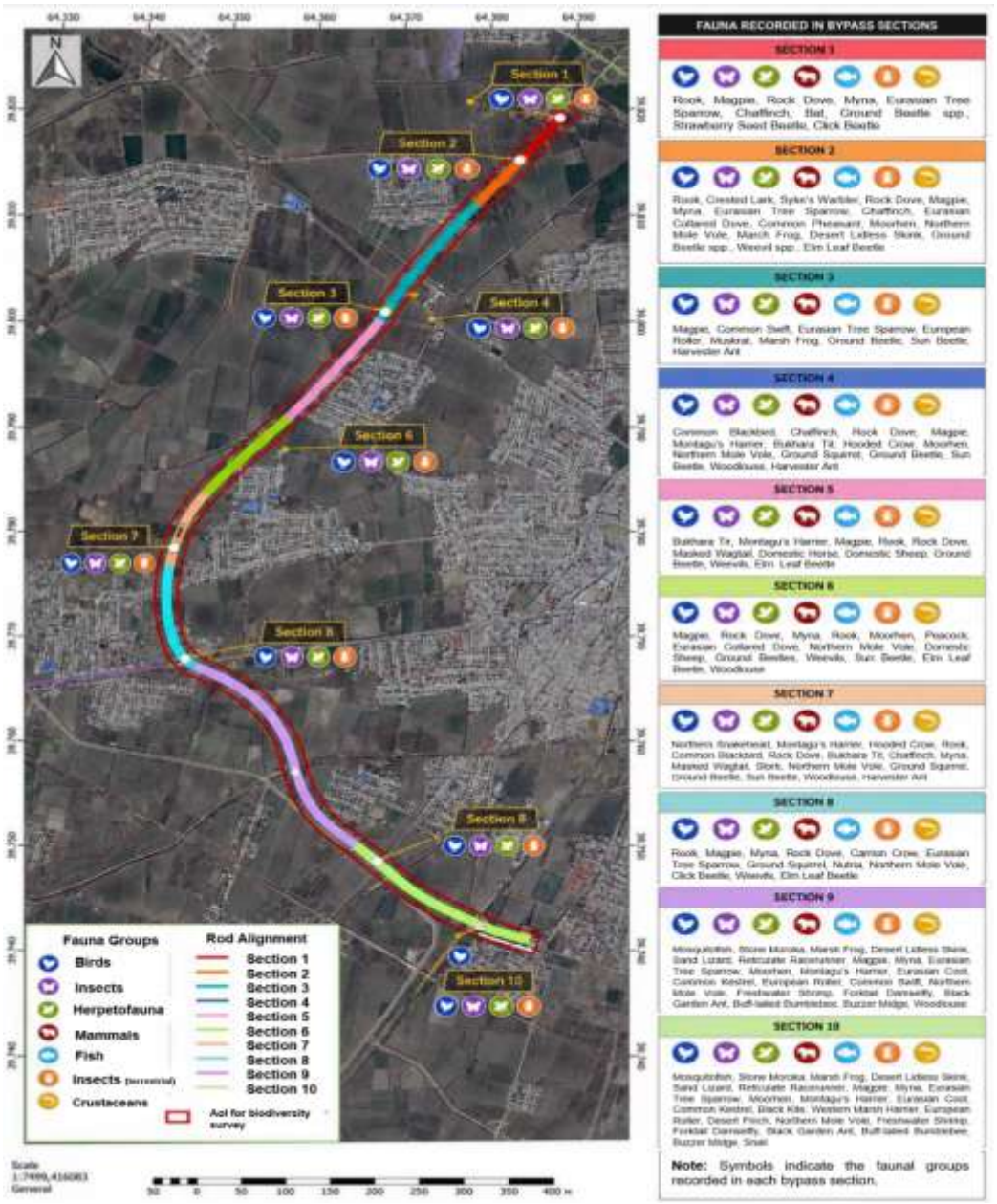


Figure 38: Fauna Recorded in Bypass Sections
(Source: ESIA)

Figure 39 summarizes the number of wildlife species recorded during the fauna baseline surveys by major taxonomic group.

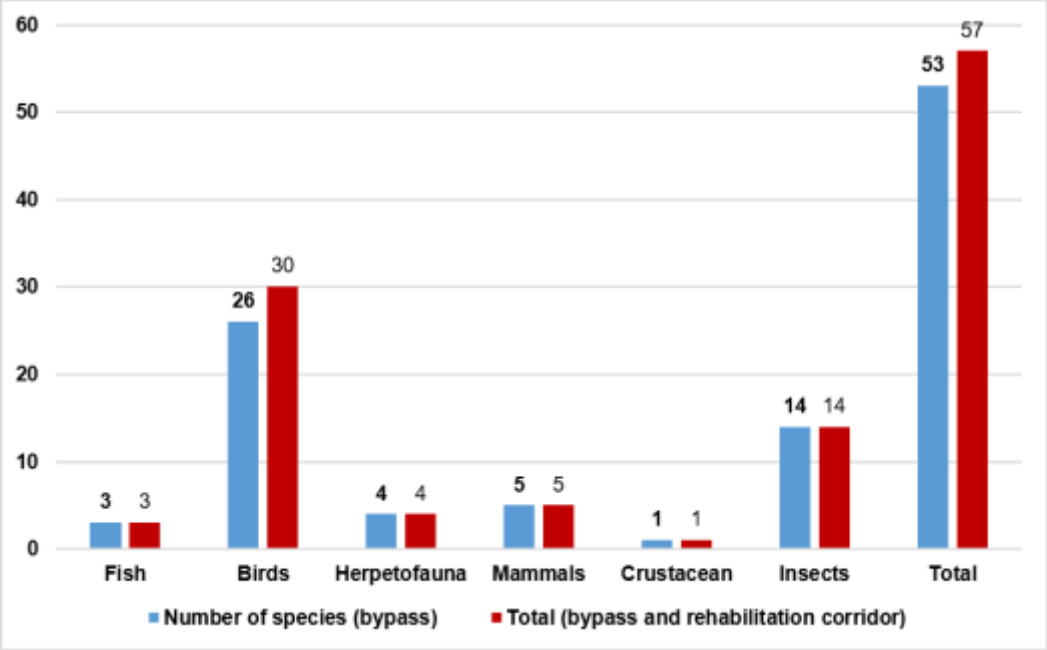


Figure 39: Fauna Species Recorded by Taxonomic Group
(Source: ESIA biodiversity survey, spring 2026)

Species-by-section breakdown table is provided below.

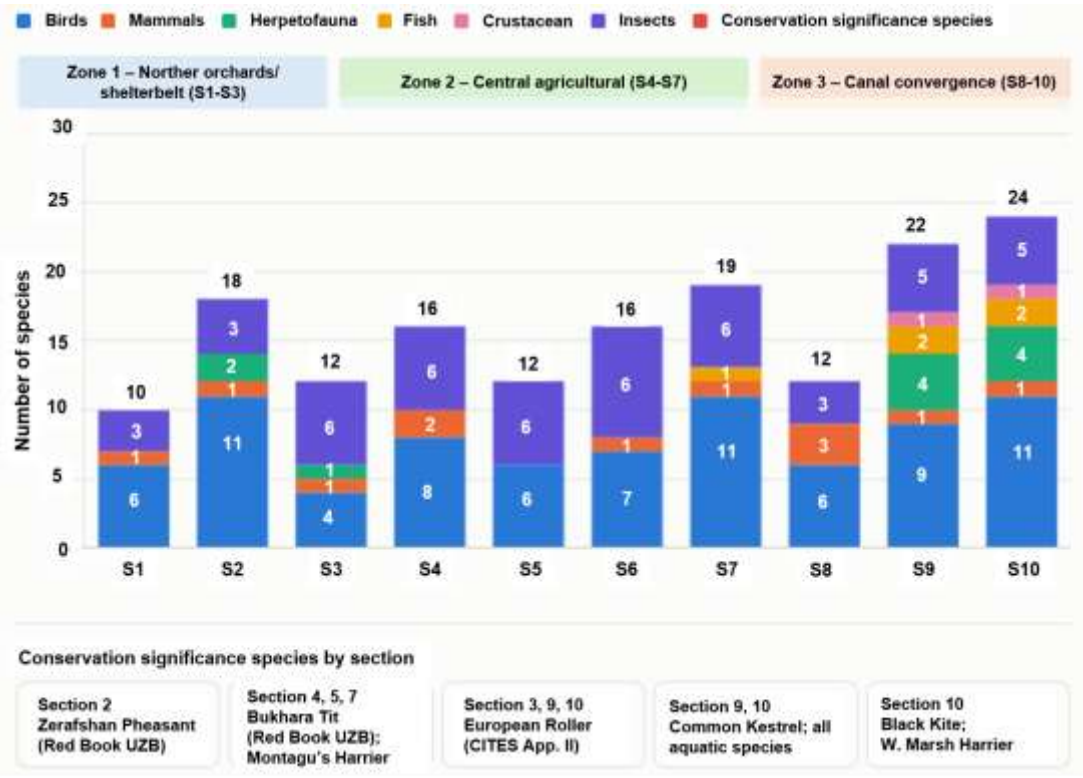


Figure 40: Species-by-section breakdown
(Source: ESIA biodiversity survey, spring 2026)

The species-by-section distribution data reveal a clear north-to-south ecological gradient across the ten bypass sections, reflecting the transition from irrigated orchard and shelterbelt habitats in the northern sections to canal-dominated aquatic and peri-urban habitats in the southern sections. Three ecologically distinct zones are identified (Figure 40):

- Zone 1: Northern Orchard and Shelterbelt Zone (Sections 1–3)
  - Sections 1–3 are characterized by orchard, shelterbelt, and agricultural field habitats with the lowest total species richness of the three zones (10–18 species per section).
  - Bird communities are dominated by generalist orchard and farmland species: Magpie (*Pica pica*), Rook (*Corvus frugilegus*), Rock Dove (*Columba livia*), Chaffinch (*Fringilla coelebs*), and Eurasian Tree Sparrow (*Passer montanus*), all recorded across multiple sections.
  - The most significant conservation finding in this zone is the Zerafshan Pheasant (*Phasianus colchicus zerafschanicus*, Red Book UZ) recorded exclusively in Section 2, associated with dense shelterbelt and orchard edge habitat. This is the only section in which this nationally protected subspecies was recorded.
  - Herpetofauna are represented by Marsh Frog (*Pelophylax ridibundus*) in Sections 2 and 3 only, associated with canal margins, the most northerly occurrence of aquatic herpetofauna in the bypass corridor.
  - European Roller (*Coracias garrulus*, CITES Appendix II) recorded in Section 3, consistent with its association with open agricultural landscapes and shelterbelt nesting sites.

- Zone 2: Central Orchard and Agricultural Zone (Sections 4–7)
  - Sections 4–7 support the highest bird diversity across the bypass corridor and contain the highest concentration of nationally protected species, reflecting the mosaic of orchards, shelterbelts, canals, and agricultural fields characteristic of the Bukhara oasis irrigated landscape.
  - The Bukhara Tit (*Parus bokharensis*, Red Book UZ), an endemic Central Asian species, was recorded in Sections 4, 5, and 7, associated with mature shelterbelt and orchard trees. This species is the most significant conservation finding in the bypass corridor, given its narrow endemic range and national protection status.
  - Montagu's Harrier (*Circus pygargus*) was recorded foraging across Sections 4, 5, and 7, indicating use of the agricultural corridor as hunting habitat during the spring migration and breeding period.
  - European Roller (*Coracias garrulus*, CITES App. II) also recorded in Section 7, consistent with Zone 1 findings and confirming use of the central agricultural zone.
  - Section 7 recorded the first fish species in the bypass corridor, Northern Snakehead (*Channa argus*), associated with a canal crossing, marking the transition toward the more aquatically diverse southern sections.



  - Insect diversity peaks in Zone 2 (6–8 species per section in Sections 4–6), driven by the diversity of flowering crops, orchards, and irrigated margins providing varied foraging and breeding microhabitats for ground beetles, weevils, and social insects.

- Zone 3: Southern Canal Convergence and Peri-urban Zone (Sections 8–10)
  - Sections 9 and 10 support the highest total species richness of any sections in the bypass corridor (22 and 24 species respectively), driven by the concentration of major collector canals and associated wetland and riparian microhabitats in the canal convergence zone.
  - All aquatic and semi-aquatic species recorded in the bypass corridor are concentrated in this zone: Mosquitofish (*Gambusia affinis*), Stone Moroko (*Pseudorasbora parva*), Freshwater Shrimp (*Gammarus pulex*), and all four herpetofauna species – Marsh Frog, Desert Racerunner (*Eremias grammica*), Sand Lizard (Lacerta agilis), and Desert Skink (*Ablepharus deserti*), occur in Sections 9 and 10.
  - Raptor diversity is highest in Sections 9 and 10: Montagu's Harrier (Circus pygargus), Common Kestrel (*Falco tinnunculus*), Black Kite (*Milvus migrans*), and Western Marsh Harrier (*Circus aeruginosus*) all recorded, the latter two exclusively in Section 10. The concentration of raptors reflects the availability of aquatic prey, open water, and elevated perch structures associated with canal infrastructure.
  - Section 8, while lower in total richness (12 species), recorded the highest mammal diversity of any section (3 species: Ground Squirrel, Nutria, and Northern Mole Vole), associated with the disturbed embankment and canal margin habitats characteristic of this transitional section.
  - Aquatic insect diversity (chironomid midges, damselflies, forktails, bumblebees) in Sections 9–10 reflects the presence of open water and emergent vegetation along canal margins, providing invertebrate food resources for waterbirds and raptors.

The north-to-south ecological gradient identified above has direct implications for the construction-phase impact assessment and mitigation design. The highest sensitivity locations within the bypass corridor are:

- Section 2: sole location of Zerafshan Pheasant (Red Book UZ) requires pre-construction survey to confirm presence/absence and, if confirmed, halt-and-notify protocol during vegetation clearance.
- Sections 4, 5, 7: core Bukhara Tit (Red Book UZ) habitat requires timing restrictions on shelterbelt clearance during breeding season (April–June) and retention of mature trees where feasible.
- Sections 9–10: canal convergence zone with highest total biodiversity, all aquatic species, and highest raptor diversity requires the most rigorous canal protection, sediment control, and riparian buffer measures during construction, consistent with the findings of Section 6.3.3 (water resources impact assessment).

Rehabilitation Corridor Fauna Records: Opportunistic surveys across the four rehabilitation corridor districts (Kyzyltepa, Gijduvon, Vobkent, Bukhara, Lots 1–2) recorded species consistent with the heavily modified, traffic-influenced roadside environment. The only bird species recorded exclusively in the Lots 1–2 rehabilitation corridor is Corvus orientalis (Kyzyltepa district), a common disturbance-tolerant species typical of settled and agricultural landscapes that does not represent additional conservation significance beyond those identified in the bypass baseline. Ground Squirrel (*Spermophilus sp.*) was recorded in Bukhara district of the rehabilitation corridor, consistent with embankment and roadside margin habitat use. No species of conservation significance were recorded exclusively in the rehabilitation corridor that were not already identified in the bypass assessment. The rehabilitation corridor fauna baseline is consistent with Modified Habitat classification throughout, confirming that the bypass corridor is the primary focus of biodiversity sensitivity within the project area.

Desktop screening against the Wetlands International Waterbird Population Estimates (WPE) database identified 45–48 waterbird species with Central Asian Flyway range overlap at project corridor coordinates; full WPE screening results are provided in Appendix 11, Section 14. No species from this desktop screen were recorded during field surveys, consistent with the absence of permanent open water habitat within the bypass footprint outside the canal convergence zone in Sections 9–10.

All fauna recorded are associated with Modified Habitat; no Critical Habitat fauna community was identified.

4.2.7. Species of Conservation Significance

This section presents the consolidated findings on species of conservation significance identified through field surveys and supplementary desktop data (iNaturalist, GBIF) across the project corridor (Table 31).

Species are organized into four groups: (A) Red Book of Uzbekistan plant species, (B) IUCN Red List plant species, (C) Nationally Protected Fauna, (D) IUCN-listed fauna and CAF Action Plan fauna.

Species locations and group classifications are presented spatially in Figure 41 (entire corridor) and Figure 42 (bypass Sections 1–10).

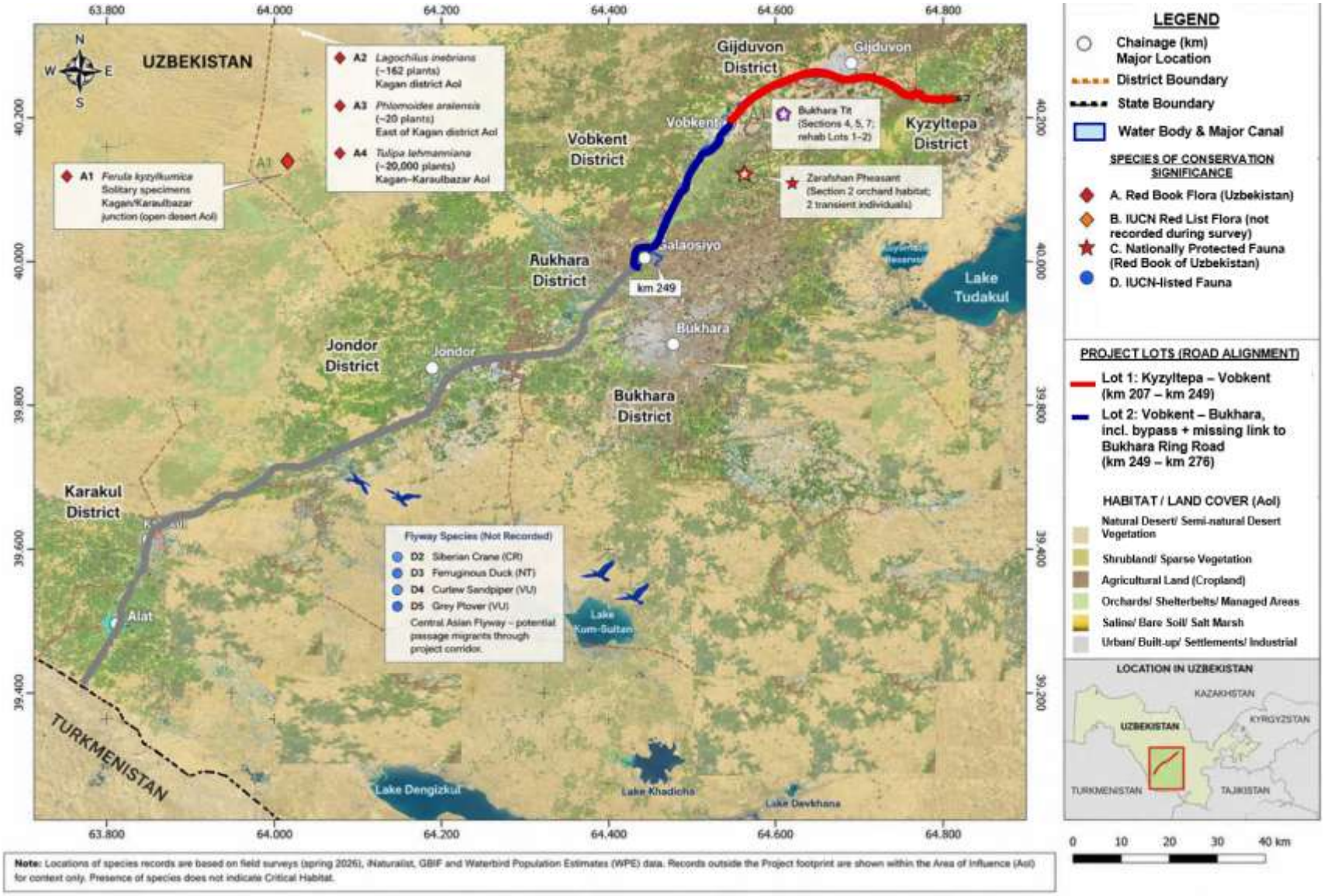


Figure 41: Species of Conservation Significance (Entire Corridor)
(Source: ESIA)

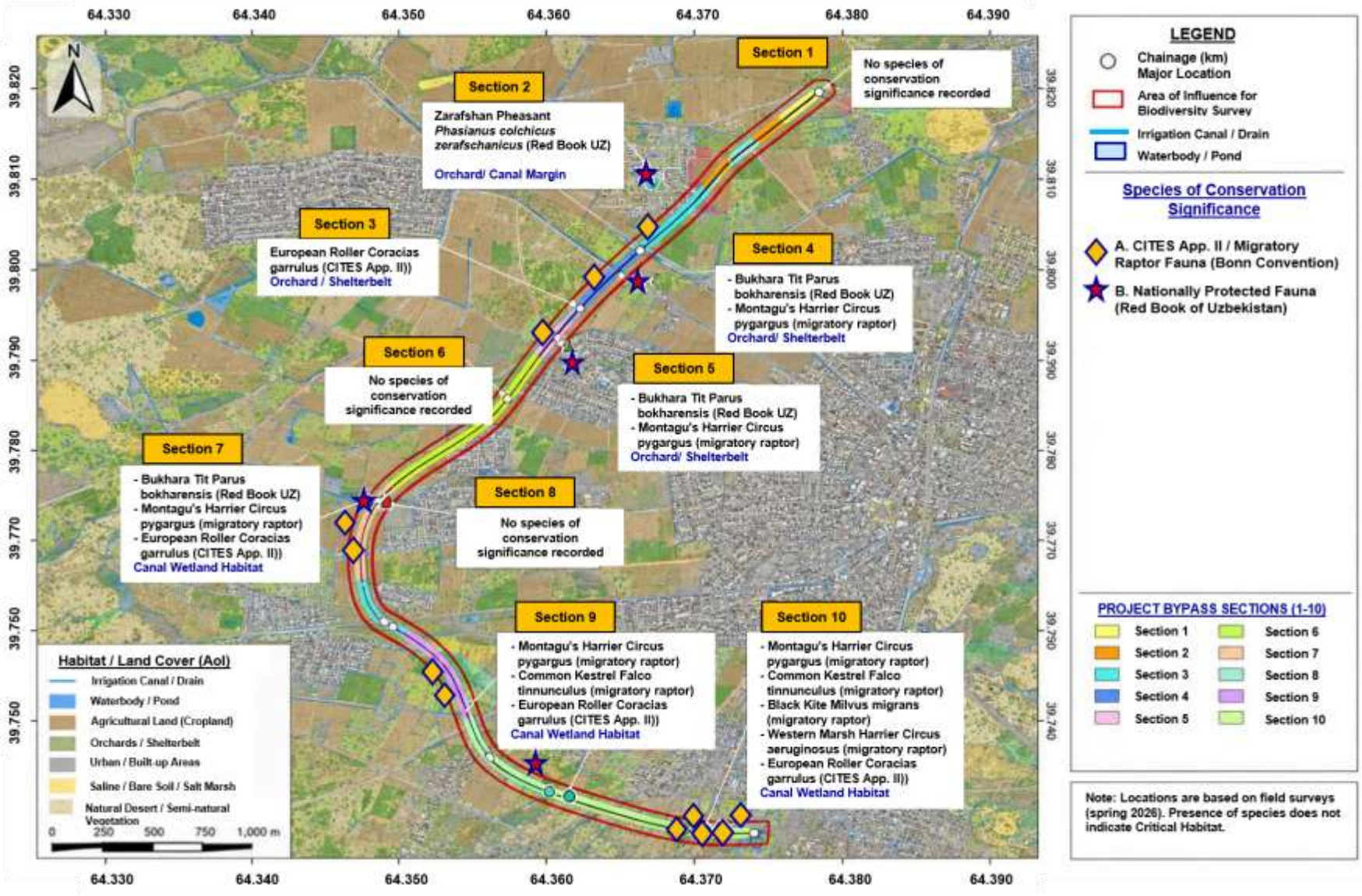


Figure 42: Species of Conservation Significance (Bypass Sections 1-10)
(Source: ESIA)

Table 31: Consolidated Species of Conservation Significance, Lots 1-2 (All Taxa)

Ref.	Taxa	Species	National Status (Red Book UZB)	International Status (IUCN / CITES / CAF)	Survey Finding in Project Area / AoI	Management Classification
Group A – Red Book Flora (Uzbekistan)						
A1	Flora	*Ferula kyzylkumica*	**Red Book UZ – Endemic**	Not assessed (IUCN)	Desktop confirmed; AoI – Kagan/ Karaulbazar junction; solitary desert specimens; not recorded in survey footprint	Monitor during earthworks; halt-and-notify protocol if encountered
A2	Flora	*Lagochilus inebrians*	**Red Book UZ**	Not assessed (IUCN)	Desktop confirmed; AoI – Kagan district (~162 plants); not detected in survey footprint	Desktop confirmed; no direct impact; no action required
A3	Flora	*Phlomoides aralensis*	**Red Book UZ**	Not assessed (IUCN)	Desktop confirmed; AoI – east of Kagan district (~20 plants); not detected in survey footprint	Desktop confirmed; no direct impact; no action required
A4	Flora	*Tulipa lehmanniana*	**Red Book UZ**	Not assessed (IUCN)	Surveyed during flowering period; ~20,000 plants in AoI (Kagan – Karaulbazar district); not found in footprint	No direct impact; no action required
A5	Flora	*Climacoptera merkulowiczii*	**Red Book UZ**	Not assessed (IUCN)	Desktop confirmed; AoI – Kuyumazar Reservoir area; not recorded in footprint	Desktop confirmed; no direct impact; no action required
Group B — IUCN Red List Flora (not recorded during field surveys)						
B1	Flora	*Zygophyllum bucharicum (Bukhara Bean-Caper)*	—	**CR – Critically Endangered (IUCN)**	Not confirmed in footprint; AoI – Kagan district saline soils/roadsides; distinct from Z. oxianum recorded in surveys	CR species; targeted pre-construction re-survey required in saline sections; addressed in supplementary ESIA
B2–B4	Flora	*Calligonum matteianum, C. molle, C. paletzkianum*	—	**EN (C. matteianum, C. molle); VU (C. paletzkianum) – IUCN**	Not recorded in footprint; AoI – Sundukli sands / Lake Dengizkul; sandy desert	Outside Lots 1–2 AoI; no direct impact

Ref.	Taxa	Species	National Status (Red Book UZB)	International Status (IUCN / CITES / CAF)	Survey Finding in Project Area / AoI	Management Classification
					substrate remote from Lots 1–2 alignment	
Group C — Nationally Protected Fauna (Red Book of Uzbekistan)						
C1	Avifauna	*Phasianus colchicus zerafschanicus (Zarafshan Pheasant)*	**Red Book UZB**	LC (IUCN)	Recorded – Bypass Section 2 orchard habitat; 2 transient individuals during spring survey	Pre-construction survey to confirm presence/absence ; halt-and-notify protocol during vegetation clearance in Section 2
C2	Avifauna	*Parus bokharensis (Bukhara Tit)*	**Red Book UZB – Endemic**	LC (IUCN)	Recorded – Bypass Sections 4, 5, 7 and rehabilitation corridor Lots 1–2; associated with mature shelterbelt and orchard trees	Timing restriction on shelterbelt clearance during breeding season (April–June); retention of mature trees where feasible
Group D — IUCN-listed and CAF Action Plan Fauna (desktop records; not recorded during field surveys)						
D1	Avifauna	*Circus pygargus (Montagu's Harrier) Coracias garrulus (European Roller) Falco tinnunculus (Common Kestrel) Milvus migrans (Black Kite) Circus aeruginosus (Western Marsh Harrier)*	—	LC (IUCN); Bonn Convention Appendix II; Central Asian Flyway Action Plan species	Recorded during field surveys in bypass Sections 4, 5, 7, 9, 10 (raptors); European Roller in Sections 3, 7, 9, 10 (CITES App. II)	Avoid construction during peak raptor activity (March–May); retain foraging habitat along canal margins where feasible
D2–D5	Avifauna	*Grus leucogeranus (Siberian Crane) Aythya nyroca (Ferruginous Duck) Calidris ferruginea (Curlew Sandpiper) Vanellus cinereus (Grey Plover)*	—	**CR (Siberian Crane); NT (Ferruginous Duck); VU (Curlew Sandpiper, Grey Plover) – IUCN; CAF Action Plan species**	Not recorded during field surveys; desktop WPE screening confirms CAF flyway range overlap with project corridor coordinates; potential passage migrants	Construction noise and disturbance management at canal margin habitats during spring migration (March–May); monitoring per ESMP

Sources: IUCN Red List; Red Book of Uzbekistan; CABI Invasive Species Compendium; CAF; BirdLife International; WPE data; iNaturalist/GBIF; ESIA. IUCN Category: CR = Critically Endangered; EN = Endangered; VU = Vulnerable; NT = Near Threatened; LC = Least Concern.

A summary of the number of species by category is presented in Figure 43.

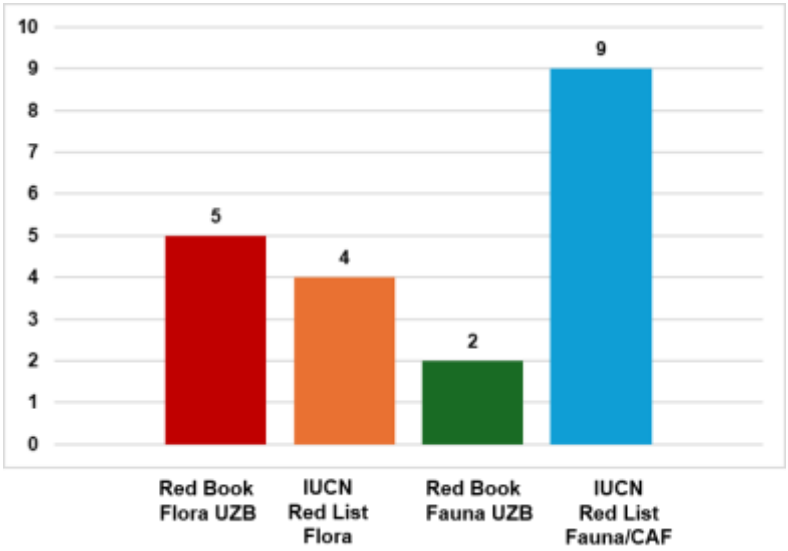


Figure 43: Species of Conservation Significance by Category
(Source: ESIA)

Based on the completed field surveys and available desktop information, no Critical Habitat has been identified within the project construction footprint. Species of conservation significance recorded within or adjacent to the project are associated with Modified Habitat and do not trigger Critical Habitat under IFC PS6. Subject to completion of the planned pre-construction verification surveys where required and implementation of the mitigation measures presented in Table 29, the project is not expected to result in significant residual impacts on biodiversity receptors of conservation significance.

5. SOCIOECONOMIC BASELINE CONDITIONS

5.1. Regional and Local Economic Context

5.1.1. Regional Socioeconomic Conditions

5.1.1.1. Bukhara Province

The proposed project corridor traverses two provinces of Uzbekistan: Navoi Province in the north-east and Bukhara Province for the greater part of the alignment. Within Bukhara Province, the project crosses Gijduvon, Vobkent, and Bukhara districts.

Bukhara Province covers 41,830 km² in central Uzbekistan (bordering Navoi Province, Karakalpakstan, and Turkmenistan) and comprises 11 administrative districts, 11 cities, 68 towns, and 1,473 villages with 544 mahallas. As of January 2026, total permanent population is 2,107.0 thousand (36.8% urban, 63.2% rural), with a population density of 53.5 persons/km².

Agriculture is the dominant sector by GRP share (agriculture, forestry and fisheries are UZS 10,353.3 billion of total GRP of UZS 36,813.1 billion for January-June 2025), consistent with the corridor's predominantly rural, agricultural character. Other significant sectors include services, manufacturing, retail trade, and construction. Per capita income rose from UZS 25,341.6 thousand (2023) to UZS 35,176.2 thousand (2025), while the poverty rate declined from 11.8% to 6.0% over the same period (Figure 44), indicating measurable improvement, though the province retains a predominantly rural character (63.2% rural population; 63% of households with 5+ members; 75% with children under 16).

Annual indicator series for 2023–2026 (employment, household structure, healthcare, education, housing, pensions) are provided in Appendix 12.

5.1.1.2. Navoi Province

The project enters Navoi Province through Kyzyltepa district only. Navoi Province is the largest province in Uzbekistan by area (109,480.86 km²) and one of the least densely populated (10.2 persons/km²). Kyzyltepa district occupies 2,185.19 km² in the province's southwestern part, adjacent to the Bukhara Province boundary.

Navoi Province is economically distinguished from Bukhara Province by the dominance of mining and metallurgy (the Muruntau open-pit gold mine, uranium processing, and the Navoi Free Economic Zone), generating substantially higher incomes: per capita income of UZS 44,694.2 thousand in 2025, approximately 27% above Bukhara Province, a correspondingly lower poverty rate (4.2% vs. 6.0%) (Figure 44).

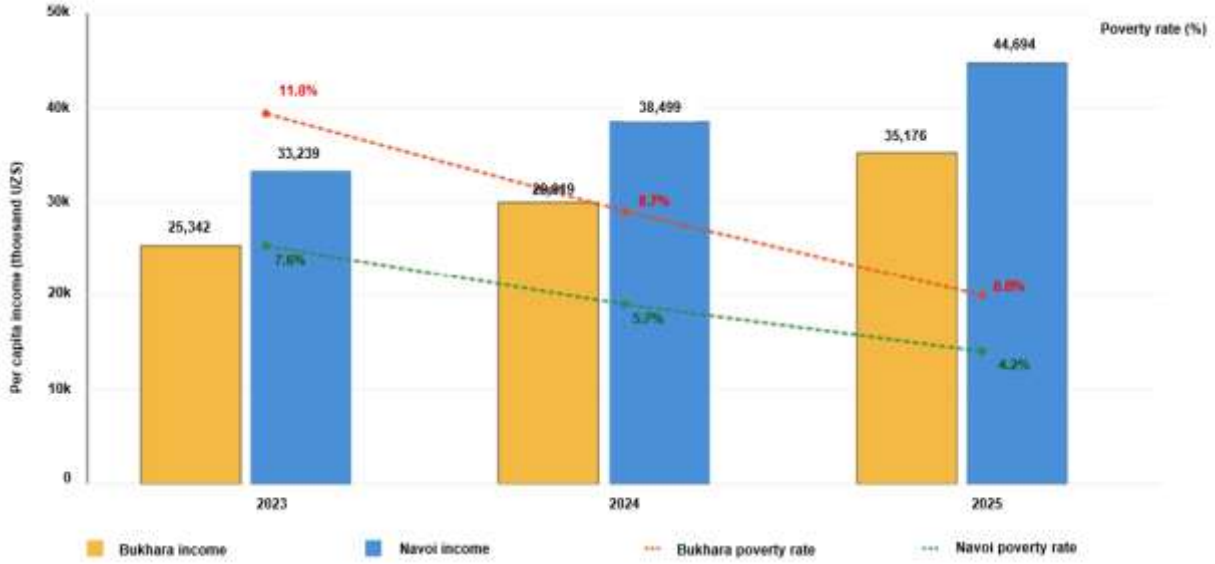


Figure 44: Per Capita Income and Poverty Trend (2023-2025), Bukhara vs. Navoi Province
(Source: National Statistics Committee of Uzbekistan (Letter #01/3-02-07-192, dated 20.05.2026))

Household income composition also differs markedly: primary/labour income accounts for 86.4% of total income in Navoi Province (vs. 67.5% in Bukhara Province), reflecting a higher share of formal-sector wage employment associated with the mining industry.

For the purposes of this ESIA, Kyzyltepa district is treated as economically and demographically comparable to the Bukhara Province corridor districts rather than as representative of Navoi Province as a whole, given the province's dual economy, a high-income mining/industrial core centered on Navoi city, and a lower-income agricultural periphery that includes Kyzyltepa.

Full annual indicator series for Navoi Province (2023–2026) are provided in Appendix 12.

5.1.2. Socioeconomics of the Project Districts

5.1.2.1. Project Districts

The review of key socioeconomic indicators of the project districts in Bukhara Province is based on official statistical data provided by the National Statistics Committee of Uzbekistan (Letter #01/3-02-07-192, dated 20.05.2026).

The M37 corridor traverses three districts in Bukhara Province (Gijduvon, Vobkent, and Bukhara) and Kyzyltepa district in Navoi Province. Together these form a contiguous rural-agricultural zone running from the Navoi Province.

The four districts present a typologically diverse set of communities, where:

- Gijduvon is the largest and most economically diversified, functioning as the corridor's principal urban-industrial node.

- Bukhara district surrounds the provincial capital and has strong peri-urban characteristics (the only district with net in-migration).
- Vobkent is mid-sized, predominantly agricultural districts, with the smallest by area and highest by population density (390 persons/km²).
- Kyzyltepa (Navoi Province) is broadly comparable in scale and rural character to the Bukhara Province districts.

Population size and density across four districts are compared in Figure 45.

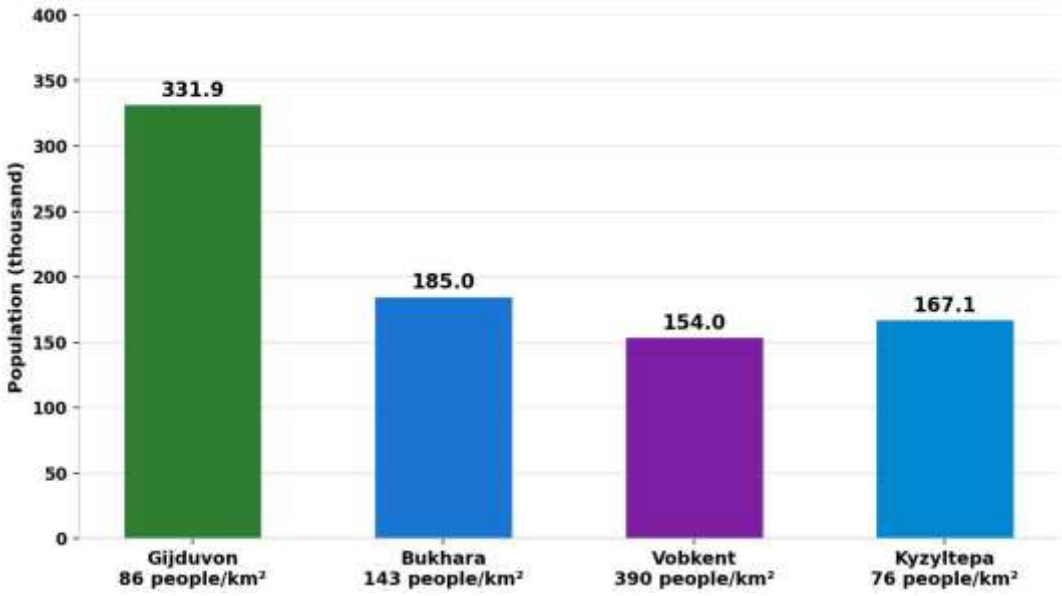


Figure 45: Population and Population Density by Project District (2026)
(Source: National Statistics Committee of Uzbekistan (Letter #01/3-02-07-192, dated 20.05.2026))

Comparative socioeconomic indicators, including economic output, education, and housing, are presented in Table 32.

Table 32: Key Socioeconomic Indicators on Project Districts

Indicator	Gijduvon	Bukhara	Vobkent	Kyzyltepa
Area (km²)	3,840.7	1,297.3	394.5	2,185.2
Population (thousand, 01.01.2026)	331.9	185.0	154.0	167.1
Density (persons/km²)	86.4	142.6	390.4	76.5
Rural population share (%)	71.0%	77.4%	80.7%	n/a
Natural growth 2025 (persons)	5,844	3,144	3,160	3,067
Net migration 2025 (persons)	−1,417	+128	−386	n/a
Marriages / Divorces (2025)	2,347 / 424	1,203 / 201	1,112 / 131	1,116 / 160
Industrial output 2025 (bn. UZS)	3,182.8	1,412.0	1,366.3	389.8
Agricultural output 2025 (bn. UZS)	5,375.7	4,947.6	4,155.8	4,791.9
Pre-school institutions (2024/2025)	438	124	154	216
General schools / pupils (2024/2025)	76 / 55,526	56 / 24,078	44 / 22,286	44 / 24,357
Total housing units (01.01.2026)	64,119	43,422	31,245	33,953

(Source: National Statistics Committee of Uzbekistan, Letter #01/3-02-07-192, dated 20.05.2026)

Full set of comparative socioeconomic indicators for four districts are consolidated in Appendix 12.

5.1.2.2. Population Dynamics and Migration

Four project districts recorded positive natural population growth in 2025. A consistent pattern across the corridor is negative net migration: only Bukhara district recorded net inward migration (+128 persons), reflecting its peri-urban position and attraction as a residential location for Bukhara city workers. All other districts experienced net outmigration, led by Gijduvon (−1,417 persons) (Figure 46).

This sustained outmigration indicates structural pressure on rural livelihoods, consistent with the broader Uzbek pattern of labour mobility toward Tashkent and other major urban centers. For the project, this means construction-phase labour will likely be available locally, but permanent inward migration to take up project-phase employment is unlikely without targeted recruitment from the districts themselves.

Natural population growth and net migration for each district in 2025 are compared in Figure 46.

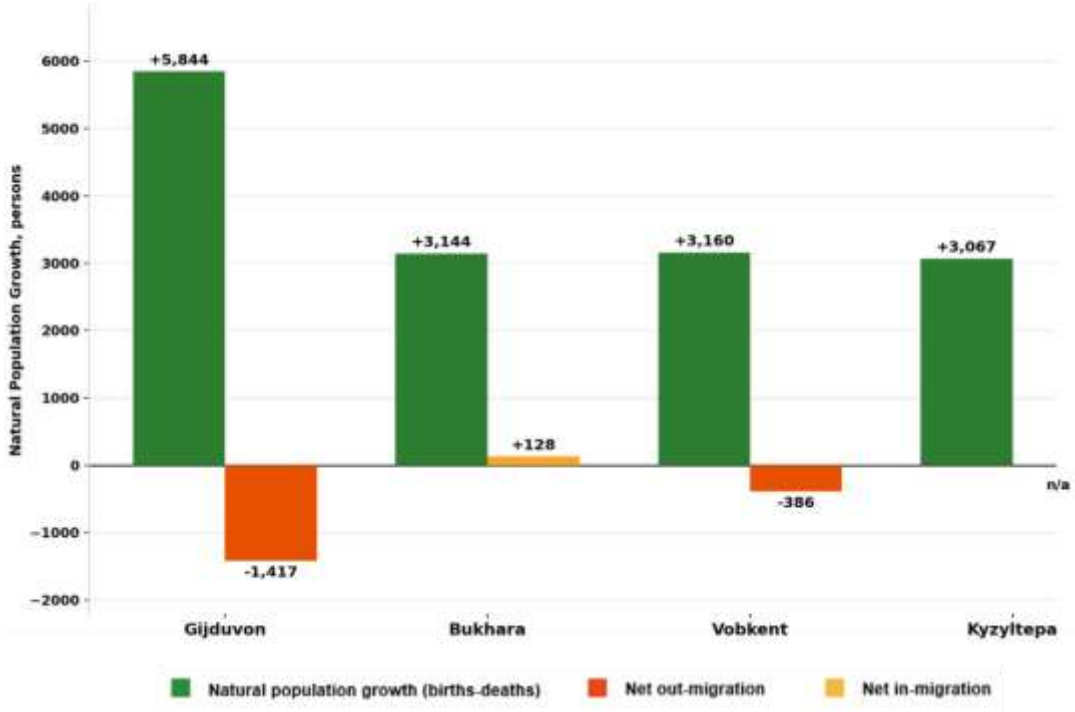


Figure 46: Natural Population Growth vs. Net Migration by District (2025)

(Source: National Statistics Committee of Uzbekistan (Letter #01/3-02-07-192, dated 20.05.2026))

5.1.2.3. Economic Activity

Industrial and agricultural outputs by the project district in 2025 are compared in Figure 47.

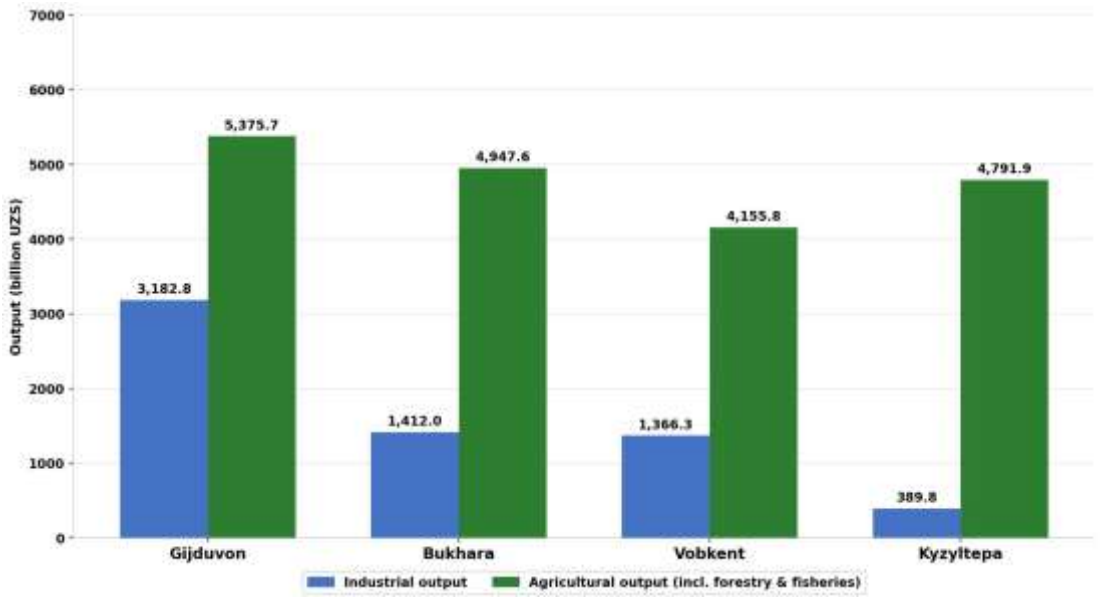


Figure 47: Industrial and Agricultural Output by District (2025)
(Source: National Statistics Committee of Uzbekistan (Letter #01/3-02-07-192, dated 20.05.2026))

Agriculture is the dominant economic activity by value in project districts, exceeding industrial output in every case (Figure 47), 1.7x in Gijduvon (the most industrially diversified district). Gijduvon is the dominant industrial district (UZS 3,182.8 billion output in 2025, anchored by textiles and food processing). Vobkent is notable for chemical production (53.7% of provincial chemical output). All districts recorded positive real industrial and agricultural growth in both 2025 and Q1 2026, indicating broad-based expansion.

5.1.2.4. Education and Healthcare

The expansion of pre-school provision between 2023/2024 and 2024/2025 academic years is dramatic across all districts (Figure 48):

- Gijduvon district increased from 78 to 438 institutions;
- Vobkent district increased from 41 to 154;
- Bukhara district increased from 51 to 124.

Consultations with representatives of district educational departments indicate that this province-wide increase reflects the national policy to convert unrecorded private mahalla-based childcare and pre-school training centers into formally registered pre-school institutions starting in 2024. A similar approach applies when interpreting the large jump in general education school counts in some districts between the two academic years; private training centers providing educational services to high school and secondary school students were added to the single district school register.

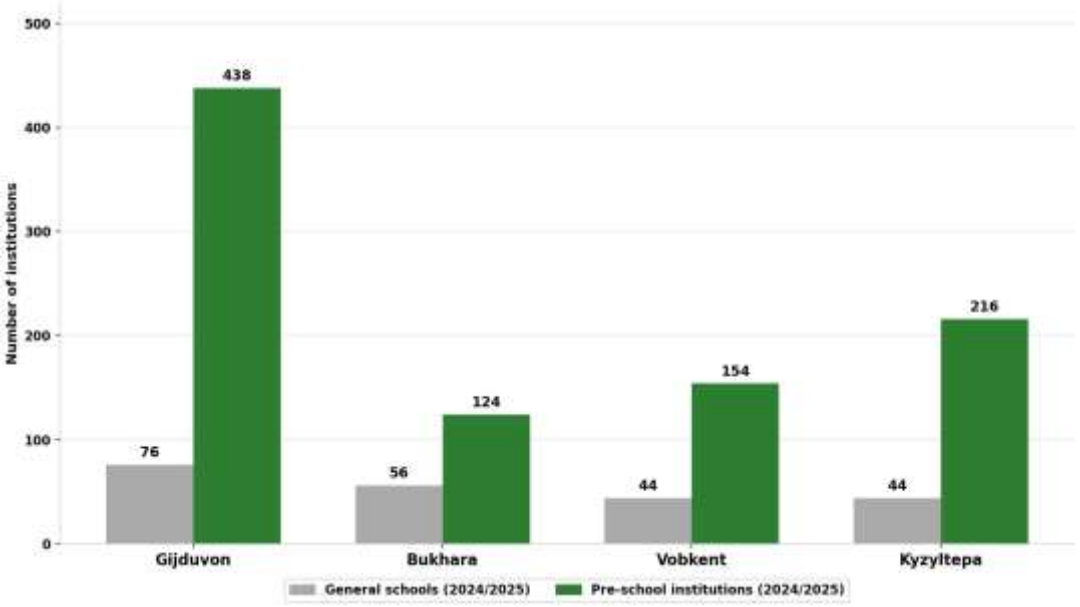


Figure 48: Pre-School Institution Growth (2023/2024 to 2024/2025)
(Source: National Statistics Committee of Uzbekistan (Letter #01/3-02-07-192, dated 20.05.2026))

Gijduvon has the largest school-age population (55,526 pupils in general education in 2024/2025, shown alongside all six districts in Figure 49) and the strongest vocational education capacity (3 vocational schools, 2,350 students), consistent with its role as the corridor's principal economic center. Vocational school enrolment increased substantially across all districts between 2023/2024 and 2024/2025, more than doubling in most cases, reflecting both increased registration rates and the expansion of state-supported vocational training programs under the national employment strategy.

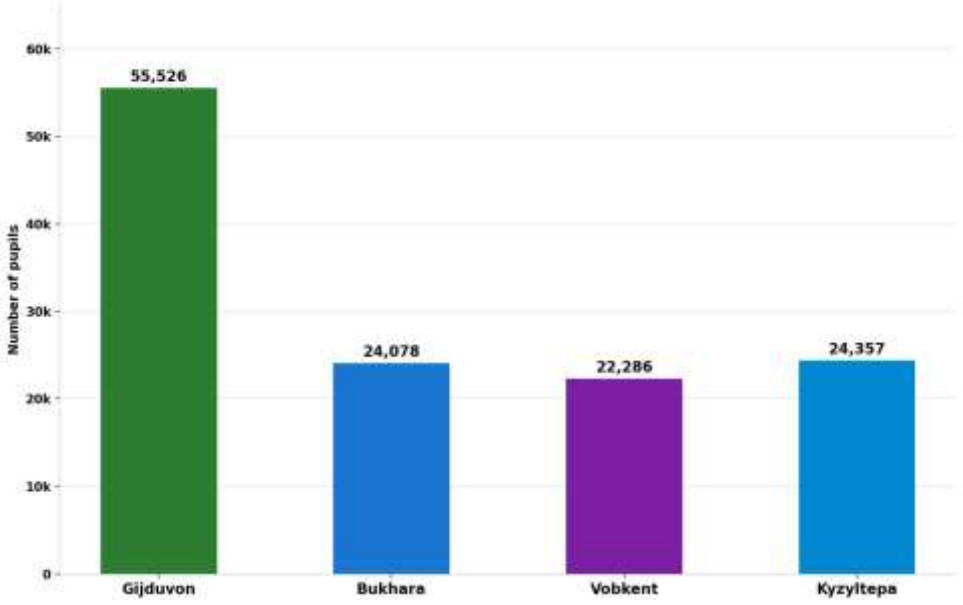


Figure 49: General Education School Students (2024/2025)
(Source: National Statistics Committee of Uzbekistan (Letter #01/3-02-07-192, dated 20.05.2026))

5.2. Road and Transport Infrastructure

5.2.1. Road Physical Condition

This subsection presents the findings of the road safety audit (RSA) conducted along the M37 highway corridor between km 207 (Kyzyltepa district, Navoi Province) and km 276 (Bukhara district, Bukhara Province), covering geometry, pavement condition, roadside infrastructure, pedestrian provision, lighting, structures, traffic management, and border crossing conditions. Full field observations are provided in Appendix 15.

Throughout the surveyed corridor, the M37 functions as a dual carriageway with two lanes in each direction, separated by a continuous concrete median, with a predominantly straight, flat alignment across irrigated agricultural land and desert steppe. Median treatment and pavement conditions vary considerably along the corridor, reflecting an ongoing, piecemeal rehabilitation programme rather than a systematic overlay of the full corridor: several districts show extensive alligator cracking, potholing, and surface raveling, while other sections, particularly in Vobkent district, show recently completed resurfacing in good condition.

Roadside infrastructure shows consistent deficiencies corridor-wide: shoulders are unimproved and generally unsuitable for emergency stopping by heavy vehicles; active utility works were observed without adequate safety provision (e.g., an open excavation trench directly behind the carriageway edge kerb in Kyzyltepa district, with no protective barriers); and roadside commercial/service development fronts directly onto the highway without service roads along most settled sections, generating frequent speed differentials and turning conflicts.

Pedestrian and non-motorized user infrastructure is highly deficient and represents one of the most significant road safety concerns identified. Along most of the corridor, no formal footpath, sidewalk, or pedestrian crossing facility exists; where pedestrian warning signs are present, they are not accompanied by marked crossings, raised crossing platforms, or traffic calming measures. Field observations confirmed pedestrians routinely walk along the carriageway edge, use the dirt shoulder as a footpath, and cross the highway at uncontrolled locations, including two adults observed standing on top of the concrete median barrier while waiting to cross, and a separate observation of an adult and child attempting to cross through a gap in the broken median barrier. These observations are consistent with the accident record, which shows pedestrian strikes as the most frequent accident type on the M37 corridor in 2025.

Road lighting is intermittent and largely absent: present in peri-urban sections of Gijduvon and Vobkent; the rural corridor between settlements is entirely unilluminated at night, with no road markings visible in the absence of artificial lighting. The accident

record confirms nighttime travel on unlit sections as a significant contributing factor to crash risk.

Two at-grade roundabouts (Kyzyltepa district center) operate as high-speed dual carriageway junctions without adequate approach speed reduction measures or pedestrian crossing facilities. Lane markings are absent or heavily faded over extensive sections; traffic management, regulatory signage, and speed control measures (no speed limit signs, cameras, or speed control measures identified) are minimal corridor-wide.

A summary of key physical condition findings by theme, with associated road safety implications, is presented in Table 33.

Table 33: Summary of Key Physical Condition Findings

Theme	Key Observation	Road Safety Implication
Pavement condition	Extensive alligator cracking, raveling, potholes, and surface water retention across multiple districts; asymmetric rehabilitation ongoing.	Reduced skid resistance, aquaplaning risk, vehicle instability, particularly for heavy vehicles.
Pedestrian infrastructure	Virtually absent along the rural corridor; one isolated sidewalk in Vobkent district; pedestrians observed on carriageway and median throughout.	Highest risk factor; pedestrian strikes are the most frequent accident type on the corridor.
Road lighting	Present only in peri-urban sections and near border crossing; rural inter-settlement sections entirely unlit.	Night accidents documented; unlit sections increase collision and pedestrian strike risk.
Railway level crossing	At-grade crossing with severe pavement deterioration at approach; no advance warning signs or rumble strips.	High-priority hazard; inadequate approach warning for high-speed vehicles.
Junctions and roundabouts	Two at-grade roundabouts on a high-speed corridor; no speed reduction measures; direct access from travel lanes to commercial premises throughout.	Speed-conflict risk at junctions; rear-end and right-angle collisions.
Border crossing queue	Pedestrians walking between stationary vehicles; no traffic management.	Rear-end collision risk; pedestrian-vehicle conflict; high-speed vehicles approaching stationary queue.
Roadside works and encroachment	Active utility excavations and construction debris within road reserve without protective measures; observed in Kyzyltepa district.	Hazard to errant vehicles and roadside workers; lane obstruction risk.

(Source: ESIA, Field observations from road safety audit, April–May 2026)

5.2.2. Traffic Volume and Composition

This subsection presents the findings of the traffic count survey conducted along the M37 corridor. Two complementary data sources are used: primary traffic counts obtained through video-based detection, conducted in April–May 2026 at thirteen designated kilometer posts, and secondary traffic data from official classified traffic counts carried out by the Roads Department of Uzbekistan in January–March 2026 for the project corridor. Full methodology, per-location survey results, and the complete Average Daily Traffic (ADT) dataset are provided in Appendix 15.

The primary survey used stationary and dashcam video sources with machine-learning-based vehicle detection and classification (three-category: light vehicles, heavy vehicles, bicycles, motorcycles, mopeds), configured to minimize false positives; detection accuracy was affected by heavy rainfall, out-of-focus dashcam video, and nighttime conditions at some locations, meaning actual vehicle volumes should be considered conservative estimates. The secondary Roads Department dataset, covering thirteen-kilometer posts, provided 4-hour counts extrapolated to 24-hour ADT per MQN 45-2007, with reduced traffic intensity calculated per SHNQ 2.05.02-23.

Traffic volume and vehicle fleet findings are summarized as follows:

- The M37 functions as a high-volume, mixed-use arterial carrying approximately 28,000–65,000 vehicles per day across different sections, with a clear spatial gradient: traffic peaks at km 265 (64,792 vehicles/day, approaching the Gijduvon/Bukhara agglomeration) and declines progressively westward to 27,863 vehicles/day at km 360, the lowest point on the corridor, though still substantially exceeding typical two-lane undivided highway volumes.
- Light passenger vehicles dominate at all locations (76.8–94.1% of traffic), but the heavy vehicle component (semi-trailers, trucks, buses) consistently accounts for 10–25% of the traffic stream and poses a disproportionate collision risk given the corridor's pavement condition and lack of access control. Semi-trailers are present at all kilometer posts, reflecting the M37's function as an international freight corridor to Turkmenistan and onward to Iran.
- Heavy vehicles share peaks in the evening (18:00–19:00) at up to 23.2%, compared to 12–13% during morning hours, coinciding with declining natural light and the onset of unilluminated night-time conditions on the rural corridor, a compounding risk factor.
- Bicycles and mopeds are present in small numbers at most locations (0–1.0%) but represent a disproportionate safety risk given the complete absence of dedicated non-motorized infrastructure on a high-speed, non-access-controlled corridor.
- High traffic volumes recorded at km 230–265 (exceeding 50,000 vehicles/day) place particular pressure on the at-grade roundabouts documented in Kyzyltepa district, which were not designed to safely manage such volumes.

5.2.3. Road Safety Performance

This section presents the road safety baseline for the M37 corridor, based on the official road traffic accident (RTA) register provided by the traffic police authorities in Bukhara and Navoi Provinces. The register covers all recorded incidents on the M37 between km 212 and km 276 during January–December 2025, comprising 30 road traffic incidents, 4 fatalities, and 30 injured persons. The accident register (individual date, time, location, type records) is provided in Appendix 15.

It should be noted that the accident register covers only the eastern 64 km of the full project corridor (km 212–276).

Table 34: Road Safety Headline Indicators, M37 km 212–276 (January–December 2025)

Safety Indicator	Value, 2025
Total road traffic incidents recorded	30
Fatalities (persons killed)	4
Persons injured	30
Average incidents per month	2.5
Incidents involving fatalities	3 events (4 fatalities)
Fatality rate (per 100 incidents)	13.3%
Corridor section covered	km 212–276 (64 km)

(Source: Official RTA register, Traffic Police of Uzbekistan, 2025)

Accident type, spatial, and temporal patterns are summarized as follows:

- Pedestrian strikes are by far the most prevalent accident type, accounting for 46.7% of incidents (14 of 30) and, critically, all four recorded fatalities. Every person killed on the M37 in 2025 was a pedestrian struck by a vehicle, directly corroborating the infrastructure deficiencies identified (near-total absence of pedestrian crossing facilities and sidewalks).
- Collisions between vehicles are the second most frequent type (33.3%, 10 incidents, 2 fatalities), consistent with speed-differential conflicts arising from the numerous uncontrolled access points and at-grade junctions.
- Gijduvon district (km 212–234) and Bukhara district (km 255–277) each account for 12 incidents and all fatal events (40% of recorded RTAs), consistent with the highest traffic volumes and ribbon commercial development documented along these sections.
- Four kilometer-posts (km 216, 226, 242, 249) account for 9 of 30 incidents and all 4 fatalities and should be prioritized for targeted safety interventions.

- Incidents are distributed across all twelve months with no pronounced seasonal peak, confirming the road safety risk is chronic and structural (attributable to persistent infrastructure deficiencies) rather than weather-driven.
- The combined evening and night period (18:00–06:00) accounts for 43.3% of all incidents, disproportionately high relative to expected traffic volumes in those hours, consistent with the documented absence of road lighting across rural sections and the absence of effective road markings.

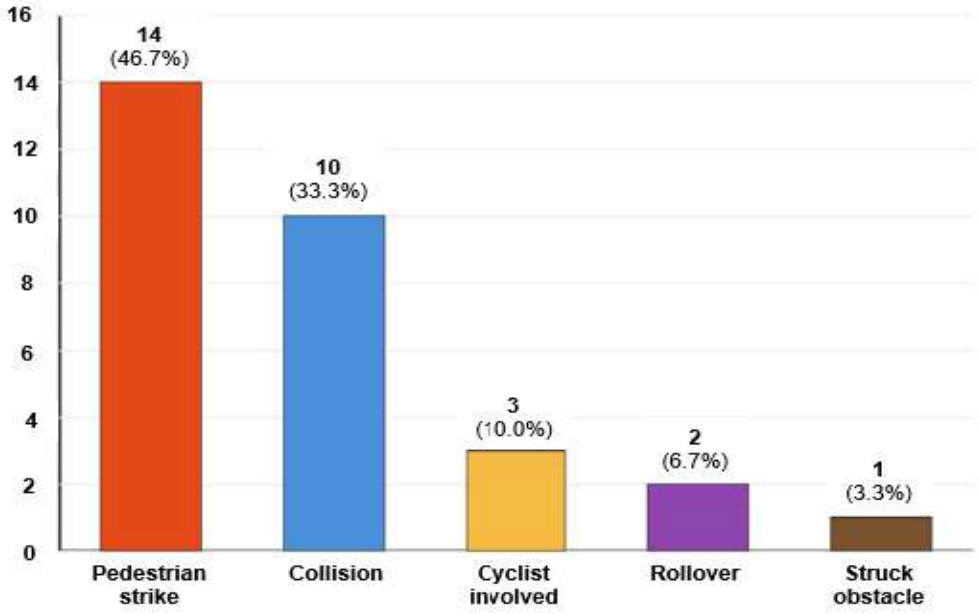


Figure 50: Accident Type
(Source: ESIA, road safety audit)

The 2025 accident record for the M37 corridor reveals a chronic and systemic pattern attributable to identifiable infrastructure and traffic management deficiencies:

- Pedestrian fatality dominance: all four 2025 fatalities involved pedestrians struck by vehicles; the complete absence of pedestrian crossings, footpaths, and safe refuges forces pedestrians onto the carriageway at uncontrolled locations, directly producing this outcome.
- Black spot concentration: four kilometer-posts account for 9 of 30 incidents and all 4 fatalities; targeted infrastructure interventions at these locations (pedestrian crossings, lighting, speed reduction, median gap management) would address a disproportionate share of the corridor's casualty burden.
- Night-time risk: the 43.3% share of incidents occurring during evening/night hours, on a corridor almost entirely unlit across rural sections, confirms the absence of road lighting as a direct and measurable contributor to crash risk.
- Heavy vehicle severity amplifier: the high heavy-vehicle share documented in the traffic count survey (up to 23% at peak times) amplifies collision severity when crashes occur, consistent with the high-energy events (rollover, collision fatalities) recorded on this mixed, non-access-controlled corridor.

5.3. Access to Utility Services

5.3.1. Access to Drinking Water, Sanitation, and Natural Gas

Access to safe drinking water, centralized sanitation, and natural gas supply are important components of social infrastructure and public health within the project area. The M37 corridor traverses three districts of Bukhara Province (Bukhara, Vobkent, Gijduvon) and Kyzyltepa district in Navoi Province, where utility coverage varies considerably by district and utility type. District-level 2024 coverage for all three utilities is summarized in Table 35.

Table 35: Utility Access Coverage by Project District (2024)

Area / Coverage	Drinking Water (%)	Sanitation/ Sewerage (%)	Natural Gas (%)
Bukhara district	68.8	23.8	80.7
Vobkent district	50.5	19.8	64.7
Gijduvon district	66.9	24.6	72.7
Bukhara Province (avg.)	**69.2**	**42.4**	**66.7**
Kyzyltepa district	89.5	23.3	70.9
Navoi Province (avg.)	**88.0**	**49.0**	**66.9**

(Source: Bukhara Province Department of National Statistics Committee of Uzbekistan; National Statistics Committee of Uzbekistan)

All three utilities show improvement across all districts between 2022 and 2024, but substantial gaps remain: household drinking water coverage in most Bukhara Province districts remains below 70% (well below the Kyzyltepa, Navoi Province level of ~88–90%), and centralized sanitation coverage is markedly low corridor-wide, only 19.8–24.6% in the Bukhara Province districts and 23.3% in Kyzyltepa, meaning 70–80% of households across the project area continue to rely on decentralized water, sanitation, or gas alternatives (private wells, boreholes, tanker deliveries, pit latrines, septic tanks, and LPG/solid fuel heating, respectively). Natural gas supply is comparatively higher and more consistent than water/sanitation, though coverage still ranges from below 64.7% (Vobkent) to over 80% (Bukhara district).

To address these deficiencies, the Government of Uzbekistan, with AIIB financing, is implementing the Bukhara Region Water Supply and Sewerage Project[27] (BRWSSP), which aims to improve access to reliable, safely managed drinking water and wastewater services across the province, including major investments in Bukhara district, which is traversed or adjacent to the M37 corridor within the Lots 1-2 scope. The project includes rehabilitation and expansion of water supply networks, pumping stations, and storage facilities, and new wastewater collection networks and treatment plants, and

[27] Bukhara Region Water Supply and Sewerage Project, Asian Infrastructure Investment Bank, https://www.aiib.org/en/projects/details/2020/approved/Uzbekistan-Bukhara-Region-Water-Supply-and-Sewerage-Project.html (accessed June 2026)

is expected to significantly improve service reliability and coverage for communities along the M37 corridor.

Sector assessments undertaken as part of BRWSSP preparation identified water quality deficiencies at several district water treatment facilities, attributed primarily to deteriorated water supply infrastructure and operational limitations, aging distribution networks exceeding design life, corrosion, leakage, and structural deterioration increasing contamination and pressure-fluctuation risk. These findings, drawn from BRWSSP preparation investigations, are presented here solely for baseline context regarding existing drinking water service conditions within the wider project area.

Construction activities associated with the project will need to avoid disruption of existing water, sanitation, and gas infrastructure crossed by or adjacent to the corridor and ensure that any temporary interruption to services is minimized and promptly restored in coordination with local authorities and utility operators.

5.3.2. Solid Waste Management

Municipal solid waste management services are available throughout the project area, administered by district authorities and specialized waste management operators. Waste generated by households, commercial establishments, public institutions, and service facilities is collected through district-level collection systems and transported to designated municipal solid waste disposal sites (landfills).

Stakeholder consultations with district authorities confirmed that each project district in Bukhara Province is served by an officially designated municipal solid waste disposal site, located within designated mahallas and receiving waste collected from settlements throughout the respective district. Landfill locations and approximate distances from the M37 corridor are presented in Table 36; their spatial relationship to the corridor is shown in Figure 51.

Table 36: Municipal Solid Waste Disposal Sites in Project Districts

District	Landfill Location (Mahalla/Community)	Landfill Area (ha)	Approximate Distance to M37 Corridor (km)
Bukhara	Sufikorgar Mahalla	2.0	12
Vobkent	Latifsobungar Mahalla	1.85	9
Gijduvon	Karakhoni Mahalla	4.6	15
Kyzyltepa	Alisher Navoi Mahalla	n/a	1.1

(Source: Information provided by district authorities during stakeholder consultations, May-June 2026)



Figure 51: Existing Municipal Solid Waste Disposal Sites Along the M37 Corridor
(Source: ESIA)

The Kyzyltepa district landfill (Navoi Province) is located southeast of the M37 corridor at approximately 7 km distance. The average distance between waste collection points and disposal sites ranges from 10–35 km across Bukhara Province, though the landfill facilities themselves lie between approximately 0.5 and 15 km from the corridor. Most facilities are separated from the project by several kilometers and are not expected to experience direct impacts from construction activities. These facilities may serve as approved disposal locations for municipal and non-hazardous construction waste generated by the project, subject to agreement with the relevant district authorities and landfill operators.

Overall, all districts crossed by the M37 corridor have access to designated municipal solid waste disposal facilities and organized waste collection services. Landfill disposal remains the dominant waste management practice throughout the project area, with limited evidence of waste segregation, recycling, or resource recovery activities. The availability of existing disposal infrastructure is expected to facilitate management of municipal and non-hazardous construction waste during project implementation, subject to compliance with applicable national requirements and approval by the relevant authorities.

5.4. Profile of the Project Corridor

5.4.1. Overview of Communities Along M37

Baseline socioeconomic information for communities located along the M37 corridor was obtained from mahalla passports, official community registers maintained and updated annually by each community chairperson ("mahalla oqsoqol"). These registers compile demographic, social, economic, housing, infrastructure, and vulnerability information for every community and serve as the primary source of local administrative statistics used by district and provincial authorities for planning and social protection programs.

The project corridor passes through or in proximity to selected mahallas within Kyzyltepa District of Navoi Province, and Gijduvon, Vobkent, Bukhara districts of Bukhara Province. The reviewed community profiles include Govshun, Gumbaz, Bulrakobot, and Buston in Kyzyltepa District; Abdulla Kahhor, Gajdumak, Govshun, Gulistonobod, Jovgari, Kulliabbor, Labirut, Ok-Gul, Pomuza, Saidkent, Takhtakhon, Uzanon, Khatcha, and Shakh in Gijduvon District; Charmaqoron, Muminobod, Shirin (Chorbaqkent), Hadjuvon, Ponob, and Kholach in Vobkent District; Kushkhodim, Baqikalon, Dustlik, Galaosiyo, Navruz, and Oybek in Bukhara District.

These communities are well-established rural settlements with populations ranging from approximately 2,500 to more than 7,400 residents. The largest include Shark in Gijduvon District (7,418 residents), Baqikalon in Bukhara District (7,149 residents), Pomuza (7,169 residents), Gulistonobod (7,111 residents), Shirin/Chorbaqkent in Vobkent District (6,472 residents), Uzanon (6,646 residents), and Jovgari (6,048 residents). Smaller settlements include Oybek (2,479 residents), Buston (2,726 residents), Navruz (2,971 residents), and Muminobod (3,002 residents). Across all surveyed communities, the combined population exceeds 143,000 residents, with an almost equal distribution between men and women (women account for approximately 48–52% of residents in nearly all mahallas, indicating a balanced demographic structure).

The surveyed mahallas are predominantly rural settlements where agriculture is the principal economic activity at the community level – crop cultivation, livestock breeding, horticulture, greenhouse farming, poultry production, beekeeping, and orchard management are widespread and constitute important livelihood activities. However, household survey results indicate that for many residents, agriculture functions as a supplementary source of income, while salaried employment in the public sector, and small businesses provide the primary source of household income. Agricultural production is particularly important in Gajdumak, Govshun, Labirut, Takhtakhon, Khatcha, Shakerkent, Muminobod, Ponob, Kholach, Turkon, Kushkhodim, and Baqikalon. Several communities have developed specialized economic activities, including greenhouse farming in Govshun, livestock production in Bulrakobot and Kulliabbor, tailoring and embroidery in Saidkent and Uzanon, handicrafts in Govshun,

and trade/service activities in Gumbaz, Shark, Galaosiyo, and Dustlik. Small-scale production and service enterprises are also present in communities located closer to district centers.

Housing consists predominantly of detached individual houses, reflecting the rural character of the project area. Multistorey apartment buildings are limited to several larger settlements, including Abdulla Kahhor, Pomuza, Gulistonobod, Shark, Govshun, and Dustlik, while most households occupy individual residential properties. Access to centralized water supply is generally high, particularly in Kyzyltepa district where all surveyed households are connected, while service coverage varies across Gijduvon, Vobkent, and Bukhara districts. Natural gas supply is widespread in Kyzyltepa district but remains incomplete in parts of Gijduvon and Vobkent districts, with several communities relying on alternative energy sources.

The population structure indicates relatively young, rural communities: children and adolescents below 18 years of age comprise a substantial proportion of the total population, and a significant share of residents belongs to the economically active youth age group. At the same time, older people aged sixty and above represent a considerable segment of the community, demonstrating that although the corridor settlements have a relatively young demographic profile, they also include significant numbers of elderly residents requiring continued access to healthcare and social support services.

The project area is ethnically homogeneous. Ethnic Uzbeks constitute more than 99% of the population in nearly all surveyed communities. Small numbers of Russians, Tatars, Turkmens, Tajiks, Kazakhs, Koreans and other ethnic groups are recorded in communities such as Buston, Abdulla Kahhor, Pomuza, Shark, Charmaqoron, Galaosiyo and Turkon, but these groups represent only a very small proportion of the total population and are dispersed rather than geographically concentrated.

Mahalla passports also identify socially vulnerable groups requiring ongoing social assistance. These include retired persons, elderly people living alone, persons with disabilities, female-headed households, families that have lost their primary breadwinner, children under guardianship, unemployed persons, and labour migrants. Across the surveyed communities along the M37 corridor, retired persons constitute a notable share of the population, and a significant number of people with disabilities are registered, predominantly within the second disability category. Elderly people living alone and children under guardianship or custodial care, while representing smaller groups, are also recorded across multiple communities and require targeted social support.

Labour migration represents an important livelihood strategy throughout the project area. The mahalla passports record many labour migrants in the project communities, the majority of whom are men of working age employed outside their home districts or abroad. In addition, more than half of recorded labour migrants returned from

employment abroad during the previous year, indicating the continued importance of migration as a source of household income and employment. Reported unemployment remains relatively low within the surveyed communities, although registered unemployed women account for a relatively higher proportion of registered unemployed persons in several settlements.

Community registers also document broader social conditions, including family vulnerability, divorce, crime prevention measures, and social welfare cases. Across the selected communities along the M37 corridor, a limited number of divorce cases and troubled families are recorded, alongside cases subject to crime prevention measures including persons under preventive police supervision and on probation. The number of recorded drug-addiction cases is very low, while alcohol dependency cases remain limited but are present in several communities. These records indicate that the corridor communities are generally stable, with social welfare challenges present but not at levels that would suggest systemic vulnerability.

Education infrastructure is well established throughout the project corridor. The surveyed communities contain a substantial number of pre-school and general education schools, supplemented by specialized and vocational educational institutions, and access to higher education through institutions located in district and provincial centers. Several larger communities, including Baqikalon, Turkon, Shark, Gaidumak, Gulistonobod, Shirin (Chorbaqkent), and Hadjuvon, accommodate large student populations and function as local education hubs for surrounding settlements.

Overall, the surveyed mahallas represent stable rural communities with diversified agricultural economies, relatively young populations, balanced gender composition, and generally good access to housing, education, and basic public services. Nevertheless, the presence of vulnerable households, persons with disabilities, labour migrants, economically disadvantaged families, and ageing residents, demonstrates the need for inclusive stakeholder engagement, accessible grievance mechanisms, and targeted support measures during project implementation. These baseline characteristics have been considered in the assessment of project impacts and in the development of mitigation measures, stakeholder engagement activities, labour management procedures, and livelihood restoration measures where applicable.

5.4.2. Household Survey Findings

A household survey was conducted along the existing M37 corridor within the Lots 1-2 project area, covering Kyzyltepa district (Navoi Province) and Gijduvon, Vobkent, and Bukhara districts (Bukhara Province). A total of 234 households (1,342 persons) from these four districts participated in the survey. The full survey dataset covering corridor districts (234 households, 1,342 persons) is provided in Appendix 13. Spatial distribution of households surveyed is shown in Figure 52.

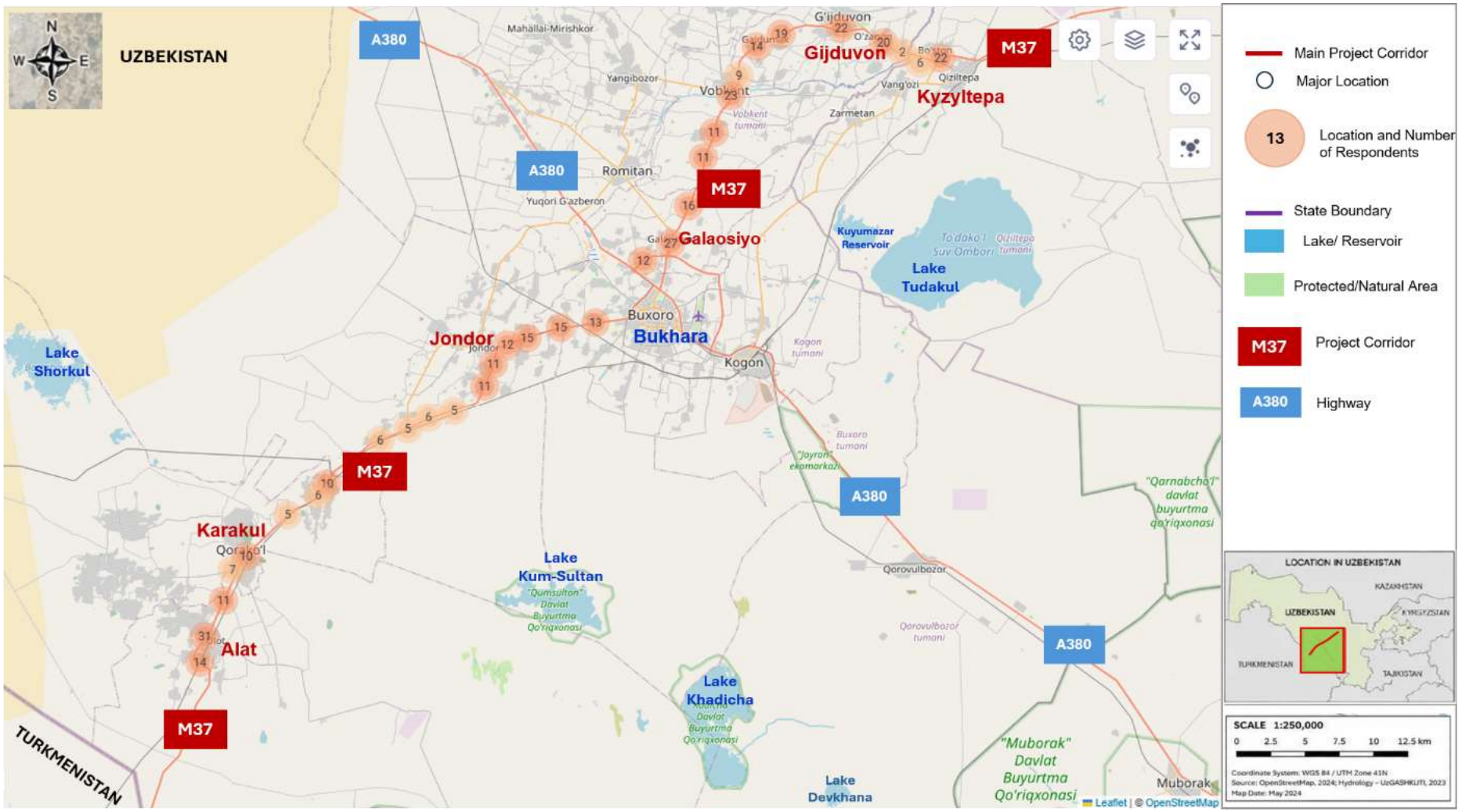


Figure 52: Spatial Distribution of Household Survey Respondents along the M37 Corridor
(Source: Household Survey, May 2026; Basemap: OpenStreetMap)

A total of 234 respondents from four districts, Kyzyltepa, Gijduvon, Vobkent, and Bukhara, participated in the survey, of them 18% are women.

Table 37: Respondents by Sex and District

District	Male		Female		Total
	persons	*%*	*persons*	*%*	*persons*
Gijduvon	68	83	14	17	82
Bukhara	55	74	19	26	74
Vobkent	44	88	6	12	50
Kyzyltepa	27	96	1	4	28
Total:	194	82.9	40	17.1	234

The total surveyed population across the four Lots 1–2 districts comprised 1,342 persons, as detailed in Table 38.

Table 38: Surveyed Population by Sex and District

District	Male		Female		Total
	persons	*%*	*persons*	*%*	*persons*
Gijduvon	240	53%	212	47%	452
Bukhara	231	51%	219	49%	450
Vobkent	167	55%	134	45%	301
Kyzyltepa	72	52%	67	48%	139
Total:	710	53%	632	47%	1,342

(Source: Household Survey, May 2026; ESIA)

5.4.2.1. Population, Respondents, and Household Composition

The surveyed population across the four Lots 1–2 districts comprises 1,342 persons, of whom 53% are male (710 persons) and 47% are female (632 persons). Adults (18+) account for most of the surveyed population, with children distributed across two age groups: boys and girls aged 4–17 and children aged 0–3. The district breakdown is presented in Table 36.

Respondents were predominantly male (84%), consistent with household heads, who serve as primary respondents. Male-headed households account for 96.6% (226 of 234) of all surveyed households across the four districts. Female-headed households are most prevalent in Gijduvon (7% of households) and were not recorded in Kyzyltepa.

The average household size across the four Lots 1–2 districts is 5.64 persons, consistent with national rural norms and multi-generational family structures. Household sizes are largest in Bukhara district (6.08 persons) and Vobkent (6.02 persons) and smallest in Kyzyltepa (4.96 persons). Medium-sized households (3–6 members) dominate the sample, while very large (9+ members) and very small (1–2 members) households are

both comparatively rare. District-level breakdown of average household size and composition is presented in Table 39.

Table 39: Average Household Size by District

District	Average Number of Male Adults (18+)	Average Number of Female Adults (18+)	Average Number of Children (4–17)	Average Number of Children (0–3)	Average Household Size
Gijduvon	1.81	1.79	1.47	1.00	5.51
Bukhara	1.96	1.84	1.54	1.06	6.08
Vobkent	2.00	1.52	1.60	1.08	6.02
Kyzyltepa	1.74	1.74	1.72	0.50	4.96
Weighted Average:	1.88	1.72	1.58	0.91	5.64

(Source: Household Survey, May 2026; ESIA)

5.4.2.2. Elderly Population and Pensioners

A total of 149 pensioners were identified across the households surveyed in the four Lots 1–2 districts, representing 11.1% of the total surveyed population of 1,342 persons. The sex split among pensioners shows a slight female majority: 67 male pensioners (45%) and 82 female pensioners (55%). This pattern reflects Uzbekistan's pension eligibility structure, where women typically become eligible at an earlier age than men, resulting in a larger female pensioner pool even within a slightly male-dominated overall population. By district, Bukhara has the largest pensioner group (69 persons), followed by Gijduvon (46), Vobkent (20), and Kyzyltepa (14).

5.4.2.3. Education Level

Across the surveyed population of 1,342 persons in the four Lots 1–2 districts, 59.5% have no specialized education, 29.5% hold vocational or specialized qualifications, and 10.75% have completed higher education. Men show a marginally higher share with higher education than women (14% vs. 11%), consistent with the full corridor pattern. Kyzyltepa district has the most educated population profile among the four districts (18% higher education, 35% with no specialized education), while Bukhara district shows the lowest higher education share (9%) and the highest proportion with no specialized education (73%), suggesting structural rather than geographic barriers to formal education access in peri-urban corridor communities. District-level education breakdown is presented in Table 40.

Table 40: Education Level by District

District	No Specialized Education		Vocational / Specialized		Higher Education		Total
	people	%	people	%	people	%	people
Gijduvon	285	63%	114	25%	53	12%	452
Bukhara	330	73%	79	18%	41	9%	450

District	No Specialized Education		Vocational / Specialized		Higher Education		Total
	people	%	people	%	people	%	people
Vobkent	203	67%	85	28%	13	4%	301
Kyzyltepa	48	35%	66	47%	25	18%	139
Total:	866	59.5%	344	29.5%	132	10.75%	1,342

(Source: Household Survey, May 2026; ESIA)

5.4.2.4. Employment and Economic Activity

The employment profile of the surveyed population across the four districts (Lots 1-2) reflects a mixed labour market structure combining formal employment, self-employment, household-based activity, and pensioner status. Among the 1,342 persons surveyed, a total of 400 persons are engaged in paid employment, of whom 259 are men (65%) and 141 are women (35%). Self-employed persons number 288 (173 men and 115 women). Unemployed persons and homemakers together account for 163 individuals, of whom 22 are men and 141 are women.

A notable finding is the high share of women categorized as unemployed or homemakers – 141 of 163 persons in that category, representing 86.5%. This reflects the socio-cultural context where women's primary role is household management, a factor that has implications for income vulnerability assessment and for the design of livelihood restoration measures under the project's resettlement framework. District-level breakdown of employment status is presented in Table 41.

Table 41: Employment Status by District, Lots 1–2

District	Employed		Self-employed		Unemployed / Homemakers	
	total	of whom female	total	of whom female	total	of whom female
Gijduvon	149	58	118	51	53	40
Bukhara	140	45	72	32	42	34
Vobkent	67	21	52	15	35	46
Kyzyltepa	44	17	46	17	33	21
Total:	400	141	288	115	163	141

(Source: Household Survey, May 2026; ESIA)

5.4.2.5. Household Income and Economic Situation

Own business is the primary income source for the largest share of households in the four Lots 1–2 districts (76 households, 32.5%), followed by government and public sector employment (70 households, 29.9%) and private sector employment (58 households, 24.8%). Agriculture is a primary income source for only 2.6% of households, though this does not indicate agriculture is unimportant corridor-wide, mahalla passport data (Section 5.4.1) confirm it remains the dominant community-level activity, but for most surveyed households it supplements rather than replaces formal or business income. Primary income source by district and gender of household head is shown in Table 42.

Table 42: Primary Income Source of Surveyed Households

Primary Income Source	Male-headed HHs	Female-headed HHs	Total HHs (% of 234)
Government and public sector employment	68	2	70 (29.9%)
Own business	72	4	76 (32.5%)
Private sector employment	57	1	58 (24.8%)
Other	23	1	24 (10.3%)
Agriculture	6	0	6 (2.6%)
Total:	226	8	234 (100%)

HH = Household (Source: Household Survey, May 2026; ESIA)

Monthly household income is predominantly in the UZS 5–10 million range, reported by 113 households (48.3%). The less-than-UZS 5 million band follows with 63 households (26.9%), and 48 households (20.5%) report income in the UZS 10–15 million band. Only 10 households (4.3%) report income above UZS 15 million per month (Table 43).

Table 43: Monthly Household Income Distribution

Monthly Income Band (UZS)	Male Respondents		Female Respondents		Total HHs (% of 234)
	persons	*%*	*persons*	*%*	
Less than UZS 5 million	51	21.8%	12	5.1%	63 (26.9%)
UZS 5–10 million	89	38.0%	24	10.3%	113 (48.3%)
UZS 10–15 million	44	18.8%	4	1.7%	48 (20.5%)
UZS 15–20 million	8	3.4%	0	0.0%	8 (3.4%)
UZS 20–25 million	2	0.9%	0	0.0%	2 (0.9%)
Total:	194	82.9%	40	17.1%	234 (100%)

HH = Household; UZS = Uzbek Soum (Source: Household Survey, May 2026; ESIA)

5.4.2.6. Land Use and Agricultural Activity

Just over half of surveyed households (121 of 234, or 51.7%) use land along or near the M37 right-of-way. Among land users, ownership is the dominant tenure form: 102 households (84.3% of land users) are outright owners, while 16 (13.2%) are leaseholders and 3 hold land under seasonal or informal arrangements. Plot sizes are predominantly small: 62 households (50.4% of land users) hold under 0.1 hectares, and a further 48 (39.0%) hold between 0.1 and 0.5 hectares, meaning 89.4% of land-using households hold under 0.5 hectares. Commercial land is the most commonly held land type (52 households), followed by residential (46 households) and irrigated agricultural land (27 households).

Agricultural activity remains widespread at the household level despite agriculture's small share as a primary income source. 64.1% of households keep livestock (150 households), 38.9% grow crops (91 households), and 38.9% keep poultry (91 households). Critically for the impact assessment, 93.2% of households (218 of 234) report having trees

on their land, the highest single agricultural indicator recorded, given that tree removal is one of the primary anticipated impacts of the road rehabilitation and bypass works. Agricultural machinery use is very limited: only 9 households (3.8%) use any machinery, of whom 8 access it through rental rather than ownership, reflecting limited capital assets among corridor agricultural households.

5.4.2.7. Access to Services, Road Use, and Community Perceptions

The M37 road is the primary artery connecting corridor communities to essential services, and households are concentrated in its immediate vicinity: 83.8% of surveyed households are within 500 metres of the highway (105 within 100 m and 91 within 100–500 m), underscoring both their dependence on the road and their direct exposure to construction impacts.

Access to educational institutions is moderate: 65 households (27.8%) are within 100–500 m of a school and 85 (36.3%) are within 500 m to 1 km, while 35 households (15.0%) are more than 2 km from the nearest school. Healthcare access is markedly more constrained: only 28 households (12.0%) are within 500 m of a clinic, while 80 (34.2%) are between 1 and 2 km and 59 (25.2%) are more than 2 km away. Market access is the most constrained of all services: 164 households (70.1%) are more than 2 km from the nearest market, and only 5 (2.1%) are within 500 m, indicating heavy reliance on the M37 for market trips.

Commuting to work is by far the most common reason households use the M37 (180 respondents, 76.9%), followed by accessing services (102 respondents, 43.6%) and business travel (74 respondents, 31.6%), reflecting the road's centrality to daily corridor livelihoods.

When asked to identify the primary problems in their community, respondents most frequently cited poor utility quality (131 households, 56.0%), noise (111, 47.4%), lack of lighting (108, 46.2%), unemployment (91, 38.9%), and road safety (87, 37.2%). These findings are directly relevant to project design: the prominence of utility quality, lighting, and road safety concerns provides strong baseline evidence for prioritizing pedestrian crossings, speed control measures, street lighting, and bus shelters as core components of the M37 rehabilitation. The relatively high share citing noise (47.4%), likely attributable in large part to existing traffic on the M37, reinforces the importance of construction noise management provisions in the ESMP. The lack of public transport (38, 16.2%) points to an unmet mobility need that project-associated measures could partially address.

5.4.2.8. Summary of Key Findings

The household survey findings across the four Lots 1–2 districts reveal a corridor population characterized by moderate household size (average 5.64 persons), predominantly male-headed households (96.6%), and a mixed formal-informal economic base. Own business is the single largest primary livelihood source (32.5% of

households), followed closely by government and public sector employment (29.9%) and private sector employment (24.8%). Supplementary income from small-scale agricultural sales is common, though agriculture is the primary income source for only 2.6% of households. Education levels are moderate: 59.5% of the surveyed population have no specialized education, while 29.5% hold vocational qualifications and 10.75% have completed higher education.

Agricultural activity, particularly tree cultivation (93.2% of households), livestock keeping (64.1%), and small-plot cropping (38.9%), is prevalent and creates a significant land and asset footprint that is directly relevant to the impact and resettlement assessment. Tree removal associated with road rehabilitation and bypass construction is the single most widespread household-level agricultural impact anticipated.

The community's heavy dependence on the M37 road is evidenced by proximity (83.8% of households living within 500 m of the highway), the centrality of road access to employment (76.9% of households use the road for work), healthcare, and market access. Market access is the most constrained service: 70.1% of households are more than 2 km from the nearest market, confirming the M37 as an essential mobility link. At the same time, the prevalence of poor utility quality (56.0%), noise (47.4%), and lack of lighting (46.2%) as the leading community-identified problems, alongside road safety concerns (37.2%) and poor road condition (20.1%), confirms both the current inadequacy of corridor infrastructure and the high expectations communities hold for the rehabilitation project. These findings form the baseline against which project impacts and benefits will be measured.

5.4.3. Vulnerable Groups

This section identifies and analyses the vulnerable households and population groups within the M37 Lots 1-2 project-affected area, drawing on data from the household survey conducted across four districts (Kyzyltepa, Gijduvon, Vobkent, and Bukhara). Vulnerability is assessed in accordance with the *AIIB ESS2 on Involuntary Resettlement*, which requires that particular attention be given to the needs of disadvantaged and vulnerable individuals or groups who may be disproportionately affected by project activities or who may have limited capacity to access project benefits and grievance mechanisms.

For the purposes of this assessment, vulnerability is defined by the presence of one or more of the following household characteristics:

(i) low income (below 5 million UZS per month)
(ii) presence of elderly members (aged 65 and above)
(iii) presence of persons with disabilities
(iv) female-headed household status
(v) presence of chronically ill household members
(vi) large number of dependents (more than five non-working members)

(vii) loss of a primary breadwinner
(viii) female-headed households requiring additional support.

Women within male-headed households engaged in corridor-dependent income activities are additionally recognized as an at-risk group (Section 5.5.3.1).

5.4.3.1. Identification of Vulnerable Households

The household survey included a dedicated vulnerability screening module in which respondents were asked whether any of the defined vulnerability criteria applied to their household. Of the 234 households surveyed across Lots 1–2, 64 households (27.4%) reported no vulnerability condition, while the remaining 170 households (72.6%) exhibit at least one vulnerability marker. This means that nearly three in four households within the Lots 1–2 corridor can be considered vulnerable under at least one of the defined criteria, a proportion that warrants structured mitigation measures in the project's RAP.

The most prevalent category of vulnerability is low income (monthly household income below UZS 5 million), self-identified by 106 households (45.3%). This is notably higher than the 63 households (26.9%) that fall within the below-UZS 5 million income band in the income distribution survey, a difference that reflects households perceiving economic hardship beyond the strict income threshold, including those in the UZS 5–10 million band who consider themselves income-constrained relative to household size and expenditure needs.

The second most prevalent category is the presence of elderly members (aged 65 and above), recorded in 66 households (28.2%). These two categories, low income and elderly presence together cover the core vulnerability profile of the Lots 1–2 corridor population.

Table 44: Vulnerability Categories of Households Surveyed

Vulnerability Category	HHs (numbers)	% of All Surveyed HHs (234)
No vulnerability identified	64	27.4%
Low income (< 5 million UZS/month)	106	45.3%
Elderly household members (> 65 years)	66	28.2%
Persons with disabilities (HH members)	14	6.0%
Female-headed household	8	3.4%
Chronically ill household members	11	4.7%
Large number of non-working dependents (> 5)	3	1.3%
Loss of primary breadwinner	2	0.9%
Female-headed HH requiring additional support	2	0.9%

HH = household; Vulnerability categories are not mutually exclusive; a single household may qualify under multiple criteria. (Source: Household Survey, May 2026; ESIA)

Persons with disabilities are present in 14 households (6.0%), and chronically ill members, including those with diabetes, cardiovascular disease, oncological conditions, neurological disorders, and musculoskeletal problems, are recorded in a further 11 households (4.7%). Three households report a large number of non-working dependents (more than five), and two report the loss of a primary breadwinner, and two female-headed households have been specifically flagged as requiring additional support beyond the standard compensation framework.

5.4.3.2. Vulnerability by District

While the survey data provide district-level breakdowns for the primary vulnerability categories, the income distribution data (Table 41), education data (Section 5.4.2.3), and employment data (Section 5.4.2.4) allow a more complete district-level vulnerability profile to be constructed. This is supplemented by data on female-headed households and pensioner presence. District-level vulnerability profiles vary considerably across the four districts, as shown in Table 45.

Table 45: Composite Vulnerability Indicators by District, Lots 1–2

District	Total HHs	Female-headed HHs	Female-headed HHs (%)	Pensioners (persons)	Elderly HHs (%)	Low-income HHs (%)	No vulnerability (%)	Average HH size
Gijduvon	82	6	7	46	22	43	0	5.51
Bukhara	74	1	1	69	48.6	59	54	6.08
Vobkent	50	1	2	20	20	32	48	6.02
Kyzyltepa	28	0	0	14	7	39	0	4.96
Total / Average	234	8	3.4	149	28	45	27	5.64

HH = Household (Source: Household Survey, May 2026; ESIA)

In terms of objective income vulnerability, 63 households (26.9%) reported monthly income in the lowest survey band (below UZS 5 million) in the income distribution data. This is distinct from the 106 households (45.3%) who self-identified as low-income in the vulnerability screening module, a substantially higher figure that likely reflects household perceptions of economic hardship beyond the strict income band threshold, including households in the UZS 5–10 million band who consider themselves income-constrained relative to household size and expenditure needs.

Gijduvon presents the most acute overall vulnerability profile among the four districts: every surveyed household (82 of 82) exhibits at least one vulnerability marker (0% no-vulnerability responses), 43% self-identify as low-income, 22% contain elderly members, and the district accounts for 75% of all female-headed households in the Lots 1–2 sample (6 of 8 FHHs). The combination of low-income prevalence, the highest absolute pensioner count outside Bukhara (46 persons), and the concentration of female-headed households makes Gijduvon the highest-priority district for targeted vulnerability support during RAP implementation.

Bukhara district presents the most concentrated elderly vulnerability profile, with 49% of its households containing elderly members (36 of 74) and the highest pensioner count (69 persons). It is also the highest-income district proportionally, 54% of Bukhara households report no vulnerability, suggesting a bimodal distribution of relatively better-off and significantly disadvantaged households within the same district. Gijduvon and Kyzyltepa record 0% no-vulnerability responses, indicating that every surveyed household in these two districts exhibits at least one vulnerability marker, with low income being the dominant category (43% in Gijduvon, 39% in Kyzyltepa).Vobkent, despite relatively lower low-income prevalence (32%), records a disproportionately high female share among unemployed and homemaker household members, consistent with the corridor-wide pattern in which 86.5% of all unemployed and homemaker persons are women, reflecting significant gender-specific economic vulnerability in this district.

5.4.3.3. Female-Headed Households

Female-headed households (FHHs) constitute a recognized category of vulnerability in resettlement and social impact assessment practice. The survey identified 8 female-headed households (3.4%) across the four Lots 1–2 districts, a substantially lower share than the four-district corridor average (14%). Gijduvon records the highest number (6 FHHs; 7% of its households), while Bukhara and Vobkent each record 1 FHH, and Kyzyltepa records none.

Table 46: Female-Headed Households by District

District	Total HHs	Male-headed HHs	Female-headed HHs	FHH as % of District HHs	FHH as % of All FHHs (55)
Gijduvon	82	76	6	7	75.0
Bukhara	74	73	1	1	12.5
Vobkent	50	49	1	2	12.5
Kyzyltepa	28	28	0	0	0.0
Total:	234	226	8	3.4%	100%

HH = Household; FHH = Female-headed Household (Source: Household Survey, May 2026; ESIA)

Two of the eight female-headed households have been flagged as requiring additional support beyond the standard compensation framework. While the absolute number of FHHs in Lots 1–2 is small, their concentration in Gijduvon (75% of all Lots 1–2 FHHs) warrants targeted outreach in that district during RAP implementation.

5.4.3.4. Elderly and Disabled Persons

Elderly Persons

Elderly persons aged 65 and above are present in 66 households surveyed (28.2%), second most prevalent vulnerability category after low income. The survey identified 149 pensioners across all Lots 1–2 households, with a slight female majority (82 female

and 67 male, 55% vs 45%), reflecting Uzbekistan's earlier pension eligibility age for women.

Elderly persons face specific vulnerabilities in the context of road rehabilitation: physical difficulty navigating construction zones and detour routes; higher dependence on proximity to healthcare (59 households, 25.2%, are more than 2 km from the nearest clinic); greater susceptibility to construction-related noise, dust, and vibration; and limited capacity to engage independently with grievance and compensation processes. Survey data confirm that 84.2% (197 of 234) of respondents are aware of road accidents in their area, conditions particularly hazardous for elderly pedestrians. Respondents themselves identify elderly persons as among the most at-risk road users, cited by 149 respondents (63.7%), second only to persons with disabilities (65.4%).

Persons with Disabilities

Persons with disabilities are recorded as household members in 14 households surveyed, representing 6.0% of all households. This figure captures households where at least one member has a disability formally registered under the *Medical and Labour Expert Commission*[28] system; physical, sensory, cognitive, or chronic health-related. A further 11 households (4.7%) report the presence of chronically ill members (diabetes, cardiovascular disease, oncological conditions, neurological disorders, gastrointestinal conditions, mobility impairments), who while not classified under formal disability status, may face comparable functional limitations in the context of project disruption.

Respondents identified persons with disabilities as the most frequently cited vulnerable road user group (153 respondents, 65.4%), ahead of the elderly (63.7%) and children (82.5%). The combination of poor road infrastructure (no pavements in many sections, absence of pedestrian crossings), heavy traffic, and limited accessible transport options creates a particularly hazardous environment for persons with mobility impairments. The project design should incorporate universal access provisions, including accessible pedestrian crossings, ramps, tactile paving, and accessible bus shelters, consistent with international inclusive design standards.

Table 47: Vulnerable Road User Groups as Identified by Survey Respondents

Vulnerable Road User Group	Total respondents citing	Total (% of 234)
Children	193	82.5
Elderly persons	149	63.7
Persons with disabilities	153	65.4
Women	80	34.2
Cyclists	79	33.8

[28] Law No. ZRU-641, On the Rights of Persons with Disabilities, dated 15.10.2020, https://lex.uz/uz/docs/5049549 (accessed June 2026)
Presidential Decree No. PP-22, dated 27 November 2021, On Measures to Further Improve the Activities of the Medical and Social Expertise Service and the System for Establishing Disability for Children, 27.11.2021, https://lex.uz/ru/docs/5745292 (accessed June 2026)

Module included multiple responses; (Source: Household Survey, May 2026; ESIA)

5.4.3.5. Low-Income Households

Low-income households are defined for this assessment as those reporting monthly household income below UZS5 million. They constitute the largest single vulnerability category, comprising 106 households (45.3% of all surveyed households). This self-identified figure is substantially higher than the 63 households (26.9%) falling within the below-UZS 5 million income band in the objective income distribution data, reflecting broader perceptions of economic constraint among households in the UZS 5–10 million band who face large household sizes and limited disposable income.

Income seasonality is a compounding factor for low-income households: 93 households (39.7%) report that income varies by season. For those already at or near subsistence income levels, seasonal income fluctuations combined with the anticipated disruption of agricultural activities, business access, and commuting patterns during construction create significant livelihood risk.

The supplementary income is reported by 85 households (36.3%). The dominant supplementary source is own business (66 households, 77.6% of those with supplementary income), followed by fruit sales (18 households, 21.2%) and vegetable sales (17 households, 20.0%). Livestock and meat product sales (10 households, 11.8%) and dairy sales (5 households, 5.9%) are also recorded. These supplementary income streams, particularly fruit, vegetables, and livestock sales along the road corridor, are directly susceptible to disruption during construction due to restricted access and reduced customer traffic.

Economic self-assessment data corroborate the income vulnerability picture: 12 households (5.1%) report that income covers food only without capacity for clothing or utilities, and 1 household reports income insufficient even for food. By contrast, 101 households (43.2%) report incomes sufficient to purchase household appliances, and 36 (15.4%) report sufficient income for major purchases such as a vehicle or property, indicating the full economic spectrum present within the four-district survey area.

Livelihood restoration and entitlement provisions for low-income and other vulnerable households are addressed in the RAP entitlement matrix and the ESMP pre-construction and construction phase provisions.

5.5. Gender Profile and Women's Conditions

5.5.1. Gender Policies and Practices

5.5.1.1. Policies

In Bukhara and Navoi Provinces, several government and public organizations promote women's rights, gender equality, and women's participation in social, economic, and political life, including the Women's Committee of Uzbekistan, Bukhara and Navoi Province Administrations (khokimiyats), the "Oila" Scientific Research Center[29] under the Cabinet of Ministers, the Association of Mahallas, the Public Fund[30] for the Support of Women and Families, and the Association of Businesswomen of Uzbekistan.

Gender equality in Uzbekistan is governed by *Law on Guarantees of Equal Rights and Opportunities for Women and Men*[31]." In addition, the *Strategy for Achieving Gender Equality in the Republic of Uzbekistan by 2030*[32] seeks to ensure equal rights and opportunities for women and men across political, economic, legal, cultural, educational, scientific, and sporting spheres. Since adoption of these policy measures, the proportion of women in senior management positions in public institutions has increased from 27% to 35% in 2024, the number of female entrepreneurs has doubled, and female enrolment in higher education institutions has increased sixfold.

According to the Bukhara Province Administration, two women from Bukhara Province currently serve in the national Parliament (one in the Senate and one in the Legislative Chamber). In addition, 103 women serve as members of local deputy councils (kengashes), while more than 2,395 women held managerial positions across the province in 2025.

5.5.1.2. Bukhara and Navoi Provinces Gender Statistics

Labour market statistics[33] indicate persistent gender disparities in economic participation and employment across both provinces, though gradual improvements are evident over 2021–2024. Men consistently exhibit higher levels of economic activity and employment than women, while women experience higher unemployment. The economically active population is predominantly male: in 2024, women represented

[29] Decree of the Cabinet of Ministers of Uzbekistan No. 229, 26.03.2018, On measures to organize the activities of the Scientific and Practical Research Center "Oila" under the Cabinet of Ministers of the Republic of Uzbekistan, https://lex.uz/ru/docs/3598039?ONDATE=04.06.2019&ONDATE2=18.02.2020&action=compare (accessed June 2026)
[30] This institution is established following Decree of the Cabinet of Ministers of Uzbekistan No. 645 of 04.11.2022, On the organization of the activities of the Public Fund for the Support of Families and Women, https://lex.uz/docs/6273551 (accessed June 2026)
[31] Law No. 562, 02.09.2019, On Guarantees of Equal Rights and Opportunities for Women and Men, https://lex.uz/docs/4494849 (accessed June 2026)
[32] Resolution No. KQ-346/1-V of the Senate Council of the Oliy Majlis of Uzbekistan, Strategy for Achieving Gender Equality in the Republic of Uzbekistan by 2030, 26.05.2026, https://lex.uz/docs/-8286995 (accessed June 2026)
[33] FOOTNOTE 53

approximately 43.9% of the economically active population in Bukhara Province and 43.8% in Navoi Province.

Economic activity rates also show a consistent gender gap of approximately 12–13 percentage points (2024: women 65.4–68.6%, men 77.1–79.2%, Bukhara and Navoi respectively), indicating lower female labour force participation. Employment reflects a similar pattern (women ~43% of total employment in both provinces), with only modest increases in female employment since 2021. Unemployment rates have declined substantially for both sexes over the reporting period, but remain consistently higher among women (7.3% Bukhara, 6.8% Navoi in 2024, compared with 3.8% and 3.5% for men respectively), women remain almost twice as likely to be unemployed as men, a gap that has narrowed only slightly since 2021.

Sector-level employment share by gender (2021–202Share of Women Employed by Economic Activity, 2021–20244) is presented in Table 48.

Table 48: Share of Women Employed by Economic Activity, 2021–2024

Activity	2021	2022	2023	2024
Agriculture, forestry, and fishery, %	48.0	46.6	47.3	47.0
Industry, %	41.9	42.6	42.4	42.4
Construction, %	4.8	4.4	9.3	9.4
Enterprises and organizations, %	42.4	44.1	44.4	44.8

(Source: Gender Statistics Department of National Statistics Committee of Uzbekistan)

Overall, female labour market participation has remained relatively stable and unemployment has decreased, but structural gender disparities persist across both provinces, women continue to participate less in the labour force, are employed in lower numbers than men, and face higher unemployment. These findings underscore the importance of implementing targeted project measures to promote equal access to employment opportunities, both during construction and operation, supported through gender-responsive labour management procedures and measures to prevent discrimination, sexual harassment, and gender-based violence.

5.5.2. Gender Distribution in Households *(Household Survey Findings)*

The surveyed population of 1,342 persons across the four districts comprises 710 men (53%) and 632 women (47%), with an adult sex ratio of 435 men to 406 women (52% to 48%). The respondent profile is strongly male-dominated: 194 of 234 survey respondents (83%) were men, and 226 of 234 household heads (97%) are male. This structural male dominance in household representation is characteristic of the socio-cultural context of Bukhara and Navoi regions, where men are conventionally the primary interlocutors with external institutions including survey teams, local authorities, and project representatives.

The female share of the household population is consistent across age groups. Among adults (18+), women constitute 48% (406 of 841). Among children aged 4–17, girls represent 44% (192 of 433), and among infants and toddlers (0–3), girls account for 50% (34 of 68). These balanced ratios confirm the absence of significant sex-selective demographic distortion.

Table 49: Gender Distribution of Surveyed Population by Age Group

Age / Role Group	Male		Female		Total
	persons	*%*	*persons*	*%*	
Adults (17+)	435	52	406	48	841
Children (4–17)	241	56	192	44	433
Infants / toddlers (0–3)	34	50	34	50	68
Pensioners	67	45	82	55	149
Survey respondents	194	83	40	17	234
Household heads	226	97	8	3	234

(Source: Household Survey, May 2026; ESIA)

Women's underrepresentation as respondents and household heads does not reflect their absence from economic and social life, but rather the prevailing social norm of male household representation.

5.5.3. Women's Economic Participation and Employment

5.5.3.1. Employment Status

The survey revealed that of the 1,342 surveyed persons, 141 women are formally employed (compared to 259 men), and 115 women are self-employed (compared to 173 men). A total of 141 women are classified as unemployed or homemakers, representing 86.5% of all 163 persons in that category. This is the most pronounced gender disparity in the employment data.

146 of 234 households (62.4%) report that women participate in income-generating activity, while 88 households (37.6%) report no female income participation. The dominant form is home-based work (63 households, 26.9%), followed by own business (47 households, 20.1%) and government sector employment (38 households, 16.2%).

Women in Male-Headed Households

The 8 female-headed households (3.4%) represent a small fraction of the survey sample. However, 143 of 226 male-headed households (63.3%) report that women within the household participate in income-generating activities. These women, within formally male-headed households, are economically active but are not captured by the female-headed household vulnerability category. Their income activities are predominantly road- and corridor-dependent: home-based work (63 households), own



business (45 households), roadside trade and other commerce (18 households), fruit and vegetable sales (19 households), and livestock and dairy product sales (16 households). All of these activities are directly susceptible to disruption from construction-phase access restrictions, reduced customer traffic, and temporary severance of market linkages.

For impact assessment purposes, women within male-headed households engaged in these corridor-dependent activities must be identified as a distinct at-risk group with dedicated livelihood continuity measures in the RAP and ESMP.

Table 50: Types of Women's Income-Generating Activities

Type of Activity	Male respondents		Female respondents		Total HHs	
	persons	*%*	*persons*	*%*	**HHs**	**% of 234 HHs**
Home-based work	57	24.4	6	2.6	63	26.9
Own business	39	16.7	8	3.4	47	20.1
Government sector employment	33	14.1	5	2.1	38	16.2
Other trade	15	6.4	4	1.7	19	8.1
Sale of fruit and vegetables (from home garden)	16	6.8	3	1.3	19	8.1
Sale of meat and dairy products (livestock)	14	6.0	3	1.3	17	7.3
Private sector employment	6	2.6	4	1.7	10	4.3
Seasonal agricultural work	3	1.3	0	0	3	1.3
Farming	0	0	0	0	0	0

Module included multiple responses; HH = Household (Source: Household Survey, May 2026; ESIA)

Farming records zero responses in the Lots 1–2 four-district sample and can be removed from the table if preferred. All percentage columns are calculated as a share of 234 total households. The male/female respondent split (194 male, 40 female) reflects who answered the survey, not who performs the activity, both male and female respondents are reporting on women's income activities within their household.

Agricultural-based income activities collectively account for women's participation in 36 households (15.4% of all households). These activities are closely tied to land plots adjacent to the M37 corridor. The anticipated project impacts on trees (93.2% of households have trees), kitchen gardens, and livestock keeping therefore have a direct bearing on women's income security, even where land is registered in the name of a male household head.

Relevant requirements to GAP and measures are provided in Section 6.2.7.

5.5.3.2. Financial Control and Income Autonomy

Despite significant female participation in economic activity, income and financial decision-making remain predominantly male-controlled. Survey data (Table 51) indicate that in 155 households (66.2%) income is controlled by men; in 74 households (31.6%) jointly; and in only 5 households (2.1%) by women alone. Financial decisions follow a similar pattern: men decide in 164 households (70.1%), jointly in 66 (28.2%), and women alone in 4 (1.7%). Women's access to personal financial resources is somewhat stronger: 141 households (60.3%) report that the woman has personal funds she can dispose of independently.

Table 51: Financial Control and Income Autonomy within Households

Question / Indicator	Response	HHs (numbers)	% of 234
Who controls household income?	Men	155	66.2
	Women	5	2.1
	Both	74	31.6
Who makes financial decisions?	Men	164	70.1
	Women	4	1.7
	Both	66	28.2
Does the woman have personal funds?	Yes	141	60.3
	No	93	39.7
Women participate in income activity?	Yes	146	62.4
	No	88	37.6

(Source: Household Survey, May 2026; ESIA)

This asymmetry has critical implications for the project's compensation process. 43 households (18.4%) acknowledge barriers to women's access to compensation payments, citing documentation requirements, mobility constraints, and cultural norms. While 207 households (88.5%) believe women will have equal access to compensation if their assets are affected, 14 households (6.0%) explicitly state they will not, and 13 (5.6%) are uncertain.

Women's participation in livelihood restoration programmes is constrained by the same structural barriers. In 70.1% of households men make financial decisions, meaning livelihood restoration options presented only to the male household head may not translate into benefits for women whose specific income activities are disrupted. The RAP will ensure women in male-headed households are individually consulted on livelihood restoration options relevant to their specific activities, using female enumerators where required. (Section 6.2.7.1, Gender and Social Inclusion).

Relevant requirements to GAP and measures are provided in Section 6.2.7.

5.5.4. Women's Access to Services and Decision-Making *(Household Survey Findings)*

5.5.4.1. Mobility and Transport Access

Women's access to services is fundamentally shaped by their mobility, their ability to travel independently and affordably along the M37 corridor and to feeder roads. The survey reveals significant gender disparities in transport access and mobility autonomy. Only 8 of 234 households (3.4%) report that a woman owns personal transport, and all 8 of these women drive independently. Mobility restrictions affecting women were reported in 22 of 234 households (9.4%) in the four-district sample. Reported restrictions were predominantly financial (20 households) rather than direct mobility limitations (2 households). Men travel daily in 218 households (93.2%); women daily in 153 households (65.4%) and weekly in 81 households (34.6%). The near-total absence of female vehicle ownership (96.6% of women do not own transport) means women are almost entirely dependent on male family members, shared vehicles, or public transport for their mobility.

5.5.4.2. Trip Purposes and Service Access

The purposes for which women travel differ from those of men, reflecting their distinct social roles and service needs. Work commuting is the dominant road use purpose for the Lots 1–2 corridor (203 households, 86.8%), followed by government services (152, 65.0%), market access (131, 56.0%), and healthcare (122, 52.1%). The high healthcare figure (52.1%) reflects women's primary caregiver role and their disproportionate dependence on clinic access, a finding directly relevant to the impact assessment given that 25.2% of households are more than 2 km from the nearest clinic. The road's role as a conduit for healthcare access is particularly significant for women as primary caregivers for children and elderly household members.

Table 52: Trip Purposes by Sex

Trip Purpose	Male respondents		Female respondents		Total HHs	
	persons	*%*	*persons*	*%*	*persons*	*% of 234 HHs*
Work / Employment	167	71.4	36	15.4	203	86.8
Government services	123	52.6	29	12.4	152	65.0
Market	105	44.9	26	11.1	131	56.0
Healthcare (clinic, pharmacy, hospital)	101	43.2	21	9.0	122	52.1
Education / Study	79	33.8	18	7.7	97	41.5
Business	80	34.2	15	6.4	95	40.6
Other social facilities	56	23.9	15	6.4	71	30.3
Agriculture	18	7.7	5	2.1	23	9.8
Social visits	8	3.4	3	1.3	11	4.7

Module included multiple responses; (Source: Household Survey, May 2026; ESIA)

The distance to key services documented in the household survey is particularly constraining for women with limited transport access. The fact that 67.8% of households are more than 2 kilometers from the nearest bazaar, and 21.6% are more than 2 kilometers from the nearest health facility, has a disproportionate impact on women, who are more likely to travel on foot (72.6% (170 of 234 households) of women's transport mode responses include walking) and less likely to have access to personal vehicles.

5.5.4.3. Women's Participation in Household Decision-Making

Despite constrained financial autonomy, women demonstrate high levels of participation in general household decision-making and community discussion. 224 of 234 households (95.7%) report that women participate in family decision-making, and 228 households (97.4%) report women participate in community discussions. Women's participation in income-generating decisions is reported for 146 households (62.4%). These findings indicate substantial social voice for women, even alongside constrained financial autonomy.

Table 53: Women's Participation in Decision-Making and Community Life, Lots 1-2

Indicator	Male respondents		Female respondents		Total	
	persons	*%*	*persons*	*%*	*persons*	*% of 234*
Women make decisions in the family	186	79.5	38	16.2	224	95.7
Women participate in community discussions	189	80.8	39	16.7	228	97.4
Women participate in income activities	123	52.6	23	9.8	146	62.4
Women have equal access to compensation	171	73.1	36	15.5	207	88.5
Barriers to women's compensation access	34	14.5	9	3.8	43	18.4

(Source: Household Survey, May 2026; ESIA)

Regarding project-specific entitlements, 207 households (88.5%) believe that women will have equal access to project compensation if their assets are affected. However, 43 households (18.4%) identify barriers to women's access to compensation, citing documentation requirements, mobility constraints, and cultural and social norms, a significant minority that warrants dedicated attention in the design of the project's entitlement and grievance frameworks.

Relevant requirements to GAP and measures are provided in Section 6.2.7.

5.5.5. Safety and Security of Women *(Household Survey Findings)*

5.5.5.1. Women's Safety on the M37 Corridor

Women's safety on and around the M37 is a significant concern identified by the household survey, with implications for both the baseline situation and for the project's construction and operational phases. The survey reveals a clear distinction between daytime and nighttime safety perceptions, and between general road safety concerns and gender-specific security issues.

During the day, 141 households (60.3%) consider the M37 safe for women, while 93 (39.7%) do not. As with harassment data, daytime safety concerns for women may be underreported given the 83% male respondent profile.

At night, safety perceptions deteriorate sharply: 151 households (64.5%) do not consider the road safe for women after dark, and only 83 (35.5%) consider it safe. Specific safety concerns were identified by 107 households (45.7%). This day/night divergence reflects the absence of street lighting, identified as a leading community concern by 46.2% of Lots 1–2 respondents (108 households), and the low presence of other pedestrians and public transport during evening hours.

Table 54: Women's Safety on the M37 Corridor: Daytime and Nighttime Perceptions

Safety Question	Response	Total HHs, % of 234
(i) Women safe on M37 during the day?	Yes	141 (60.3%)
	No	93 (39.7%)
(ii) Women safe on M37 at night?	Yes	83 (35.5%)
	No	151 (64.5%)
(iii) Specific safety concerns reported?	Yes	107 (45.7%)
	No	127 (54.3%)

(Source: Household Survey, May 2026; ESIA)

5.5.5.2. Nature of Women's Safety Concerns

Respondents who identified safety concerns were asked to specify the nature of those concerns. Vehicle speed is the dominant safety concern (98 households, 41.9%), followed by unsafe road crossings (86, 36.8%), heavy traffic volume (76, 32.5%), poor lighting (61, 26.1%), and harassment or pursuit (9, 3.8%).

Table 55: Nature of Women's Safety Concerns on the M37 Road

Safety Concern	Male respondents		Female respondents		Total HHs	
	persons	*%*	*persons*	*%*	*persons*	*% of 234 HHs*
Vehicle speed	80	34.2	18	7.7	98	41.9
Unsafe road crossings	72	30.8	14	6.0	86	36.8

Safety Concern	Male respondents		Female respondents		Total HHs	
	persons	*%*	*persons*	*%*	*persons*	*% of 234 HHs*
Heavy traffic volume	59	25.2	17	7.3	76	32.5
Poor lighting	49	20.9	12	5.1	61	26.1
Harassment / pursuit	8	3.4	1	0.4	9	3.8

Module included multiple responses; (Source: Household Survey, May 2026; ESIA)

Although the reported rate of harassment is relatively low (3.8%), the high proportion of male household heads among respondents (83%) should be considered when interpreting these findings, as some experiences of gender-based harassment and security incidents may not have been fully captured.

5.5.5.3. Impact of Construction on Women's Safety

The anticipated construction phase introduces additional safety and security risks specifically affecting women. Construction is expected to affect women's daily lives by 85 households (36.3%). Safety near construction camps is a concern for 36 households (15.4%), and concerns about the presence of construction workers near settlements were reported by 18 households (7.7%). While these figures are lower than the four-district sample, they represent a non-trivial risk given the underreporting dynamic noted above.

Gender-based risks associated with migrant labour influx are a recognized concern in international infrastructure project practice. Concerns about the presence of construction workers near settlements were reported by 18 households (7.7%), and concerns about safety near worker camps by 36 households (15.4%). While these figures are relatively low, they reflect the predominantly male respondent profile (83%) and the well-documented social inhibition around discussing gender-based violence and harassment in a household survey context, both factors that systematically suppress reported rates of GBV risk in surveys of this type.

The project's construction Environmental and Social Management Plan (C-ESMP) should include a Labour Management Plan with gender-specific provisions. These should address: a Code of Conduct for contractor workforce prohibiting harassment, intimidation, and exploitation of local women; clear reporting channels for gender-based incidents; community awareness sessions on workers' expected behavior; and coordination with local khokimiyat and mahalla committees on monitoring of worker-community interactions.

5.5.5.4. Women's Mobility and Service Access

Construction-phase disruption to road access and pedestrian infrastructure will disproportionately affect women given their near-total dependence on walking and public transport (96.6% of women have no personal vehicle). Temporary road closures, detour routes, and disrupted pedestrian crossings will increase travel time and cost for

women accessing healthcare, markets, schools, and government services, trip purposes disproportionately represented in women's travel patterns: healthcare (52.1% of households), government services (65.0%), and market access (56.0%). Women in the 25.2% of households more than 2 km from the nearest clinic are particularly exposed, given their primary caregiver role for children and elderly household members.

The construction-phase mobility impact on women is therefore not merely an inconvenience but a direct livelihood and welfare risk: restricted access to markets disrupts women's roadside and home-based trade; restricted access to healthcare affects their caregiver responsibilities; and disrupted school access creates additional unpaid care burdens that fall predominantly on women. These impacts require dedicated mitigation provisions, maintained pedestrian access routes, temporary crossings, and advance community notification through channels accessible to women, specified in the traffic management plan.

Relevant requirements to GAP and measures are provided in Section 6.2.7.

5.5.6. Women's Preferred Communication and Engagement Methods

Effective engagement with women requires communication approaches tailored to their specific mobility constraints, time availability, and social contexts. The survey identified preferred methods for communicating with women about the project. Community meetings are the most preferred engagement channel (185 households, 79.1%), followed by phone contact (107 households, 45.7%) and female community liaisons (98 households, 41.9%).

Table 56: Preferred Communication Methods for Reaching Women

Communication Method	Male respondents		Female respondents		Total HHs	
	persons	*%*	*persons*	*%*	*persons*	*% of 234 HHs*
Community meetings	149	63.7	36	15.4	185	79.1
Telephone / mobile contact	94	40.2	13	5.6	107	45.7
Female community liaisons / data collectors	78	33.3	20	8.5	98	41.9
Other methods	24	10.3	3	1.3	27	11.5

HH = Household; Module included multiple responses; (Source: Household Survey, May 2026; ESIA)

The strong preference for female community liaisons (41.9%) is a significant finding. It indicates that a substantial proportion of households recognize the need for gender-sensitive outreach channels and that women may be more willing to engage with project processes when approached by a female representative. Separate women's consultations must be carried forward as a binding requirement in the SEP and GAP. Specifically: (i) all consultation events must include a dedicated women's session or separate FGD component; (ii) female enumerators and facilitators shall be deployed for women's sessions; (iii) findings from women's sessions must be reported separately in

semi-annual social monitoring reports; and (iv) the GRM must include a dedicated channel accessible to women without requiring household head involvement.

Relevant requirements to GAP and measures are provided in Section 6.2.7.

5.5.7. Project Impacts on Women's Assets and Livelihoods

The household survey explored whether respondents perceive the project as having differentiated impacts on women's assets, business activities, and livelihoods. Most respondents (63.7%; 149 households) do not anticipate that construction will affect women's daily lives, while 36.3% (85 households) do expect some impact. Similarly, 89.7% of respondents (210 households) do not expect the project to affect women's business activities, but 10.3% (24 households) do, a smaller but still relevant minority, given women's concentration in home-based and market-linked activities.

When asked whether project impacts will differ by sex, 202 households (86.3%) said they would not. However, 32 households (13.7%) indicated that impacts would be differentiated by sex. Among the reasons cited for gender-differentiated impacts, mobility is the most frequently mentioned (29 households, 12.4%), followed by safety (27 households, 11.5%) and income (15 households, 6.4%). These responses are consistent with the broader pattern of data: women's greater dependence on walking and public transport, with 96.6% of women having no personal vehicle, means that any disruption to road access and pedestrian safety is disproportionately impactful for them compared to male household members who predominantly travel by private vehicle or motorcycle.

Table 57: Perceived Gender-Differentiated Project Impacts

Indicator / Question	Male respondents		Female respondents		Total	
	persons	*%*	*persons*	*%*	*persons*	*% of 234*
Construction affects women's daily lives — Yes	67	28.6	18	7.7	85	36.3
Construction affects women's business — Yes	22	9.4	2	0.9	24	10.3
Project impacts differ by sex — Yes	24	10.3	8	3.4	32	13.7
Reasons why impacts differ by sex (of 32 HHs):	---	---	---	---	---	---
Mobility	23	9.8	6	2.6	29	12.4
Safety	20	8.5	7	3.0	27	11.5
Income	12	5.1	3	1.3	15	6.4

HH = Household (Source: Household Survey, May 2026; ESIA)

These relatively low figures should additionally be interpreted in light of the 83% male respondent profile, male household heads may systematically underestimate the gendered nature of project impacts on women's specific income activities, reinforcing

the need for individual assessment of women's livelihood exposure rather than reliance on household-level impact reporting.

The project's gender-responsive measures should recognize that even where the majority of respondents do not anticipate gender-differentiated impacts, the specific vulnerabilities of women, in terms of mobility dependency, asset informality, income insecurity, and safety risk, mean that standard compensation and mitigation measures designed for male-headed households may be insufficient to ensure equitable outcomes for women.

Relevant requirements to GAP and measures are provided in Section 6.2.7.

5.5.8. Summary of Key Gender Findings

Table 58: Summary of Key Gender Findings

Theme	Key Finding
Economic participation	62.4% of HHs have women in income activity; home-based work dominant (26.9%); 86.5% of unemployed/homemakers are women.
Women in male-headed HHs	63.3% of male-headed HHs have economically active women; these women are a distinct at-risk group not captured by FHH category.
Financial control	Men control income in 66.2% of HHs; women control in 2.1%; 60.3% of women have personal funds.
Compensation access	18.4% of HHs acknowledge barriers to women's compensation access; RAP must include binding joint notification and payment provisions.
Transport and mobility	96.6% of women have no personal transport; 65.4% use road daily vs 93.2% of men.
Road safety (day)	39.7% of HHs consider M37 unsafe for women daytime; top concerns are speed (41.9%) and unsafe crossings (36.8%).
Road safety (night)	64.5% consider M37 unsafe for women at night; lighting is primary infrastructure gap.
Labour influx and GBV risk	15.4% concerned about safety near construction camps; harassment likely underreported given 83% male respondent profile.
Decision-making	95.7% of women participate in family decisions; 97.4% in community discussions; financial decisions remain male-dominated (70.1%).
Communication	79.1% prefer community meetings; 45.7% phone; 41.9% female liaisons, separate women's FGDs must be a binding SEP/GAP requirement.

HH = Household (Source: Household Survey, May 2026; ESIA)

The gender-specific vulnerabilities identified in Sections 5.5.2–5.5.8, including women's economic dependence on corridor-adjacent land and road-based trade, structural barriers to compensation access, mobility constraints, and safety risks, require dedicated gender-responsive provisions across the project's safeguard instruments. Specific measures addressing compensation payment procedures, grievance redress accessibility, stakeholder consultation requirements, and GBV prevention are set out in the ESMP (gender and social inclusion) and the project's GAP, which should be read in conjunction with this baseline section.

5.6. Community Perceptions and Expectations

This section presents household survey findings on community awareness, perceptions, expectations, and concerns regarding the M37 road rehabilitation project, covering current road use and problems, safety concerns, expectations from the project, willingness to participate in project-related work, potential conflict risk, and the influence of migrant labour on corridor communities. Data were collected from 234 household respondents across four districts, Gijduvon, Bukhara, Vobkent (Bukhara Province), and Kyzyltepa (Navoi Province), and are presented with sex-disaggregation throughout. Given that 83% of respondents are male, percentage figures are reported against the total respondent base of 234 households unless otherwise stated.

5.6.1. Current Road Conditions and Use Patterns

The M37 road is used daily by most households (94.4% of respondents; 221 households), with only 5.1% weekly (12 households) and 0.4% less frequent users (1 household), a near-universal daily dependency that gives particular weight to community perceptions of the road's current condition and to expectations about rehabilitation impacts. Respondents play diverse roles on the road: the largest group is drivers (38.0%; 89 households), followed by pedestrians (34.2%; 80 households) and passengers (24.4%; 57 households), with a small share of cyclists (3.4%; 8 households). Road crossing is a frequent activity for the majority, 64.1% cross the road often and 35.9% sometimes. The large majority of crossings (79.5%) are made at designated crossings, while 17.1% cross at any available location, a practice with significant safety implications given the high-speed traffic on the M37 road.

Safety concerns are widespread: 67.5% of respondents (158 households) do not feel safe when crossing the M37 road, and 84.2% (197 households) are aware of road accidents in their area. Accidents are reported to occur sometimes by 36.3% of respondents and often by 30.8%, with 17.1% reporting rare accidents. The most common accident types are vehicle-to-vehicle collisions (68.4%; 160 households) and vehicle-to-pedestrian incidents (47.0%; 110 households), the latter being particularly significant given the high pedestrian activity along the corridor.

5.6.2. Problems Experienced When Travelling on M37 Road

Respondents identified a wide range of problems experienced when traveling on the M37. The dominant issue is the absence of adequate public transport, cited by 54.7% of respondents (128 households), reflecting the limited coverage and frequency of bus services along the corridor. Poor road surface condition is the second most commonly cited problem (50.0%; 117 households), followed by high noise and dust levels (45.7%; 107 households). The absence of signalized crossings, pedestrian crossings, and safe crossing infrastructure near residential areas, hospitals, schools, and colleges is cited by 44.4% of respondents (104 households), a concern that directly corresponds to the high

rate of unsafe crossing behavior documented above. High accident risk is identified by 43.6% (102 households). Absence of road safety rules, speed limits, and road signs is cited by 41.9% (98 households). High travel costs concern 23.5% (55 households), long travel times 23.1% (54 households), and low service frequency or long waiting times 12.8% (30 households).

Table 59: Problems Experienced When Travelling on the M37

Problem	Male		Female		Total (%)	
	persons	*%*	*persons*	*%*	*persons*	*%of 234 HHs*
Inadequate public transport (routes, vehicles, overcrowding)	106	45.3	22	9.4	128	54.7
Poor road surface condition	101	43.2	16	6.8	117	50
High noise and dust levels	86	36.8	21	9.0	107	45.7
Absence of traffic lights and pedestrian crossings near residential areas	83	35.5	21	9.0	104	44.4
High risk of road accidents	86	36.8	16	6.8	102	43.6
Absence of bus stops, night lighting, rest areas	81	34.6	17	7.3	98	41.9
Absence of road safety rules, speed limits, road signs	70	29.9	20	8.5	90	38.5
High travel cost	44	18.8	11	4.7	55	23.5
Long travel time	41	17.5	13	5.6	54	23.1
Low service frequency / long waiting time	25	10.7	5	2.1	30	12.8

HH = Household; Multiple responses foreseen for this module (Source: Household Survey, May 2026; ESIA)

5.6.3. Road Safety Problems

5.6.3.1. Safety Problems in the Residential Area

The survey asked respondents to identify specific road safety problems in their residential area. Excessive vehicle speed is identified as the most critical safety problem by an overwhelming 93.2% (218 households) of all respondents, making it by far the dominant safety concern across four Lots 1–2 districts. Poor street lighting is the second most cited problem (56.4%; 132 households), followed by poor road surface condition (44.0%; 103 households) and absence of road signs (42.7%; 100 households). Heavy traffic volume is cited by 42.3% (99 households) and absence of pedestrian crossings by 41.5% (97 households). Absence of pavements and footpaths concerns 35.0% (82 households), inadequate bus stops 18.8% (44 households), and unreliable public transport 16.2% (38 households).

Table 60: Road Safety Problems Identified in Residential Area

Safety Problem	Male		Female		Total	
	persons	*%*	*persons*	*%*	*persons*	*%of 234 HHs*
Excessive vehicle speed	181	77.4	37	15.8	218	93.2
Poor street lighting	110	47.0	22	9.4	132	56.4
Poor road surface condition	85	36.3	18	7.7	103	44.0
Absence of road signs	80	34.2	20	8.5	100	42.7
Heavy traffic volume	82	35.0	17	7.3	99	42.3
Absence of pedestrian crossings	79	33.8	18	7.7	97	41.5
Absence of pavements / footpaths	65	27.8	17	7.3	82	35.0
Inadequate bus stops	36	15.4	8	3.4	44	18.8
Unreliable public transport	32	13.7	6	2.6	38	16.2

HH = Household; Multiple responses foreseen for this module (Source: Household Survey, May 2026; ESIA)

5.6.3.2. Safety Improvements Required

Respondents were asked to identify the safety improvements they consider most necessary. Speed control measures are the top priority, cited by 86.8% of respondents (203 households), consistent with the identification of excessive speed as the leading safety problem (93.2%). Traffic signals rank second (79.1%; 185 households), followed closely by pedestrian crossings (78.2%; 183 households) and street lighting (76.9%; 180 households). Pavements and footpaths are cited by 67.9% of respondents (159 households) and road signs by 62.4% (146 households). Bus stop improvement is cited by 29.1% of respondents (68 households).

The community's safety improvement priorities are closely aligned with the technical scope of the M37 rehabilitation project. Speed control measures, pedestrian crossings, street lighting, and road signs are all elements that can be incorporated into civil works design.

5.6.4. People's Expectations from the Project

5.6.4.1. Required Road Improvements

Beyond safety, respondents across the four Lots 1–2 districts expressed a broad range of expectations regarding the scope and outcomes of the M37 rehabilitation project. Road reconstruction and resurfacing is the most widely expected improvement (73.9%; 173 households), followed by construction of new road sections (59.8%; 140 households). Safety improvement is the third most frequently cited expectation, with 128 households (54.7%) citing general safety and 121 households (51.7%) citing specific road safety improvements, together confirming safety as the dominant community expectation

from the project. Street lighting improvement is expected by 48.7% of respondents (114 households), and improved road maintenance services by 41.0% (96 households). More U-turns near settlements are requested by 36.3% (85 households), and increased traffic signals and pedestrian crossings near settlements by 35.5% (83 households). Improved bus stop comfort is cited by 33.8% (79 households).

The community's improvement priorities are closely aligned with the technical scope of the M37 rehabilitation project. Road reconstruction, safety infrastructure, street lighting, pedestrian crossings, and traffic signals are all elements incorporated into civil works design and should be treated as community-validated priorities in the project design.

5.6.4.2. Self-Identification and Relationship to the Road

Respondents across the four districts (Kyzyltepa, Gijduvon, Vobkent, and Bukhara) were asked to characterize their relationship to the M37 road. The dominant self-identification is as a regular road user, reported by 202 households (86.3%), underlining the road's critical role in the daily life of corridor communities. A further 51 households (21.8%) consider themselves indirect beneficiaries, acknowledging that they benefit from road access without being daily direct users. 47 households (20.1%) identify their business as directly dependent on the road, and 41 households (17.5%) self-identify as belonging to a vulnerable road user group, including the elderly, women, children, and persons with disabilities. Agricultural producers dependent on the road account for 4 households (1.7%).

Table 61: Self-Identification of Respondents in Relation to the M37 Road

Self-Identification Category	Male		Female		Total	
	persons	*%*	*persons*	*%*	*persons*	**%**
Regular road user	167	71.4	35	15.0	202	86.3
Indirect beneficiary	40	17.1	11	4.7	51	21.8
Business dependent on the road	37	15.8	10	4.3	47	20.1
Vulnerable road user (elderly, women, children, disabled)	27	11.5	14	6.0	41	17.5
Agricultural producer dependent on road	4	1.7	0	0.0	4	1.7

(Source: Household Survey, May 2026; ESIA)

5.6.4.3. Expected Project Benefits

Respondents hold broadly positive expectations about the outcomes of the M37 rehabilitation project. Reduced travel costs are the most widely anticipated benefit, cited by 163 households (69.7%), followed by improved road access and reduced travel barriers, cited by 128 households (54.7%). Travel time savings are expected by 83 households (35.5%), and business growth by 59 households (25.2%). These findings reflect a strong community understanding of the economic development benefits of improved road infrastructure.

The alignment of expected benefits with the project's development objectives, Improved connectivity, reduced vehicle operating costs, and economic development along the corridor, is a positive indicator of community readiness to support the project. However, the high community expectations also create a risk of disappointment if the project's implementation does not deliver visible safety and service improvements alongside the physical road works.

5.6.5. Expected Improvements in Access to Services

One of the strongest findings from the expectations module is the near-universal anticipation that the project will improve access to key services. Access to healthcare is expected to improve for 96.6% of households (226 respondents) – the highest expectation of any service category. Access to education is anticipated by 93.6% (219 households), and access to markets by 92.7% (217 households). These figures are notable given that current access to these services is constrained – 70.1% of households (164 of 234) are more than 2 km from the nearest bazaar, and 25.2% (59 of 234 households) are more than 2 km from the nearest health facility.

These expectations are grounded in the realistic observation that the M37 road is the primary, and in many cases sole, artery connecting corridor communities to district and regional centers. Any improvement in road quality, travel speed, and transport frequency will directly translate into reduced effective distances to these services.

5.6.6. Before and After Comparison: Travel, Cost, and Service Access Expectations

5.6.6.1. Travel Time

Current travel times on the M37 corridor are predominantly in the 10–30 minutes range, reported by 150 households (64.1%). A further 73 households (31.2%) currently travel 30–60 minutes on typical journeys, 9 households (3.8%) travel less than 10 minutes, and 2 households (0.9%) report journey times exceeding one hour.

After project completion, expectations shift markedly: 127 households (54.3%) expect travel times to fall below 10 minutes, and 99 households (42.3%) expect 10–30 minute journeys. Only 8 households (3.4%) expect journeys to remain above 30 minutes. This represents a substantial anticipated improvement in journey time efficiency, consistent with the expected increase in road design speed following rehabilitation.

5.6.6.2. Travel Cost

Current travel expenditure is predominantly in UZS 6,000–10,000 per journey, reported by 107 households (45.7%), followed by the UZS 11,000–15,000 band cited by 70 households (29.9%). A further 34 households (14.5%) report costs in the lowest band (UZS 2,000–5,000), while 19 households (8.1%) report UZS 16,000–20,000, and 4 households (1.7%) report costs above UZS 20,000.

After project completion, expectations shift strongly toward the lower cost bands: 139 households (59.4%) expect travel costs to fall to the UZS 2,000–5,000 range – a band currently reported by only 14.5% – and 85 households (36.3%) expect UZS 6,000–10,000. Only 10 households (4.3%) expect costs to remain above UZS 10,000. This anticipated cost reduction is consistent with the reduced vehicle operating costs and improved road surface quality expected from the rehabilitation works and aligns with the finding that reduced travel costs are the most widely anticipated project benefit (69.7% of households, Section 5.6.4.3).

Table 62: Current and Expected Travel Time and Cost (Before and After Project)

Parameter	Current Situation	After Project (Expected)	Change Direction
Travel Time			
< 10 minutes	3.8% (9 HHs)	54.3% (127 HHs)	▲ Large increase
10–30 minutes	64.1% (150 HHs)	42.3% (99 HHs)	▼ Moderate decrease
30–60 minutes	31.2% (73 HHs)	3.0% (7 HHs)	▼ Large decrease
Over 60 minutes	0.9% (2 HHs)	0.4% (1 HH)	▼ Near elimination
Travel Cost (UZS per journey)			
2,000–5,000 UZS	14.5% (34 HHs)	59.4% (139 HHs)	▲ Large increase
6,000–10,000 UZS	45.7% (107 HHs)	36.3% (85 HHs)	▼ Moderate decrease
11,000–15,000 UZS	29.9% (70 HHs)	3.8% (9 HHs)	▼ Large decrease
16,000–20,000 UZS	8.1% (19 HHs)	0.0% (0 HH)	▼ Near elimination
Over 20,000 UZS	1.3% (3 HHs)	0.4% (1 HH)	▼ Near elimination

HH = Household (Source: Household Survey, May 2026; ESIA)

5.6.6.3. Road Use Frequency and Income Effects

Following project completion, most respondents anticipate using the M37 road more frequently. Road use frequency is expected to increase for 86.8% of households (203 respondents), to remain the same for 11.5% (27 households), and to decrease for only 1.7% (4 households). Correspondingly, 91.5% of households (214 respondents) expect to make more trips in total. These findings indicate that the project is expected to generate substantial induced demand, an important consideration for traffic forecasting and the dimensioning of road capacity.

In terms of income effects, 32.9% of households (77 respondents) anticipate a modest income increase following project completion, 10.7% (25 households) a moderate increase, and 1.7% (4 households) a significant increase. However, 54.7% (128 households) do not expect any income change, suggesting that the majority of Lots 1–2 corridor households are primarily interested in road quality and accessibility improvements rather than direct income gains, consistent with travel cost reduction being the top stated expected benefit (Section 5.6.4.3).

Among all surveyed households, 23.5% (55 households) expect a modest increase in business or agricultural sales, 14.5% (34 households) a moderate increase, and 1.7% (4 households) a significant increase, while 60.3% (141 households) expect no change in sales volume.

5.6.7. Potential Challenges and Concerns During Rehabilitation

5.6.7.1. Concerns About Project Consequences

Despite strong overall support for the project, respondents express a range of concerns about the consequences of rehabilitation activities. Disruption to normal movement during construction is the most widely cited concern, identified by 78.2% of respondents (183 households). This is a highly significant finding: the M37 road is used daily by 94.4% of Lots 1–2 households, meaning that construction-phase access disruption will directly affect almost every surveyed household in the corridor.

Tree removal is the second most prominent concern (41.5%; 97 households), which aligns with the finding that 93.2% of households have trees on their land adjacent to the corridor. Temporary restriction of access to healthcare infrastructure is cited by 35.5% (83 households), and dust generation during construction by 33.3% (78 households). Construction vibration concerns 30.3% (71 households). Safety risks associated with increased vehicle speed during works are cited by 22.2% (52 households), restricted access to educational facilities by 21.8% (51 households), general healthcare access restriction by 20.5% (48 households), and safety risks near construction sites with particular impact on children by 20.1% (47 households).

Project impacts on physical assets and livelihoods during construction are also a significant concern. 51.7% of households (121 households) anticipate difficulty accessing their homes during construction, and restricted access to homes, businesses, and social facilities is expected by 43.2% (101 households). Business disruption is expected by 23.5% of households (55 respondents). In terms of noise and dust risk perception, 60.3% of households rate it as high, 32.5% as medium, and only 7.3% as low, indicating that the community expects significant environmental nuisance during the construction phase and will require active management and communication from the contractor.

Among specific assets at risk from project activities, commercial buildings are identified by the highest number of households (11.1%; 26 households), closely followed by trees (10.7%; 25 households), homes/structures (7.3%; 17 households), kitchen gardens (5.6%; 13 households), and orchards (4.7%; 11 households).

5.6.7.2. Concerns About the Construction Phase Specifically

When asked about concerns specific to the construction period, respondents across the four Lots 1–2 districts focus on four main issues. Noise during construction is the leading concern, cited by 72.6% of respondents (170 households). Dust is the second

most cited concern (59.8%; 140 households). Safety risks during construction are cited by 46.6% (109 households), and disruption of access to homes, businesses, and social facilities by 43.2% (101 households). These four concerns together form the core community risk perception about the construction phase.

5.6.8. Willingness to Participate in Project Work

The survey did not include a dedicated question on willingness to participate in construction employment. However, several data points provide indirect evidence of community attitudes toward project participation. 150 of 234 households (64.1%) have self-employed members, and the significant proportion of households relying on seasonal and supplementary income suggests a ready pool of labour with flexible working arrangements and potential interest in construction-related employment opportunities.

The community's strong expectation of income benefits from the project – 45.3% anticipating any income growth (32.9% modest, 10.7% moderate, 1.7% significant) and 39.7% expecting increased business or agricultural sales – indicates openness to project-associated economic activity. The contractor's employment plan should actively target corridor communities, particularly in districts with higher unemployment rates. Unemployment is cited as a top community problem by 38.9% of all Lots 1–2 households (91 households), with the highest concentration in Bukhara district (60.8%) and Gijduvon district (32.9%). Priority should be given to households with low income, female-headed households, and households with unemployed adult members.

Communication about local employment opportunities should use the community's preferred channels: community meetings (75.6%; 177 households), telephone outreach (51.3%; 120 households), noticeboards in mahallas (39.3%; 92 households), and khokimiyat and mahalla committee channels (34.6%; 81 households). The contractor should establish a clear, transparent local recruitment process, with opportunities communicated in Uzbek and with separate sessions for women to promote female employment in suitable roles (site safety flagging, environmental monitoring, catering, and administrative support).

5.6.9. Possibility of Conflict During or After Project Implementation

The survey data identify several potential sources of community conflict that may arise during or after project implementation. These are analyzed below across four dimensions: access disruption conflicts, compensation-related conflicts, resource use conflicts, and inter-community tensions.

5.6.9.1. Access Disruption Conflicts

The most significant conflict risk during the construction phase relates to access disruption. With 78.2% of households (183 households) concerned about movement

disruption, and 51.7% (121 households) anticipating difficulty accessing their homes, the potential for community grievances and disputes with the contractor is high, particularly if construction sequencing, detour management, and communication are inadequate.

Alternative routes exist for 70.9% of households (166 households), a notably higher share than the four-district average (51.8%). However, of these 166 households with alternative routes, only 6 households (3.6% of those with alternatives) consider those alternatives unsafe, suggesting that where alternatives exist in the Lots 1–2 corridor, they are generally considered acceptable.

The more significant access risk is concentrated among the 29.1% of households (68 households) that have no alternative route at all. For these households, any construction-related road closure becomes an immediate access emergency rather than a managed inconvenience, particularly acute given that 43.2% (101 households) specifically cite disruption of access to homes, businesses, and social facilities as a construction concern, and 94.4% of households use the M37 daily. These households must be individually identified during pre-construction survey and provided with specific access continuity provisions in the construction traffic management plan.

5.6.9.2. Compensation-Related Conflicts

Compensation disputes are a predictable source of conflict in any road rehabilitation project involving land acquisition and asset impact. The survey identifies 18.4% of households (43 respondents) as perceiving barriers to women's access to compensation, a specific equity concern that, if unaddressed, can generate intra-household conflict as well as disputes with the project. Demolition of buildings, homes, or businesses is a concern for 20.1% of households (47 respondents), indicating a non-trivial share of households anticipating direct physical asset impacts from the project.

9 households (3.8%) exhibit two or more combined vulnerability markers, including low income combined with disability (7 households) and female-headed combined with low income (2 households). These multiply-vulnerable households face disproportionate difficulty navigating the compensation process and are at risk of inadequate redress. They will be individually identified in the RAP vulnerability register and assigned dedicated support through the compensation process.

5.6.9.3. Worker-Community Tensions

The influx of a construction workforce, particularly if predominantly non-local, introduces potential for tension with host communities. 12.0% of respondents (28 households) explicitly cite concerns about an influx of people who may not share local values – a more specific and culturally grounded concern than a general worker-presence anxiety. Concerns about safety near construction camps are cited by 15.4% (36 households), and concerns about the presence of construction workers near settlements by 7.7% (18 households). As discussed in Section 5.5, these figures are likely

underreported given the 83% male respondent profile and social inhibition around discussing gender-based security concerns.

The concern about increased human trafficking and illegal migration, while cited by 4.7% of respondents (11 households), is a recognized risk in corridors connecting Central Asian countries, particularly in the Kyzyltepa district section of the corridor which lies in Navoi Province. This risk warrants monitoring and preventive measures including Code of Conduct provisions, worker registration, and coordination with local authorities.

5.6.9.4. Conflict Risk Summary

Overall, the conflict risk profile along the M37 corridor is moderate. The community's strong support for the project, high expectations of benefits, and reliance on established mahalla and khokimiyat structures for dispute resolution provide a positive foundation for conflict prevention. The primary conflict risks are operational in nature, arising from inadequate management of access disruption, construction noise and dust, tree removal, and compensation processes, rather than from fundamental opposition to the project. The concentration of no-alternative-route households (29.1%) in the Lots 1–2 corridor, combined with near-universal daily road dependency (94.4%), means that construction sequencing and access continuity provisions are the single most important conflict prevention measures available to the contractor.

Robust implementation of the GRM, proactive community communication through preferred channels (community meetings and telephone outreach), transparent compensation procedures with dedicated provisions for women and vulnerable households, and early and sustained engagement with mahalla committees are the primary mitigation tools for managing conflict risk during project implementation.

5.6.10. Influence of Migrant Labour on Communities

Labour migration, both the outmigration of local workers to Russia, Kazakhstan, and other destinations, and the potential influx of non-local construction workers, has multidimensional effects on M37 corridor communities that the project must understand and manage.

5.6.10.1. Outmigration of Local Labour

The employment and income data from the household survey provide indirect evidence of labour outmigration in four districts. The total of 163 unemployed and homemaker persons across surveyed households, of whom 86.5% are women, suggests that male working-age adults may in some cases be absent from the household due to labour migration rather than present as unemployed. 39.7% of households (93 households) report that income varies by season – a pattern consistent with supplementary remittance income from seasonal migrant workers, particularly given that formal seasonal worker employment is reported as a supplementary income source by only 4 households (1.7%). 20.9% of households (49 households) report no working

members at all, a figure that may partly reflect households where the primary working-age male is an absent migrant worker.

The presence of households with a lost breadwinner, 2 households (0.9%), may in some cases reflect the non-return of a migrant worker rather than death or disability. District-level net migration data from the National Statistics Committee corroborate the outmigration pattern: Gijduvon records net out-migration of -1,417 persons and Vobkent -386 persons in 2025, while Bukhara district records net in-migration of +128 persons and Kyzyltepa data are not available.

Outmigration of working-age men from corridor communities has several implications for the project. First, female-headed households (8 households; 3.4%) may in some cases reflect de facto rather than de jure female headship, where the male head is absent as a migrant worker. These households may be more vulnerable during the compensation process if legal title remains in the absent male's name, an additional argument for the individual notification and joint account provisions set out in Section 6.2.7.1. Second, households reliant on remittances and supplementary seasonal income may be more economically vulnerable to any disruption of income streams during construction, particularly the 39.7% reporting seasonal income variability.

5.6.10.2. Influx of Construction Workers

The potential influx of a non-local construction workforce is a recognized source of community tension in the Lots 1–2 corridor. 12.0% of respondents (28 households) cite concerns about an influx of people who may not share local cultural values, and 4.7% (11 households) express concern about increased human trafficking and illegal migration. As noted in Section 5.6.9.3, these figures are likely underreported given the 83% male respondent profile and social inhibition around discussing gender-based security and GBV risks. The contractor's Labour Management Plan must include provisions to manage worker-community interactions, including a Code of Conduct, worker registration, community awareness sessions, and coordination with local khokimiyat and mahalla committees consistent with the binding provisions set out for gender and social inclusion (Section 6.2.7).

5.6.11. Preferred Communication with the Project

Respondents across the four Lots 1–2 districts were asked how they prefer to communicate with and receive information from the project. Community meetings are the most preferred channel overall (75.6%; 177 households), followed by telephone contact (51.3%; 120 households), mahalla notice boards (39.3%; 92 households), and communication through the khokimiyat and mahalla committee system (34.6%; 81 households). These preferences reflect the established social communication infrastructure of Uzbek communities, in which the mahalla, the traditional neighborhood self-governance unit, remains the primary channel for community information and decision-making.

5.6.12. Summary of Community Perceptions

The household survey findings on community perceptions across the four Lots 1–2 districts reveal a corridor population that is strongly supportive of the M37 rehabilitation project, highly dependent on the road for daily life, and acutely aware of both the current inadequacies of the road and the potential disruptions of the construction phase. Key community perception findings are summarized in Table 63.

Table 63: Summary of Key Community Perception Findings

Theme	Key Finding
Road dependency	94.4% of HHs use M37 daily; 86.3% self-identify as regular road users; the road is the primary connection to employment, markets, health, and education.
Safety concerns	Excessive speed (93.2%), poor street lighting (56.4%), and poor road surface condition (44.0%) are the top safety problems; 39.7% of HHs consider the road unsafe for women during the day; 64.5% unsafe at night.
Construction concerns	78.2% concerned about movement disruption; 72.6% about construction noise; 59.8% about dust; 41.5% about tree removal.
Travel time expectations	54.3% expect travel time to drop below 10 min (from 64.1% currently in 10–30 min range); only 3.4% expect journeys to remain above 30 min after project.
Travel cost expectations	59.4% expect cost to drop to UZS 2,000–5,000 (from 14.5% currently); 45.7% currently pay UZS 6,000–10,000 per journey.
Service access	92.7–96.6% expect improved access to markets, healthcare, and education after project completion; healthcare is the highest-priority expectation.
Expected benefits	Reduced travel costs (69.7%) and improved road access (54.7%) are the top expected benefits; 45.3% anticipate income growth.
Conflict risk	Access disruption (78.2%), compensation barriers for women (18.4%), and worker-community tensions (15.4% concerned about camp safety) are the primary conflict risks.
Labour influx	Trafficking and migration concerns (4.7%); worker value mismatch concern (12.0%); Gijduvon and Vobkent record net out-migration; Bukhara net in-migration.
Communication preferences	Community meetings (75.6%), telephone (51.3%), mahalla notice boards (39.3%), and khokimiyat/mahalla committee (34.6%) are preferred project communication channels.

(Source: Household Survey, May 2026; ESIA)

5.7. Cultural Heritage

To ensure comprehensive protection and management of cultural assets during project implementation, the assessment of potential impacts on cultural heritage was conducted within a strictly defined Area of Influence, a 100-meter corridor extending on both sides of the proposed road alignment. The baseline study used a multi-tiered approach: comprehensive desk-based assessment (compiling a spatial list of known cultural heritage resources along the corridor); mapping and attribute analysis (verifying each asset's distance from the alignment, legal protection status, and sensitivity); a dedicated greenfield bypass alignment screening (confirming the bypass routing entirely avoids UNESCO World Heritage properties and buffer zones); a corridor-level targeted field reconnaissance survey; identification of unregistered receptors (particularly informal cemeteries and burial areas); and institutional/community consultation with local administrations and community representatives on local cultural and religious sites, including intangible heritage.

5.7.1. Buffer Zone

Paragraph 33 of Annex 9 of the Law on Protection and Use of Cultural Heritage Objects, No. 269-II specifies following buffer zones for objects of cultural and archaeological heritage: (i) up to 300 meters for objects of international importance included in the UNESCO World Heritage List, (ii) up to 200 meters for objects of historical importance, (iii) up to 100 meters for objects of national importance.

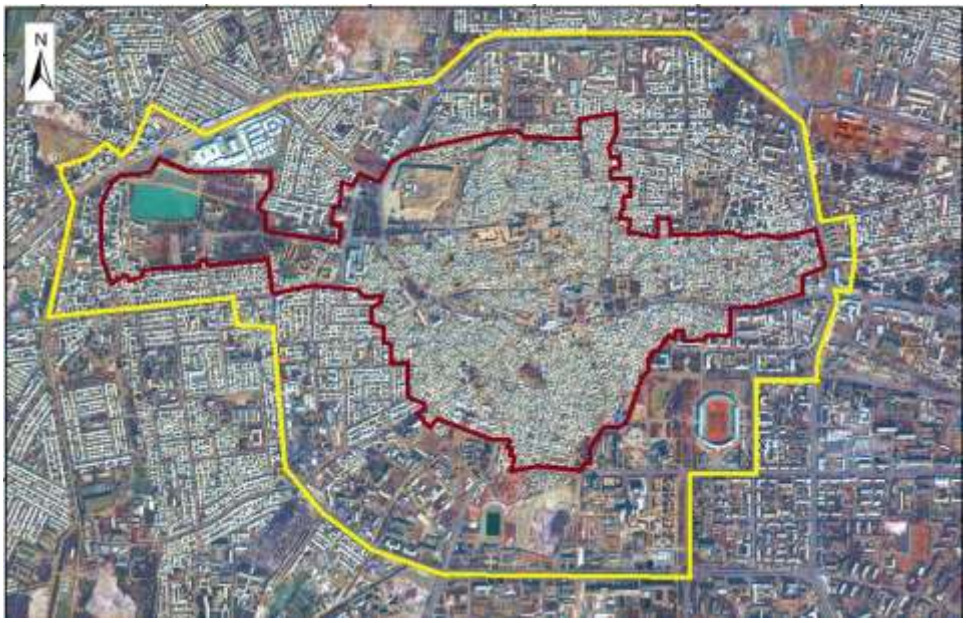


Figure 53: Historic Center of Bukhara and Its Buffer Zone
Red line=World Heritage property; yellow line=Buffer zone
(Source: UNESCO World Heritage Convention)

A survey confirmed no architectural heritage sites lie within 300 meters of either side of the road alignment. Architectural sites within the World Heritage Property protected

and monitored by UNESCO in Bukhara city are located approximately 3.5 km from the proposed greenfield Bukhara bypass, and construction works will not affect the property in any way.

5.7.2. Cultural Heritage along the Project Corridor

The M37 corridor traverses one of the most culturally and historically significant zones in Central Asia. The Bukhara oasis has been continuously inhabited for more than 2,500 years and served for centuries as a major node on the Great Silk Road connecting China and the Mediterranean. The oasis is characterized by an exceptional density of archaeological and architectural heritage representing successive civilizations *Sogdian, Achaemenid, Hellenistic, Kushan, Hephthalite, Sassanid, early Islamic, Samanid, Karakhanid, Mongol, Timurid, Sheibanid, and Bukharan Emirate periods*, spanning from the first millennium BCE to the early twentieth century.

The National List of Immovable Cultural Heritage Objects (Cabinet of Ministers Decree No. 846) records a total of 53 registered sites across the project districts, comprising 21 archaeological monuments and 30 architectural/historical monuments.

Sacred Sufi Heritage along the M37 Corridor: Beyond the officially registered immovable cultural heritage, the M37 corridor passes through a zone of profound living religious and intangible cultural heritage significance: the sacred pilgrimage circuit known as the "*Seven Pirs of Bukhara*".

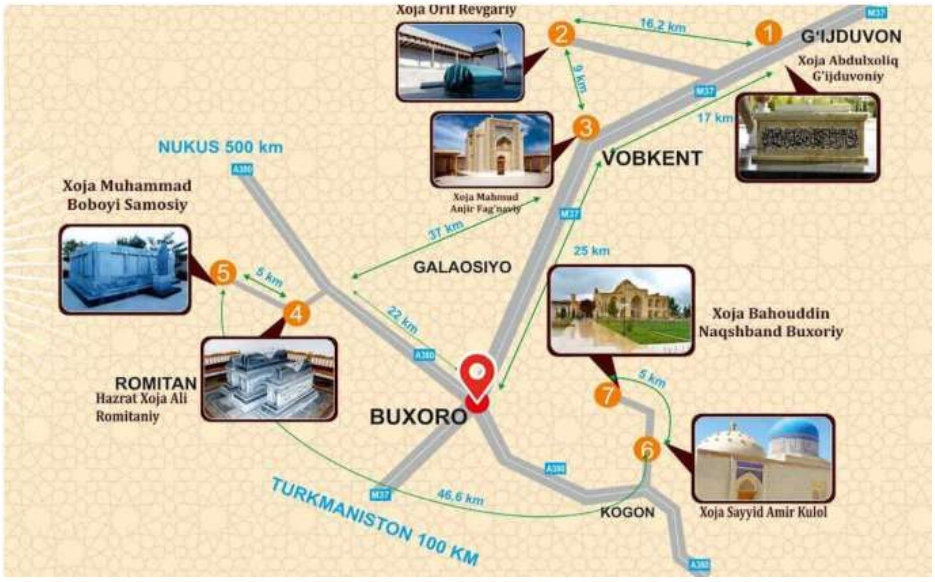


Figure 54: Location of the Seven Pirs (Seven Saints) of Bukhara in Relation to the M37 Corridor
(Source: Dolores Travel / Eurasia Travel; adapted for ESIA purposes)

The mausoleum complexes of seven revered Sufi masters of the *Naqshbandiya order* and its predecessor, the *Khwajagan (Masters) silsila* collectively represent one of pilgrimage destinations in the Bukhara Province.

Bukhara City and Bukhara District: Bukhara city is the dominant cultural heritage center of the project area and one of the most significant heritage concentrations in Central Asia. The Historic Centre of Bukhara was inscribed on the UNESCO World Heritage List in 1993 (Reference No. 602), recognized as the most complete and best-preserved example of a medieval Muslim city in Central Asia. The National Register records 28 immovable cultural heritage sites within Bukhara city district. The M37 road does not pass through the UNESCO World Heritage Site core zone or buffer zone of the Historic Centre of Bukhara. No direct physical impact on registered heritage sites within the Historic Centre is anticipated from the road rehabilitation works.

Gijduvon District: Varakhsha complex is among the most significant archaeological sites in the Bukhara oasis, located approximately 39 kilometers northwest of Bukhara city. Varakhsha is registered in the National List and is on Uzbekistan's UNESCO Tentative List.

The mausoleum complex of Khoja Abdulkhaliq Gijduvani (1103–1179) in Gijduvon town is the first and most senior site on the Seven Pirs pilgrimage circuit. The complex is a continuously active pilgrimage site and is registered in the National List. The complex is in Gijduvon town, directly on the M37 road alignment.

The Rabat-i Malik is an XI-century caravanserai built during the Karakhanid dynasty on the historic Bukhara–Samarkand Road, of which the M37 broadly follows the alignment. The Rabat-i Malik is registered in the National List and is on Uzbekistan's UNESCO Tentative List. Field verification of its precise distance from the M37 right-of-way is required.

Vobkent District: The Vobkent Minaret (1196–1197 CE) is one of the finest surviving examples of pre-Mongol Central Asian architecture. The minaret is registered in the National List and is a component of the UNESCO World Heritage Site Silk Roads: Zarafshan-Karakum Corridor (No. 1608, 2023). It is in Vobkent town center, and approximately 500 m from the M37 road.

The mausoleum of Khoja Mahmud Anjir Fagnavi, the third Pir on the Seven Pirs pilgrimage circuit, is located in Anjirboq village in Vobkent District, approximately 25 km from Bukhara along the road through Vobkent. The shrine is an active pilgrimage site visited by devotees travelling the Seven Pirs circuit, many of whom travel along the M37 road through Vobkent.

Kyzyltepa District (Navoi Province): Kyzyltepa district is the northern starting point of the project corridor. The district falls within Navoi Province. Registered sites are predominantly archaeological in nature. Kyzyltepa district contains four registered archaeological sites: Kyzyltepa Hillfort (I millennium BCE – I millennium CE), Khazora Hillfort (I–XII c.), the Sangtepa settlement (I–VII c.), Qizilqir Hillfort (I–XII c.). These sites represent the ancient agricultural and pastoral settlements of the oasis margins. Their locations relating to the M37 right-of-way should be confirmed during detailed design.

Unregistered Cultural Heritage and Chance Find Procedures: The National Register represents only formally documented heritage. The Bukhara oasis contains approximately 300 ancient settlements and mounds of varying archaeological significance, many unregistered or unexcavated. Given the extraordinary density of historic occupation across the corridor spanning more than two millennia, the probability of encountering unknown subsurface archaeological deposits during construction is moderate to high, particularly where earthworks penetrate below the existing road surface level. Moreover, both active and historical cemeteries are located near several settlements along the corridor and must be treated with equal caution during any ground disturbance works. Chance Find Procedure will be applied during construction works.

6. IMPACT ASSESSMENT

6.1. Impact Assessment Methodology

This section sets out the methodology for identifying, predicting, evaluating, and managing the project's environmental and social risks and impacts. The methodology is applied in accordance with AIIB ESS1 and ESP, and applicable national legislation of Uzbekistan. Specific procedures related to land acquisition, resettlement, and livelihood restoration are addressed through the ESS2 framework and are described in further detail in the RAP.

The objective of the impact assessment is to evaluate environmental and social risks and impacts in relation to the project's nature, scale, and risk classification, ensuring that the level of analysis, spatial extent, and assessment detail are proportionate to the risks identified during screening. The assessment identifies, predicts, evaluates, and manages impacts across the pre-construction, construction, and operation phases of the project, and considers direct, indirect, induced, and cumulative impacts, associated facilities, reasonably foreseeable unplanned events, and climate-related risks and vulnerability.

The project comprises a mix of components with differing impact profiles, including the rehabilitation of approximately 69 km of the existing M37 alignment, construction of a new greenfield bypass of approximately 12 km to the west of Bukhara city, and construction of new interchanges along the corridor. Given this mixed nature, the impact assessment methodology distinguishes consistently between:

- Rehabilitation sections, which are expected to generate predominantly temporary and localized impacts within an already established transportation corridor, with assessment focused on construction-related effects, community exposure, and traffic management.
- The greenfield bypass and associated interchanges, which introduce permanent and spatially extensive impacts, including land acquisition, potential habitat conversion, agricultural fragmentation, disruption to ecological connectivity, and changes in traffic dynamics, requiring a broader Area of Influence, higher survey intensity, and more detailed analysis of long-term and cumulative impacts.

This differentiation is applied consistently throughout the impact assessment methodology, including impact identification, prediction methods, assessment of magnitude and sensitivity, and definition of mitigation measures.

6.1.1. Impact Assessment Process

The significance of environmental and social impacts is determined through a structured four-step process:

Step 1. Identification and Prediction of Impacts
Step 2. Evaluation of Impact
Step 3. Management and Mitigation Measures
Step 4. Evaluation of Residual Impact.

An overview of the objectives under each step is presented in Table 64.

Table 64: Impact Assessment Steps

Impact Assessment Stage	Objective
Step 1: Identification and Prediction of Impacts	▪ Ensure that all potentially significant impacts are identified and considered in the ESIA process. ▪ Identify what could happen to resources and receptors as a consequence of the planned activities. ▪ Identify the Area of Influence for each environmental and social component.
Step 2: Evaluation of Impact	▪ Identify the magnitude of potential impacts and provide the basis for the assessment of significance. ▪ Evaluate the significance of identified impacts by considering magnitude, extent, duration, likelihood of occurrence, and the value and sensitivity of affected resources and receptors, compared with the situation without the project.
Step 3: Management and Mitigation Measures	▪ Identify appropriate and justified measures to avoid, minimize, mitigate, or compensate for potential impacts, applying the mitigation hierarchy.
Step 4: Evaluation of Residual Impact	▪ Evaluate the significance of impacts assuming implementation of the proposed mitigation measures.

(Source: ESIA)

Impact identification begins during the scoping phase and continues through the collection of baseline data, drawing on engineering design documentation, baseline environmental and social surveys, stakeholder engagement, and a review of comparable road projects in Uzbekistan and the region. Environmental and social impacts can never be predicted with absolute certainty; the assessment therefore considers all reasonably available factors and applies precaution to reduce uncertainty. Prediction methods applied include qualitative assessment, quantitative modeling (such as noise propagation and air dispersion), GIS-based spatial analysis (covering land use conversion, agricultural fragmentation, and habitat connectivity), and traffic redistribution analysis to assess the effects of the bypass.

Associated facilities and ancillary activities identified during screening, including construction camps, borrow areas, batching plants, and access roads, are included in impact identification and assessment to ensure full coverage of the project Area of Influence.

6.1.2. Impact Characteristics

Once impacts have been identified and predicted, each potential effect is described according to a defined set of characteristics, summarized in Table 65.

Table 65: Impact Characteristics

Characteristic	Definition and Designation
Type	▪ Direct: effects arising from direct interaction between project components and resources/receptors. ▪ Indirect: effects caused by project components that are later in time or farther removed in distance, but still reasonably foreseeable. ▪ Induced: effects resulting from development stimulated by the project (e.g., roadside commercial development, informal access creation, land use change). ▪ Cumulative: effects resulting from the incremental impact of the project in combination with other past, present, and reasonably foreseeable future actions, regardless of which agency or person undertakes them.
Geographical Extent	▪ Local: site-specific or limited to the project footprint and immediate surroundings (within a few kilometers). ▪ Regional: extending beyond the immediate project area. ▪ National/International: affecting resources on a national or international scale. ▪ For rehabilitation sections, extent is generally smaller and contained within the existing right-of-way; for the greenfield bypass, extent reflects the broader geographical spread, duration, and severity of induced change.
Duration	Temporary, short-term, medium-term, or long-term, reflecting the period over which a receptor or resource is potentially affected by project activities.
Scale	The size of the area potentially impacted and the proportion of the resource that could be lost or affected (small, medium, large).
Frequency	A measure of the constancy or periodicity of impact occurrence (infrequent, frequent, continuous).
Likelihood	▪ Unlikely: unlikely to occur at any time during normal operating conditions. ▪ Possible: may occur at some time during normal operating conditions. ▪ Likely: essentially inevitable to occur during normal operating conditions.
Reversibility	▪ Short-term reversible: reversible during construction or within one year following construction. ▪ Medium-term reversible: reversible within the operational period. ▪ Long-term reversible/Irreversible: reversible only after the operational period, or effectively permanent.
Magnitude	The intensity, scale, and duration of change relative to baseline conditions, designated as negligible, low, medium, or high.

(Source: ESIA)

6.1.3. Impact Magnitude and Receptor Sensitivity

Evaluating the significance of environmental and social impacts is one of the most critical components of the impact assessment. Significance is determined in three steps: first, by assigning sensitivity to the affected receptor or resource; second, by determining the magnitude of the predicted impact; and third, by combining magnitude and sensitivity using a standardized impact significance matrix.

Impact magnitude reflects the intensity, scale, and duration of change, both adverse and beneficial, that the Project is expected to cause relative to baseline conditions. Magnitude is assessed based on the parameters set out in Table 64, considering the duration of the potential impact, its spatial extent, the reversibility of the effect, compliance with legal standards and established professional criteria, and the likelihood of the impact occurring. While rehabilitation sections generally have a smaller physical footprint than the greenfield bypass, magnitude can still be significant depending on the scope of works, such as widening, realignment, or full-depth pavement reconstruction.

Table 66: Parameters for Determining Magnitude

Parameter	High	Medium	Low	Negligible
Duration of potential impact	Long term (beyond the project life)	Medium term: lifespan of the project (5–15 years)	Limited to the construction period	Temporary, with no detectable potential impact
Spatial extent of the potential impact	Widespread, far beyond Project boundaries	Beyond immediate Project components or site boundaries; local area	Within Project boundary	Specific location within a Project component or site boundary, with no detectable potential impact
Reversibility of potential impacts	Effectively permanent; requires considerable intervention to return to baseline	Baseline requires about a year, with some intervention, to return to baseline	Baseline returns naturally or with limited intervention within a few months	Baseline remains constant
Legal standards and established professional criteria	Breaches national standards and/or international guidelines or obligations	Complies with limits given in national standards but breaches international lender guidelines in one or more parameters	Meets minimum national standard limits or international guidelines	Not applicable
Likelihood of potential	Occurs under typical operating or construction	Occurs under worst-case (negative impact)	Occurs under abnormal, exceptional, or	Unlikely to occur

Parameter	High	Medium	Low	Negligible
impacts occurring	conditions (certain)	or best-case (positive impact) operating conditions (likely)	emergency conditions (occasional)	

(Source: ESIA)

Based on the parameters in Table 64, magnitude is designated as negligible, low, medium, or high, as summarized below:

- Negligible: a temporary or intermittent, very minor loss or alteration of one or more characteristics, features, or elements; changes in attributes, quality, or vulnerability are minimal, and adverse effects are unlikely.
- Low: a very minor loss or alteration of one or more key characteristics, features, or elements; noticeable changes may occur but are short-term, intermittent, and reversible.
- Medium: a minor loss or alteration of one or more key characteristics, features, or elements, resulting in measurable changes that are long-term but reversible and likely to occur.
- High: a loss of resources or integrity, resulting in partial loss of or damage to key characteristics, features, or elements; changes are permanent or irreplaceable and likely to occur.

Receptor sensitivity is determined based on the value, vulnerability, and capacity of the receiving environment or receptor to absorb proposed changes, including consideration of population proximity, numbers, and vulnerability, and the presence of valued features on or surrounding the project site. In the Uzbekistan context, sensitivity evaluation gives particular weight to irrigated agricultural systems, shelterbelt networks, mahalla settlements, cultural heritage assets, and areas with limited land substitution potential. For rehabilitation sections, sensitivity may be lower due to existing disturbance, although sensitive receptors such as schools, clinics, and canal crossings remain critical and require continued protection. Sensitivity criteria are set out in Table 67.

Table 67: Sensitivity Criteria

Sensitivity	Description
High	Legally protected habitats; nationally important farmland; cultural heritage sites; vulnerable communities; critical irrigation nodes; vulnerable receptors with little or no capacity to absorb proposed changes or minimal opportunities for mitigation.
Medium	Productive agricultural land; irrigation-dependent systems; community infrastructure; regionally important habitats; receptors with some capacity to absorb proposed changes or moderate opportunities for mitigation.

Sensitivity	Description
Low	Modified or disturbed environment; high resilience; easily replaceable resource; receptors with good capacity to absorb proposed changes and/or good opportunities for mitigation.

(Source: ESIA)

6.1.4. Assigning Significance

Once the magnitude of the predicted impact and the sensitivity of the affected receptor have been determined, significance is assigned using the standardized impact significance matrix in Table 68, applied consistently to all resources, receptors, and associated impacts within the project AoI.

Table 68: Impact Significance Matrix

Receptor Magnitude	Receptor Sensitivity		
	Low	**Medium**	**High**
Negligible	Negligible	Negligible	Low
Low	Negligible	Low	Medium
Medium	Low	Medium	High
High	Medium	High	High

(Source: ESIA)

Additional context for interpreting impact significance is as follows:

- Negligible significance: The resource or receptor is essentially unaffected; the predicted effect is imperceptible or indistinguishable from natural background variation, and no additional mitigation is required.
- Low significance: A small-scale effect leading to a slight deterioration of existing conditions; while generally undesirable, such impacts are acceptable, fall within applicable regulatory limits, and are manageable through standard ESMP measures.
- Medium significance: The magnitude remains within legal or regulatory standards but exceeds the threshold of a minor effect; these impacts must be reduced to a level that is as low as reasonably practicable and require specific mitigation and monitoring.
- High significance: Established limits or standards are likely to be exceeded, or high-magnitude effects affect sensitive or valued receptors; these impacts require avoidance, redesign, or strong mitigation, and any residual high-significance impact must be explicitly justified.

Generally, an effect is considered significant where it is extensive over space and time, is intensive in concentration or proportion to assimilative capacity, exceeds established environmental standards or thresholds, fails to comply with environmental policies or land use plans, or adversely and seriously affects ecologically sensitive areas, cultural and archaeological heritage resources, or communities, traditions, and values. Major residual impacts shall be avoided wherever technically and financially feasible.

6.1.5. Impact Mitigation

Mitigation measures are differentiated between rehabilitation and greenfield components in line with the nature, scale, and permanence of impacts, and follow the mitigation hierarchy required under the AIIB ESP and ESS1:

(1) Avoid adverse impacts at source;
(2) Minimize impacts that cannot be avoided;
(3) Restore or rehabilitate affected environments and livelihoods;
(4) Provide compensation or offsets for significant residual impacts, where technically and financially feasible.

Mitigation measures applied at the source of impact are prioritized, with minimization, rehabilitation, and compensatory measures addressing the resultant effect on receptors and resources. Mitigation measures will be proportionate to the project's risk classification, incorporated into engineering design where feasible, included in bidding documents and contractor obligations, reflected in the Environmental and Social Management Plan (ESMP), and linked to monitoring indicators and institutional responsibilities.

6.1.6. Evaluation of Residual Impact

Residual impacts are those predicted to persist after the implementation of mitigation measures. Residual effects are characterized in terms of their direction (positive, adverse, or neutral), magnitude, geographic extent, duration and frequency, reversibility, likelihood of occurrence, and ecological or social context, using the same magnitude-sensitivity matrix applied to pre-mitigation impacts. Residual impacts are classified as acceptable, acceptable with monitoring, significant but unavoidable, or unacceptable and requiring redesign.

If monitoring during implementation reveals unforeseen impacts, adaptive management strategies will be employed. Attention will be given to monitoring agricultural productivity, canal functionality, road safety, biodiversity fragmentation, and dust levels under the arid conditions typical of the project area.

6.1.7. Cumulative Impact Assessment

Cumulative impacts will be assessed in combination with other existing and planned infrastructure projects in the region, including the A380 corridor and the urban

expansion of Bukhara, to evaluate incremental effects on environmental resources, traffic patterns, and community conditions. The cumulative impact assessment (CIA) identifies other projects, activities, or disturbance features in the vicinity of the project that may combine with residual project effects to increase the overall level of effect within the project area, following a structured approach consistent with *IFC Good Practice Handbook*[34] on cumulative impact assessment:

(1) Determine spatial and temporal boundaries of cumulative impact assessment.
(2) Identify Valued Environmental and Social Components (VECs) in consultation with affected communities and stakeholders.
(3) Determine the present condition of identified VECs.
(4) Assess cumulative impacts and evaluate their significance against the predicted future condition of VECs.
(5) Design and implement adequate strategies, plans, and procedures to manage cumulative impacts, together with appropriate monitoring indicators and supervision mechanisms.

6.1.8. Area of Influence

The Area of Influence (AoI) defines the geographic extent within which the environmental and social impacts associated with the project may reasonably occur. The AoI is specific to each discipline and varies according to the type of impact, the sensitivity of the receptors, terrain, prevailing meteorological conditions, and the phase of the project.

Consistent with the AIIB ESF, the project AoI includes not only the main project site but also associated facilities, such as relocation and access roads, borrow and disposal areas, construction camps, and utility relocation corridors, as well as unplanned developments triggered by the project, such as spontaneous roadside settlement or informal access creation. The ESIA accordingly encompasses the AoI for each environmental and social impact component, including:

- The direct footprint of rehabilitation and greenfield sections
- Temporary construction areas, including camps, borrow pits, and batching plants
- Access roads and detours
- Utility relocation corridors
- Drainage and irrigation systems
- Areas subject to traffic redistribution
- Areas potentially affected by induced development.

[34] IFC Good Practice Handbook on CIA: Six-Step Approach, https://www.ifc.org/content/dam/ifc/doc/mgrt/3-gph-steps-cardinale.pdf (accessed June 2026)

The AoI differs between rehabilitation and greenfield sections due to variations in the permanence and scale of impacts. The proposed AoI for key environmental and social components is detailed in Table 69.

Table 69: Area of Influence

E&S Component	Area of Influence
Ambient Air Quality (Dust and Exhaust Emissions)	▪ 500 m for the greenfield bypass (earthworks-intensive sections). ▪ 200 m for rehabilitation sections (limited earthworks). ▪ 200 m around auxiliary facilities, such as batching plants and borrow pits.
Noise	Up to 200 m at sensitive receptors.
Vibration	▪ 0–30 m: potential structural damage risk zone; ▪ Up to 50 m: conservative structural precaution zone; ▪ Up to 100 m: human perception and annoyance zone, with monitoring focused on buildings within 50–100 m and sensitive or historic structures regardless of distance.
Biodiversity	▪ Rehabilitation sections: up to 100 m, to account for habitat disturbance and impacts on roadside vegetation. ▪ Greenfield bypass: 250 m core survey corridor on either side; extended ecological screening up to 500 m where shelterbelts, canal networks, or wildlife movement corridors are present; 5 km desktop screening for protected areas and regional ecological links.
Cultural Heritage	▪ 100 m corridor on both sides of the road, for both rehabilitation and greenfield sections.
Social Component	▪ Up to 1 km, to encompass affected communities and capture both direct and indirect social effects.

(Source: ESIA)

6.2. Anticipated Potential Impacts during Pre-Construction Phase

6.2.1. Project Design

The design of the M37 rehabilitation and upgrading project has incorporated environmental and social considerations from an early stage, following an iterative process of alternatives analysis, engineering optimization, and avoidance/minimization of impacts (Section 1.4). As a result, many potential adverse effects associated with poor or unmitigated design have already been addressed at the design stage rather than left to be managed reactively during construction. Nonetheless, because several design parameters remain to be finalized , and the residual impacts described below should be treated as indicative pending confirmation during detailed design.

It should be noted that the engineering design is based exclusively on national design standards and norms of the Republic of Uzbekistan (Section 2.3.1), including *SHNK*

2.05.02-23[35]. No international design standards or design codes have been referenced or applied in the current design documentation.

- Status of Design Completion: Engineering design has been completed for Lots 1 and 2.
- Climate Adaptation Measures: Without deliberate incorporation of climate adaptation measures, the upgraded corridor would be exposed to increased risk of drainage failure, flooding, and premature infrastructure deterioration under projected increases in rainfall intensity and variability, as well as continued seismic vulnerability in a known active seismic zone.
- Alignment and Land Take: The approximately 7.5 km greenfield bypass and 4.5 km connection to the Bukhara ring road in Lot 2 will require permanent acquisition of productive agricultural land and removal of roadside plantations and is accordingly the highest-impact section of the corridor. Localized expansion of the footprint will also occur at the 8 grade-separated interchanges in Lot 1 grade-separated junctions in Lot 2, where additional land is required for ramps, loops, and associated structures.
- Road Safety and Community Interface: In the absence of design intervention, uncontrolled access points, mixed local/transit traffic, and the lack of pedestrian infrastructure in settlement sections would continue to expose motorists and vulnerable road users to elevated accident risk.
- Drainage Design: Roadside planting, green strips, and landscaped medians are incorporated in settlement and peri-urban sections, providing partial dust and noise attenuation, visual improvement, and partial compensation for vegetation removed elsewhere along the corridor; detailed planting schemes and species selection remain to be defined.

Mitigation measures to be implemented:

- A context-sensitive, optimized design tailored to traffic demand, settlement density, and spatial constraints, was selected.
- Climate adaptation measures were developed as part of the Paris Alignment and Climate Finance Assessment prepared for the project and have been reviewed and approved by the Design Institute for incorporation into the engineering design.
- The design strategy prioritizes upgrading within or immediately adjacent to the existing right-of-way, with deviations limited to locations where geometric, safety, or junction requirements make this necessary, minimizing new land take along the 69 km corridor. Land acquisition and resettlement impacts are addressed through the RAP.
- The design integrates median separation, guardrails, safety barriers, signage, pavement markings, and lighting at interchanges, settlement sections, and

[35] SHNK 2.05.02-23: Urban Planning Norms and Rules: Roads. Design Requirements, Standard is registered by the Ministry of Justice of Uzbekistan on 14.10.2024, No. 304, https://mc.uz/uploads/mcuz_7943453353296.pdf (accessed June 2026)



pedestrian crossings, together with dedicated pedestrian infrastructure and livestock crossings in areas with reported social concerns. At-grade intersections retained for local access in rural sections, and U-turns identified as posing elevated risk for this road category, remain a residual safety consideration.

- The drainage design integrates longitudinal drainage, cross-drainage structures, and connectivity with the extensive irrigation and drainage network crossed by the corridor and incorporates conservative capacity allowances intended to accommodate more frequent high-intensity rainfall events under future climate conditions.

The project design measures described above are expected to avoid or substantially reduce impacts that would otherwise arise from an unoptimized design, particularly with respect to land acquisition, vegetation loss, and road safety.

6.2.2. Land Acquisition and Resettlement

Land acquisition and associated physical and economic displacement are a result of the project's design and alignment. The scale and location of land acquisition have been confirmed for Lots 1 and 2, where the design has been completed, and a *Resettlement Action Plan* (RAP) has been prepared based on an inventory of assets and a census of affected persons.

- Permanent land acquisition will be required, primarily linear in nature, in four categories of locations:
  (i) Settlement and peri-urban areas where the cross-section is widened.
  (ii) Sites of the approximately 14 grade-separated interchanges and junctions confirmed in Lots 1-2.
  (iii) Sections requiring geometric improvement, such as curve realignment and embankment widening.
  (iv) Approximately 7.5 km greenfield bypass and 4.5 km ring-road connection in Lot 2, where an entirely new corridor is established through agricultural land.

- Temporary land occupation will be required during construction for contractor camps and site offices, material storage and laydown areas, temporary access roads and traffic diversions, staging areas and potential borrow areas and spoil disposal sites. Specific locations have not yet been identified and will depend on contractor mobilization plans; temporary occupation has the potential to affect additional landholders beyond those subject to permanent acquisition, including through temporary loss of access to land or interruption of agricultural use.
- Crossings of irrigation systems and canals present an additional risk to agricultural production, as disruption to water supply and access during construction can affect landholders beyond the immediate footprint of the works.
- Where the ROW intersects existing utility infrastructure (electricity lines, gas pipelines, water pipelines), relocation requirements may introduce additional,

currently unquantified land acquisition needs outside the confirmed project footprint.

Summary of key RAP findings (Lots 1-2) is as follows:

- Affected Households (AHs) and Population: The total number of affected households (AHs) is 179. This includes 105 farmers and dekhkan (agricultural users), 57 owners of commercial establishments, 4 households affected only by auxiliary non-residential structures, and 13 public/state facilities. According to the socio-economic survey (SES), which covered a representative sample of 61 households (348 persons), the average household size is 5.7 persons. All surveyed household heads are ethnic Uzbeks.
- Affected Businesses (Roadside Commerce): The project affects 57 commercial structures, mainly roadside retail shops, cafés, pharmacies, and auto repair services.
    i. 39 commercial buildings are subject to full demolition and relocation, most of them permanent brick structures.
    ii. 18 establishments are classified as light movable structures (sheds, tandoors (stationary outdoor ground oven), kiosks), which can be temporarily dismantled and re-installed by owners on the same plots without interruption of business activity.
- Affected Agricultural Land: The total area of acquired land is 92.277 ha, of which 91.84 ha are agricultural lands (including 3.17 ha of state reserve land). A total of 105 farming and dekhkan households are affected. Main crops on the acquired land include cotton and wheat (41.54 ha), vineyards (22.88 ha), orchards/seedlings (11.11 ha), and vegetable crops (5.99 ha).
- Vulnerable Households: The socio-economic survey identified 10 households with disabled family members (7 in Navoi Province and 3 in Bukhara Province). 3% of affected households are female-headed. All confirmed vulnerable households are entitled to special assistance allowances.
- Physical Displacement: No residential buildings are subject to demolition, as the alignment remains within the existing right of way. Impacts on the residential sector are limited to partial removal of auxiliary structures (fences and front yards) at two households in Lot 1 (PK 65), and partial acquisition of a non-residential plot (0.12 ha) with an auxiliary building of 38.8 m² at PK 453+80. The main physical displacement concerns 39 roadside commercial buildings.
- Economic Displacement: The project primarily causes economic displacement, linked to loss of commercial premises by self-employed entrepreneurs (57 AHs) and partial acquisition of leased agricultural land from farmers (105 AHs). 39 commercial establishments are considered severely affected (losing more than 10% of productive assets), as they lose their primary business premises entirely. Permanent job losses among hired workers are not anticipated, since the average land acquisition per farmer is small (approximately 0.5 ha), allowing redistribution of labor to remaining plots.

- Livelihood Restoration Requirements: To comply with AIIB ESS2, an Income Restoration and Rehabilitation Program (IRRP) has been developed:
  i. For entrepreneurs: compensation for lost income for 6 months, based on tax declarations or average province-level wages (Bukhara – UZS 5.09 million per month; Navoi – UZS 7.87 million per month).
  ii. For farmers: compensation for one year's crop loss, reimbursement of soil preparation costs, and payments for agricultural employment loss, calculated by Uzdaverloyikha Institute, land management authority.
- Organizational Support: assistance with business relocation, re-registration, utility reconnection, consultations on participation in state electronic land auctions (e-auksion.uz), and priority access to employment in Project construction works.
- Key RAP Entitlements and Allowances:
  i. Replacement Cost Principle: all compensation for structures is determined by independent valuers based on market cost of materials and labor, without depreciation.
  ii. Right to Materials: all affected persons retain the right to salvage and reuse construction materials from demolished structures free of charge.
  iii. Transport Allowance: payment of UZS 412,000 to cover relocation expenses.
  iv. Severity Allowance: lump sum payment of three times the minimum wage (UZS 1,236,000) for 41 severely affected households.
  v. Support for vulnerable groups: allowance of UZS 1,236,000 for vulnerable households.
  vi. Construction impact minimization: contractors must ensure continuous safe access to operating roadside businesses and apply dust/noise suppression near residential areas and schools, in line with the SSEMP.
  vii. Design optimization: sidewalk alignments will be adjusted during detailed design to minimize demolition of fences and front yards.
- Estimated RAP Budget: The total indicative RAP implementation budget for Lots 1 and 2 is UZS 33,066,674,671.03 (approx. USD 2,758,103.40), including 10% contingency. Funding is provided from the state budget of Uzbekistan.

Eligibility for Compensation and Assistance

Eligibility for compensation and assistance is not limited to formally titled landholders. In accordance with AIIB ESS2, the following categories are recognized as affected persons eligible for defined entitlements under the RAP:

(i) persons with formal legal title to affected land or structures
(ii) persons with customary or traditional land use rights, including informal occupants of state land who lack formal documentation
(iii) informal business operators and commercial users without formal registration or lease documentation
(iv) tenants and leaseholders of affected land or structures
(v) seasonal agricultural users and sharecroppers who derive income from affected land

(vi) community members who use affected land for common or shared purposes.

Persons without legal title to land will not receive compensation for land itself but will receive full compensation for structures, crops, trees, and other assets, together with transitional and resettlement assistance equivalent to that provided to titled persons. The eligibility cut-off date has been established and communicated to affected persons, and no new constructions or plantings after that date will be eligible for compensation.

Mitigation and management measures to be implemented:

- Selection of the optimized design, with reduced land acquisition, structure impacts, and vegetation loss relative to the design alternatives considered.
- Preparation of the RAP (census, asset inventory, and valuation of all affected land, crops, trees, entitlement matrix, and structures as of the established eligibility cut-off date, and sets out compensation and assistance) in accordance with the applicable national legislation, and AIIB ESS2.
- No land acquisition or displacement will occur in any lot prior to the preparation, disclosure, and implementation of the applicable RAP, including payment of compensation to affected persons at replacement cost before construction commences in the relevant section.
- Specific measures will be implemented to restore irrigation access and water supply to affected landholders following construction, in coordination with irrigation and canal management authorities.
- Where utility relocation is required, the PMO/PMC will coordinate with the relevant utility operators (electricity, gas, water) on relocation design, timing, and cost allocation prior to construction in the affected section, and any resulting additional land acquisition needs will be assessed and incorporated into the RAP through an addendum if required.
- A Project-level GRM will be established and disclosed to affected persons prior to land acquisition, providing an accessible channel to raise and resolve concerns related to compensation, valuation, or displacement; affected persons will also retain access to *AIIB's Project-affected People's Mechanism* as a Bank-level recourse channel and national complaint handling system.
- Livelihood restoration support will be provided to economically displaced persons in accordance with the RAP, in addition to compensation for lost land and assets, with particular attention to identified vulnerable households. Compensation for lost assets is a necessary but not sufficient response to economic displacement; livelihood restoration to pre-project levels is the overriding standard required under AIIB ESS2. The following livelihood restoration measures are part of the RAP for Lots 1–2, in addition to compensation for lost assets at replacement cost:
  - Agricultural production restoration: affected farmers will receive support to restore agricultural output to pre-project levels, including replacement of irrigation access, soil reinstatement on temporarily occupied land, and



replanting support for orchard and vineyard losses. Restoration of irrigation access will be confirmed operational before construction commences in each affected section.

  - Orchard and tree crop restoration: the extended income loss period associated with tree crop establishment (typically 3–7 years for orchard species) will be compensated through multi-year income restoration assistance rather than a single one-off payment, in recognition that replacement planting does not immediately restore income.
  - Business income restoration: affected businesses, including informal operators without formal registration, will receive income restoration assistance equivalent to the period required to re-establish viable operations at an alternative location or following construction completion, based on documented or estimated pre-project income.
  - Transitional assistance: all physically and economically displaced households will receive transitional support during the displacement and relocation period, including moving allowances, temporary accommodation support where required, and enhanced assistance for vulnerable households.
  - Vulnerable household support: households identified as vulnerable in the RAP vulnerability register, including low-income households, female-headed households, elderly-headed households, households with persons with disabilities, and households with multiply-combined vulnerability markers, will receive enhanced livelihood restoration packages and dedicated case management through the RAP implementation consultant.
  - Livelihood restoration monitoring: the PMC and PMO will monitor livelihood outcomes for economically displaced persons at six-monthly intervals following displacement, with monitoring continuing until affected households have demonstrably restored their livelihoods to pre-project levels or better. Monitoring findings will be reported to AIIB in semi-annual RAP progress reports and will trigger corrective action if restoration targets are not being met.
- Temporary land occupation for contractor camps, storage, laydown, and access roads will be subject to negotiated agreements or easements with landholders and compensation for any resulting loss of use, to be confirmed once contractor mobilization plans and specific sites are known.
- The PMC and PMO will monitor implementation of the RAP (Lots 1-2) and will report on progress, including compensation payment and grievance resolution, to AIIB.

Compensation and assistance are provided in accordance with the RAP entitlement matrix, including the Replacement Cost Principle, right to salvage materials, and transport, severity, and vulnerability allowances (Key RAP Entitlements and Allowances).

6.2.3. Tree Cutting and Management

Considering tree and vegetation loss is one of the most significant, tangible, and legally regulated impacts of the project's pre-construction and construction phases. The Tree Management and Planting Plan (TMP) will be developed by the Contractor as a Lot-specific plan as part of their SSESMP)/C-ESMP, once detailed engineering design per Lot is approved. The purpose of TMP is to provide a structured, auditable framework that:

(i) Ensures avoidance and minimization opportunities are exhausted before any tree is authorized for felling or transplantation.
(ii) Ensures all felling and relocation occur under a valid permit issued by the competent authority and, where applicable, government-level authorization based on regulations of the President of the Republic of Uzbekistan.
(iii) Secures replacement planting at a ratio of 10 seedlings for each tree or shrub removed, with seedlings of minimum age 5 years (trees) or 3 years (shrubs) and aggregate value not less than the value of the vegetation removed, grown and maintained for a minimum of two years, in accordance with Cabinet of Ministers Decree No. 464 of 22 August 2022[36], in appropriate locations, with adequate species selection and long-term survival monitoring.
(iv) Protects retained trees within or adjacent to the works area.
(v) Monitors the survival and effectiveness of replacement planting.
(vi) Maintains continuous coordination with local government and environmental authorities throughout implementation and provides a basis for the Contractor's obligations under the SSESMP/C-ESMP, supervision by the PMC/PMO, and demonstration of compliance with applicable Uzbek legislation and AIIB ESSs.

Based on the design for Lots 1-2, an estimated 11,351 plants, comprising orchard and ornamental trees, are anticipated to be removed through linear vegetation clearance along the corridor and localized losses at junctions, interchanges, and overpasses. This represents the most tangible, quantified tree-loss impact currently available for the project. Loss of mature trees carries a disproportionate impact relative to younger vegetation, as mature specimens require long periods to replace in terms of ecological function, shade, and landscape value, and their removal cannot be fully offset by replacement planting within the short to medium term. Where affected trees form part of productive orchards or vineyards, their removal contributes to the economic displacement impacts on affected farmers and landholders (RAP).

In the absence of a documented, contractor-level TMP prior to construction, there is a risk that tree removal and replanting could proceed in an uncoordinated manner, without adequate avoidance ecological consideration, species-appropriate replacement planting, or monitoring of replanting survival and with no assurance that legal obligations, considerations, or community expectations are being met. Failure to

[36] Cabinet of Ministers Decree No. 464 of 22 August 2022, Improvement of Procedure for Planting, Growing and Using Trees and Shrubs that are Out of State Forest Fund (Chapter 5, Article 32b), https://lex.uz/docs/6165732#6167373

prepare and properly coordinate the TMP, or indiscriminate felling and replanting conducted outside its framework, would have several consequences beyond the direct loss of vegetation:

- Legal and regulatory non-compliance: Felling without a valid permit from the competent forestry/environmental authority exposes the Contractor and project to fines, stop-work orders, or permit revocation, with associated delays and cost to the construction program.
- Loss of ecological and landscape value without adequate offset: Felling carried out without prior ecological supervision or species/habitat consideration risks removing trees of higher ecological or landscape value than necessary, and replacement planting carried out without regard to site suitability or species selection risks high post-planting mortality, undermining the intended 10:1 replacement outcome even where the planting count is nominally met.
- Increased erosion and drainage disturbance: Uncoordinated or excessive removal of vegetation, particularly on embankments, slopes, or near drainage structures, can increase surface runoff, soil erosion, and sedimentation, compounding the drainage and climate-resilience risks.
- Ineffective or conflicting replanting locations: Replacement planting undertaken without coordination with local authorities and future road operations risks being sited in locations that conflict with utilities, road safety sightlines, or maintenance access, resulting in trees being removed again shortly after planting and effectively negating the compensation intended.
- Community and social impacts: Indiscriminate felling, particularly of mature roadside trees relied upon by communities for shade in settlement areas can generate legitimate community grievances, erode trust in the project, and increase reliance on the GRM to resolve avoidable disputes.
- Undermining climate and Paris Alignment objectives: Loss of vegetation without adequate replacement reduces the corridor's carbon sequestration and microclimate regulation potential, running counter to the climate resilience and Paris Alignment objectives embedded in the project design.
- Project and lender risk: Non-compliance with the TMP framework could be identified as a gap against AIIB ESS1and ESS2 requirements during supervision, potentially triggering corrective action requests, reputational risk, or delays to disbursement, in addition to the direct environmental and social harm caused.
- Permitting and schedule risk: Under *Cabinet of Ministers Resolution No. 342*[37], relocation of trees or shrubs exceeding 15 cm trunk diameter (10 cm root-collar diameter for shrubs) within transport and road infrastructure projects requires government-level authorization based on documents of the President of the Republic of Uzbekistan. If this requirement is not planned for early, for mature roadside and orchard trees affected at interchanges and junctions, it could result in permitting delays to the construction program in the affected Lot.

[37] FOOTNOTE #3

- Community land-protection risk: Under *Presidential Decree No. UP-217*[38], residents of community/mahalla may petition to block withdrawal or reallocation of settlement land on which non-forest-fund trees grow; where at least 10% of the mahalla's population supports the petition, the environmental authority may impose a formal prohibition on reallocating that land. If potentially affected mahallas in settlement sections with dense shelterbelt/orchard cover are not engaged early and transparently, this mechanism could delay or complicate land acquisition and tree removal, and the associated construction schedule.

Mitigation and management measures to be implemented:

- A comprehensive, geo-referenced tree inventory, including species classification and condition assessment of individual trees, will be carried out at the detailed design and pre-construction stage for each procurement Lot, once the final alignment and construction footprint are defined. This inventory will be undertaken under each Lot. A dedicated technical specialist (ecologist/botanist/arborist) will be engaged under the PMC/PMO contract. This specialist will supervise the Contractor's tree inventory, confirm species identification, conduct pre-felling inspections for nesting birds/fauna, and verify the tree register prepared by the Contractor.
- The TMP for each Lot will specify replacement planting, species selection criteria (prioritizing native and locally appropriate species), and, where technically feasible, provisions for relocation rather than felling of viable mature trees. Consistent with applicable Uzbek legislation, replacement planting will be carried out at a ratio of 10 trees planted for every tree felled. Species lists and planting locations are to be confirmed with the district environmental, forestry, or agricultural authorities and finalized prior to physical work for each Lot.
- Bidding documents and contract terms for each Lot will require the Contractor to price and implement the compensatory planting obligation, including a costed Bill of Quantities item covering seedling procurement, planting, and the two-year growing/maintenance obligation (Section 6.2.5).
- Compensation for trees within productive orchards, vineyards, or other agricultural land will be addressed through the RAP (Lots 1-2) entitlement matrix as an economic-displacement impact, separate from the roadside/public tree replacement planting addressed under the TMP.
- The monitoring program will be developed to track the effectiveness of tree removal avoidance measures, monitor replacement planting survival rates, and support adaptive management, with outputs reported through the ESMP's monitoring and reporting protocol.

[38] Presidential Decree No. UP-217, On measures for organizing the activities of the National Committee of Uzbekistan for Ecology and Climate Change, https://lex.uz/ru/docs/7847356, (accessed July 2026).

- The detailed tree inventory, enumeration, marking, and mapping of affected trees will be undertaken for all Lots and the corresponding Lot-specific TMP will be finalized accordingly prior to any tree removal in that Lot's sections.

6.2.4. Existing Utilities and Infrastructure

Gas pipelines, drinking water supply pipelines, electricity transmission, and distribution lines, as well as other underground or aboveground service networks, may be affected by relocation, protection, or adjustment work required before and during the construction of the M37 corridor. Considering that utility conflicts are a foreseeable pre-construction impact with direct implications for public safety, continuity of essential services, and construction schedule, the assessment revealed the following:

- The ROW may intersect existing utility infrastructure along the corridor, including gas pipelines, drinking water supply pipelines, local distribution networks, service connections, and electricity transmission and distribution lines.
- Utility interactions are expected to occur primarily in three categories of location:
  - Settlement and peri-urban sections, where underground services are more densely distributed.
  - Junctions and widened cross-sections, where additional land take extends beyond the existing corridor.
  - Areas with existing roadside infrastructure such as sidewalks, bus stops, and drainage systems.

  In rural sections, utility conflicts are expected to be less frequent and primarily associated with linear pipeline or cable crossings.
- The project design has identified a hierarchy of responses to utility conflicts, relocation (diversion) outside the new ROW, lowering or realignment of underground services, in-situ protection (encasement or shielding) where relocation is not feasible, and temporary disconnection with reinstatement during construction, but detailed utility mapping is not yet available; the exact location and extent of affected utilities will be confirmed during detailed design in coordination with the relevant service providers.

In the absence of comprehensive utility mapping and a coordinated relocation plan prior to construction, or where excavation proceeds without adequate utility location and protection measures, the following risks arise beyond direct infrastructure damage:

- Public safety risk: Excavation or construction activity near unmapped or inadequately marked underground utilities carries a risk of utility strikes, including gas pipeline rupture, electrocution from damaged electrical cables, or water main damage, with potential for injury to workers or the public.
- Service disruption without adequate notice: Utility relocation or protection works undertaken without advance coordination and community notification risk disrupting water, gas, or electricity supply to households and public institutions,

generating legitimate community grievances and reliance on the GRM to resolve avoidable disputes.

- Schedule and cost risk: Utility conflicts discovered reactively during construction, rather than identified and planned for during detailed design, typically require emergency relocation at higher cost and with greater schedule impact than planned relocation carried out in coordination with utility operators in advance.
- Coordination failure risk: The project's ROW interfaces with multiple utility operators (gas, water, and electricity providers, and potentially telecommunications operators), each with distinct technical standards, approval processes, and timelines; without centralized coordination, misaligned relocation schedules across operators could create sequencing bottlenecks affecting the overall construction program.
- Environmental risk: Uncontrolled utility damage arising from utility strikes during excavation, a risk directly linked to inadequate pre-construction utility mapping and locating, particularly gas leaks or water main bursts, can result in localized environmental contamination, erosion, or waterlogging in addition to the direct safety and service impacts.
- Legal and contractual risk: Relocation or protection works undertaken without the approval of, or coordination with, the relevant utility operator may breach applicable technical and safety standards and expose the Contractor to liability for damage to third-party infrastructure.

Mitigation and management measures to be implemented:

- A comprehensive utility mapping and survey, undertaken in consultation with all affected utility operators (gas, water supply, and electricity providers, and telecommunications operators where relevant), will be completed during detailed design for each Lot, prior to finalization of the construction footprint and prior to any excavation works.
- A Lot-specific utility relocation plan will be prepared, applying the design hierarchy of responses in order of preference, avoidance through design adjustment, in-situ protection, relocation or lowering, and temporary disconnection with reinstatement.
- Formal coordination and written agreements will be established with each affected utility operator regarding relocation timing, technical standards, and cost responsibility, prior to contractor mobilization in the affected sections.
- A contingency and emergency response protocol will be established for accidental utility strikes, including trained personnel, appropriate protective equipment, and a communication protocol with the relevant utility operator and emergency services.
- Off-site or external utility works will be screened against the AIIB ESS1 definition of associated facilities during detailed design, with corresponding environmental and social due diligence undertaken where such works are confirmed to qualify.

- A monitoring and reporting framework will be established during pre-construction to track progress on utility relocation and to record any service disruption incidents during construction, consistent with the project's overall ESMP monitoring and reporting protocol, with the GRM available to receive and address utility-related community complaints. Ongoing monitoring, incident recording, and GRM case handling during actual utility works are addressed under the project's Construction Phase impacts.

6.2.5. Bidding Documents

Considering that the environmental and social performance of construction works depends fundamentally on whether these requirements are embedded in the bidding documents and contract from the outset, the assessment revealed the following:

- Bidding documents for each Lot are the primary mechanism by which the environmental and social commitments established in this ESIA, the ESMP, the RAP, and other E&S instruments become binding contractual obligations on the Contractor; requirements not incorporated at the bidding stage are significantly more difficult to enforce once a contract is awarded.
- Bid evaluation criteria determine whether contractors with genuine environmental and social management capacity and an adequately resourced ESMP budget are distinguished from those offering a lower price but limited capacity, a risk directly relevant to the M37 corridor given the scale of tree/vegetation management, resettlement, and utility relocation obligations.
- The Contractor's SSESMP/C-ESMP, to be prepared and submitted after contract award, is the instrument through which the Lot-specific TMP, utility relocation plan, and RAP entitlements are translated into implementable, site-specific sub-plans.

In the absence of clear, binding, and adequately budgeted environmental and social provisions in the bidding documents and contract, the following risks arise:

- Contractor capacity risk: Where bid evaluation does not adequately weight environmental and social management experience and ESMP budget, a Contractor may be selected primarily on price, with limited genuine capacity to implement the TMP, RAP, and other management plans described elsewhere in this ESIA, a risk directly relevant given the environmental and social management demands already identified for this corridor.
- Contractual enforceability risk: Environmental and social requirements not explicitly incorporated into the bidding documents and contract are difficult to enforce as binding obligations once the contract is signed, reducing the PMO/PMC's leverage to compel compliance during construction.
- Mobilization delay risk: Where the requirement to prepare and obtain approval of the SSESMP/C-ESMP before commencing physical work is not clearly stated in

the bidding documents, a Contractor may seek to begin work before an adequate SSESMP/C-ESMP is in place.

- Under-resourced environmental and social personnel risk: Without an explicit bidding requirement for qualified, experienced environmental and social personnel on-site, a Contractor may assign this function to unqualified or part-time staff, directly undermining implementation of the TMP's ecological supervision requirements and the utility relocation safeguards.
- Uncompensated third-party damage risk: Without an explicit bidding requirement for reinstatement of damaged utilities, roads, and access infrastructure, the Contractor may treat such reinstatement as outside its contractual scope, leaving affected communities and utility operators without a clear contractual remedy.
- Uncosted noise mitigation risk: Without an explicit bidding requirement to price and implement corridor-specific noise mitigation measures, including the mobile noise barrier system specified in Section 6.3.5, a Contractor may treat this as a discretionary, unpriced item given its material and labour cost implications (continuous timber/plywood panelling, relocation along the work front as construction progresses), leaving noise-sensitive receptors (schools, health facilities, residential clusters) without effective mitigation during construction.

Mitigation and management measures to be implemented:

- Bidding documents and the contract for each Lot will ensure the inclusion of environmental and social provisions, together with the applicable ESMP, TMP, RAP, and utility relocation requirements set out in this ESIA.
- Bidding documents and contract terms will require the Contractor to price and implement the mobile noise barrier system specified in Section 6.3.5, including a costed Bill of Quantities (BoQ) item for barrier materials, installation, and relocation along the work front.
- Bidding documents and contract terms will require the Contractor to price and plant compensatory trees and shrubs at a ratio of 10 seedlings for each tree or shrub removed, in accordance with Cabinet of Ministers Decree No. 464[39] (~11,351 trees, Lots 1–2). Seedlings will be of minimum age of 5 years (trees) or 3 years (shrubs), and their aggregate value will be not less than the value of the trees and shrubs removed. The Contractor will grow and maintain the compensatory planting for a minimum of two years following planting. Bidding documents will include a costed Bill of Quantities item covering seedling procurement (of the specified minimum age and value), planting, and the two-year growing/maintenance obligation.
- Bid evaluation criteria will ensure the selection of a Contractor with demonstrated experience in environmentally and socially responsible construction, who proposes an adequately resourced ESMP budget, including

[39] FOOTNOTE 36

specific budget provision for TMP implementation and utility relocation coordination.

- The contract with the successful bidder will require submission of the SSESMP/C-ESMP within 30 days of contract award and before commencement of any physical work, prepared by the Contractor and subject to approval by the PMO/PMC. The SSESMP/C-ESMP will include, at a minimum, the following sub-plans:
  (i) earthworks and topsoil management plan
  (ii) traffic management plan
  (iii) petroleum and chemicals management plan
  (iv) solid waste management plan
  (v) hazardous waste management plan
  (vi) Tree Management and Planting Plan
  (vii) construction camp management plan
  (viii) occupational health and safety management plan
  (ix) emergency response plan, including utility strike contingency procedures
  (x) contingency and spoil management plan
  (xi) social impacts mitigation plan
  (xii) utility relocation and reinstatement plan
  (xiii) access restoration plan
  (xiv) recruitment plan, including provisions for employment of women and unskilled local residents.

- Bidding documents will require the Contractor to provide qualified and experienced environmental and social personnel on-site to manage and monitor performance, including the PMO/PMC-engaged dedicated technical specialist arrangement to tree/vegetation matters.
- Bidding documents will ensure the Contractor's obligation to reinstate any utilities, roads (including access roads), and transmission/distribution lines damaged during construction.

6.2.6. Permits, Consents, and Authorizations

This section addresses the permits, consents, and certifications required before and during construction of the M37 corridor, as a pre-construction safeguard ensuring structural safety, environmental protection, cultural heritage protection, and compliance with applicable national regulations before physical works commence.

Considering that obtaining the relevant permits, consents, and certifications in advance of and during construction is fundamental to safety, regulatory compliance, and environmental and cultural heritage protection, the assessment revealed the following:

- Design and construction permits: The project design, and any subsequent contractor-level design detailing, must be reviewed and approved by the competent state construction/architecture authority to confirm compliance with

applicable building and road design codes, including structural, drainage, and road safety standards; the design team responsible for the M37 design documentation holds a valid license to provide design services under applicable national legislation. The Contractor must hold the necessary construction permit confirming that works will be conducted in accordance with the approved design.

- Demolition permits: Where existing structures affected by the ROW (identified in the asset inventory, Section 6.2.2) require demolition, demolition permits are required to ensure this is carried out safely and in compliance with applicable environmental regulations, including proper handling and disposal of any hazardous materials (e.g., asbestos-containing materials in older structures).
- Environmental approval: The project design has secured the relevant environmental approval from the National Committee for Ecology and Climate Change (or its territorial subdivision, as applicable) following provision of EIA per national legislation requirements. Before commencing any physical work, the Contractor must prepare the SSESMP/C-ESMP (Section 6.2.5) and obtain approval from the PMO, PMC, and AIIB.
- Utility and infrastructure crossing permits: Permits and consents are required from the relevant utility operators, irrigation/canal management authorities, and railway authority (*O'zbekiston Temir Yo'llari*) for works affecting or crossing gas, water, and electricity infrastructure (Section 6.2.4), irrigation canals and collectors, and existing railway lines at at-grade and grade-separated crossing locations along the corridor.
- Cultural heritage clearance: Given the corridor's proximity to Bukhara city and its UNESCO World Heritage-listed historic urban environment, and the project's specific design objective of diverting transit traffic away from the city via the western bypass (Section 6.2.1), clearance from the relevant cultural heritage authority is required for any works within or affecting the protected zone or buffer zone of the cultural heritage property, and more generally for any construction activity in proximity to designated cultural heritage assets along the corridor.
- Tree felling/relocation permits and government authorization: As set out in Section 6.2.3, felling or relocation of trees and shrubs not part of the state forest fund requires a permit from the territorial subdivision of the National Committee for Ecology and Climate Change, or, for valuable species exceeding the diameter threshold, government-level authorization based on documents of the President of the Republic of Uzbekistan.
- Technical supervision certification: Technical supervision of construction works must be conducted solely by certified engineers holding valid certification, in accordance with the *Decree of the President of the Republic of Uzbekistan dated 28 August 2023, No. UP-151*[40].

[40] Decree of the President of the Republic of Uzbekistan dated 28 August 2023, No. UP-151, On measures for the effective organization of public administration in the field of construction and housing and communal services within the framework of administrative reforms, https://lex.uz/uz/docs/6587224 (accessed July 2026)

- Design change permits: Any change or modification to the approved project design during construction requires review and approval before implementation; where such a change affects felling of valuable tree species, it additionally requires a new environmental review consistent with the Design Institute's accountability under *Presidential Decree No. UP-46*[41] (Section 6.2.3).

In the absence of a comprehensive permit and certification framework established and tracked prior to and during construction, the following risks arise:

- Legal and regulatory risk: Construction undertaken without the necessary permits, consents, or authorizations exposes the Contractor and project to fines, stop-work orders, permit revocation, or legal action, with associated cost and schedule impact.
- Safety and structural risk: Construction carried out without proper design review, building permits, or certified technical supervision risks structural deficiencies, non-compliance with safety standards, and potential for structural failure, endangering workers and the public.
- Environmental non-compliance risk: Construction proceeding without the relevant environmental approval by the environmental authorities, or without the Contractor's SSESMP/C-ESMP being reviewed and approved by the PMO, PMC, and AIIB, risks pollution, habitat disturbance, and non-compliance with AIIB ESSs, undermining the environmental commitments established elsewhere in this ESIA (Sections 6.2.1–6.2.5).
- Cultural heritage risk: Works undertaken without the required cultural heritage clearance, particularly in proximity to Bukhara's historic urban environment, risk damage to or diminishment of the outstanding universal value of the World Heritage property, directly undermining the bypass's core design rationale of protecting this asset (Section 6.2.1).
- Third-party infrastructure and coordination risk: Works affecting railway crossings, irrigation infrastructure, or utility networks undertaken without the relevant operator's consent risk service disruption, infrastructure damage, and liability exposure, compounding the utility-related risks already identified in Section 6.2.4.
- Uncontrolled design change risk: Design modifications implemented during construction without review and approval, particularly where they affect tree felling scope, risk bypassing the avoidance and minimization safeguards, permitting requirements, and moratorium provisions established in Section 6.2.3.
- Administrative and schedule risk: Where the range of permits, consents, and authorizations required across multiple authorities (construction, environmental, cultural heritage, utility, railway) is not identified and tracked centrally from an early stage, sequencing conflicts or delays in obtaining any single permit could delay the overall construction program for the affected Lot.

[41] Decree of the President of the Republic of Uzbekistan dated 30 December 2021, No. UP-46, On measures to accelerate landscaping work and further effective organization of tree protection, https://lex.uz/docs/5801449 (accessed July 2026)

Mitigation and management measures to be implemented:

- The PMO and PMC will assist the Contractor to obtain, or will ensure that the Contractor obtains, as appropriate, all permits, consents, clearances, and authorizations applicable to the project from the relevant national, provincial, and district authorities, in accordance with applicable laws and regulations.
- A permit register will be established and maintained for each Lot, identifying every required permit, consent, or authorization, the responsible party, the issuing authority, status, and any conditions attached.
- Before commencing any physical work, the Contractor will confirm that the necessary construction permit, environmental approval, and any required demolition, utility crossing, railway crossing, and cultural heritage clearances have been obtained for the relevant section of works.
- Technical supervision of construction works will be conducted solely by certified engineers holding valid certification consistent with *Presidential Decree No. UP-151*[42] (28 August 2023).
- Mandatory inspections will be conducted by the PMC and PMO at key construction stages (e.g., earthworks/subgrade, pavement layers, bridge and culvert structures, drainage works, and road safety feature installation) to verify compliance with the approved design and applicable national standards.
- Any changes or modifications to the approved project design during construction must be submitted for review and approval by the contractor and design institute to the PMO/PMC and the AIIB before implementation. Along with these submissions, an updated EIA must be provided in accordance with national legislation due to the changes in the project design, and a new environmental permit will need to be obtained.
- Coordination with the relevant utility operators, irrigation/canal management authorities, and *O'zbekiston Temir Yo'llari* will be established and formalized prior to commencement of works affecting their respective infrastructure, consistent with Section 6.2.4.
- Coordination with the relevant cultural heritage authority will be established prior to commencement of works within or near Bukhara's historic urban environment or other designated cultural heritage assets along the corridor, to confirm the scope of any required clearance.
- Progress on obtaining and maintaining permits, consents, and authorizations will be tracked and reported through the project's overall ESMP monitoring and reporting protocol, with any material delay or non-compliance escalated to PMO and, where relevant, AIIB.

6.2.7. Gender and Social Inclusion

The household survey findings presented in Sections 5.5.2–5.5.8 reveal a consistent pattern of gender-specific vulnerability that standard project compensation and

[42] FOOTNOTE #6

engagement procedures, designed for male household heads as primary beneficiaries and interlocutors, are insufficient to address. The 83% male respondent profile means that gender-specific impacts, particularly on harassment, mobility restrictions, safety near construction camps, and women's business disruption, are likely underreported in the survey data; mitigation measures must therefore be designed conservatively, accounting for a higher actual risk level than survey figures alone indicate.

The primary gender-specific impacts during the pre-construction phase are: (i) exclusion of women from compensation processes due to male-controlled payment mechanisms; (ii) failure to identify women in male-headed households as affected persons despite demonstrated livelihood exposure to construction-phase disruption; and (iii) inadequate consultation processes that systematically underrepresent women's concerns. To address these and the broader construction- and operation-phase gender risks and opportunities identified throughout this ESIA, a dedicated Gender Action Plan (GAP) has been prepared as part of the project's safeguard instruments. The GAP sets out binding activities, indicators, targets, responsible parties, and monitoring arrangements across all project phases, and is to be read together with this section. This section consolidates the gender-responsive provisions required across the project's safeguard instruments, translating baseline survey findings into binding operational requirements. Mitigation measures addressing each of these impacts are set out in Sections 6.2.7.1–6.2.7.3.

6.2.7.1. Compensation Mechanism and Payment Procedures

The survey confirms that income is controlled by men in 66.2% of households, that only 2.1% of women control household income independently, and that 18.4% of households acknowledge explicit barriers to women's access to compensation payments.

The following provisions must be incorporated as binding requirements in the RAP entitlement matrix and payment procedures:

- Individual asset and livelihood assessment for women: Women within male-headed households engaged in corridor-dependent income activities, confirmed for 63.3% of male-headed households in the survey, will be individually registered as affected persons where their livelihood is demonstrably impacted.
- Mandatory joint notification: Where a female household member is a co-user of or income earner from any affected asset, both the registered owner and the female household member will receive individual written notification of entitlement amounts, payment schedules, and grievance rights. Notifications will be delivered in person to each party separately, not only through the household head.
- Joint account option for compensation payments: All affected households with a female co-user or income earner will be proactively offered the option of receiving compensation payments into a joint account in both spouses' names.



This option will be offered as a standard procedure, not requiring the household to request it.

- Separate individual accounts for female-headed households: All compensation payments to female-headed households will be made directly to the female household head's individual account. No intermediation through a male relative or community representative is permitted.
- Livelihood restoration for women in male-headed households: The RAP livelihood restoration programme will include specific measures for women within male-headed households whose income activities are disrupted by construction, including home-based workers, roadside traders, fruit and vegetable sellers, and livestock keepers, with eligibility criteria that do not require formal asset title or household head status.
- Identification of informal female-run enterprises: The RAP census and asset inventory will actively survey and record informal, unregistered female-run home-based enterprises and agriculture-adjacent income activity within the acquisition footprint, using a household-level identification protocol independent of business registration status, with a dedicated livelihood support pathway for women identified through this process who fall outside standard compensation-eligible categories.
- Identification of de facto female-headed households: During individual RAP consultation, households will be asked whether the recorded male household head is absent due to labor migration, and for what duration. Households confirmed as long-term labor-migrant-absent will be flagged as de facto female-headed in the RAP vulnerability register and receive the same enhanced livelihood restoration package and case management as de jure female-headed households.
- Compensation payment monitoring disaggregated by sex: All compensation payment records will be maintained with sex-disaggregated data on who received payment. Semi-annual RAP monitoring reports will include a dedicated section on women's compensation access, reporting the number of joint notifications issued, joint accounts established, compensation access barriers identified through the GRM, and the percentage of eligible women who participated in compensation consultations, received compensation, and participated in livelihood restoration programs, benchmarked against the corresponding rates for male.

Details are provided in RAP and GAP prepared as part of this ESIA.

6.2.7.2. Stakeholder Engagement and Consultation

Separate focus group discussions with women were conducted across all four corridor districts during ESIA preparation (Section 7.5), demonstrating both the operational feasibility and the methodological value of gender-disaggregated consultation. The survey further confirms a 41.9% preference for female community liaisons as a communication channel and a 97.4% rate of women's participation in community

discussions, confirming women's readiness and willingness to engage when appropriate conditions are provided.

The SEP and GAP must incorporate the following as binding requirements:

- Mandatory separate women's sessions at all consultation events. All project-phase public consultation events, during RAP implementation, construction monitoring, and operational review, will include a dedicated women's session or separate FGD component. Mixed sessions alone do not satisfy this requirement.
- Female enumerators and facilitators for women's sessions. All women's sessions will be facilitated by female project staff or consultants. Where this is not possible due to staffing constraints, this will be documented and justified in the social monitoring report.
- Separate reporting of women's consultation findings. Findings from women's sessions will be reported separately from general consultation findings in all semi-annual social monitoring reports submitted to AIIB. This includes attendance figures, key concerns raised, responses provided, and follow-up actions taken.
- Proactive outreach to women in male-headed households. Consultation outreach will specifically target women within male-headed households, not only female household heads, using community meeting announcements distributed through channels accessible to women including mahalla committees, school networks, and health facility contacts.
- GAP implementation and monitoring. The GAP will include a results framework with sex-disaggregated indicators, targets, and responsible parties. Progress against GAP targets will be reported in each semi-annual social monitoring report and reviewed by the AIIB during supervision missions.

Details are provided in GAP and SEP prepared as part of this ESIA.

6.2.7.3. Labour Management and GBV Prevention

The survey confirms that 15.4% of households are concerned about safety near construction camps, and that the reported harassment rate (3.8%) is likely underreported given the 83% male respondent profile. Gender-based risks associated with migrant labour influx are a recognized concern in international infrastructure project practice and will be addressed through the C-ESMP Labour Management Plan.

The following provisions will be incorporated as binding requirements in all contractor contracts:

- Code of Conduct: All construction workers and supervisory staff will sign and comply with a Code of Conduct prohibiting harassment, intimidation, sexual exploitation, and abuse of local women and community members. The Code of Conduct will be explained in induction training in workers' own languages.

- Survivor-centered SEA/SH referral protocol: Prior to camp mobilization in each Lot, the Contractor, supported by PMC, will establish and document a survivor-centered SEA/SH referral protocol specifying the local GBV referral pathway, named contact points at each GRM level, response procedures distinct from standard GRM timelines, and escalation procedures to law enforcement and national GBV services where required or requested by the survivor. The protocol will define specific roles and responsibilities for the Contractor, PMC, PMO, and local authorities in receiving, referring, and responding to SEA/SH reports. The referral protocol's functionality will be independently tested at least once per Lot during construction (e.g., via confirmation check with the named local service contact) to verify it remains active and responsive, not solely confirmed as documented.
- Community awareness sessions: Before construction begins in each district, community awareness sessions will be conducted, including separate women's sessions, explaining workers' expected behavior, community members' rights, and how to report concerns.
- Worker camp management standards: Worker accommodation will be located and managed to minimize interaction risks with local communities, with clear rules on worker movement outside camp boundaries during non-working hours.
- Monitoring and incident reporting: The construction supervision consultant must include a GBV monitoring component in monthly site reports, with any incidents reported immediately to the PMO and AIIB in accordance with the project's incident reporting protocol.

Details are provided in GAP and LMP prepared as part of this ESIA.

6.2.7.4. Grievance Redress Mechanism

The following provisions will be incorporated as binding requirements in Project GRM:

- Designated woman GRC member: At least one woman member of the Community-level Grievance Redress Committee per participating settlement will be designated as the specific point of contact for gender-related and SEA/SH complaints, with her identity and an accessible means of contacting her (not requiring the household head's involvement) disclosed to the community during consultation and disclosure activities.
- Sex-disaggregated complaint tracking: Number and percentage of grievances submitted by women, resolution rates, and average resolution time will be tracked separately from aggregate complaint data.
- Differentiated resolution timelines: General gender-related grievances will be resolved within 14 days. SEA/SH grievances will instead follow the survivor-centered protocol set out in Section 6.2.7.3 and Section 8.5, where survivor safety and consent govern the pace and manner of response rather than a fixed deadline.

- Non-retaliation: Consistent with AIIB's Directive on Protection against Retaliation (Section 8.9), no person will be subject to intimidation, harassment, discrimination, or retaliation for raising concern through Project GRM, AIIB Management, or the AIIB PPM.

6.3. Anticipated Potential Impacts during Construction Phase

6.3.1. Landscape and Topography

Construction activities along the 69 km M37 corridor will result in localized changes to topography and landscape character, though the nature and extent of this change differs significantly between the rehabilitation sections and the greenfield bypass. Along the corridor (Lots 1-2), works are confined largely within or immediately adjacent to the existing road alignment; earthworks in these sections are principally associated with widening the existing carriageway, re-profiling embankments and side slopes, and reconstructing drainage channels, and are not expected to substantially alter the established topographic character of the corridor. The most significant topographic and landscape change will occur along the approximately 7.5 km greenfield bypass and 4.5 km ring-road connection in Lot 2, where an entirely new corridor is established through previously agricultural and semi-desert land; earthworks here will introduce new embankment and cut sections, alter existing field boundaries and irrigation patterns, and change the visual character of land that is currently open agricultural or undeveloped terrain. Vegetation clearance along both the rehabilitation corridor and the bypass (Section 6.2.3) will further alter the landscape's visual character, particularly the loss of established roadside shelterbelt trees that currently define the corridor's appearance in settlement sections. Temporary land disturbance at borrow areas, spoil disposal sites, and contractor camps, if not properly sited and managed, would create additional localized topographic and visual disturbance. Overall, this impact is considered temporary and, for the rehabilitation sections, minor in nature; for the greenfield bypass section it is considered more significant, reflecting its introduction of new topographic and visual features into a previously undeveloped landscape corridor situated within proximity to the historic urban environment of Bukhara.

The table below provides characterization of the landscape/topography impact during the construction phase.

Table 70: Landscape/Topography during Construction Phase

Impact	Duration	Extent	Likelihood	Magnitude	Sensitivity	Significance
Landscape and Topography: Rehabilitation Corridor (Lots 1-2)	Short-term	Local	Likely	Low	Low	Negligible
Landscape and Topography: Greenfield Bypass and Ring-Road Connection (Lot 2)	Short-term	Local	Likely	Medium	High	High

Mitigation and management measures to be implemented:

- Mitigation measures for this impact, including the green landscape design (roadside planting, green strips, and landscaped medians) and selection of the optimized alignment, have already been incorporated into the project design to minimize new topographic and visual disturbance ahead of construction.
- Construction camps, borrow areas, and spoil disposal sites will be sited at suitable locations agreed with the PMC and PMO, avoiding sensitive landscape features and agricultural land where practicable.
- Vegetation clearance will be kept to the minimum extent necessary within the confirmed construction footprint, consistent with the avoidance and minimization measures set out in the Tree Management and Planting Plan.
- Following completion of construction, compensatory tree planting will be carried out at the required 10:1 ratio, with particular attention to sections near populous residential areas, to mitigate visual and noise impacts on nearby residents and restore the aesthetic and landscape value of the corridor.
- All areas temporarily affected by construction activities, including borrow pits, spoil sites, and camp areas, will be restored to their original or an equivalent stable condition upon completion of works.
- GRM will be used to record, investigate, and respond to any complaints related to project activities. The impacted receptors will have access to raise complaints regarding project activities during the construction phase.

6.3.2. Soils

Construction activities along the M37 corridor will result in temporary soil disturbance, including topsoil stripping, compaction, structural degradation, and a risk of contamination from fuel, oil, and construction materials, with the nature and extent of this impact again differing between the rehabilitation corridor and the greenfield bypass. Along the rehabilitation sections, soil disturbance is largely confined to shoulders, verges, and adjacent land already influenced by decades of road operation and maintenance; widening works, embankment re-profiling, and temporary works areas (access tracks, laydown space) will affect a comparatively narrow strip of soil, much of which borders productive irrigated agricultural land in Lots 1–2. Along the approximately 7.5 km greenfield bypass and 4.5 km ring-road connection in Lot 2, construction will strip topsoil from a continuous corridor of currently undisturbed, productive agricultural soil, with a substantially larger volume of earthworks than the equivalent length of rehabilitation corridor, and correspondingly greater potential for loss of soil fertility, mixing of topsoil and subsoil horizons, and compaction from construction traffic and stockpiling if not properly managed. Compaction from heavy machinery and vehicle movement, particularly within temporary works areas, contractor camps, and access tracks outside the permanent footprint, has the potential to reduce soil permeability and structure, affecting post-construction reinstatement and, where these areas overlap agricultural land, subsequent agricultural

productivity. Accidental spills of fuel, oil, or other construction chemicals at storage, refueling, or maintenance areas present a further risk of localized soil contamination. In the moderately saline sections, earthworks and excavation carry an additional risk of disturbing and redistributing saline subsoils, with potential to affect adjacent agricultural land or drainage patterns if excavated material is not appropriately managed. Overall, this impact is considered temporary and, for the rehabilitation sections, of lower magnitude given the narrower and largely already-disturbed soil footprint affected; for the greenfield bypass section, magnitude is considered higher, reflecting the greater area and volume of previously undisturbed, productive agricultural soil affected.

The table below provides characterization of the impact on soils during the construction phase.

Table 71: Soils during Construction Phase

Impact	Duration	Extent	Likelihood	Magnitude	Sensitivity	Significance
Soil Disturbance, Compaction, and Contamination Risk: Rehabilitation Corridor (Lots 1-2)	Short term	Local	Likely	Low	Medium	Low
Soil Disturbance, Compaction, and Contamination Risk: Greenfield Bypass and Ring-Road Connection (Lot 2)	Short term	Local	Likely	Medium	Medium	Medium

Mitigation and management measures to be implemented:

- Topsoil within the confirmed construction footprint will be stripped, stockpiled separately from subsoil, and protected prior to earthworks commencing, consistent with the Contractor's spoil and topsoil management plan; stockpiled topsoil will be reused for reinstatement of temporary works areas and, where feasible, for landscaping and compensatory planting sites.
- Temporary works areas, contractor camps, access tracks, and material storage/laydown areas will be sited to avoid productive agricultural land where practicable and agreed with the PMC prior to establishment; upon completion of works, these areas will be de-compacted and reinstated to a condition suitable for their prior land use.
- Fuel, oil, and construction chemicals will be stored, handled, and refueling/maintenance activities conducted within designated, bunded areas with appropriate spill containment measures, consistent with the Contractor's petroleum and chemicals management plan; a spill response protocol, including trained personnel and spill kits, will be maintained at all storage and refueling locations.
- In the saline sections, excavated saline subsoil will be managed separately from surface topsoil and, where reuse is not feasible, disposed of at designated sites

in coordination with the PMC, to avoid redistributing saline material onto adjacent agricultural land or into drainage channels.
- Construction traffic and machinery movement will be restricted to designated haul routes and works areas to minimize the extent of soil compaction outside the confirmed footprint.
- Soil reinstatement, including de-compaction and topsoil replacement, will be verified by the PMC prior to demobilization from each work area, with any agricultural land temporarily affected returned to a condition consistent with its prior productive use.
- GRM will be used to record, investigate, and respond to any complaints related to project activities. The impacted receptors will have access to raise complaints regarding project activities during the construction phase.

Residual Impacts: Following implementation of the above mitigation measures, the residual impact of soil disturbance, compaction, and contamination risk is expected to be adequately mitigated (low) for the rehabilitation corridor, given the narrower, already disturbed soil footprint affected and the routine, well-established nature of topsoil stripping, stockpiling, and reinstatement measures. For the greenfield bypass, a residual low-to-medium significance is anticipated notwithstanding mitigation, reflecting the larger area and volume of previously undisturbed, productive agricultural soil converted through earthworks; successful segregation and management of saline subsoil, and effective de-compaction and reinstatement of temporary works areas, will be verified by the PMC and PMO as the primary means of confirming this residual rating is achieved in practice rather than assumed by default.

6.3.3. Water Resources

Water Contamination: Construction activities at bridge and culvert crossings along the M37 corridor carry a risk of water contamination, particularly given the corridor's extensive interaction with the Zarafshan River (Lot 1) and the dense irrigation and drainage canal network crossed throughout Lots 1–2, including the Vabkentdarya, Amu-Bukhara, Djuizar, Shakhrud, Chorbakr canals and the Central Bukhara Drainage Canal, among others. Sources of potential contamination include run-off from excavation, crushed rock, and ground rock material from drilling; run-off from earthmoving and spoil handling, open excavations, and concrete batching; sanitary effluents from construction camps; oil and chemical spillage and washing of vehicles and other machinery; and piling activities at bridge and culvert structures. Along the rehabilitation corridor, works are generally confined to upgrading or reconstructing existing bridge and culvert crossings at dispersed locations, with contamination risk limited to the immediate vicinity of each crossing. Along the greenfield bypass, the canal-convergence zone in the Section 9–10 area (Lot 2, near the Bukhara ring road connection) presents a materially higher risk, given the concentration of several major canal crossings within a short section of new alignment, requiring construction of multiple new bridge and culvert structures over active irrigation and drainage

infrastructure within a compressed area and timeframe. This contamination is considered a temporary, construction-period impact; the affected canals themselves are not subject to any impact distant from the project alignment.

The table below provides characterization of the impact on water quality during the construction phase.

Table 72: Water Contamination during Construction Phase

Impact	Duration	Extent	Likelihood	Magnitude	Sensitivity	Significance
Water Contamination	Short-term	Local	Likely	Low	Medium	Low

Mitigation and management measures to be implemented:

- The Contractor will prepare and implement a pollution prevention plan prior to commencement of works at each crossing, with baseline water quality data collected in advance.
- The Contractor will prepare a bridge/culvert construction management plan for each crossing, addressing environmental impacts of construction, including a water diversion plan where required.
- The Contractor will comply with applicable national legislation on water discharge and will not discharge any waste, spoil, or wastewater into a water body without appropriate treatment.
- Areas intended for storage of fuels, oils, and other hazardous materials will be bunded and provided with adequate containment facilities complying with applicable statutory requirements.
- For treatment of any construction-related effluent, sedimentation ponds will be provided, sized for periodic removal of sediment, and located at a suitable setback distance from water bodies; water being discharged from these ponds will be regulated to ensure it is within acceptable turbidity limits before release.
- Sewage from construction camps will be directed to septic tanks or equivalent treatment facilities; sewage/sludge will be periodically removed from the site by licensed disposal trucks rather than discharged to canals, collectors, or groundwater.
- Oil and water separators and settling ponds will be installed where appropriate to minimize the risk of contaminated construction water entering the canal, collector, or groundwater system.
- Concrete batching, vehicle washing, and machinery maintenance will be confined to designated areas set back from water bodies, with contained wash-water collection and no direct discharge to any canal, drain, or watercourse.
- Vehicle and machinery movements near water bodies will be avoided where practicable, and construction works near canals and collectors will be carried out to ensure debris or excavated soil is not released into the water.
- At the canal-convergence zone (Lot 2), construction will be phased across the multiple crossings to avoid concurrent disturbance of several canals at once,

with enhanced sedimentation and turbidity controls applied given the concentration of crossings in this section.

- GRM will be used to record, investigate, and respond to any complaints related to project activities. The impacted receptors will have access to raise complaints regarding project activities during the construction phase.

Residual Impacts: Following implementation of the above mitigation measures, the residual impact of water contamination is expected to be adequately mitigated (Low) for the rehabilitation corridor. For the canal-convergence zone of the greenfield bypass, given the concentration and scale of concurrent crossing works, a residual impact of medium significance is anticipated notwithstanding mitigation, reflecting the greater number of active irrigation and drainage systems affected within a compressed construction period.

Blockage of or Damage to Canals and Drainage Channels: Construction activities at canal and drainage channel crossings can cause damage to, or temporary blockage of, the side slopes, bed, or structural integrity of irrigation canals and drainage channels along the M37 corridor, particularly during piling of bridges and culverts and installation of temporary works such as cofferdams. Damage or blockage of irrigation canals can reduce water availability for irrigation purposes, causing loss of agricultural produce for farmers dependent on the affected system, consistent with the irrigation-dependent agricultural land use identified throughout Lots 1–2. Similarly, damage to or blockage of drainage channels can cause localized flooding, adversely affecting adjacent cultivation and, in low-lying sections, roadside and settlement areas. This risk is present along the rehabilitation corridor at each existing canal crossing requiring reconstruction, but is of greater concern at the greenfield bypass's canal-convergence zone (Lot 2, Sections 9–10), where the corridor crosses multiple major canals, including the Shakhrud, and Djuizar canals and the collector canal after Sakovich, within a short section of new alignment, a location already identified in the project's biodiversity baseline as the most ecologically significant cluster of canal connectivity features along the corridor, given the density of reed and riparian vegetation these canals support.

The table below provides characterization of the impact on irrigation and drainage system during the construction phase.

Table 73: Canal/Drainage Blockage or Damage during Construction Phase

Impact	Duration	Extent	Likelihood	Magnitude	Sensitivity	Significance
Canal/Drainage Blockage or Damage: Rehabilitation Corridor Crossings (Lots 1-2)	Short term	Local	Likely	Low	Medium	Low
Canal/Drainage Blockage or Damage: Greenfield Bypass and Ring-Road Connection (Lot 2)	Short term	Local	Likely	Medium	Medium	Medium

Mitigation and management measures to be implemented:

- The Contractor will prepare a bridge and culvert construction management plan for each crossing, including a water diversion plan to maintain canal and drainage flow continuity throughout construction.
- No debris, spoil, waste material, or excavated soil arising from construction will be released into canals or drainage channels.
- Construction material will not be stockpiled near water bodies, canals, or drainage channels.
- Vehicle and machinery movement in the vicinity of canals and drainage channels will be avoided where practicable.
- The Contractor will liaise with the relevant irrigation and canal management authority in advance of works at each crossing and will keep affected water users and stakeholders informed in the event of any damage to, or blockage of, an irrigation canal or drainage channel.
- Any damage to canals or drainage channels arising from construction activities will be restored promptly to at least their pre-construction condition and hydraulic capacity.
- At the canal-convergence zone (Lot 2), works at the multiple canal crossings will be phased and coordinated with irrigation authorities to avoid simultaneous disruption to more than one active irrigation system at a time, and canal bank vegetation disturbed during crossing works will be reinstated with native riparian species following construction, consistent with the ecological connectivity function of this section identified in the biodiversity baseline.
- GRM will be used to record, investigate, and respond to any complaints related to project activities. The impacted receptors will have access to raise complaints regarding damage to, or blockage of, irrigation canals and drainage channels, or disruption to irrigation water supply, during the construction phase.

Residual Impacts: Following implementation of the above mitigation measures, the residual impact of canal or drainage channel blockage/damage is expected to be adequately mitigated (Low) for the rehabilitation corridor. For the canal-convergence zone of the greenfield bypass, a residual impact of medium significance is anticipated notwithstanding mitigation, reflecting the concentration of active irrigation and drainage systems crossed within this section and the corresponding importance of coordinated phasing with irrigation authorities.

6.3.4. Air Quality

Baseline ambient air quality along the M37 corridor is already influenced by regional desert dust, existing traffic, and, near Bukhara and Kagan districts, background industrial sources, with SO_2 exceeding the WHO 24-hour guideline at all monitored stations and benzene approaching the national limit at several rehabilitation-corridor stations (baseline air quality assessment, above). Suspended particulate matter (PM) and dust are the pollutants of primary concern during construction, generated from two main sources: mobile sources (construction machinery, diesel generator sets, and haul

trucks) and fixed sources (concrete batching plants, asphalt hot-mix plants, and crushers and quarry sites). Construction work, breaking up, digging, crushing, transporting, and dumping large quantities of dry material along a 69 km corridor and the 7.5 km greenfield bypass, will inevitably generate dust and combustion emissions in and around active work sites, with emissions from crushers and quarry sites capable of causing health effects (coughing, irritation of eyes, reduced visibility) and generally settling within a short distance of the construction area, meaning the impact, while direct, is temporary and largely confined to active work sites, haul routes, and the immediate downwind vicinity, depending on wind speed, direction, and atmospheric stability. Because baseline air quality along the rehabilitation corridor is already close to international guideline thresholds, the project's construction-phase contribution has reduced headroom to be absorbed without approaching or exceeding these thresholds locally, even though it does not represent a new pollution source in an otherwise clean-air setting.

The project's GHG assessment (Paris Alignment and Climate Finance Assessment) estimates construction-phase emissions at approximately 333,000 tCO_2e for the 69 km corridor (approximately 155,000 tCO_2e for the confirmed Lots 1–2 design), of which cement concrete pavement production accounts for the large majority (approximately 82%), with asphalt production, sidewalk paving, and earthworks-related diesel combustion contributing the remainder. This one-time construction emission is equivalent to less than one year of the corridor's projected operational emissions at capacity (approximately 506,000 tCO_2e/year from 2033) and represents approximately 3% of total corridor emissions over the 25-year operational assessment period (2026–2050). It is also more than offset by the estimated 1.01 million tCO_2e net emission saving projected over the same period from improved pavement condition relative to the do-nothing scenario, per the same assessment.

The table below provides characterization of the impact on ambient air quality during the construction phase.

Table 74: Air Quality during Construction Phase

Impact	Duration	Extent	Likelihood	Magnitude	Sensitivity	Significance
Air Quality (Dust/Emissions)	Short-term	Local	Likely	Medium	Medium	Medium

Mitigation and management measures to be implemented:

(a) Dust Suppression

- The Contractor will prepare an SSESMP/C-ESMP comprising earthworks and topsoil management plans and a traffic management plan, including dust suppression measures.
- Unpaved access roads, excavation areas, and stockpiles will be sprayed with water regularly, at a minimum of 3–4 times per day during dry and windy conditions, with increased frequency in settlement sections.

- Soil, sand, and other dust-forming stockpiles will be sited downwind of sensitive receptors, lightly wetted, compacted, and covered with tarpaulins or geotextile sheeting.
- All trucks transporting soil, sand, gravel, or other loose/fine materials will be fully covered during transport.
- High-dust activities will be scheduled outside periods of strong wind and suspended during regional dust storms.

(b) Plant, Equipment, and Vehicle Emissions

- Concrete and asphalt batching and hot-mix plants will be sited at a suitable setback distance from populated areas, fitted with fabric filters or wet scrubbers, with stacks of adequate height, and sited downwind of the nearest settlement where feasible.
- All vehicles, plant, and equipment will comply with applicable Uzbek emissions legislation, undergo regular maintenance, and be withdrawn from site if exhibiting excessive visible emissions or unnecessary idling.
- Diesel generator sets will use low-sulphur diesel, be fitted with adequate stack height, and be placed on drip trays sized to contain any leaked fuel/oil in the event of a spill.
- Refueling will be conducted only at designated refueling stations.
- Concrete mixers and similar mixing equipment will be properly calibrated, cleaned, and maintained.

(c) Materials and Waste Handling

- Cement and other fine bulk materials will be stored in sealed containers or closed, ventilated facilities.
- Incineration of domestic, construction, or landscaping waste at construction sites is prohibited.
- Hazardous materials with potential gas emissions will be stored in sealed containers within well-ventilated, secure, low-risk areas.

(d) Worker Protection

- Dust masks will be provided to workers, and a dust collection system will be maintained at crushers, supported by continuous water sprinkling.

(e) Monitoring, Consultation, and Grievance

- Ambient air quality monitoring will be carried out during construction at sensitive receptor locations, per the project's monitoring plan, with corrective action taken on any deviation from established thresholds, with particular attention to the near-limit SO_2 and benzene baseline locations identified above.
- The Contractor will conduct community consultations to inform residents of potential air-quality-related inconvenience and associated mitigation measures.
- GRM will be used to record, investigate, and respond to any complaints related to project activities. The impacted receptors will have access to raise complaints regarding project activities during the construction phase.

Residual Impacts: Following implementation of the above measures, the residual impact of construction-phase air pollution is expected to be adequately mitigated (Low) for the greenfield bypass and the general rehabilitation corridor, consistent with the temporary, localized, and largely self-dissipating nature of construction dust. A residual medium significance is retained specifically for rehabilitation-corridor settlement sections with near-limit baseline SO_2 and benzene concentrations, reflecting the reduced assimilative capacity at these locations rather than any deficiency in the proposed mitigation.

6.3.5. Noise and Vibration Level

Baseline monitoring (10–17 May 2026, 13 stations: N1–N7 rehabilitation corridor, N8–N13 bypass) confirms daytime and nighttime LAeq compliant with the applicable SanPiN No. 0008-20/WHO-aligned reference levels (55/45 dBA) at all 13 locations, with the rehabilitation corridor's daytime baseline generally higher (reflecting existing M37 traffic) than the comparatively quieter bypass area. Notwithstanding this LAeq compliance, short-duration LAmax exceedances above the 70 dBA daytime reference level were already recorded at 8 of 13 stations at baseline, attributable to passing heavy vehicles on the rehabilitation corridor, and to a mix of wind, agricultural machinery, and local road traffic at bypass stations N8 and N10. Baseline vibration is most pronounced in settlements immediately adjacent to the existing roadway (pavement deterioration and heavy traffic loading) and presently limited within the greenfield bypass footprint.

Construction activities, earthworks, heavy equipment operation, piling at bridge and culvert crossings (Section 6.3.3), and increased haul truck movement, will generate additional, temporary noise and ground vibration, with the vibration Area of Influence (50–100 m) narrower than the noise Area of Influence (200 m). This impact is most relevant where sensitive receptors are close to the works: over 40 receptors, including schools, health facilities, and households, occur within the rehabilitation corridor's noise Area of Influence, several within 50 m and, at bypass station N8, as close as 13 m to the alignment boundary. A cemetery was also identified among the bypass monitoring locations (N9), warranting a precautionary approach to construction scheduling and vibration in its vicinity pending confirmation of its formal heritage status.

At the request of the Bank's transport specialist, indicative construction noise levels were modeled to assess the impact of project construction activities on existing ambient noise conditions along the corridor and compared against the project's own harmonized noise standards rather than the LAmax figure used for baseline monitoring comparison, which is not the applicable outdoor community noise limit. Reference sound levels are taken from the FHWA Roadway Construction Noise Model (RCNM), applied at its standard 15 m reference distance with conservative point-source geometric spreading (no credit assumed for ground absorption, barriers, or vegetation).

The resulting levels are compared directly against harmonized framework (Section 3.5.2.2) outdoor daytime LAeq thresholds, 55 dBA for residential areas and school

playgrounds, and 60 dBA for industrial, commercial, and traffic areas, as a conservative, worst-case screening comparison. Actual time-averaged (LAeq) exposure at a given receptor would likely be lower once the intermittent, mobile nature of linear road construction (equipment advancing along the corridor rather than remaining fixed at one location for the duration of works) is accounted for. This screening comparison does not extend to indoor thresholds (school classrooms: 35 dBA; hospitals: 30 dBA daytime), which require a building facade attenuation assumption not available at this stage.

Table 75: Predicted Instantaneous Construction Noise Levels by Distance

Equipment	Reference Noise Level at 15 m	Noise level generated by various vehicles, dBA						
		13 m	50 m	100 m	150 m	200 m	300 m	500 m
Grader	85	86.2	74.5	68.5	65.0	62.5	59.0	54.5
Excavator	81	82.2	70.5	64.5	61.0	58.5	55.0	50.5
Mobile crane	81	82.2	70.5	64.5	61.0	58.5	55.0	50.5
Generator (mobile)	81	82.2	70.5	64.5	61.0	58.5	55.0	50.5
Vibratory compactor/roller	80	81.2	69.5	63.5	60.0	57.5	54.0	49.5
Haul/dump truck	76	77.2	65.5	59.5	56.0	53.5	50.0	45.5
Threshold: Residential/School Playground (55 dBA daytime, Section 3.5.2.2)	---	55	55	55	55	55	55	55
Threshold: Industrial/Commercial/Traffic (60 dBA daytime, Section 3.5.2.2)	---	60	60	60	60	60	60	60

Against the correct 55 dBA outdoor residential/school threshold, every modeled equipment type exceeds this limit well beyond the project's own 200 m noise Area of Influence: graders remain above 55 dBA out to approximately 474 m, excavators, cranes, generators to approximately 299 m, compactors and rollers to approximately 267 m, and haul trucks to approximately 168 m. Against the less stringent 60 dBA industrial and traffic threshold, graders remain non-compliant to approximately 267 m and excavators, cranes, and generators to approximately 168 m, in both cases beyond the 200 m AoI boundary. Only haul truck movement alone complies with the 60 dBA threshold within the AoI (at approximately 95 m). Nighttime compliance distances (45 dBA residential) are substantially greater still (approximately 532–1,500 m depending on equipment), reinforcing why night-time construction near any settlement must be avoided rather than managed through distance alone.

The table below provides characterization of noise and vibration impact during the construction phase.

Table 76: Noise and Vibration during Construction Phase

Impact	Duration	Extent	Likelihood	Magnitude	Sensitivity	Significance
Noise: Rehabilitation Corridor and Greenfield Bypass	Short-term	Local	Likely	High	High	High
Vibration: Rehabilitation Corridor and Greenfield Bypass	Short-term	Local	Likely	Low	Medium	Low

Mitigation and management measures to be implemented:

- Construction equipment and vehicles will be fitted with effective silencers and mufflers, maintained in good working order, and operated to minimize unnecessary idling.
- High-noise and high-vibration activities (piling, heavy earthworks, rock breaking) will be restricted to daytime hours in settlement sections; night-time work near residential areas, schools, and health facilities will be avoided given the substantially greater compliance distances required at night (approximately 532–1,500 m), except where unavoidable for technical or safety reasons and subject to prior notification and enhanced mitigation.
- Given that modeled exceedance of the 55 dBA daytime threshold extends beyond the full 200 m noise AoI for most equipment, noise management will not be limited to a narrow near-field zone. A mobile noise barrier system (solid timber or plywood panels, minimum 18–25 mm thickness, continuous with no gaps between panels or at the base, of sufficient height to break the direct line of sight between the equipment and the nearest receptor, and extending an adequate length beyond the source to avoid edge diffraction) will be installed close to active equipment and relocated as the work front progresses along the project corridor, at all schools, health facilities, and residential clusters within the AoI, prioritized by proximity to the works. A well-specified noise barrier of this kind is expected to achieve approximately 5–10 dB of noise reduction.
- The loudest equipment (graders, excavators, cranes, generators) will be scheduled to minimize simultaneous operation near a single receptor, and, given the linear and mobile nature of the works, the construction program will be sequenced so that the period of closest proximity to any given settlement is minimized rather than sustained.
- Vibration-generating activities (piling, compaction) near the bypass cemetery (N9) and any other identified sensitive structures will be preceded by a condition survey, with vibration monitoring and, where necessary, method adjustment (e.g., non-percussive piling techniques) to avoid damage.
- Affected communities, schools, and health facilities will be informed in advance of planned high-noise construction activities (e.g., piling schedules, timing of works passing their location) through the project's stakeholder engagement channels. The Contractor will schedule coordination of high noisy activities with school hours.

- Haul routes and vehicle movements will be scheduled to avoid concentration of heavy traffic during periods of highest sensitivity (early morning, late evening) in settlement sections.
- Ambient noise and vibration monitoring will be carried out during construction at representative sensitive receptor locations.
- GRM will be used to record, investigate, and respond to any complaints related to project activities. The impacted receptors will have access to raise complaints regarding project activities during the construction phase.

Residual Impacts: Following implementation of the above measures, the residual impact of construction vibration is expected to be adequately mitigated (Low) corridor-wide, given the temporary and reversible nature of construction vibration and the routine, well-established nature of the proposed mitigation. For construction noise, the mobile noise barrier measure is expected to provide a meaningful, quantifiable reduction. Per the accompanying noise model, a well-specified barrier (assumed 5–10 dB insertion loss) reduces the distance at which the loudest equipment (graders, excavators, cranes, generators) complies with the 55 dBA daytime threshold from approximately 300–474 m unmitigated to approximately 150–270 m with a barrier, and for haul trucks from approximately 168 m to approximately 53–95 m, a substantial reduction in the overall extent of the affected zone.

This residual impact is considered unavoidable in absolute terms at very close-range using construction-phase mitigation alone, given the physical proximity of existing settlements to the M37 corridor, established through the project's design and alternatives analysis. It is time-limited to the period during which works are active in the immediate vicinity of a given receptor, consistent with the linear and mobile nature of the construction program, rather than persisting for full construction duration at any single location. The combined effect of the barrier, equipment scheduling, and sequencing of works to minimize the duration of closest proximity is expected to substantially reduce the frequency, duration, and severity of exceedance experienced by these closest receptors relative to unmitigated conditions.

6.3.6. Solid Waste and Wastewater Management

Hazardous Waste: Rehabilitation and widening of the M37 corridor, and construction of the greenfield bypass, will generate several streams of hazardous waste associated with specific construction activities, including waste oils and hydraulic fluids from the large construction vehicle and equipment fleet, spent batteries, bituminous/asphalt residues from hot-mix and batching plant operation, paints and solvents from road marking and structural coating, chemical admixture containers from concrete works, and potentially asbestos-containing materials (ACM) from demolition of older structures affected by the ROW. These materials pose risks of soil and groundwater contamination, toxic exposure, air emissions, and ecological harm to surface waters, particularly the extensive irrigation and drainage canal network crossed by the corridor.

The engineering assessment did not specifically survey for the presence of ACM in structures scheduled for demolition. Given that several affected structures (residential buildings, auxiliary structures such as livestock shelters, and a commercial unit, per the asset inventory) may predate widespread adoption of asbestos-free construction materials, the presence of ACM, particularly in roofing sheets, pipe lagging, or insulation, cannot be excluded without a dedicated pre-demolition survey. Asbestos-related diseases have a long latency period, and asbestos fibers can remain airborne long enough to travel considerable distances; if encountered and not properly managed, this represents a serious and irreversible health risk to workers and nearby communities.

Table 77: Hazardous Waste Impacts

Construction Activity Generating Waste	Hazardous Waste Type	Potential Impacts
Fueling, servicing, and maintenance of construction vehicles and equipment (all Lots, camps, workshops)	Waste oils, lubricants, hydraulic fluids, oil filters, oily rags	Soil/groundwater contamination; toxicity to workers; fire hazard
Vehicle and equipment battery replacement	Used lead-acid batteries	Heavy metal (lead, sulfuric acid) contamination of soil/water
Asphalt/bitumen production and paving (hot-mix and batching plants, paving works)	Bituminous waste, tar residues, plant residues	Air emissions; soil contamination at plant sites; potential PAH exposure
Road marking, signage installation, and structural painting/coating (bridges, culverts, barriers)	Paints, thinners, solvents, empty containers	VOC emissions; soil/water contamination
Demolition of structures affected by the ROW identified in the asset inventory, including older residential and auxiliary structures	Potential ACM, roofing sheets, pipe lagging, insulation in older structures	Airborne carcinogenic fibers; chronic, irreversible health effects
Concrete works (admixtures, curing compounds, form-release agents), bridge and culvert construction	Chemical containers, curing compound residues	Soil contamination; skin/respiratory irritation
Vehicle and equipment tire replacement	End-of-life tires	Fire hazard; potential vector breeding habitat if stored improperly; soil contamination if burned
Vegetation/weed control within the ROW, where herbicide use cannot be avoided	Herbicide containers and residues	Soil/water contamination; risk to non-target flora and fauna (Section 6.2.3)
Operation of site clinics/first aid stations	Medical/sharps waste	Infection risk; contamination if improperly disposed
Replacement of electronic components (traffic monitoring/WIM stations, lighting control cabinets)	Electronic waste (batteries, circuit boards, wiring)	Heavy metal release; fire hazard

Hazardous waste generation occurs only during active construction and is temporary, limited to the construction period for each Lot. Impact is generally confined to construction sites, camps, and the immediate ROW, but spill pathways could extend impacts to soil, groundwater, and the irrigation and drainage canal network if not

properly managed, particularly in the canal-convergence zone. While hazardous waste generation itself is certain, harmful impacts (contamination, spills, worker exposure) will only occur if waste management practices are inadequate; activities of concern include fuel and oil handling and spillage during equipment servicing, and any encounter with ACM during demolition.

The table below provides characterization of the hazardous waste impact during the construction phase.

Table 78: Hazardous Waste during Construction Phase

Impact	Duration	Extent	Likelihood	Magnitude	Sensitivity	Significance
Hazardous Waste	Short term	Local	Likely	Medium	Medium	Medium

Non-Hazardous Solid Waste: Construction activities along the corridor will generate substantial quantities of non-hazardous solid waste, including excavated material, construction and demolition debris, packaging, and domestic waste from camps. Given the 69 km length of the corridor and the number of interchanges, junctions, overpasses, and the greenfield bypass, waste volumes, particularly excavated material and pavement removal/milling debris, will be substantially larger in aggregate than for a single-site facility, though generally lower in hazard profile than the hazardous waste streams above.

Table 79: Sources and Types of Non-Hazardous Solid Waste

Waste Category	Sources	Waste Types
Construction and Demolition Waste	Milling/removal of old asphalt and concrete pavement; demolition of structures identified in the asset inventory; removal of old culverts, drainage structures, guardrails, and signage	Asphalt millings; broken concrete/pavement slabs; old base/subbase material; bricks and masonry fragments; scrap metal (old guardrails, signage posts, rebar); old timber formwork
Earth and Excavation Waste	Earthworks, cut-and-fill, embankment construction; drainage excavation; borrow pit operations; vegetation clearance within the confirmed footprint	Excavated soil/subsoil (reuse for embankment where suitable); rock fragments; cleared vegetation and brush; surplus spoil material
Concrete and Pavement Construction Material Waste	Cement concrete pavement construction; bridge and culvert concrete works	Excess concrete/grout; broken formwork; rebar off-cuts; sawdust; dust and fine particulate from cutting/grinding; leftover aggregate and sand; concrete washout waste
Packaging Waste	Delivery of culverts, pipes, guardrails, signage, lighting fixtures, geotextiles/geogrids, and traffic monitoring equipment	Plastic wrapping; wooden pallets; crates; cardboard packaging; steel/plastic strapping; polystyrene blocks and foam
Organic and Domestic Waste	Construction camps, site offices, and worker accommodation	Food waste; plastic food containers; paper and cardboard; bottles; general office waste; sanitary waste

Non-Hazardous Mechanical and Electrical Waste	Replacement of old signage, lighting, guardrail hardware, and non-hazardous traffic monitoring components	Scrap metal; non-hazardous cabling; damaged fixtures; non-oily machine components

Even though non-hazardous waste does not pose the same immediate hazard as the streams above, it can still cause significant impacts if not properly collected or disposed of soil and surface water pollution where debris, packaging, or sediment enters the irrigation and drainage canal network; landscape degradation from accumulated rubble and waste, particularly in settlement sections and near the Bukhara historic urban environment. Air quality impacts from dust generated by rubble, cement bags, or soil piles, or from illegal burning of waste (Section 6.3.4); and indirect ecological impacts, where improperly managed waste could attract scavengers and disturb wildlife, with risk of entanglement in plastic or wire waste or ingestion by wildlife.

The table below provides characterization of non-hazardous solid waste impact during the construction phase.

Table 80: Non-Hazardous Solid Waste Impact during Construction Phase

Impact	Duration	Extent	Likelihood	Magnitude	Sensitivity	Significance
Non-Hazardous Solid Waste	Short-term	Local	Likely	Medium	Medium	Medium

Wastewater: Domestic/sanitary wastewater from construction camps and site offices, and construction process wastewater (vehicle, equipment washing, oil and water separator effluent), are addressed as part of the water contamination assessment (Section 6.3.3.1), including septic tank and sealed tank management, sedimentation ponds, and oil/water separators. One additional wastewater stream specific to concrete-intensive road and bridge/culvert construction is concrete washout water, the highly alkaline (typically pH 11–13) wash water generated from cleaning concrete mixer drums, chutes, and tools, which is toxic to aquatic life if discharged untreated. Dedicated management of this stream is set out in the mitigation measures below.

Mitigation and management measures to be Implemented:

- The Contractor will develop a waste management plan as part of the SSESMP/C-ESMP, including separate provisions for domestic, construction, and hazardous waste.
- Before commencing any demolition or repair work on structures identified for demolition (Section 6.2.2), the Contractor will carry out a pre-demolition ACM survey. Where ACM is confirmed or cannot be excluded, an Asbestos Management Plan (AMP) will be prepared and implemented; all personnel involved will be trained in accordance with the AMP and equipped with appropriate PPE; removal, handling, and disposal of ACM will be carried out only by specially trained personnel, using wet removal techniques, double-bagging, and licensed disposal.

- The Contractor will establish an agreement with licensed waste management operators for the collection, transportation, and disposal of both hazardous and non-hazardous waste, and will adhere to the specific mitigation measures for handling hazardous waste.
- The Contractor will minimize waste generation through a reduce/reuse/recycle approach; waste will be segregated at source, and containers for reuse/recycling will be provided at each worksite.
- The Contractor will identify appropriate locations for temporary storage of construction and domestic waste within project sites, camps, and the ROW; waste storage areas will be sited at least 100 m from canals, drainage channels, and other water bodies. All hazardous waste, including any contaminated soil, will be properly stored until collection by a licensed waste operator. All waste transport vehicles will be inspected to ensure sealed beds, particularly for trucks servicing sections near the irrigation canal network (Section 6.3.3) and the Bukhara historic urban environment.
- Dumping of waste in trenches, along canal banks, within the biodiversity-sensitive canal-convergence zone (Section 6.3.3), or in any area not designated for waste disposal is strictly prohibited.
- Concrete washout water will be captured in designated, lined washout pits or containers, located away from canals and drainage channels; washout waste will be allowed to settle and be neutralized (pH-adjusted) prior to any discharge, or removed for licensed disposal; no direct discharge of washout water to any watercourse or drain is permitted.
- The Contractor will provide training on waste segregation, handling of non-hazardous and hazardous waste, spill response, prevention of waste entering watercourses, and wildlife protection measures, as part of environmental induction and periodic refresher training.
- All containers, drums, and tanks used for storage will be maintained in good condition, sealed, clearly labeled, and regularly inspected for leaks.
- Incineration of domestic, construction, and landscaping waste at construction sites is strictly prohibited.
- The Contractor will maintain all construction sites in a clean, tidy, and safe condition, with appropriate facilities for temporary waste storage prior to transportation and final disposal.
- End-of-life tires will be collected and stored to prevent contact with soil and will be disposed of at an approved facility.
- Medical waste from any site clinics or first aid stations will be disposed of in accordance with national medical waste regulations.
- A recording system will be established to track all waste types and quantities generated, felled/relocated tree debris handled separately per the Tree Management and Planting Plan (Section 6.2.3).
- GRM will be used to record, investigate, and respond to any complaints related to project activities. The impacted receptors will have access to raise complaints regarding project activities during the construction phase.

Residual Impacts: Following implementation of the above measures, the residual impact of non-hazardous solid waste and of general hazardous waste (oils, chemicals, bituminous residues, batteries) is expected to be adequately mitigated (Low), given the routine, well-established nature of the proposed waste management measures and the temporary, construction-limited duration of waste generation.

For asbestos-containing materials, the residual risk is directly dependent on completion of the pre-demolition ACM survey and full AMP implementation before any demolition proceeds; provided these measures are implemented as set out above, the residual impact is expected to be reduced to Low, since ACM handling under a properly implemented AMP (wet removal, trained personnel, licensed disposal) is standard, effective practice. The high significance rating identified prior to mitigation reflects the severity and irreversibility of asbestos exposure if this sequence is not followed, specifically, if demolition proceeds without a prior ACM survey, and is retained as a residual risk only in that non-compliance scenario. It is not an inherent, unavoidable residual impact of the project in the way that, for example, close-range construction noise is (Section 6.3.5). Confirmation that a pre-demolition ACM survey has been completed for every structure identified for demolition, prior to any demolition proceeding.

6.3.7. Biological Environment

Vegetation and Tree Loss: Construction will require clearance of vegetation within the permanent and temporary works footprint, including removal of shelterbelt, roadside, and orchard trees, most heavily concentrated in Lots 1–2 of the rehabilitation corridor (approximately 11,351 trees inventoried) and within the bypass right-of-way. This represents a direct, long-term loss of planted vegetation that provides shading, wind erosion control, and habitat connectivity for birds, bats, and small mammals. Because the affected vegetation is planted and part of a Modified Habitat, and equivalent species are widespread regionally, the magnitude of this impact is assessed as moderate at the corridor scale and low at the regional scale. Given the low–moderate sensitivity of shelterbelt habitat, the impact significance prior to mitigation is assessed as Moderate, driven primarily by the loss of the connectivity function at overpass and junction locations where up to approximately 1,200 ornamental trees occur at single chainages.

Disturbance to Canal-Margin and Riparian Vegetation and Aquatic Habitat: Works at canal crossings and hydraulic structures (present in all lots) may disturb canal-bank vegetation, including *Phragmites*-dominated reed beds that provide the highest-value habitat within the irrigation network, and may temporarily affect water quality, flow, and turbidity at crossing points. These effects could disturb *Marsh Frog* breeding habitat and aquatic invertebrate and fish communities at affected crossings and could affect the bridge structures over the Zarafshan River (Lot 1) that provide nesting habitat for swallows, swifts, and potentially bats. Given the moderate connectivity value of the canal network and its role as the principal ecological corridor in an otherwise arid

landscape, this impact is assessed as Moderate prior to mitigation, notwithstanding its localized and largely temporary nature and the potential for Nature-based Solutions (see mitigation measures below) to reduce impacts at crossing points.

Species of Conservation Significance: Two Red Book bird taxa (*Zarafshan Pheasant* and *Bukhara Tit*) are associated with orchard and shelterbelt habitat within the bypass and Lots 1–2 of the rehabilitation corridor and could experience temporary displacement or disturbance during vegetation clearance and earthworks. Prior to mitigation, impacts on the two Red Book bird taxa are assessed as Minor to Moderate given their association with widespread, replaceable Modified Habitat.

Disturbance to Fauna: Construction traffic, earthworks, and equipment operation will generate noise, dust, and vibration that may temporarily displace disturbance-sensitive fauna, including raptors and waterbirds using canal and agricultural habitats, and may disrupt movement of desert-adapted reptiles, rodents, and raptors across the desert-agricultural ecotone. Livestock grazing and transiting the bypass sections may also be temporarily displaced or have movement patterns disrupted during active construction, requiring coordination with local herders on work scheduling and access. These effects are generally temporary and localized to the active construction footprint and its immediate surroundings and are assessed as Minor given the widespread tolerance of recorded species and grazing livestock to existing agricultural and roadside disturbance.

Spread of Invasive Species: Soil disturbance, vehicle movement, and imported construction materials create a pathway for further spread of Acroptilon repens (Russian Knapweed), already present at multiple bypass sections and in Gijduvon district, and for introduction of other invasive flora along disturbed and stockpiled soils. This impact is assessed as Minor to Moderate, reflecting the localized but self-reinforcing nature of invasive species establishment if left unmanaged.

Risk to Desert Fauna: Earthworks and surface disturbance in the desert and semi-desert transition habitat and could increase wind erosion risk on exposed desert soils. This impact is assessed as minor, reflecting the sparse and mobile nature of the species in this area and the limited extent of natural vegetation retained within the footprint.

The table below provides characterization of the impact on biodiversity during the construction phase.

Table 81: Significance Summary

Impact	Duration	Extent	Likelihood	Magnitude	Sensitivity	Significance
Vegetation and Tree Loss	Long-term	Site-specific	Likely	Medium	Medium	Medium
Disturbance to Canal-Margin/Riparian Vegetation and Aquatic Habitat	Short-term	Site-specific	Likely	Medium	Medium	Medium

Impact	Duration	Extent	Likelihood	Magnitude	Sensitivity	Significance
Disturbance to Red Book Avifauna	Short-term	Local	Likely	Low	Medium	Medium
Spread of Invasive Species	Long-term	Local	Likely	Medium	Low	Low
Disturbance to Desert Fauna	Short-term	Local	Likely	Low	Low	Low

Mitigation and management measures to be Implemented:

(a) Biodiversity Management and Supervision

- The Contractor will appoint a Biodiversity Specialist/Environmental Specialist for the duration of construction in Lots 1–2, responsible for supervising pre-clearance surveys, verifying compliance with this section's measures, authorizing temporary work stoppages where protected species or active nests are encountered, and maintaining biodiversity-related records (survey results, nest and roost checks, incident log).
- The Contractor will conduct biodiversity induction training for all workers, covering protected and Red Book species present in the corridor (Zarafshan Pheasant, Bukhara Tit, Marsh Frog), prohibited behaviors (hunting, feeding wildlife, harassment, unauthorized handling), emergency response for wildlife or livestock encounters in the work area, and restricted/buffer zones.
- The Contractor will maintain a wildlife and livestock incident log recording sightings, injuries, mortalities, and corrective actions taken, reviewed periodically by the PMC/PMO.

(b) Habitat Protection, including Greenfield Bypass Sections

- Sensitive habitat features identified along the corridor and the approximately 12 km greenfield bypass, including Phragmites reed beds, canal margins will be clearly demarcated and, where works are adjacent, fenced to prevent inadvertent encroachment.
- No works or access outside the approved right-of-way and confirmed construction footprint will be permitted across all Lots 1–2 sections; this control is particularly critical in the greenfield bypass, where no pre-existing disturbed corridor constrains the work area informally.
- Vegetation clearance will be minimized and micro-sited to avoid higher-value habitat features (dense shelterbelt stands, mature orchard blocks, riparian margins) within the confirmed footprint, consistent with the avoidance measures above.

(c) Species Protection Protocols

- Pre-clearance surveys for active bird nests and bat roosts will be conducted in trees and bridge structures scheduled for removal or works, timed to avoid the bird breeding season where feasible; a qualified ecologist is authorized to halt works locally if protected species or active nests are encountered, until young

have fledged or an alternative resolution is agreed with the environmental authority.

- Targeted pre-earthworks fauna checks (burrows of reptiles, rodents, hedgehogs) will be conducted in the greenfield bypass sections prior to clearance, given the absence of any existing road-related disturbance baseline there; any fauna found within the work footprint will be allowed to disperse naturally before works proceed. The surveys will be conducted in orchards and shelterbelt habitat scheduled for clearance in the bypass and Lots 1–2 corridor prior to works; where individuals or active breeding have habitat, clearance in that sections will be timed outside the breeding period where feasible, or subject to micro-siting adjustment agreed with the ecologist.
- Bat roost checks at bridge structures (including the Zarafshan River crossing, Lot 1) will be conducted by a qualified ecologist prior to any works affecting the structure; where active roosts are confirmed, works will be scheduled outside sensitive roosting periods or subject to an exclusion/deterrent protocol agreed with the environmental authority before proceeding.
- Amphibian check at canal crossings will be conducted prior to works at hydraulic structures identified as Marsh Frog habitat, in addition to the breeding-season scheduling restriction; where breeding activity is confirmed outside the anticipated period, works at that crossing will be temporarily suspended pending ecologist advice.
- Active relocation of fauna encountered within the work footprint will only be carried out by the district environmental authority or another authorized/qualified ecologist, and only for species for which handling is legally permitted; Contractor personnel are prohibited from handling, chasing, feeding, or photographing wildlife at close range. Fauna that cannot disperse from the area unaided will be reported to the Contractor's Biodiversity Specialist for handover to the responsible authority.
- Where vegetation clearance in native/semi-natural habitat is unavoidable, native seed or propagule collection will be carried out by a trained biologist prior to clearance, in coordination with the district Environmental Protection Department and other competent agencies, for use in site restoration; collection and subsequent use will be limited to native species, with no introduction of non-native or ornamental species in ecologically sensitive areas.

(d) Fauna and Livestock Disturbance Management

- The Contractor will coordinate with local herders and mahalla representatives in advance of works in the bypass sections to confirm grazing/transit patterns and agree work scheduling and temporary access arrangements that minimize disruption to livestock movement.
- Temporary fencing or signage will be installed at active worksites in the bypass sections to prevent livestock straying into hazardous construction areas, particularly excavation and equipment-operation zones.

- Any livestock found within the active work footprint will not be handled or moved by Contractor personnel. The Contractor will contact the owner/herder or, where the owner cannot be identified, the relevant local authority.

(e) Invasive Species Management

- Vehicle wheel-washing will be conducted before vehicles enter or leave designated stockpile, laydown, and greenfield bypass work areas, to limit spread of Acroptilon repens and other invasive flora, in accordance with a designated stockpile and vehicle-cleaning procedure.
- Rehabilitated surfaces (temporary works areas, disturbed soils, batter slopes) will be monitored for invasive establishment during the post-construction monitoring period, with control measures applied where new infestations are identified.

(f) Restoration and Compensatory Replanting

- In accordance with Cabinet of Ministers Decree No. 464 of 22 August 2022, replacement planting of trees and shelterbelt vegetation at a ratio of 10 seedlings[43] for each tree or shrub removed, with seedlings of minimum age 5 years (trees) or 3 years (shrubs) and aggregate value not less than the value of the vegetation removed, grown and maintained for a minimum of two years, informed by the joint tree and asset inventory (~11,351 trees, Lots 1–2), prioritizing native and regionally appropriate species and reinstatement of connectivity at overpass and junction locations, consistent with Section 6.2.3. An estimated compensatory planting budget is provided in Section 9.6.
- Topsoil across all Lots 1–2 work areas, including the greenfield bypass sections will be stripped and stockpiled separately prior to earthworks and reused for restoration of temporary work areas and batter slopes, to support faster re-establishment of ground cover and reduce erosion risk on newly disturbed soils.

(g) Canal and Hydraulic Structure Design

- Crossing structures designed to maintain existing flow regime, bank vegetation, and aquatic connectivity, incorporating Nature-based Solutions (NbS) such as bio-engineered bank protection and native vegetation buffers in preference to hard engineering where technically feasible, avoiding channelization or realignment beyond the minimum required for the works.

(h) Water Quality and Dust Management

- Standard construction-phase erosion and sediment control and spill-prevention measures will be applied at all canal crossings.
- Regular watering of exposed soils and access tracks across Lots 1–2 work areas will be conducted to control dust, with particular attention to settlement sections

[43] Decree of the Cabinet of Ministers of Uzbekistan #464 dated 22.08.2022, Improvement of Procedure for Planting, Growing and Using Trees and Shrubs that are Out of State Forest Fund (Article 32b, Chapter 5), https://lex.uz/docs/6165732

along the rehabilitation corridor and to newly exposed soils in the greenfield bypass, with works suspended during high-wind conditions or dust storms.

(i) Monitoring and Reporting

- The PMC/PMO will conduct periodic (at minimum monthly during active clearance and earthworks) supervision of the measures above, including nest/roost check records, replanting survival rates, invasive species control effectiveness, and livestock/fauna incident logs, with findings reported through the ESMP's monitoring and reporting protocol.
- Post-construction ecological surveys will be conducted to confirm restoration success and inform any corrective replanting.

(j) Grievance Redress: The Project-level GRM will be accessible to herders and other community members for concerns related to livestock disruption, access restriction, or other biodiversity-management matters arising during construction in the bypass and rehabilitation sections.

Residual Impacts: Following implementation of the mitigation measures, residual significance for all identified impacts is expected to be reduced to Low. No Medium or High residual impacts are predicted:

- Vegetation and shelterbelt loss (rehabilitation corridor and greenfield bypass): residual significance is Low, reflecting compensatory replanting of trees and shelterbelt vegetation at the ratio and species-mix; full reinstatement of the connectivity function at overpass and junction locations will depend on the establishment period of replacement planting.
- Canal-margin and riparian vegetation/aquatic habitat (rehabilitation corridor and greenfield bypass): residual significance is Low, reflecting scheduling and design controls at crossings; localized, temporary disturbance to *Marsh Frog* breeding habitat and reed-bed vegetation may still occur during active works at individual crossings.
- Red Book avifauna (*Zarafshan Pheasant, Bukhara Tit*), rehabilitation corridor and greenfield bypass: residual significance is Low, reflecting pre-clearance nest checks and construction timing restrictions during the breeding season; the widespread availability of equivalent orchard and shelterbelt habitat outside the footprint further limits residual significance.
- General fauna disturbance and invasive species spread (rehabilitation corridor and greenfield bypass): residual significance is Low, reflecting the temporary nature of construction disturbance and the effectiveness of standard stockpile, vehicle-cleaning, and monitoring controls.
- Disturbance to desert fauna, rehabilitation corridor only: residual significance is Low, reflecting the temporary and localized nature of surface disturbance in the desert-transition sections and the limited extent of natural vegetation retained within the footprint.

6.3.8. Socioeconomics

Employment and Local Economic Opportunities: The project will undoubtedly generate additional job and market opportunities for the local population. Unskilled and semi-skilled construction jobs generated by the rehabilitation and bypass works will be made available to residents of the project-affected districts, reducing the need for workers to seek employment outside the area. Specific positions, such as flagging, catering, and light labor, will be prioritized for women, allowing them to earn additional household income while continuing to manage family responsibilities. The local population will also be able to sell agricultural produce and self-made goods to the contractor's workforce, generating supplementary income, and local enterprises may be engaged to provide equipment repair, transport, catering, and other paid services to the contractor. This impact is assessed as beneficial and of High significance along the rehabilitation corridor, given the density of existing roadside settlement and commercial activity, and of Medium to High significance along the greenfield bypass, reflecting its more limited existing roadside economic base.

Livelihood Impacts: Construction activity may temporarily disrupt agriculture-based and informal livelihoods along the corridor, distinct from the direct employment and economic opportunities described above. Dust deposition on adjacent crops, orchards, and vineyards; temporary restriction or interruption of irrigation flows during canal crossing works; and disruption to field access for farm labor and machinery during earthworks may temporarily reduce agricultural productivity and household income for affected farming households.

The population potentially affected by these temporary disruptions is broader than the 105 farming and dekhkan households subject to permanent land acquisition under the RAP (Section 6.2.2): landholders adjacent to, but not within, the confirmed acquisition footprint may also experience temporary income loss from dust deposition, shared irrigation interruption, or access restriction during the active construction period in their section, without being RAP-eligible for permanent displacement compensation. A quantified estimate of the number of non-RAP-eligible households likely to experience temporary disruption is not currently available and will be refined during detailed construction planning and Contractor mobilization, once specific work sequencing and laydown/access arrangements are confirmed for each Lot. These impacts are expected to be localized to the active work front at any given time and limited in duration to the construction period at that section (typically weeks to a few months, depending on the sequencing of works for the affected Lot), rather than persisting for the duration of the project.

In the greenfield bypass sections, construction activity and surface disturbance may temporarily disrupt movement and grazing patterns of domestic livestock and pastoralist/herder households using the bypass corridor, consistent with the fauna and livestock baseline described in Section 6.3.7.

Roadside vendors and small businesses operating informally along the existing carriageway may also experience temporary loss of custom and access disruption during construction; this is distinct from the 18 light movable commercial structures already identified for temporary dismantlement and reinstallation under the RAP (Section 6.2.2), and refers instead to businesses not otherwise captured in the RAP asset inventory that may nonetheless experience reduced footfall during active works nearby.

Temporary economic displacement of this kind is addressed through three complementary channels: (i) construction management measures, including advance notice, phased work scheduling, dust suppression, and maintained access, set out below; (ii) for RAP-eligible households, the livelihood restoration measures already committed under Section 6.2.2, including soil reinstatement on temporarily occupied land and restoration of irrigation access confirmed operational before construction proceeds in each section; and (iii) for landholders and businesses not eligible for RAP compensation but experiencing verifiable temporary loss (e.g., crop damage from dust, irrigation interruption, access-related business loss), a dedicated crop-damage and livelihood-disruption claims channel through the project GRM, distinct from the RAP entitlement matrix.

This impact is assessed as Medium significance prior to mitigation, reflecting the localized extent and short-term duration of disruption at any given work front, set against the moderate sensitivity of irrigation-dependent farming households, herders, and informal vendors along the corridor and bypass to even temporary interruption of water access, field access, or customer footfall.

Labor Influx and Associated Social Risks: Mobilization of a construction workforce, including non-local labor and workforce camps at bypass and Lot boundaries, may increase demand for local housing, water, and other services, contribute to localized price inflation for goods, and introduce social risks associated with interaction between an incoming workforce and host communities, including the following risks:

- Increased risk of infections, including water bone disease associated with poor sanitation of construction sites and worker accommodation facilities, sexually transmitted infections and HIV/AIDS, intestinal diseases due to poor standard of food hygiene in site catering facilities.
- Risks of gender-based violence and sexual harassment and abuse.
- Disturbance and tension between migrant workers and local communities.
- Pressure on public service and infrastructure.

This impact is assessed as medium significance prior to mitigation, reflecting the high sensitivity of host communities, particularly women and children, to labor influx-related risks, notwithstanding the temporary and localized nature of the workforce presence.

The table below provides characterization of the impact on socioeconomics during the construction phase.

Table 82: Socioeconomics during Construction Phase

Impact	Duration	Extent	Likelihood	Magnitude	Sensitivity	Significance
Employment and Local Economic Opportunities	Short-term	Local	Highly Likely	High	Medium	High (Beneficial)
Livelihood Impact (temporary disruption to agriculture, livestock, and informal livelihoods)	Short-term	Local	Likely	Medium	Medium	Medium
Labor Influx and Associated Social Risks (GBV/SEA, Service Demand)	Short-term	Local	Likely	Medium	High	Medium

Mitigation and management measures to be Implemented:

- Local hiring: The Contractor will give preference to local, unskilled and semi-skilled workers during recruitment and shall set and report against a specific target for women's employment in suitable roles.
- Local procurement: The Contractor will procure goods, services, and materials from local suppliers and vendors along the corridor and bypass wherever feasible.
- Irrigation continuity: The Contractor, in coordination with local water user associations and affected farmers, will schedule canal crossing works to avoid critical irrigation periods where feasible and shall provide temporary irrigation bypass arrangements whenever flows must be interrupted.
- Agricultural liaison and access management: The Contractor will give affected farming households advance notice of the timing and duration of works, maintain temporary access for field labor and machinery, and implement dust suppression measures adjacent to active cropland, orchards, and vineyards.
- Livestock movement: The Contractor will maintain designated livestock crossing points and coordinate directly with pastoralist households along the project corridor, including greenfield bypass, throughout construction.
- Support for informal vendors: The Contractor will give advance notice to roadside vendors and small businesses affected by the works and shall, where feasible, provide temporary relocation space to limit the loss of business days.
- Temporary disruption claims: Landholders and business operators not eligible for RAP compensation who experience verifiable temporary income loss due to construction activity (crop damage, irrigation interruption, access-related loss of custom) may submit a claim through the project GRM. The PMC/PMO will

establish a simple assessment procedure and response timeline for such claims, distinct from the RAP entitlement matrix process.

- Labor Management Plan: The Contractor will implement a Labor Management Plan, including a workforce Code of Conduct that prohibits GBV/SEA and exploitative behavior, worker accommodation and camp management standards, and a dedicated GBV/SEA referral pathway linked to the project grievance mechanism.
- Community awareness: The Contractor, supported by the PMC and PMO, will provide host communities with advance information on workforce presence, expected duration, and the Code of Conduct, and shall designate a community liaison point of contact.
- The PMC and PMO will track local employment and procurement figures, disaggregated by sex, and report on livelihood- and labor influx-related grievances in its semi-annual environmental and social monitoring reports.
- GRM will be used to record, investigate, and respond to complaints related to project activities during construction; affected receptors will have access to raise complaints, including women and vulnerable groups, with defined response timelines and a specific channel for GBV/SEA-related complaints. Livelihood-related claims (crop damage, irrigation interruption, access-related loss) are handled through the dedicated temporary disruption claims process.

6.3.9. Traffic and Transportation

Construction Traffic and Congestion: Mobilization of construction vehicles, delivery of materials and equipment, and spoil and borrow haulage will increase heavy vehicle movements along the existing M37 carriageway and at access points to the greenfield bypass, adding to baseline traffic and increasing congestion, particularly at junctions, interchanges, and through the settlement sections of the rehabilitation corridor (Kyzyltepa, Gijduvon, Vobkent, and Bukhara), including the Bukhara urban frontage and Ring Road connection (Lot 2). This impact is assessed as medium significance along the rehabilitation corridor, reflecting existing traffic density and the concentration of junction works, and Low significance along the greenfield bypass, where baseline traffic volumes are lower and works are more spatially dispersed.

Temporary Restricted Access to Properties, Businesses, and Agricultural Land: Widening works, junction reconstruction, and canal crossing works may temporarily restrict or delay access to homes, roadside businesses, schools, and agricultural land directly fronting the existing carriageway, particularly within the settlement sections of the rehabilitation corridor. Restricted access along the greenfield bypass is expected to be less severe, given the more limited number of existing access points, but may affect field access tracks and irrigation-related access crossed by the new alignment. This impact is assessed as medium significance along the rehabilitation corridor and Low significance along the greenfield bypass.

Traffic Safety Risks: Increased heavy vehicle movement, combined with active work zones, may increase the risk of traffic accidents involving pedestrians, cyclists, school children, and non-motorized and animal-drawn traffic, particularly where the rehabilitation corridor passes directly through settlement sections without dedicated pedestrian infrastructure. This impact is assessed as medium significance along the rehabilitation corridor's settlement sections, reflecting the high sensitivity of pedestrians and school children in these areas, and Low significance along the greenfield bypass, reflecting lower baseline pedestrian exposure.

Damage to Local and Secondary Roads Used for Diversions or Haulage: Use of local and secondary roads as temporary diversion routes or haul roads for spoil, borrow material, and construction supplies may accelerate pavement deterioration on roads not designed for sustained heavy vehicle loading. This impact is assessed as Low significance along both the rehabilitation corridor and the greenfield bypass, reflecting the temporary nature of haulage activity and the availability of repair and reinstatement measures.

Disruption to Public and Informal Transport Services: Temporary diversions, lane closures, and work zone restrictions may disrupt the routes, schedules, or stopping points of public and informal transport services (shared taxis, minibuses) operating along the rehabilitation corridor's settlement sections. This impact is assessed as Low significance, reflecting the localized and temporary nature of the disruption and the general flexibility of informal transport services to adapt routes.

The table below provides characterization of the impact on traffic and transportation during the construction phase.

Table 83: Traffic and Transportation during Construction Phase

Impact	Duration	Extent	Likelihood	Magnitude	Sensitivity	Significance
Construction Traffic and Congestion	Short-term	Local	Likely	Medium	Medium	Medium
Temporary Restricted Access to Properties, Businesses, and Agricultural Land	Short-term	Local	Likely	Medium	Medium	Medium
Traffic Safety Risks (Pedestrians, Cyclists, School Children, Non-Motorized Traffic)	Short-term	Local	Likely	Medium	High	Medium
Damage to Local/ Secondary Roads Used for Diversions or Haulage	Short-term	Local	Likely	Medium	Low	Low
Disruption to Public and Informal Transport Services	Short-term	Local	Likely	Low	Medium	Low

Mitigation and management measures to be Implemented:

- The Contractor will prepare and implement a traffic management plan, approved by the PMC and PMO prior to mobilization, covering construction traffic routing, staging of works at junctions and interchanges, signage, and flagging arrangements at active work zones.
- The Contractor, supported by the PMC and PMO, will provide advance public notification of planned traffic diversions, lane closures, and work zone schedules to affected communities, businesses, and transport operators along the corridor.
- The Contractor will maintain temporary access to homes, businesses, schools, and agricultural land throughout construction, including provision of temporary access tracks, plates, or ramps where the permanent access point is obstructed by works.
- The Contractor will restrict heavy vehicle movement through settlement sections during school arrival and departure times and peak market hours, where practicable, and shall implement reduced speed limits and signage in school zones and other sensitive locations.
- The Contractor will route haul traffic to avoid local and secondary roads not designed for sustained heavy vehicle loading where alternative routes are available and will undertake pre- and post-construction condition surveys of any local roads used for diversion or haulage, repairing any damage attributable to project traffic.
- The Contractor will provide clearly signed and, where necessary, physically separated temporary passage for pedestrians, cyclists, and non-motorized traffic through active work zones.
- The Contractor will coordinate with public and informal transport operators on any required route or stop changes and shall communicate these changes to the public in advance.
- The Contractor shall enforce driver training, journey management, and speed limits for all construction vehicles operating on public roads.
- The PMC and PMO will monitor traffic-related incidents and accidents during construction and report on traffic management performance and grievances in its semi-annual environmental and social monitoring reports.
- The PMO and PMC shall ensure the project grievance redress mechanism is accessible for traffic- and access-related complaints, with defined response timelines.

Residual Impacts: Following implementation of the traffic management plan and the mitigation measures, residual significance for all identified traffic and transportation impacts is expected to be reduced to Low along both the rehabilitation corridor and the greenfield bypass. No medium or high residual impacts are predicted.

6.3.10. Restricted Access

Disruption to normal movement during construction is the concern most often raised by surveyed households: 78.2% (183 of 234) cited it, and 94.4% of Lots 1–2 households use the M37 daily. 51.7% (121) expect difficulty reaching their homes, 43.2% (101) expect restricted access to homes, businesses and social facilities, 35.5% (83) to health facilities, 21.8% (51) to educational facilities, and 23.5% (55) expect business disruption. Access to markets, shops and irrigation was also raised in the consultations, and the Contractor committed to maintain temporary access to markets and shops and to provide a temporary irrigation bypass where flows must be interrupted.

Community Severance and Cross-Corridor Movement: Widening works, open trenches, and active work zones may temporarily divide settlements along the rehabilitation corridor, complicating pedestrian and vehicle movement between the two sides of the road in densely settled sections (Kyzyltepa, Gijduvon, Vobkent, and Bukhara). Along the greenfield bypass, the new alignment will temporarily obstruct informal footpaths and tracks used by farmers and herders to move between fields, grazing areas, and villages on either side of the corridor. This impact is assessed as medium significance along the rehabilitation corridor's settlement sections and medium significance along the greenfield bypass, reflecting the disruption of established cross-corridor movement patterns in both settings.

Access to Homes and Businesses: Widening, drainage and trench works and junction reconstruction may temporarily block or restrict access to the entrances, driveways and gates of homes and to the frontages, parking and delivery access of roadside businesses and vendors, particularly in the settlement sections of the rehabilitation corridor. 51.7% of households surveyed (121) expect difficulty reaching their homes and 23.5% (55) expect business disruption. This impact is assessed as medium significance along the rehabilitation corridor and Low along the greenfield bypass.

Access to Social Infrastructure and Essential Services: Construction activity at junctions and along the carriageway may temporarily restrict or complicate access to schools, health facilities, mosques and other religious sites, and markets located along or crossing the rehabilitation corridor, particularly during active work hours. This impact is assessed as medium significance along the rehabilitation corridor, reflecting the concentration of social infrastructure fronting the existing carriageway, and Low significance along the greenfield bypass, which has a more limited concentration of such facilities directly on the new alignment.

Access to Agricultural Land and Irrigation Infrastructure: Canal crossing works along the rehabilitation corridor and construction of the new bypass alignment through actively cultivated cropland may temporarily block field access tracks, footbridges, and irrigation control points relied upon for day-to-day farming activity. This impact is assessed as medium significance along both the rehabilitation corridor, at canal



crossings and field frontages, and the greenfield bypass, where the new alignment bisects previously contiguous farmland.

Access for Emergency and Service Vehicles: Temporary road closures, diversions, and narrowed carriageway sections during construction may delay emergency vehicle response (ambulance, fire, police) and routine service delivery (waste collection, utility maintenance) in affected settlement sections of the rehabilitation corridor. This impact is assessed as medium significance along the rehabilitation corridor's settlement sections, reflecting the potential consequence of delayed emergency response, and Low significance along the greenfield bypass, reflecting its lower baseline settlement density.

Access for Vulnerable Groups: Elderly persons, persons with disabilities, pregnant women, and young children may face disproportionate difficulty navigating temporary diversions, unpaved detours, or unsignaled crossing points where dedicated pedestrian infrastructure is not provided. This impact is assessed as medium significance along both the rehabilitation corridor and the greenfield bypass, reflecting the high sensitivity of these groups regardless of corridor type.

The table below provides characterization of the restricted access impact during the construction phase.

Table 84: Restricted Access during Construction Phase

Impact	Duration	Extent	Likelihood	Magnitude	Sensitivity	Significance
Community Severance	Short-term	Local	Likely	Medium	Medium	Medium
Homes and Businesses Access	Short-term	Local	Likely	Medium	Medium	Medium
Social Infrastructure Access	Short-term	Local	Likely	Medium	Medium	Medium
Agricultural Land Access	Short-term	Local	Likely	Medium	Medium	Medium
Emergency Vehicle Access	Short-term	Local	Likely	Medium	Medium	Medium
Vulnerable Group Access	Short-term	Local	Likely	Medium	Medium	Medium

Mitigation and management measures to be implemented:

Access will be maintained or restored in four ways. First, civil works are staged in short sections so that no household, business, field or facility is fully cut off. Second, temporary access (ramps, plates, footbridges, tracks and signed diversions) is provided wherever permanent access is obstructed. Third, affected people and facilities are told in advance, and a named contact and the project GRM are available to them. Fourth, every affected access is reinstated to at least its pre-project condition and signed off before the Contractor leaves the section. Table 83 sets out how this applies to each receptor.

Table 85: Access Maintenance and Restoration by Receptor (Construction Phase)

Receptor	Access at risk	How access is maintained during works	If access is interrupted	Notice and coordination	At completion
Homes	Entrances, driveways and gates of homes fronting the carriageway in the settlement sections (Kyzyltepa, Gijduvon, Vobkent, Bukhara), during widening, drainage and trench works and junction reconstruction.	▪ Works are staged in short sections, so that no household or plot is fully cut off. ▪ Temporary ramps or steel plates are placed over open trenches at each entrance, and a safe, marked pedestrian passage stays open at all times. ▪ Vehicle access is kept open or restored [by the end of each working day] where an entrance must be blocked temporarily.	▪ A signed alternative access route is agreed with the household before works start. ▪ Extra help for elderly persons, persons with disabilities, pregnant women and young children: ramps, handrails, lighting and assisted crossing.	▪ Each affected household is notified at least 3 days before works start, with the expected duration and the alternative route (door to door, mahalla committee, notice boards). ▪ A named community liaison contact is given.	▪ Driveways, gates, footpaths and drainage at each entrance are reinstated to at least their pre-project condition, checked against the pre-construction condition record and signed off by the household.
Businesses and roadside vendors	Shopfronts, workshops, roadside stalls, parking and delivery access along settlement sections and at junctions; access to markets.	▪ Customer and delivery access stays open during trading hours. ▪ Works next to shopfronts are scheduled outside market days and peak trading hours where practicable. ▪ Temporary ramps or plates and clear signs ("open during works").	▪ Where access cannot be kept open, temporary relocation space is offered to informal vendors where feasible, and alternative delivery arrangements are agreed. ▪ Verified temporary income loss is handled through the temporary disruption claims process (Section 6.3.8), separate from the RAP.	▪ Advance notice to each affected business (at least 3 days) with duration. ▪ Coordination with market management and the mahalla; this follows the commitment given at Vobkent that access to markets and shops will be maintained.	▪ Frontage access is reinstated and confirmed with the business owner.
Agricultural land, field access and livestock	Field access tracks, farm entrances and footbridges along the corridor; paths across farmland where the bypass bisects it; livestock routes.	▪ Temporary field access tracks or crossings are provided at every point where a field entrance or track is cut, for labor and machinery. ▪ Continuity of access is prioritized during critical agricultural periods, identified with district authorities, the mahalla and farmers. ▪ Designated livestock crossing points are kept open and coordinated with herders.	▪ An alternative track is agreed with the farmer, and works at a field entrance are scheduled outside sowing and harvest peaks where feasible.	▪ Farmers are told the timing and duration of works in advance through the mahalla and khokimiyat; a joint site meeting is held for each affected field access.	▪ Field access tracks, footbridges and crossings are reinstated or replaced as designed, and confirmed with the farmer and the mahalla.



Receptor	Access at risk	How access is maintained during works	If access is interrupted	Notice and coordination	At completion
Irrigation infrastructure	Canal crossings, control gates, offtakes, canal maintenance tracks and drainage.	▪ Crossing works are scheduled outside critical irrigation periods where feasible, agreed with the water user associations. ▪ A temporary irrigation bypass (pipes or a temporary channel) is in place before any flow is interrupted. ▪ Access to control gates and offtakes stays open for water users and canal operators.	▪ Temporary alternative water supply arrangements are provided where users are affected. ▪ Interruptions are limited to the agreed windows.	▪ Water user associations and affected farmers are told the timing and duration of any interruption in advance, with a joint schedule.	▪ Canals, gates, culverts and offtakes are restored to at least their pre-project capacity and function before flows resume, with sign-off by the water user association.
Schools	Gates and approaches of schools fronting or near the works; children's walking routes.	▪ Every school is listed in the access register with a named contact. ▪ Works and heavy vehicle movements near school gates are avoided during opening and closing periods (windows agreed with each school). ▪ A safe, separated, lit and signed pedestrian route to each gate stays open at all times, with school-zone signs and reduced speed, and marshals at peak times where needed.	▪ A temporary alternative entrance or route is agreed with the school administration in advance.	▪ Written notice to the school administration before any activity affecting access, with a weekly look-ahead of the works.	▪ Gates, crossings and footpaths are reinstated, with the safe crossings provided in the design.
Health facilities	Clinics, hospitals and pharmacies fronting or reached through the works; ambulance routes.	▪ Every health facility is listed in the access register. ▪ Pedestrian and vehicle access, including ambulance access, stays open at all times. ▪ No work blocks an entrance during opening hours without a signed alternative; priority routes are agreed with the facility and emergency services.	▪ Where an entrance must be closed, an alternative signed entrance is agreed beforehand.	▪ The facility is told of any planned closure at least 3 days ahead, with a named contact. ▪ Complaints about health facility access are handled on an expedited basis through the project GRM.	▪ Access is reinstated and verified with the facility.

Receptor	Access at risk	How access is maintained during works	If access is interrupted	Notice and coordination	At completion
Community services	Mosques and religious sites, markets, emergency services (ambulance, fire, police), waste collection, utility maintenance, public and informal transport routes and stops.	▪ Works near mosques and markets are scheduled around prayer times and market days. ▪ Priority access routes through work zones are agreed with local authorities and emergency service providers. ▪ Service vehicle and waste collection routes are kept open or alternatives agreed; transport operators are consulted on any route or stop change.	▪ A signed diversion is announced in advance to operators and the public, and emergency services are notified of closures.	▪ Advance notice of closures to authorities and emergency services; public announcements on notice boards, local media and Telegram channels.	▪ Bus stops, access points and service routes are reinstated.

Management measures to be Implemented:

- The Contractor will maintain at least one safe, clearly marked pedestrian and vehicle crossing point at regular intervals through settlement sections and at bypass farmland crossings, ensuring no household or farming plot is fully cut off from the opposite side of the corridor during works.
- The Contractor will install temporary footbridges or designated crossing points over open trenches, canal works, and other excavations to preserve pedestrian and field access at active work locations.
- The Contractor, in coordination with the PMC, will identify all schools, health facilities, mosques, and markets fronting or crossing the works and will adjust work scheduling and sequencing to minimize access disruption during school hours, market days, and prayer times.
- The Contractor will coordinate with local authorities and emergency service providers on maintaining priority access routes through work zones and will give advance notice of planned closures to enable emergency and service route planning.
- The Contractor, in coordination with district and mahalla (local community) authorities and affected farmers, will maintain or provide alternative access to agricultural land, irrigation control points, and field access tracks affected by works, prioritizing continuity of access during critical agricultural periods.
- The Contractor will give particular attention to the needs of vulnerable groups in the design of temporary access and detour routes, including ramps, handrails, adequate lighting, and assisted crossing arrangements where needed.
- The Contractor, supported by the PMC, will notify affected households, businesses, and community facilities at least 3 days before any planned access restriction, including expected duration and alternative routes.
- The PMC and PMO will review and approve the ARP for each Lot prior to authorizing commencement of physical works and will monitor implementation against the ARP's commitments through routine site supervision.
- The Contractor will record the pre-construction condition of each affected access point and will reinstate it to at least its pre-project condition, with the owner's or user's sign-off, before demobilizing from each section.
- The PMO and PMC will ensure the project GRM includes a specific channel for access-related complaints, with expedited response procedures for cases involving emergency service or essential facility access.
- The PMC will verify implementation on site each week, and the PMO will report the access indicators in the monitoring plan in the semi-annual environmental and social monitoring report.

Given the frequency with which access restoration concerns were raised in stakeholder consultations and the household survey, and the range of access impacts identified above, the Contractor will prepare an Access Restoration Plan (ARP) for each Lot as a Lot-specific sub-plan of the SSESMP/C-ESMP, and will submit it with the Traffic

Management Plan for review by the PMC and approval by the PMO before physical works start. The ARP will address at minimum:

- an access register of all schools, health facilities, mosques and other religious sites, markets, major business frontages, farm accesses, irrigation control points, canal crossings and livestock crossings along the Lot, by chainage, updated monthly;
- work-front access plans stating, for each work front, which access is affected, how it is maintained or replaced, for how long, who has been notified, and who is responsible on site;
- minimum standards for temporary access: no household or field fully cut off; access that is safe, passable in all weather, usable by persons with disabilities, lit where used at night, and signed in Uzbek; including residential and commercial access and temporary crossing infrastructure (ramps, plates, footbridges, designated crossing points) over open trenches, canal works, and other excavations;
- access to schools, health facilities, mosques, and markets, including work scheduling adjustments around school hours, market days, and prayer times; school access and school-zone safety measures;
- emergency and essential service vehicle access, coordinated with local authorities and emergency service providers, including a protocol that keeps priority routes open at all times;
- agricultural land, irrigation control point, livestock crossing, and field access track continuity, coordinated with district and mahalla authorities, water user associations, and affected farmers, consistent with the irrigation continuity and agricultural liaison measures, including critical periods, temporary bypass arrangements, notice of interruptions, and reinstatement sign-off;
- provisions specific to vulnerable groups (elderly persons, persons with disabilities, pregnant women, young children), including ramps, handrails, lighting, and assisted crossing arrangements, and direct contact with households identified by the mahalla or the RAP as needing assistance;
- advance notification procedures to affected households, businesses, and community facilities at least 3 days before any planned restriction, including expected duration and alternative routes, a weekly look-ahead of works shared with mahallas, schools, health facilities and water user associations, and a named community liaison contact;
- an access channel in the project GRM with expedited handling of complaints about emergency service or essential facility access, and the temporary disruption claims process;
- weekly inspection by the Contractor, monthly reporting to the PMC, the indicators in the monitoring plan, a pre-construction condition record of each access point, and a reinstatement inspection with the owner or user before demobilization from each section.



The PMC and PMO will review and approve the ARP for each Lot prior to authorizing commencement of physical works and will monitor implementation against the ARP's commitments through routine site supervision.

Residual Impacts: Following implementation of the mitigation measures, residual significance for all identified restricted access impacts is expected to be reduced to low along both the rehabilitation corridor and the greenfield bypass. This depends on the ARP being approved before physical works start in each Lot and implemented as set out above. No medium or high residual impacts are predicted for the construction phase.

6.3.11. Community Health and Safety

Community Exposure to Construction Site Hazards: Active work zones, open excavations, stockpiled materials, and construction equipment located immediately adjacent to settlements may expose community members, particularly children, to the risk of injury if sites are not adequately secured. This risk is more pronounced along the rehabilitation corridor, where the existing carriageway abuts dense settlement in Lots 1–2, than along the greenfield bypass, where work areas are generally more removed from habitation. This impact is assessed as medium significance along the rehabilitation corridor and Low significance along the greenfield bypass.

Children's Safety and School Access: Construction activity along the rehabilitation corridor, where several schools front or lie in close proximity to the existing carriageway, presents a distinct and elevated risk to children during school opening and closing periods, when pedestrian volumes of children walking to and from school peak, often coinciding with unrelated general traffic and construction vehicle movements. Risks include children crossing active work zones or mixed traffic without dedicated safe crossings, heavy vehicle movement near school gates during arrival/dismissal periods, and reduced driver visibility around construction equipment, stockpiles, and diversions near school frontages. This impact is assessed as Medium-High significance along the rehabilitation corridor's settlement sections, reflecting the concentration of schools identified in Section 5.6 and the household survey, and Low significance along the greenfield bypass, which has a more limited concentration of school facilities directly on the new alignment.

Dust, Noise, and Vibration Exposure to Nearby Communities: Construction dust, noise, and vibration may also affect community health and wellbeing directly, including nuisance, respiratory irritation, and sleep disturbance for households fronting the corridor. This impact is assessed as medium significance along the rehabilitation corridor's settlement sections, reflecting higher settlement density, and Low significance along the greenfield bypass, reflecting its more agricultural, lower-density setting.

Communicable Disease Transmission Risk: Mobilization of a construction workforce, including non-local labor with regular interaction with host communities, may increase

the risk of transmission of communicable diseases, including respiratory infections and sexually transmitted infections, particularly in smaller settlements with limited access to healthcare services. This impact is assessed as medium significance along both the rehabilitation corridor and the greenfield bypass.

Water Supply and Quality Impacts to Communities: Works at canal crossings and hydraulic structures may temporarily interrupt or reduce water flows relied upon by nearby communities for domestic and agricultural use and may increase turbidity or contamination risk if sediment and erosion control measures are inadequate. This impact is assessed as medium significance along the rehabilitation corridor, reflecting the greater density of canal-dependent households, and Low significance along the greenfield bypass, notwithstanding the canal-convergence zone at Sections 9–10.

Hazardous Materials and Waste Exposure Risk: Storage and handling of fuels, oils, chemicals, and, where encountered during demolition, asbestos-containing materials present a risk of accidental exposure to nearby communities if not properly contained and managed. This impact is assessed as medium significance along both the rehabilitation corridor and the greenfield bypass, reflecting the potential severity of exposure notwithstanding the reduced likelihood associated with proper handling protocols.

Vector-Borne Disease Risk from Standing Water: Borrow pits, drainage works, and workforce camps may create standing water conducive to mosquito breeding, increasing local vector-borne and nuisance-insect risk for nearby communities, particularly in irrigation-dense sections. This impact is assessed as Low significance along both the rehabilitation corridor and the greenfield bypass, reflecting the generally arid regional climate.

The table below provides characterization of the impact on community health and safety during the construction phase.

Table 86: Community Health and Safety during Construction Phase

Impact	Duration	Extent	Likelihood	Magnitude	Sensitivity	Significance
Community Health and Safety	Short-term	Local	Likely	Medium	Medium	Medium
Children's Safety and School Access	Short-term	Local	Likely	High	High	Medium-High

Mitigation and management measures to be Implemented:

- The Contractor will secure all active work sites, open excavations, and materials and equipment storage areas with fencing, signage, and, where appropriate, security personnel, particularly in settlement sections, to prevent unauthorized public access.

- The Contractor will implement dust suppression (water spraying, vehicle speed restrictions) and noise and vibration control measures (equipment maintenance, use of quieter equipment or barriers where feasible, restricted working hours near settlements).
- The Contractor will implement a communicable disease awareness and prevention program for the workforce, including health screening on mobilization and provision of on-site health services, coordinated with local health authorities and community awareness activities.
- The Contractor will coordinate with communities and local water authorities on the scheduling of canal crossing works, provide temporary alternative water supply arrangements where domestic or agricultural water access is interrupted, and implement sediment and erosion control measures to protect water quality.
- The Contractor will store and handle fuels, chemicals, and other hazardous materials, including secondary containment, spill kits, and trained personnel, and will follow the project's asbestos management protocol should asbestos-containing materials be encountered during demolition.
- The Contractor will manage borrow pits, drainage works, and workforce camps to minimize standing water, through grading, backfilling, or larvicide application where necessary, to reduce vector breeding habitat.
- The Contractor, supported by the PMC, will provide advance community awareness on construction site hazards, work schedules, and emergency contact procedures.
- The Contractor will implement school safety measures, including:
  - The Contractor, in coordination with the PMC and local school administrations, will identify all schools fronting or within 200 m of active work zones along the rehabilitation corridor prior to commencement of works in that section.
  - Dedicated, clearly marked and supervised pedestrian crossings will be established at identified school frontages, staffed by a designated traffic marshal/flagger during school opening and closing periods.
  - Temporary pedestrian routes, physically separated from active work zones and vehicle movements, will be provided and maintained where the existing school approach route is affected by works.
  - School-zone signage (reduced speed limits, "children crossing," construction warning signage) will be installed in advance of and throughout the active work period at each identified school frontage.
  - Heavy vehicle movements (materials delivery, plant mobilization) will be restricted within school zones during defined school opening and closing windows, to be confirmed with each school administration; where unavoidable, movements will be escorted and coordinated with school staff.
  - The Contractor will coordinate directly with school administrations on work scheduling, providing advance notice of any planned activity affecting school access, and will establish a named point of contact for school-related concerns, linked to the project GRM.



  - These measures will be documented as a school safety component of the Access Restoration Plan and the Traffic Management Plan, ensuring coordinated implementation rather than a standalone, unintegrated commitment.
- The PMO and PMC will ensure the project grievance redress mechanism is accessible for health and safety-related community complaints, with expedited response procedures for urgent safety concerns.
- The PMO and PMC will monitor community health and safety incidents and complaints during construction and report on these, together with mitigation performance, in its semi-annual environmental and social monitoring reports.

Residual Impacts: Following implementation of the mitigation measures, residual significance for all identified community health and safety impacts is expected to be reduced to low along both the rehabilitation corridor and the greenfield bypass, reflecting site security and community awareness measures, water supply continuity and quality protection, communicable disease prevention, hazardous materials management, and vector control. No medium or high residual impacts are predicted for the construction phase.

6.3.12. Occupational Health and Safety

Construction-Related Accidents and Injuries: Excavation, working at height (bridge and canal crossing works), and operation of heavy construction equipment expose the workforce to the risk of falls, being struck by moving equipment or materials, and excavation collapse. This impact is assessed as medium significance, reflecting the potentially severe consequence of such incidents notwithstanding standard construction safety practice.

Occupational Exposure to Hazardous Materials, Dust, and Noise: Workers handling fuels, bituminous materials, and chemicals, and, where encountered during demolition, asbestos-containing materials, together with prolonged exposure to construction dust and equipment noise, present a risk of occupational illness if exposure is not controlled. This impact is assessed as medium significance.

Heat Stress and Extreme Temperature Exposure: The project area's highly continental climate, with strong seasonal temperature extremes, exposes outdoor construction workers to heat stress risk during summer months. This impact is assessed as medium significance, reflecting the potential severity of heat-related illness in the absence of adequate controls.

Traffic-Related Occupational Accidents: Workers operating vehicles and equipment within active work zones located along the existing carriageway are exposed to the risk of collision with public traffic and other site vehicles. This impact is assessed as medium significance, consistent with the traffic conditions described in Section 6.3.9.

The table below provides characterization of the impact on occupational health and safety during construction phase.

Table 87: Occupational Health and Safety during Construction Phase

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

Detailed occupational health and safety management requirements, including worker recruitment, grievance mechanisms, working hours, and code of conduct provisions, are set out in the project's standalone Labor Management Plan (LMP) prepared as part of this ESIA. The following construction-specific measures apply in addition to the LMP:

- The Contractor will implement an OHS plan, consistent with the LMP, including mandatory safety induction and task-specific training for all workers prior to site access and provision of appropriate personal protective equipment (PPE).
- The Contractor will implement safe systems of work, including permit-to-work procedures, for excavation, working at height, and heavy equipment operation.
- The Contractor will provide task-appropriate PPE, including respiratory and hearing protection, and shall monitor workforce exposure to dust, noise, and hazardous materials, applying the project's hazardous materials and asbestos management protocols.
- The Contractor will adjust work schedules during periods of extreme heat, provide shaded rest areas, and ensure adequate drinking water and rest breaks for outdoor workers.
- The Contractor will manage on-site vehicle and equipment movement using trained banksmen or spotters, speed limits, and separation of pedestrian workers from vehicle movement, coordinated with the traffic management plan.
- The Contractor will maintain on-site first aid capacity and emergency response procedures, with medical referral pathways for work-related injuries, as specified in the LMP.
- The PMC will monitor OHS performance, incidents, and near-misses, and report on these in its semi-annual environmental and social monitoring reports, in coordination with LMP reporting requirements.

Residual Impacts: Following implementation of the LMP, OHS plan, and the mitigation measures, residual significance for all identified occupational health and safety impacts is expected to be reduced to low. No medium or high residual impacts are predicted for the construction phase.

6.3.13. Cultural Heritage

Disturbance to Cemeteries: Two cemeteries were identified within the greenfield bypass Section 10 construction footprint. Construction activity in their vicinity carries a risk of

physical disturbance to graves and burial grounds, which hold significant cultural and spiritual value for local communities, if not carefully avoided. This impact is assessed as medium significance, reflecting the high sensitivity of the receptor, notwithstanding that avoidance is expected to be achievable through micro-siting.

Chance Archaeological Finds: The M37 corridor traverses Bukhara Province, a region of high archaeological sensitivity given its long settlement history within the historic Zarafshan River oasis. Earthworks, particularly deep excavation for bridge foundations, canal crossings, and cut sections, carry a risk of encountering previously unrecorded archaeological remains. This impact is assessed as medium significance along both the rehabilitation corridor and the greenfield bypass, reflecting the potential importance of any finds notwithstanding the low likelihood of encounter at any specific location.

Disturbance to Local Religious and Community Heritage Sites: Widening and junction works along the rehabilitation corridor may pass near small-scale local heritage assets, such as mosques, shrines, and other community-valued sites fronting the existing carriageway in settlement sections. The greenfield bypass, traversing predominantly agricultural land, presents a lower likelihood of encountering such assets. This impact is assessed as medium significance along the rehabilitation corridor and Low significance along the greenfield bypass.

Vibration and Physical Disturbance Risk to Build Heritage near Historic Bukhara: The Bukhara Ring Road connection (Lot 2) passes near the historic core of Bukhara city, inscribed as a UNESCO World Heritage Site, where structures may be sensitive to construction vibration, groundwater changes, or dust deposition. This impact is assessed as medium significance, reflecting the high sensitivity of the receptor notwithstanding the localized nature of works and their distance from the core historic zone.

The table below provides characterization of the construction-phase impacts on cultural heritage.

Table 88: Cultural Heritage during Construction Phase

Impact	Duration	Extent	Likelihood	Magnitude	Sensitivity	Significance
Cultural Heritage	Permanent	Site-specific	Unlikely	Medium	Medium	Medium

Mitigation and management measures to be Implemented:

- The Contractor will micro-site works, laydown areas, and access tracks to avoid the two cemeteries identified in bypass Section 10, maintaining a demarcated buffer zone around these sites throughout construction.
- The Contractor will implement a chance-find procedure, including immediate work stoppage in the affected area, notification of the PMC and relevant cultural heritage authority, and assessment by a qualified archaeologist prior to



resuming works, should previously unrecorded archaeological material be encountered.

- The Contractor, supported by the PMC, will identify and record any local religious or community heritage sites fronting or crossing the works prior to construction and will adjust the works footprint, sequencing, or provide protective measures to avoid or minimize disturbance.
- The Contractor will consult with local religious and community leaders and mahalla authorities on appropriate protocols for works conducted near mosques, cemeteries, or other sensitive community sites.
- The Contractor will conduct a condition survey of built heritage structures within the zone of influence of vibration-generating works near the Bukhara Ring Road connection (Lot 2) prior to construction and will monitor vibration levels against agreed thresholds during works.
- The Contractor will implement dust suppression and, where warranted by the condition survey, vibration-limiting construction techniques near sensitive heritage structures.
- The PMO and PMC will ensure the project grievance redress mechanism is accessible for cultural heritage-related concerns raised by communities or heritage authorities.
- The PMC will report on cultural heritage chance finds, heritage site protection measures, and any related grievances in its semi-annual environmental and social monitoring reports.

Residual Impacts: Following implementation of the chance-find procedure and the mitigation measures, residual significance for all identified cultural heritage impacts is expected to be reduced to Low, reflecting avoidance of the two identified cemeteries, protection of local religious and community heritage sites, and condition survey and vibration monitoring near historic Bukhara. Residual risk associated with chance archaeological finds cannot be entirely eliminated given the region's archaeological sensitivity but is managed through the chance-find procedure should previously unrecorded material be encountered.

6.3.14. Site Restoration/Reinstatement

Incomplete Reinstatement of Temporary Works Areas: Borrow pits, quarries, laydown areas, workforce camps, and temporary haul roads occupy agricultural and other land for the duration of construction. If not reinstated to pre-construction or agreed condition on demobilization, these areas may result in long-term land degradation and loss of productive use. This impact is assessed as medium significance, reflecting the number and extent of temporary works areas across the 69 km corridor.

Residual Soil Compaction and Loss of Agricultural Productivity: Repeated movement of construction vehicles and equipment across temporary works areas and access routes on agricultural land may compact and degrade soil structure, reducing productivity if topsoil is not appropriately stripped, stored, and reinstated. This impact is assessed as



medium significance, given the predominantly agricultural land use of temporary works areas along both the rehabilitation corridor and the greenfield bypass.

Unreinstated Excavations and Borrow Pits: Borrow pits, quarries, and other excavations not required for permanent project features present a safety hazard (unstable slopes, open pits) and may collect standing water conducive to vector breeding (Section 6.3.11) if left unbackfilled or ungraded following use. This impact is assessed as medium significance.

Delayed Handback of Temporarily Acquired Land: Delays in completing reinstatement and returning temporarily acquired land to landowners may prolong the loss of agricultural income and livelihood disruption addressed in Section 6.3.8. This impact is assessed as Low significance, reflecting its temporary nature provided reinstatement is completed within a reasonable timeframe.

Residual Construction Waste and Debris: Surplus materials, packaging, and construction debris left within temporary works areas or along the corridor following demobilization may create a visual, environmental, and safety nuisance. This impact is assessed as Low significance.

The table below provides characterization of the impacts associated with site restoration and reinstatement.

Table 89: Site Restoration/Reinstatement during Construction Phase

Impact	Duration	Extent	Likelihood	Magnitude	Sensitivity	Significance
Site Restoration/ Reinstatement	Long-term	Local	Likely	Medium	Medium	Medium

Mitigation and management measures to be Implemented:

- The Contractor will prepare and implement a site restoration and reinstatement plan, approved by the PMC and PMO prior to demobilization, covering all temporary works areas, including borrow pits, quarries, laydown areas, workforce camps, and haul roads.
- The Contractor will reinstate temporary works areas on agricultural land to pre-construction condition or better, including topsoil stripping, storage, and replacement, decompaction, and, where applicable, replanting or reseeding, prior to handback to landowners.
- The Contractor will backfill, grade, or otherwise stabilize borrow pits, quarries, and other excavations not required for permanent project features, in accordance with the approved reinstatement plan, to eliminate safety hazards and standing water.

- The Contractor will promptly hand back temporarily acquired land to landowners or communities upon completion of reinstatement, coordinating timing with affected households through the RAP process.
- The Contractor will remove all construction waste, debris, and surplus materials from temporary works areas and the corridor and dispose of them in accordance with the project waste management plan.
- The Contractor will reinstate compensatory tree and shelterbelt planting commitments at agreed locations as part of site restoration.
- The PMC will inspect and certify satisfactory completion of site restoration and reinstatement for each temporary works area prior to final acceptance and demobilization sign-off.
- The PMC will monitor and report on site restoration and reinstatement progress and any related grievances in its semi-annual environmental and social monitoring reports.

Residual Impacts: Following implementation of the site restoration and reinstatement plan and the mitigation measures, residual significance for all identified site restoration impacts is expected to be reduced to Low. No medium or high residual impacts are predicted.

6.3.15. Summary of Impacts during Construction

Table 90: Summary of Impacts during Construction

Impact	Duration	Extent	Likelihood	Magnitude	Sensitivity	Significance
Landscape and Topography: Rehabilitation Corridor (Lots 1-2)	Short-term	Local	Likely	Low	Low	Negligible
Landscape and Topography: Greenfield Bypass and Ring-Road Connection (Lots 2)	Short-term	Local	Likely	Medium	High	High
Soil Disturbance, Compaction, and Contamination Risk: Rehabilitation Corridor (Lots 1-2)	Short-term	Local	Likely	Low	Medium	Low
Soil Disturbance, Compaction, and Contamination Risk: Greenfield Bypass and Ring-Road Connection (Lot 2)	Short-term	Local	Likely	Medium	Medium	Medium
Water Contamination	Short-term	Local	Likely	Low	Medium	Low

Impact	Duration	Extent	Likelihood	Magnitude	Sensitivity	Significance
Air Quality (Dust/Emissions)	Short term	Local	Likely	Medium	Medium	Medium
Noise: Rehabilitation Corridor and Greenfield Bypass	Short-term	Local	Likely	High	High	High
Vibration: Rehabilitation Corridor and Greenfield Bypass	Short-term	Local	Likely	Low	Medium	Low
Hazardous Waste	Short-term	Local	Likely	Medium	Medium	Medium
Non-Hazardous Solid Waste	Short-term	Local	Likely	Medium	Medium	Medium
Vegetation and Tree Loss	Long-term	Site-specific	Likely	Medium	Medium	Medium
Disturbance to Canal-Margin/Riparian Vegetation and Aquatic Habitat	Short-term	Site-specific	Likely	Medium	Medium	Medium
Disturbance to Red Book Avifauna	Short-term	Local	Likely	Low	Medium	Medium
Spread of Invasive Species	Long-term	Local	Likely	Medium	Low	Low
Disturbance to Desert Fauna	Short-term	Local	Likely	Low	Low	Low
Employment and Local Economic Opportunities	Short-term	Local	Highly Likely	High	Medium	High (Beneficial)
Livelihood Impact	Short-term	Local	Likely	Medium	Medium	Medium
Labor Influx and Associated Social Risks (GBV/SEA, Service Demand)	Short-term	Local	Likely	Medium	High	Medium
Construction Traffic and Congestion	Short-term	Local	Likely	Medium	Medium	Medium
Temporary Restricted Access to Properties, Businesses, and Agricultural Land	Short-term	Local	Likely	Medium	Medium	Medium
Traffic Safety Risks (Pedestrians,	Short-term	Local	Likely	Medium	High	Medium

Impact	Duration	Extent	Likelihood	Magnitude	Sensitivity	Significance
Cyclists, School Children, Non-Motorized Traffic)						
Damage to Local/ Secondary Roads Used for Diversions or Haulage	Short-term	Local	Likely	Medium	Low	Low
Disruption to Public and Informal Transport Services	Short-term	Local	Likely	Low	Medium	Low
Community Severance	Short-term	Local	Likely	Medium	Medium	Medium
Social Infrastructure Access	Short-term	Local	Likely	Medium	Medium	Medium
Agricultural Land Access	Short-term	Local	Likely	Medium	Medium	Medium
Emergency Vehicle Access	Short-term	Local	Likely	Medium	Medium	Medium
Vulnerable Group Access	Short-term	Local	Likely	Medium	Medium	Medium
Community Health and Safety	Short-term	Local	Likely	Medium	Medium	Medium
Children's Safety and School Access	Short-term	Local	Likely	High	High	Medium-High
Occupational Health and Safety	Short-term	Local	Likely	Medium	Medium	Medium
Site Restoration/ Reinstatement	Long-term	Local	Likely	Medium	Medium	Medium

All impacts assessed across the sections above are negative in nature, except for the beneficial employment and local economic opportunities generated by the project and can be effectively managed through sound construction practices and proactive mitigation. This involves securing and managing work sites responsibly, controlling dust, noise, and vibration, properly handling hazardous materials and waste, and restoring all temporary works areas to productive condition on completion. Applying these measures consistently across the rehabilitation corridor and the greenfield bypass will reduce residual impacts on biodiversity, communities, and cultural heritage to low significance.

Regarding the beneficial economic effects, the M37 rehabilitation and bypass will generate substantial local employment and income-generating opportunities,

including for women, through construction jobs, local procurement, and increased trade along the corridor. Improved road infrastructure will also support more efficient movement of goods and people, reduce transport costs, and strengthen access to markets and services for the project-affected districts. Sustaining these benefits, while safeguarding livelihoods, community health and safety, and cultural heritage, will depend on the full and consistent implementation of the mitigation measures set out in each section above.

6.4. Anticipated Potential Impacts during Operation Phase

Air Quality: Once construction ends, dust impacts largely cease; the main operational-phase effect is a modest increase in vehicle emissions (NOx, PM) from higher traffic volumes and speeds, partly offset by improved traffic flow compared to the pre-project road. This is managed through routine pavement maintenance, enforcement of vehicle emission standards, and retention of shelterbelt vegetation along the corridor to aid dispersion.

Noise: Higher traffic volumes and speeds will increase roadside noise levels, particularly in settlement sections and near sensitive receptors (schools, health facilities) along the rehabilitation corridor. This is managed through speed management, retention of shelterbelt vegetation as a noise buffer, and, where periodic monitoring identifies exceedances near sensitive receptors, targeted noise barriers.

Biological Environment: During operation, the primary risks are habitat fragmentation and vehicle-collision risk associated with the approximately 12 km greenfield bypass and new junctions, which introduce a paved barrier through habitat with no pre-existing road. Consistent with the construction-phase baseline, fauna present in the bypass sections consists of domestic livestock (grazing/transiting stock) and semi-desert fauna. Collision risk is therefore primarily a road safety and livestock-loss concern rather than a species-conservation concern, alongside reduced ecological connectivity for smaller fauna at overpass/junction locations until shelterbelt and compensatory replanting matures. These are managed through livestock-crossing signage and speed controls at known grazing/transit points, fauna-passable culvert design at existing drainage and connectivity points, and continued monitoring of replanted vegetation.

Socioeconomics: The operational phase brings sustained beneficial effects, reduced transport costs, better market access, and stronger trade for the project districts, alongside a minor risk of unregulated roadside ("ribbon") development. This is managed through coordination with local land use authorities on roadside development control.

Traffic and Transportation: Higher traffic speeds and volumes improve regional connectivity but may increase accident severity if not addressed at design stage. This is managed through permanent safety features (signage, crossings, speed management) built into the final road design and routine maintenance.

Restricted Access: The widened/rebuilt road becomes a permanent physical barrier, particularly in settlement sections and where the bypass crosses farmland. This is managed through pedestrian crossings, underpasses, and access points incorporated into the final design.

Community Health and Safety: Increased traffic brings ongoing noise and vehicle emissions exposure for roadside communities, plus safety risk for pedestrians at higher speeds. This is managed through speed management, signage, and pedestrian infrastructure near schools and settlements.

Occupational Health and Safety: Risk is limited to routine maintenance crews exposed to traffic while working on the live road. This is managed through standard traffic management and PPE protocols during maintenance activities.

Cultural Heritage: No significant operational-phase impact is anticipated once construction-phase avoidance measures are implemented; residual risk is limited to long-term traffic vibration near historic Bukhara. This is managed through periodic condition monitoring of nearby heritage structures, if warranted.

Site Restoration/Reinstatement: Not applicable during operation, this is a construction-phase and demobilization commitment only.

The table below provides characterization of the impacts during operation phase.

Table 91: Impacts Characterization during Operation

Impact	Duration	Extent	Likelihood	Magnitude	Sensitivity	Significance
Air Quality	Long-term	Local	Likely	Low	Low	Low
Noise	Long-term	Local	Likely	Medium	Medium	Medium
Biological Environment	Long-term	Local	Likely	Low	Low	Low
Socioeconomics	Long-term	Regional	Highly Likely	High	Medium	High (Beneficial)
Traffic and Transportation	Long-term	Local	Likely	Low	Medium	Low
Restricted Access	Permanent	Local	Likely	Medium	Medium	Medium
Community Health and Safety	Long-term	Local	Likely	Low	Medium	Low
Occupational Health and Safety	Long-term	Site-specific	Unlikely	Low	Medium	Low
Cultural Heritage	Long-term	Site-specific	Unlikely	Low	High	Low

Mitigation and management measures to be Implemented:

Table 92: Mitigation Measures during Operation

Topic	Anticipated Impact	Mitigation Measures
Biological Environment	Habitat fragmentation and vehicle-collision risk associated with the greenfield bypass and new junctions, primarily affecting livestock and semi-desert fauna; reduced connectivity for smaller fauna until shelterbelt and compensatory replanting matures.	▪ Livestock-crossing warning signage and speed controls at identified grazing or transit points along the bypass; ▪ fauna-passable culvert design retained at existing drainage or connectivity points for small mammals and reptiles; ▪ coordination with local herders or mahalla on livestock crossing patterns and timing; ▪ continued monitoring of replanted and compensatory vegetation.
Socioeconomics	Beneficial: reduced transport costs, better market access, stronger trade for the project districts. Adverse: risk of unregulated roadside development.	Coordination with local land use authorities on roadside development control.
Traffic and Transportation	Improved regional connectivity from higher speeds/volumes; potential increase in accident severity if not addressed at design stage.	Permanent safety features (signage, crossings, speed management) in final design; routine maintenance.
Restricted Access	Permanent physical barrier from the widened/rebuilt road, particularly in settlement sections and where the bypass crosses farmland.	Pedestrian crossings, underpasses, and access points incorporated into final design.
Community Health and Safety	Ongoing noise and vehicle emissions exposure for roadside communities; safety risk for pedestrians at higher speeds.	Speed management, signage, and pedestrian infrastructure near schools and settlements.
Occupational Health and Safety	Limited to routine maintenance crews exposed to live traffic during maintenance activities.	Standard traffic management and PPE protocols during maintenance.
Cultural Heritage	No significant impact anticipated once construction-phase avoidance measures are implemented; residual risk limited to long-term traffic vibration near historic Bukhara.	Periodic condition monitoring of nearby heritage structures, if warranted.
Site Restoration/ Reinstatement	Not applicable during operation.	Construction-phase and demobilization commitment only.
Air Quality	Modest increase in vehicle emissions (NOx, PM) from higher traffic volumes/speeds, partly offset by improved traffic flow versus the pre-project road.	Routine pavement maintenance; enforcement of vehicle emission standards; retention of shelterbelt vegetation to aid dispersion.
Noise	Increased roadside noise from higher traffic volumes/speeds, particularly in	Speed management; retention of shelterbelt vegetation as a noise buffer;

Topic	Anticipated Impact	Mitigation Measures
	settlement sections and near sensitive receptors.	targeted noise barriers if monitoring identifies exceedances.

Residual Impacts: Following implementation of the operational-phase mitigation measures described above, residual impacts across most topics are reduced to Low or Negligible significance, including air quality, biological environment, traffic and transportation, community health and safety, occupational health and safety, and cultural heritage. Restricted access remains a medium residual impact, as the road itself constitutes a permanent physical barrier that crossings and underpasses reduce but do not remove; and noise remains a medium residual impact in settlement sections closest to the corridor, pending targeted noise barriers should monitoring identify exceedances. The beneficial socioeconomic impact is expected to persist at high significance for the life of the project. Site restoration/reinstatement is not applicable during operation. Overall, the project is not expected to result in significant adverse residual impacts during the operational phase.

7. CONSULTATION AND DISCLOSURE

This chapter outlines the objectives and findings from the initial public and stakeholder consultations conducted during the development of the ESIA. Additionally, it specifies the requirements for consultations that will take place during the project implementation phase and describes the necessary disclosure requirements.

7.1. Objectives of Consultations

Stakeholder consultation (or public consultation) during the environmental and social assessment process of development projects is increasingly considered an important requirement that increases the authenticity and acceptability of the assessment itself but, more importantly, can enhance the quality of decision-making. Stakeholder consultation and participation during the various stages of the M37 project helps improve decision-making and ultimately supports more sustainable project outcomes.

Stakeholder consultation is a two-way process. For stakeholders, the consultation process is an opportunity to obtain project information, to understand its potential impacts, to raise issues and concerns, and to ask questions. For the project proponent, the consultation process offers an opportunity to understand stakeholders and their concerns about the project, their needs and aspirations, and their suggestions that can potentially shape the project and its design. Listening to stakeholders' concerns and feedback can be a valuable source of information that improves project design and outcomes and helps the project proponent identify and manage external risks. It can also form the basis for future collaboration and partnerships throughout implementation.

Specific objectives of the consultation process initiated during preparation of the present ESIA for the M37 rehabilitation corridor and greenfield bypass are listed below:

- sharing information with stakeholders on the proposed project and the key findings of the ESIA;
- obtaining stakeholders' feedback on the project, perceived impacts, and preferred mitigation measures, and collecting information on the environmental, ecological, and socioeconomic baseline conditions across the project districts (Kyzyltepa, Gijduvon, Vobkent, and Bukhara);
- understanding stakeholders' concerns regarding various aspects of the project, including the existing road condition, construction works, and the potential impacts of construction-related activities along both the rehabilitation corridor and the greenfield bypass;
- developing and maintaining communication links between the project proponent and stakeholders, including communities and businesses along the corridor and bypass;

- ensuring that the views and concerns of stakeholders are incorporated into project design and implementation as much as possible, with the objective of reducing or offsetting negative impacts and enhancing the benefits of the project;
- managing expectations and misconceptions related to the project;
- obtaining local knowledge about the communities living along the project corridor and bypass;
- interacting with the project-affected population and other stakeholders for the collection of primary and secondary data relating to project activities;
- engaging stakeholders to help maximize the benefits of the project for local communities.

7.2. Stakeholder Identification

Stakeholders are considered to be individuals or organizations which have an interest in the proposed project or knowledge that would provide insight into issues or affect decision making related to the proposed project.

7.3. Primary Stakeholders

The primary stakeholders (also called direct stakeholders) are the grass-root stakeholders, such as project-affected persons and the general public, including women, residing in the project area. These are the people who are directly exposed to the project's impacts, though in some cases they may not be receiving any direct benefit from the project.

The communities living along the M37 road, particularly along the 69 km stretch encompassing the rehabilitation corridor (Lots 1–2) and the greenfield bypass around Bukhara city, are the key primary stakeholders for the proposed project. Other primary stakeholders of the project include citizens of Bukhara Province and Kyzyltepa district of Navoi Province, particularly people living in Kyzyltepa, Gijduvon, Vobkent, Bukhara districts, as well as Bukhara city.

7.4. Secondary Stakeholders

The secondary stakeholders (also called institutional stakeholders) are the people, departments, institutions, and/or organizations that may not be directly affected by the project, however, they may influence the project and its design. They include the project proponent, other concerned departments that may have a role during various phases of the project, regulatory agencies, other relevant departments, non-governmental organizations (NGOs), the broader interested communities, including academia and journalists, and the general public.

The institutional stakeholders of the proposed project include:

- Ministry of Transport, including the Committee for Roads;
- Republican Road Fund, which is part of the organizational structure of the Roads Committee under the Ministry of Transport of the Republic of Uzbekistan, performing the role of executive body for implementation of investment projects with participation of international financial institutions, as well as foreign governmental financial organizations in the field of road facilities;
- The Ministry of Investment and Foreign Trade and the Ministry of Finance of the Republic of Uzbekistan, in terms of carrying out the feasibility study of the project and preparing opinions within their competence;
- Management and staff of the Djeiran Ecocenter (Bukhara "Jeyran" Nature Nursery), given its location within the wider area of influence of the M37 corridor and its relevance to the project's biodiversity baseline;
- Contractors/performers of works on rehabilitation of the M37 road and construction of the greenfield bypass, and implementation of technical support of the project, to be determined by competitive bidding in accordance with the established procedure;
- Bukhara region and Navoi region khokimiyats and their district departments, including Kyzyltepa, Gijduvon, Vobkent, Bukhara districts;
- Bukhara region Women's Committee, Oila Markazi, and other women's NGOs.
- Bukhara Regional Department of Ecology and Climate Change
- Bukhara regional Department of Uzbek Cultural Agency
- Department of Land Resources and State Cadaster of Bukhara region.

7.5. Consultations carried out During the ESIA

During June-July, the ESIA team held public consultations in the Bukhara and Navoi Provinces. The views and comments from all stakeholders, including vulnerable groups such as women, low-income families, and students, were documented and included in the report to ensure their concerns are addressed in the project's design and implementation. The table below provides a summary of the views and concerns shared by stakeholders.

Table 93: Summary of Public Consultations

Date and Location	Stakeholder consulted	Stakeholder concerns	Responses
01.06.2026, Kyzyltepa District Khokimiyat	FGD, 21 women participants	Stakeholders expressed interest in the project and inquired about when construction would begin. They also noted that many drivers do not adhere to the posted speed limit, resulting in accidents, and mentioned the lack of	The ESIA team explained that construction is expected to begin following approval of the project by the AIIB and the Government of Uzbekistan; the existing stage is preparation of ESIA. The team also noted that a traffic management plan will be implemented by the contractors during construction, including speed control, signage, and flagging at active work

Date and Location	Stakeholder consulted	Stakeholder concerns	Responses
		controlled pedestrian crossings.	zones. The team noted that the final road design includes dedicated pedestrian crossings, signages, and other safety infrastructure, and that these will be prioritized near schools and settlement areas.
01.06.2026, Gijduvon District Khokimiyat	FGD, 22 women participants	Participants asked whether women would have opportunities for employment during construction and raised concerns about dust and noise affecting households and roadside shops, as well as the safety of children walking to school along the corridor.	The ESIA team explained that the project will include a local hiring target with specific provisions for women's employment (e.g., flagging, catering, light labor) and that the Contractor will be required to implement dust suppression and noise control measures. The team confirmed that school-zone safety measures, including signage and restricted vehicle speeds during school hours, will be included in the traffic management plan.
02.06.2026, Vobkent District Khokimiyat	FGD, 21 women participants	Stakeholders asked about the compensation process for land and trees that would be affected by road widening, and the expected timing of compensation payments relative to construction.	The ESIA team explained that a Resettlement Action Plan has been prepared for the project, under which affected households will be compensated at full replacement cost for land, trees, and structures prior to the start of works in the affected area, and that a grievance mechanism will be available should households have concerns about the compensation process.
02.06.2026, Bukhara District Khokimiyat	FGD, 23 women participants	Participants raised concerns about potential disruption to irrigation water flows during canal crossing works and the effect this could have on household water use and crop irrigation. Stakeholders living in the proposed bypass sections asked how livestock grazing and movement routes would be maintained during construction.	The ESIA team explained that the Contractor will coordinate with local water user associations on the scheduling of canal crossing works, avoid critical irrigation periods where feasible, and provide temporary irrigation bypass arrangements where flows must be interrupted. The ESIA team explained that designated livestock crossing points will be maintained throughout construction in coordination with mahalla committees and people having livestock; pedestrian safety measures, including signed pedestrian and livestock crossings, will be provided in affected settlement areas.
02.06.2026, Vobkent District Khokimiyat	FGD, 21 women participants	Participants raised concerns about the presence of construction workers from outside the community, including personal safety and security for women and children, and asked how access to local markets and shops would be maintained during works.	The ESIA team explained that the Contractor will implement a Labor Management Plan, including a workforce Code of Conduct and a dedicated referral pathway for any concerns related to worker conduct, and that the project grievance mechanism will include a specific channel for such complaints. The team confirmed that temporary access to markets and shops will be maintained throughout construction.

Date and Location	Stakeholder consulted	Stakeholder concerns	Responses
01.07.2026, State Committee for Roads Bukhara Region Automobile Roads Head Office	Consultation with two men participants	Discussed noise levels, accidents, signages, operation and maintenance issues	The ESIA team confirmed that anticipated noise impacts and mitigation measures, including speed management and, where warranted by monitoring, noise barriers, are addressed in the ESIA, and that the final road design incorporates permanent safety features such as signage and pedestrian crossings. The team noted that operation and maintenance responsibilities, including road condition monitoring, will transfer to the relevant road authority following construction completion, consistent with established procedure.
01.07.2026, Department of Ecology and Climate Change of Bukhara Region	Consultation with two men participants	Discussed substituting Cabinet of Ministers Decree No. 541 on environmental impact assessment by new regulation to be come into effect on 14 August 2026.	The ESIA team confirmed awareness of the forthcoming regulation and committed to reviewing the ESIA and associated permitting documentation against the new requirements once in effect, and to coordinating with the Department on any additional disclosure or approval steps that may be required as a result.
29.06.2026, Kyzyltepa District Khokimiyat	Consultation with two men participants	Participants asked about compensation arrangements for roadside businesses and vendors affected by widening works, and about traffic management during construction.	The ESIA team explained that economically displaced roadside businesses are addressed under the RAP, including livelihood restoration support, and that the traffic management plan will maintain access and manage construction traffic through the district center.
29.06.2026, Gijduvon District Khokimiyat	FGD, 7 men participants	Participants asked about opportunities for local contractors and suppliers to be engaged on the project and raised concerns about potential damage to local roads used for construction access or haulage.	The ESIA team explained that the Contractor will be encouraged to procure goods and services from local suppliers where feasible, and that any local roads used for diversion or haulage will be surveyed before and after construction, with any damage attributable to project traffic repaired.
29.06.2026, Vobkent District Khokimiyat	Consultation with two men participants	Participants asked about the works planned at the Zarafshan River crossing and potential effects on the river and adjacent land uses.	The ESIA team explained that works at the Zarafshan River crossing will be micro-sited to avoid the river's riparian margin where feasible, scheduled to minimize disruption, and subject to water quality management measures during construction.
02.07.2026, Bukhara District Khokimiyat	FGD, 4 men participants	Participants raised concerns about construction traffic effects on the Bukhara Ring Road connection and asked whether works would affect areas close to the historic city center.	The ESIA team confirmed that a traffic management plan will be implemented for works at the Ring Road connection, and that a condition survey and vibration monitoring of built heritage structures near the historic core will be undertaken prior to and during construction as a precautionary measure.

Table 94: Consultation Commitments Register

#	Date / Location	Concern Raised	Commitment Made	Responsible Party	Implementation Instrument	Timeframe	Implementation Status
1	01.06.2026, Kyzyltepa District Khokimiyat	Driver speeding, accidents, lack of controlled pedestrian crossings	Contractor Traffic Management Plan will include speed control, signage, flagging; final design includes dedicated pedestrian crossings prioritized near schools/settlements	Contractor / PMO / PMC	Traffic Management Plan; Design (permanent safety features)	Traffic Management Plan: pre-construction per Lot; Design: incorporated at detailed design	Committed – design stage
2	01.06.2026, Gijduvon District Khokimiyat	Women's employment opportunities; dust/noise affecting households and shops; child safety walking to school	Local hiring target with women's employment provisions; Contractor dust/noise control; school-zone signage and restricted speeds in Traffic Management Plan	Contractor / PMO / PMC	Labor Management Plan (LMP); ESMP (dust/noise); Traffic Management Plan; School Safety Measures in Section 6.3.11	Throughout construction	Committed – to be monitored via semi-annual reporting
3	02.06.2026, Vobkent District Khokimiyat	Compensation process and timing for land/trees	Compensation at full replacement cost prior to works; GRM available	PMO / RAP Implementation Consultant	Resettlement Action Plan (RAP)	Prior to construction in each affected section	Committed - RAP disclosed
4	02.06.2026, Bukhara District Khokimiyat	Irrigation flow disruption during canal crossing works	Coordination with water user associations; avoid critical irrigation periods; temporary irrigation bypass where needed	Contractor / PMO	Section 6.3.8 (Irrigation continuity)	Throughout canal-crossing works	Committed
5	02.06.2026, Bukhara District Khokimiyat	Livestock grazing/movement routes in bypass sections	Designated livestock crossing points maintained; coordination with mahalla committees and livestock owners; signed pedestrian/livestock crossings	Contractor / PMO	Sections 6.3.7 and 6.3.8 (Livestock movement, bypass-specific)	Throughout construction in bypass sections	Committed

#	Date / Location	Concern Raised	Commitment Made	Responsible Party	Implementation Instrument	Timeframe	Implementation Status
6	02.06.2026, Vobkent District Khokimiyat	Safety/security concerns re: outside construction workers; market/shop access	Labor Management Plan with Code of Conduct and referral pathway; GRM channel for worker-conduct complaints; market access maintained	Contractor / PMO / PMC	LMP; GRM; Access Restoration Plan (ARP, Section 6.3.10)	Throughout construction	Committed
7	01.07.2026, State Committee for Roads, Bukhara Region Automobile Roads Head Office	Noise levels, accidents, signage, operation and maintenance issues	Noise mitigation per ESIA; permanent safety features in design; O&M transfers to road authority per established procedure	PMO / Road Authority	ESMP (construction-phase); Design (operation-phase); O&M handover procedure	Operation phase / post-construction handover	Committed
8	01.07.2026, Department of Ecology and Climate Change of Bukhara Region	Forthcoming substitution of Cabinet of Ministers Decree No. 541 (EIA regulation), effective August 2026	PMO to review permitting documentation against requirements of Cabinet of Ministers Decree #234, dated 11.05.2026, including preparation of national EIA and engagement of certified/licensed environmental specialist	PMO / ESIA Team	National EIA prepared in accordance with Cabinet of Ministers Decree #234, dated 11.05.2026 by certified/licensed environmental specialist	Upon regulation entry into effect (August 2026)	Committed
9	29.06.2026, Kyzyltepa District Khokimiyat	Compensation for roadside businesses/vendors; construction traffic management	Economic displacement addressed under RAP incl. livelihood restoration; Traffic Management Plan maintains access through district center	PMO / RAP Implementation Consultant / Contractor	RAP; Traffic Management Plan	Prior to works (RAP); throughout construction (Traffic Management Plan)	Committed
10	29.06.2026, Gijduvon District Khokimiyat	Local contractor/supplier opportunities; potential damage to local roads used	Contractor encouraged to use local suppliers; local roads surveyed before/after construction, damage repaired	Contractor / PMO	LMP (local procurement); - road condition survey/repair procedure	Throughout construction; survey pre/post construction	Committed (procurement)

#	Date / Location	Concern Raised	Commitment Made	Responsible Party	Implementation Instrument	Timeframe	Implementation Status
		for construction access or haulage					
11	29.06.2026, Vobkent District Khokimiyat	Works at Zarafshan River crossing and potential effects on the river and adjacent land uses	Micro-siting to avoid riparian margin; scheduling to minimize disruption; water quality management	Contractor / PMO	Section 6.3.7 (Avoidance)	During works at river crossing	Committed
12	02.07.2026, Bukhara District Khokimiyat	Construction traffic effects on the Bukhara Ring Road connection; effects near historic city center	Traffic Management Plan for Ring Road connection works; condition survey and vibration monitoring of heritage structures pre/during construction	Contractor / PMO / Cultural Heritage Specialist	Traffic Management Plan; Cultural Heritage Management Plan	Pre-construction (baseline survey); throughout construction (monitoring)	Committed

In addition, a total of 234 respondents were interviewed during the household survey, covering the entire project corridor, including both the rehabilitation corridor (Lots 1–2) and the greenfield bypass, across all four project-affected districts (Kyzyltepa, Gijduvon, Vobkent, Bukhara). This sample provides a representative basis for characterizing the socioeconomic conditions and perspectives of communities living along the M37 corridor.

The Consultation Commitments Register above will be maintained and updated throughout project implementation as a living document, cross-referenced with the SEP, which sets out the ongoing consultation, disclosure, and grievance-handling procedures through which commitment status will continue to be tracked and reported to affected communities.

How Stakeholder Feedback Has Shaped the Project

Stakeholder feedback has influenced the Project in six areas: design, mitigation measures, traffic management, road safety, livelihood restoration and RAP implementation arrangements. Table traces the main concerns raised in the focus group discussions, the institutional consultations and the household survey (234 households) to what changed and where it is reflected in this ESIA, the ESMP, the RAP, the LMP and the GAP. Table 90 records what was said and answered at each meeting, and Table 91 records the commitments made.

Not every change resulted from consultation alone. The selection of the optimized design followed the Bank's request to reduce land take and vegetation loss (Section 2.4.2); it also responds to the concern about tree removal raised in the household survey. Engineering design has been completed for Lots 1 and 2, so feedback received now can be reflected in detailed design refinements, in the Contractor's plans and in the ESMP. Concerns that have not yet been reflected are listed after the table, with the response.

Table 95: Influence of Stakeholder Concerns on the Project

Area of influence	What stakeholders raised (source)	How it has influenced the Project	Where reflected	Status
Project design	Kyzyltepa women's FGD (01.06.2026): drivers ignore speed limits and there are no controlled pedestrian crossings. Household survey: lack of lighting (46.2%, 108 households), absence of pedestrian crossings (41.5%, 97), heavy traffic (42.3%, 99).	The final design includes dedicated pedestrian crossings, signage and other safety infrastructure, prioritized near schools and settlements, and road lighting at intersections, settlement sections, pedestrian crossings and bus stop areas. The survey results were used to prioritize pedestrian crossings, speed control, street lighting and bus shelters as core components of the rehabilitation.	Sections 2.4.1, 5.4.2.8, 6.2.1 and 6.4; ESMP planning-phase measures; GAP Activity 4	In design (underpasses and traffic lights)

Area of influence	What stakeholders raised (source)	How it has influenced the Project	Where reflected	Status
Project design	Bukhara women's FGD (02.06.2026): how livestock grazing and movement routes will be maintained.	The design includes livestock crossings and controlled access on the bypass. During works, designated livestock crossing points are kept open and coordinated with mahalla committees and livestock owners.	Sections 2.4.1, 6.3.8 and 6.3.10 (Table 83); Table 91, item 5	In design; committed during works
Project design	Vobkent men's consultation (29.06.2026): works at the Zarafshan River crossing and effects on the river and adjacent land.	Works at the crossing will be micro-sited to avoid the riparian margin where feasible, scheduled to minimize disruption, and subject to water quality management.	Section 6.3.7; Table 91, item 11	Committed (during works)
Project design	Household survey: tree removal was the second most prominent concern during rehabilitation (41.5%, 97 households).	Option 3, the optimized design, reduced the trees affected in Lots 1–2 to about 11,351, which is 62% fewer than Option 1 and 43% fewer than Option 2, with lower land take. The optimization followed the Bank's design review request to avoid over-design; it also responds to this concern. Compensatory replanting is required for trees removed.	Sections 2.4.2 and 6.2.3; ESMP	In design; replanting in ESMP
Mitigation measures	Gijduvon women's FGD (01.06.2026): dust and noise affecting households and roadside shops. Household survey: dust 33.3% (78 households), vibration 30.3% (71).	The Contractor must implement dust suppression and noise control (restricted hours for noisy equipment), with noise barriers where monitoring warrants them, and ambient air and noise monitoring throughout construction.	Sections 6.3.4 and 6.3.5; ESMP; Monitoring Plan	In ESMP
Mitigation measures	Bukhara women's FGD (02.06.2026): disruption to irrigation water flows at canal crossings and its effect on household water use and crops.	Canal crossing works are scheduled with the water user associations to avoid critical irrigation periods where feasible, with a temporary irrigation bypass before any flow is interrupted, and restoration with the association's sign-off.	Sections 6.3.8 and 6.3.10 (Table 83); Table 91, item 4	In ESMP
Mitigation measures	Vobkent women's FGD (02.06.2026): presence of construction workers from outside the community and the safety of women and children.	A Labor Management Plan with a workforce Code of Conduct and a referral pathway for worker-conduct concerns, a project GRM channel for such complaints, and women's employment and facilities measures in the GAP.	Section 6.3.8; Chapter 8 (GBV/SEA/SH); LMP; GAP; Table 91, item 6	In ESMP, LMP and GAP

Area of influence	What stakeholders raised (source)	How it has influenced the Project	Where reflected	Status
Mitigation measures	Bukhara men's consultation (02.07.2026): effects on the Ring Road connection and on areas close to the historic city center. Gijduvon men (29.06.2026): damage to local roads used for diversion or haulage.	A condition survey and vibration monitoring of built heritage structures near the historic core before and during construction; pre- and post-construction condition surveys of local roads used for diversion or haulage, with damage attributable to project traffic repaired.	Sections 6.3.13 and 6.3.9; Table 91, items 10 and 12	Committed (before and during works)
Traffic management	Household survey: disruption to normal movement (78.2%, 183 households), difficulty reaching homes (51.7%, 121). Kyzyltepa men (29.06.2026): traffic management during construction. Vobkent women (02.06.2026): access to local markets and shops.	A Traffic Management Plan approved before mobilization (routing, staging of works at junctions, signage, flagging, advance notice of diversions, a Ring Road plan), access maintained through the district center, and an Access Restoration Plan for each Lot covering homes, businesses, schools, health facilities, farms and irrigation (Table 83).	Sections 6.3.9 and 6.3.10; ESMP; Table 91, items 6, 9 and 12	In ESMP
Road safety	Gijduvon women's FGD (01.06.2026): safety of children walking to school. Household survey: vehicle speed during works (22.2%, 52 households), risks to children near sites (20.1%, 47), access to educational facilities (21.8%, 51). State Committee for Roads (01.07.2026): accidents, signage, operation and maintenance.	School-zone signage, reduced speeds and heavy vehicle restrictions during school hours, a named school contact, road safety training for schools and communities (GAP Activity 6), permanent signs and crossings in operation, and transfer of maintenance and road condition monitoring to the road authority.	Sections 6.3.11 and 6.4; GAP Activity 6; Table 91, items 1, 2 and 7	In ESMP and GAP

Area of influence	What stakeholders raised (source)	How it has influenced the Project	Where reflected	Status
Livelihood restoration	Kyzyltepa men's consultation (29.06.2026): compensation for roadside businesses and vendors affected by widening. Household survey: business disruption expected by 23.5% (55 households).	Economic displacement is addressed under the RAP, including livelihood restoration support (the Income Restoration and Rehabilitation Program); the traffic plan and Access Restoration Plan keep customer access; temporary relocation space is offered to informal vendors where feasible; and people outside the RAP can claim verified temporary income loss through the project GRM.	Sections 6.2.2, 6.3.8 and 6.3.10; RAP; Table 91, item 9	In RAP and ESMP
Livelihood restoration	Gijduvon women's FGD (01.06.2026): whether women will have work opportunities. Gijduvon men (29.06.2026): opportunities for local contractors and suppliers.	A local hiring target with women's employment provisions, the minimum shares of women by job category in the GAP, and encouragement of local procurement.	Section 6.3.8; LMP; GAP Activities 3 and 7; Table 91, items 2 and 10	In LMP and GAP
RAP implementation arrangements	Vobkent women's FGD (02.06.2026): the compensation process for land and trees, and when payments will be made relative to construction.	Compensation at full replacement cost for land, trees and structures is paid before works start in each affected section, the RAP is disclosed, and the GRM is available for compensation concerns.	Section 6.2.2; RAP; Table 91, item 3	In RAP
RAP implementation arrangements	Household survey: barriers to women's access to compensation payments reported by 18.4% of households.	Compensation is paid jointly to both spouses or the woman is notified directly of the amount and date; women in RAP households are consulted individually; de facto female-headed households are identified; and women can lodge compensation complaints without the household head.	GAP Activities 17 and 18; RAP	In RAP and GAP

Keeping the Consultation Record Up to Date

- Tracking commitments: Each commitment in Table 91 names a responsible party, an implementing instrument and a timeframe, and is tracked in the Consultation Commitments Tracking Matrix in the SEP.
- Status of commitment: The status of each commitment is recorded as incorporated in design, incorporated in the ESMP, incorporated in the RAP, committed (during works), to be confirmed, or not adopted (with the reason). Table 91 also shows the area of the Project each commitment has influenced.

- Feedback to stakeholders: Progress is reported back to communities through community meetings and notice boards (Section 7.6). Consultation will continue until the design refinements, the RAP and the Contractor's plans are finalized, and new commitments will be added to Table 94.

7.6. Consultations during Project Implementation

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 project area with a specific focus on women empowerment. Visits will be undertaken in all the project 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 project risks, impacts and mitigation measures and will involve appropriate consideration of the views and responses by the PMC and PMO.

A framework has been developed for the consultations to be carried out during the project implementation.

Table 96: Consultation and Participation Framework during Project Implementation

Description	Target Stakeholder	Period	Responsibility
Public awareness campaigns, scoping sessions to share the ESIA, ESMP, and RAP with PAPs, communities, and other stakeholders. *Location: project districts (Kyzyltepa, Gijduvon, Vobkent, Bukhara) and Bukhara city.*	Communities within the project area, general public, and line departments, agencies	Commencing with preparation of the ESIA, RAP; continued throughout project preparation	PMO, Design Institute, PMC
Consultations with communities during ESIA, ESMP, and RAP implementation. *Location: project districts (Kyzyltepa, Gijduvon, Vobkent, Bukhara) and Bukhara city.*	Communities along the rehabilitation corridor and greenfield bypass	Before commencement of construction activities	PMO, PMC
Establishment of the Grievance Redress Mechanism (GRM) and Grievance Redress Committees (GRCs). *Location: project districts (Kyzyltepa, Gijduvon, Vobkent, Bukhara) and Bukhara city.*	Communities along the project corridor	Before commencement of construction activities	PMO
Grievance redress. *Location: project districts (Kyzyltepa, Gijduvon, Vobkent, Bukhara) and Bukhara city.*	PMO staff; consultants; relevant line departments; and communities (as needed)	Throughout project implementation	PMO, PMC
Informal consultations and discussions.	Communities along the project corridor	Construction stage	PMO, PMC; Contractor

Description	Target Stakeholder	Period	Responsibility
Location: project districts (Kyzyltepa, Gijduvon, Vobkent, Bukhara) and Bukhara city.			
Consultations with communities during internal environmental and social monitoring. *Location: project districts (Kyzyltepa, Gijduvon, Vobkent, Bukhara) and Bukhara city.*	Communities along the project corridor	Construction stage	PMO, PMC; Contractor
Monthly meetings at project sites. *Location: District departments of Committee for Roads offices along the corridor.*	PMO; consultants, Contractor, and communities	Construction stage	PMO, PMC; Contractor
Training of the Contractor, sub-contractors, and their workers on ESMP requirements, the workforce Code of Conduct, and the worker grievance mechanism.	Contractor, sub-contractors, service providers, suppliers, and their workers	Prior to and during construction mobilization	PMO, PMC; Contractor
Consultation workshops to review ESIA, ESMP, RAP implementation, outstanding issues and grievances, and community views and concerns, and actions needed to address them. *Location: District departments of Committee for Roads offices.*	Communities along the project corridor; relevant line departments; relevant NGOs	Six-months during the construction phase	PMO, PMC
Consultations with communities relating to leftover or outstanding tasks. *Location: District departments/ Committee for Roads offices.*	Communities along the project corridor	After completion of construction works	PMO, PMC
Consultations with communities during site visits by the Financier's review missions. *Location: Rural and urban communities and district departments of Committee for Roads offices.*	Communities along the project corridor	Construction and operation stage	PMO, PMC
Consultations during operation and maintenance, including on the grievance mechanism, damage claims, and satisfaction with engagement activities.	People residing near the corridor; other interested parties (press/media, NGOs, businesses, academia, local government departments, general public)	As needed; outreach throughout the operation phase	PMO and relevant road maintenance authority

7.7. 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 ESIA, Gender Action Plan, RAP in English and summary in Russian and Uzbek will be available on the websites of the Ministry of Transport and AIIB upon the clearance of the documents. A summary of the environmental and social assessment in Russian and Uzbek will be available to local communities and relevant authorities at the Bukhara office of PMO.

The Draft ESIA, GAP, and LRP will be published on the Ministry of Transport's website for public consultation meetings. After these meetings, feedback received from stakeholders will be incorporated into the final ESIA, GAP, and RAP. Once finalized, the updated ESIA, GAP, and RAP will be re-disclosed.

8. GRIEVANCE REDRESS MECHANISM

The project recognizes that construction and operational activities may generate a variety of concerns among affected communities, workers, and other stakeholders. These may range from temporary construction-related nuisances such as dust, noise, and access restrictions to more complex matters related to land acquisition, compensation, livelihood impacts, environmental quality, occupational health and safety (OHS), gender-based violence (GBV), and social safeguards compliance.

An effective Grievance Redress Mechanism (GRM) is therefore essential to ensure that concerns are received, registered, assessed, and resolved in timely, transparent, impartial, and culturally appropriate manner. The GRM described in this chapter applies to all categories of project-related grievances throughout the project lifecycle – from pre-construction disclosure and land acquisition through construction and into the operational phase – and covers all categories of affected persons including community members, project-affected households, agricultural producers, vulnerable groups, workers, and other stakeholders.

The GRM operates in parallel with, and is complementary to, the Resettlement Action Plans (RAPs), which contain additional grievance provisions specific to land acquisition and involuntary resettlement. The present chapter sets out the broader GRM framework applicable to the full scope of the Environmental and Social Impact Assessment (ESIA).

The GRM is consistent with the requirements of the *AIIB ESS1 (Environmental and Social Assessment and Management)* and *ESS2 (Land Acquisition and Involuntary Resettlement)*.

8.1. Grievance Redress Committees

Grievance Redress Committees (GRCs) are the institutional bodies responsible for receiving, reviewing, and facilitating the resolution of project-related complaints. It is important to distinguish GRCs from the broader GRM escalation pathway: GRCs are the standing committees with defined membership that operate at two levels within the project structure, while the escalation pathway defines the procedural route a complaint travels – from local resolution through to provincial administration and, if necessary, the courts. GRCs will operate throughout the pre-construction, construction, and operational phases of the project.

Two GRC levels are established for this project, as described below. For grievances specifically related to land acquisition and involuntary resettlement, the GRM operates in accordance with the escalation pathway established in the RAP. The two GRC levels described here are designed to support that pathway, with the Provincial Khokimiyat

integrated into the Project-level GRC composition rather than constituting a separate escalation tier.

8.1.1. Settlement-level GRC (Level 1)

A Settlement-level GRC will be established in each project-affected settlement along the M37 corridor. Its scope is limited to complaints and concerns arising from project activities in that specific settlement. Settlement-level GRCs are the first point of contact for community members and are designed to enable rapid, locally appropriate resolution of day-to-day grievances without requiring complainants to travel to district or project offices.

Settlement-level GRC members are appointed following consultations with local communities to ensure that composition reflects local trust and legitimacy. The membership of each Settlement-level GRC includes:

- Head of the community (mahalla leader), who chairs the Settlement-level GRC and acts as the primary community liaison.
- Representative of the community's women's committee, who serves as gender focal point and ensures that women's concerns and sensitive complaints are handled appropriately.
- PMO Environmental and Social Specialist (or designated field representative), who ensures compliance with project safeguards requirements and maintains the link to the Project-level GRC.
- PMC Environmental and Social Specialist, who provides technical input on construction-related complaints and monitors contractor compliance with the ESMP.
- Contractor's representative, who is accountable for construction-related issues and can authorize immediate on-site corrective actions.
- Representative of the district khokimiyat Grievance Focal Point (GFP), who ensures integration of the settlement-level process with district administrative procedures.

The Settlement-level GRC aims to resolve complaints within 5 (*five*) days of receipt, with acknowledgement to the complainant within 2 (*two*) days. If a complaint is not resolved within this period, or if the complainant is not satisfied with the outcome, the case is referred – with full documentation – to the Project-level GRC. The complainant may also submit a complaint directly to the Project-level GRC at any time, without being required to first approach the Settlement-level GRC. The composition of each Settlement-level GRC will be publicly available at the relevant community center (mahalla committee) and on the project information dashboard for affected settlements.

8.1.2. Project-level GRC (Level 2)

The Project-level GRC operates at the PMO level and has jurisdiction over all project-affected settlements along the M37 corridor. It handles complaints escalated from Settlement-level GRCs, complaints submitted directly by affected persons who choose to bypass the Settlement level, complex or cross-cutting grievances that cannot be resolved locally, and sensitive complaints, including GBV/SEAH, resettlement disputes, and OHS incidents, that require specialist input or higher-level authority.

The Project-level GRC is chaired by the PMO Coordinator and includes the following members:

- PMO Head, designated by Committee of Roads (CR) management as the senior staff member responsible for project management on behalf of CR.
- PMO Environmental and Social Specialist, who oversees safeguards compliance and coordinates with the ESMP and RAP implementation teams.
- Representative from the CR area representative office (Bukhara Regional Roads Department[44]) responsible for the project corridor.
- PMC Environmental and Social Specialist, responsible for technical review of construction-related complaints and ESMP compliance.
- CR Province Department (Bukhara or Navoi Province Road Department, as applicable), providing institutional oversight and coordination with the Committee of Roads at the provincial level
- Representative of the Provincial Khokimiyat (Navoi or Bukhara Province, as applicable), ensuring that provincial-level administrative authority is embedded within the Project-level GRC and is available to facilitate resolution without requiring a separate escalation step.

Additional members may be co-opted on a case-by-case basis, including representatives from environmental or health authorities, agricultural bodies, legal counsel, or other specialist agencies, where the nature of grievance requires expert input. The Project-level GRC composition will be publicly available at the PMO office and disclosed through project information materials.

If a complaint is not resolved at the Project-level GRC, or if the complainant is not satisfied with the outcome, they may submit their complaint to the Court of Law in accordance with national legislation. Complainants may also access the national complaint handling system (pm.gov.uz, murojaat.gov.uz, or the People's Reception Offices) or the AIIB PPM at any stage. The court and national mechanisms are independent institutions and do not constitute additional GRC levels.

Members of both GRC levels are required to declare any conflict of interest in relation to a specific complaint and must recuse themselves from handling cases in which they

[44] Bukhoro Viloyat Yo'llar Boshqarmasi, Bukhara city, Mokhikhosa, 272 Gijduvon St., buxoro@uzavtoyul.uz, https://www.uzavtoyul.uz/ru/post/bukhara.html (accessed June 2026)

have a personal, financial, or professional interest. An alternative member will be designated for the subject case to ensure impartiality.

The PMO will ensure that all GRC members at both levels receive induction training on grievance handling procedures, principles of impartiality and confidentiality, gender-sensitive approaches, and the rights of project-affected persons. Refresher training will be provided at the start of each construction season and following any significant updates to project safeguards documentation.

8.2. GRM Scope

The GRM applies to all grievances arising from project activities and is not limited to resettlement or compensation issues. The following categories of grievance fall within the scope of the mechanism:

(i) Environmental grievances may include complaints related to:

- Dust, vibration, noise and air quality impacts on communities adjacent to the construction corridor
- Disruption or contamination of surface water bodies, irrigation channels, and drainage systems
- Improper disposal of construction waste, spoil material, or hazardous substances
- Damage to agricultural land, orchards, or trees not covered under compensation agreements
- Damage to or disruption of water supply infrastructure, including wells and irrigation networks
- Impacts on cultural heritage sites, burial grounds, or sites of community significance
- Impacts on biodiversity, protected areas, or ecologically sensitive zones along the project corridor.

(ii) Social and community grievances may include complaints related to:

- Land acquisition, compensation amounts, eligibility determinations, and livelihood restoration measures (also specified in RAP GRM provisions)
- Disruption of access to properties, businesses, agricultural plots, or community services during construction
- Road safety concerns, including inadequate traffic management, signage, or pedestrian access
- Impacts on community health due to construction activities
- Damage to private property, infrastructure, or crops not covered under the compensation framework
- Social exclusion or inadequate consultation of vulnerable groups, women, ethnic minorities, or persons with disabilities
- Failure to implement mitigation measures committed to in the ESMP or site-specific plans.

(iii) Worker grievances include complaints from construction workers and project personnel related to:

- Wages, overtime pay, and timely payment of salaries
- Working hours and rest periods
- Access to personal protective equipment (PPE), sanitation facilities, drinking water, and catering
- Accommodation conditions for workers residing in camps or temporary facilities
- Medical services and emergency response arrangements
- Discrimination, unfair treatment, or forced labour practices
- Occupational health and safety hazards or unsafe working conditions
- Contractual disputes with the employer or sub-contractors.

GBV, including SEAH, constitutes a discrete and sensitive category within the GRM and is subject to a dedicated protocol (Section 8.5). Complaints in this category are handled under strict confidentiality, with the survivor's safety, rights, and wellbeing as the paramount concern.

The following matters fall outside the scope of the project GRM and will be directed to appropriate national or legal channels:

- Complaints unrelated to the project or its activities;
- Complaints arising from events that pre-date the project;
- Allegations of fraud, corruption, or procurement irregularities (to be referred to AIIB's Complaints-Resolution, Evaluation and Integrity Unit, CEIU);
- Anonymous complaints that do not contain sufficient factual information to enable investigation (Section 8.7 for handling anonymous complaints).

8.3. Grievance Hearing and Resolution

8.3.1. Grievance Submission Channels

Grievances may be submitted through any of the following channels, which are designed to be accessible to all stakeholders regardless of literacy level, physical location, or communication preference:

- In person: directly to PMO field staff, PMC representatives, GRC members, mahalla committee leaders, or district khokimiyat representatives during site visits, community meetings, or at project offices.
- By telephone: to the project phone lines indicated in Section 8.9 of this chapter, including a toll-free number accessible to workers and community members.
- In writing: by letter, email, text message (SMS or messaging applications), or by completing the standard Grievance Form (Appendix 1) and submitting it to any project office or khokimiyat.

- Through a grievance register or locked complaint box: located at contractor worksites, mahalla centers, and other accessible community points;
- Verbally: to any GRC member or PMO/PMC field staff member, who will complete the grievance form on behalf of the complainant. Verbal grievances are registered following the same formal process as written complaints;
- Anonymously: through any of the above channels, noting that anonymous complaints lacking sufficient factual information may limit the GRC's ability to investigate and respond.

All grievance submission points will be clearly communicated to affected communities through public disclosure activities. Grievance forms will be available in Uzbek, Russian, and other local languages as appropriate.

8.3.2. GRM Levels and Resolution Process

The GRM operates through a two-level grievance resolution structure (Level 1 settlement-level and Level 2 project-level), with recourse available to complainants at any stage through the national court system, Uzbekistan's National Complaint Handling System (including the Virtual Reception of the President and the State Center for Public Services), and AIIB's Project-affected People's Mechanism. This provides progressively independent and formal avenues for grievance resolution.

Complainants may enter the system at any level and are not required to exhaust lower levels before escalating to higher levels or to the national/judicial system. The objective is to resolve issues at the lowest practical level as rapidly as possible.

The table below summarizes the GRM levels, responsible bodies, timeframes, and escalation pathways.

Table 97: GRM Levels, Scope, and Timeframe

Level	Body Responsible	Scope / Types of Grievance	Timeframe	Escalation
Level 1 Settlement-level GRC	Mahalla leader, Women's Committee representative, PMO E&S Specialist, PMC E&S Specialist Contractor's representative, District Khokimiyat representative	Day-to-day construction impacts (dust, noise, traffic, access disruption); minor environmental nuisances; property damage concerns; informal community queries; initial resettlement or compensation queries	5 days (acknowledgement: 2 days)	Unresolved: refer to Level 2 (Project GRC)
Level 2 Project-level GRC	PMO Head, PMO E&S Specialist, PMC E&S Specialist, Contractor's representative,	All unresolved Level 1 complaints; complex or cross-cutting grievances; environmental, social,	5 days (complex cases: up to 30 days)	Unresolved: Court of Law or AIIB PPM

Level	Body Responsible	Scope / Types of Grievance	Timeframe	Escalation
	Committee for Roads Province Department (Bukhara or Navoi Province Road Departments), Provincial Khokimiyat representative	OHS, compensation, livelihood, and worker issues; resettlement and land acquisition disputes; GBV/SEAH and sensitive complaints		
Court of Law	Competent court under national legislation of the Republic of Uzbekistan	Any unresolved complaint at any stage; legal rights disputes; administrative decisions; complainant may access courts independently at any point in the GRM process	per Uzbek legislation	Final legal determination

(Source: ESIA)

Also, complainants may enter the GRM at any level. Workers and GBV/SEAH complaints use dedicated channels that feed into the same escalation pathway.

Project GRM is presented in Figure 55.

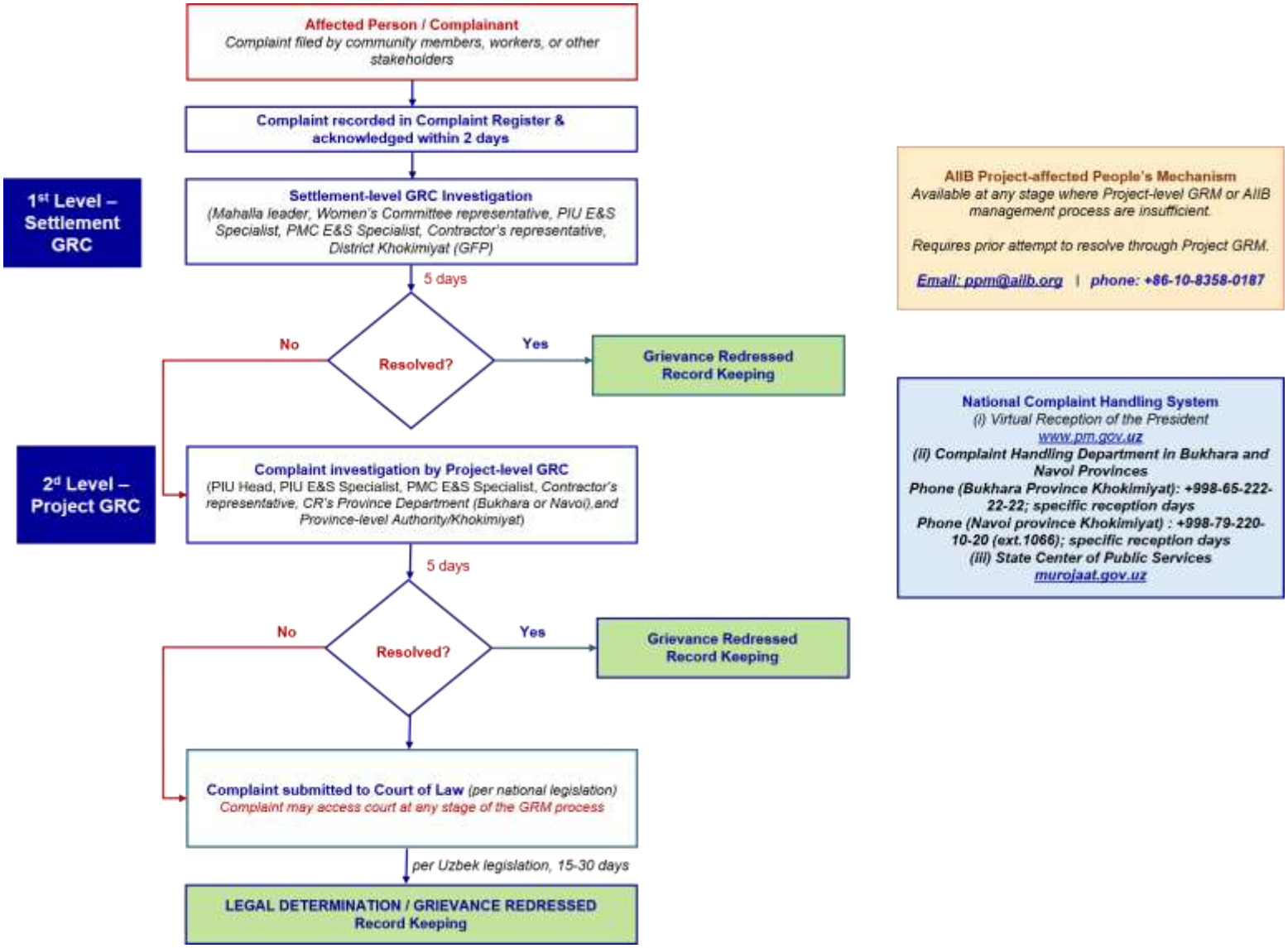


Figure 55: Project GRM Process
(Source: ESIA)

The process for each level is described in detail below.

- Level 1 – Settlement-level GRC: Complaints may be submitted to any Settlement-level GRC member – the mahalla leader, women's committee representative, PMO or PMC E&S Specialist, contractor's representative, or district khokimiyat GFP – as the first point of contact. All complaints received at this level are recorded in the Grievance Register and acknowledged to the complainant within 2 days. The Settlement-level GRC investigates and attempts to resolve the complaint within 5 days of receipt. If the issue cannot be resolved within this period, or if the complainant is not satisfied with the outcome, the complaint is referred to with full documentation to the Project-level GRC.

- Level 2 – Project-level GRC: The Project-level GRC receives complaints escalated from Level 1 or submitted directly by affected persons. The composition of the Project-level GRC includes the PMO Head, PMO E&S Specialist, PMC E&S Specialist, Contractor's representative, Committee for Roads Province Department (Bukhara or Navoi Province Road Department), and the Provincial Khokimiyat (Bukhara or Navoi Province). Upon receipt of a complaint, the Project-level GRC will:

  - Acknowledge the complaint and notify the complainant within 2 (*two*) days of receipt.
  - Investigate the complaint, consult the complainant and conduct site visits where necessary.
  - Resolve the complaint within 5 days; where additional investigation is required, a maximum of 30 calendar days is allowed for full resolution.
  - Inform AIIB if a complaint cannot be resolved within 30 days.
  - Document all steps taken, including meeting minutes, correspondence, decisions, and corrective actions, in the GRM database.

- Court of Law: At any stage of the GRM process, complainants retain the right to submit their grievance to the appropriate court of law in accordance with national legislation of Uzbekistan. Access to the courts is not contingent on exhausting GRC levels. Court proceedings will be resolved in accordance with the timeframes and procedures established under Uzbek legislation, which vary depending on case type and complexity; the project does not commit to or guarantee a specific judicial resolution period. Complainants choosing to pursue judicial remedies bear their own legal costs, unless otherwise provided under national law.

8.3.3. Grievance Registration and Tracking

All grievances received through any channel will be registered by the PMO using the standard Grievance Form within 1 working day of receipt. Each complaint will be

assigned a unique identifier and entered into the project GRM database maintained by the PMO.

The Grievance Form records the following information:

- Unique case number
- Date of receipt and channel of submission
- Complainant details (name, contact, location, and relationship to the project) or, for anonymous complaints, a description of the submission channel
- Description of the grievance, including location, affected parties, and nature of the impact
- Category of grievance (environmental, social, OHS, GBV/SEAH, resettlement, worker, other)
- GRM level at which the complaint is registered
- Actions taken and responsible parties
- Dates of all actions, communications, and decisions
- Resolution outcome and complainant satisfaction with the response
- Date of closure.

The PMO will regularly share complaint status information with the GFP and relevant khokimiyat. The GRM database will be maintained in a secure system, with sensitive case records (including GBV/SEAH complaints) accessible only to authorized personnel.

8.4. GRM for Workers

A dedicated Worker GRM will be established for the project to ensure that concerns, complaints, and disputes raised by project workers are addressed promptly, transparently, fairly, and without retaliation. The Worker GRM supplements, and does not replace, the community-facing GRM described in Sections 8.1–8.3 and operates as a dedicated and independent grievance channel embedded within the project's Labour Management Procedure (LMP). The summary provided in this section reflects the detailed Worker GRM set out in Chapter 7 of the LMP, which should be consulted for full procedural detail, roles, and monitoring indicators.

The Worker GRM applies to all categories of project workers, including direct workers, contracted workers, subcontractor personnel, temporary and seasonal workers, migrant workers, security personnel, and primary supplier workers where relevant. It operates throughout the entire project lifecycle, including mobilization, construction, demobilization, and defect liability periods, and covers grievances related to recruitment and hiring, employment terms, wages and overtime, discrimination and harassment, occupational health and safety, accommodation and camp conditions, disciplinary actions, labor influx-related issues, retaliation, and SEA/SH and GBV-related complaints, consistent with the scope set out in the LMP.

8.4.1. Grievance Submission Channels

Workers may submit grievances through any of the following channels, consistent with the LMP:

- Verbal complaint to a supervisor or designated GRM focal point.
- Locked complaint boxes installed at each active construction site and workers' accommodation facility, accompanied by standardized grievance forms in Uzbek, Russian, and other relevant languages.
- A designated toll-free telephone hotline through which workers can submit complaints confidentially, including verbally, with the PMC/PMO representative completing the form on the worker's behalf.
- Written complaint forms submitted directly to the Contractor, or PMC/PMO.
- E-mail or SMS/messaging applications where available, including the contact details of the PMC, displayed prominently at all worksites and accommodation areas.
- Anonymous submission, through any of the above channels.

Complaints may be submitted individually or collectively. The contractor will ensure that grievance submission channels are clearly visible and easily accessible at construction sites, worker camps, site offices, and welfare facilities. Where a worker is illiterate, has limited language proficiency, or prefers not to submit a written complaint, PMC and PMO personnel will record and register the concern verbally on the worker's behalf, following the standard formal process.

8.4.2. Grievance Redress Structure

The Worker GRM operates through a two-level structure, consistent with the LMP, designed to resolve grievances at the lowest appropriate level while allowing escalation where necessary.

- Level 1 – Contractor-level Resolution: The first level of resolution is managed by the Contractor through a Contractor-level GRC, which typically includes the Contractor's representative, Site Manager, OHS Officer, Environmental and Social Officer, worker representatives, a female representative or grievance focal point where women workers are engaged, and the Camp Manager where relevant. The Contractor-level GRC receives, registers, and investigates grievances, communicates with complainants, and proposes and monitors corrective actions. The Contractor will acknowledge receipt of a grievance within 3 working days, and routine grievances should be resolved within 15 working days wherever possible.

- Level 2 – PMO and PMC: If a grievance cannot be resolved at Contractor level, or the complainant is dissatisfied with the proposed resolution, it is escalated to the PMO and PMC. The PMO/PMC-level GRC may include the PMO E&S

Specialist, Labor/OHS Specialist, PMC representatives, Contractor representatives, and worker representatives where appropriate. This level reviews unresolved grievances, conducts independent investigation where necessary, proposes additional corrective measures, and monitors Contractor compliance with the LMP. Escalated grievances should normally be resolved within 20 working days. The PMO/PMC will take corresponding corrective actions and provide the complainant with a written response, which may include immediate cessation of unsafe practices, adjustment of payment procedures, improvement of site facilities, or disciplinary action against supervisory personnel, as appropriate to the severity and nature of the complaint.

- Level 3 – Government Authorities and Judicial Remedies: Where grievances remain unresolved at Level 2, or workers are otherwise dissatisfied, workers retain the right to refer complaints to local labor inspection authorities under the Ministry of Labor of Uzbekistan, trade unions, relevant government agencies, or the courts of the Republic of Uzbekistan. Access to these judicial and administrative remedies is not restricted or delayed by the Worker GRM and is available at any stage.

8.4.3. GBV/SEA/SH-Related Worker Grievances

Worker grievances related to GBV/SEA/SH are handled separately from routine worker grievances, through confidential and survivor-centered procedures consistent with the LMP. These complaints are not subject to mandatory informal settlement or mediation, and are managed only by designated and trained personnel, applying the principles of confidentiality of survivor identity, informed consent, protection from retaliation, immediate safety assessment, referral to appropriate support services, and no mandatory requirement for survivor participation in formal investigations. Women workers will have access to confidential reporting channels and may request that grievances be handled by designated female personnel where feasible.

8.4.4. Documentation, Monitoring, and Disclosure

All worker grievances will be formally recorded in a grievance register maintained by the Contractor and reviewed by the PMO and PMC, capturing the grievance identification number, date of submission, complainant details or anonymous status, description and category of grievance, responsible department or person, investigation actions, corrective measures, resolution status, and date of closure. Records will be kept at the PMO office, maintained throughout project implementation, and made available to AIIB missions for review. Confidential information, including GBV/SEA/SH-related records, will be stored securely with access restricted to authorized personnel only, and no identifying survivor information will be included in routine project reporting.

Contractors will submit regular grievance reports to the PMO and PMC, summarizing the number and types of grievances received, resolution status and average resolution

time, outstanding and repeated or systemic issues, and corrective actions implemented, including aggregated GBV/SEA/SH-related statistics without disclosure of personally identifiable information. The PMO will periodically review grievance trends, including by gender and grievance category where appropriate, to identify systemic labor and workplace issues and to improve Contractor performance management and site management practices.

All workers will receive Worker GRM awareness training during induction and through regular toolbox talks, covering submission channels, applicable timelines, confidentiality protections, non-retaliation commitments, and appeal procedures. Information will be provided in languages understandable to workers, including migrant workers, with particular attention to ensuring that women workers and other vulnerable workers are aware of available and confidential reporting channels. Full procedural detail, including grievance classification, investigation steps, collective labor disputes, roles and responsibilities, and monitoring indicators, is set out in LMP.

8.5. GRM for GBV/SEA/SH

GBV/SEA/SH grievances are subject to a dedicated protocol within the project GRM, governed by the following non-negotiable principles:

- SEAH is not acceptable under any circumstance, and the Project has zero tolerance for such conduct by any project personnel, contractor, or associated party.
- Every allegation will be acted upon, regardless of whether it involves project staff, contractor employees, or third parties.
- All actions will be fair, timely, and procedurally sound.
- The safety, rights, and dignity of survivors are the paramount concern in all decisions.
- Confidentiality will be maintained throughout the process, with personal information not disclosed without the written consent of the complainant.
- No retaliation against complainants or witnesses will be tolerated.

8.5.1. Submission Channels for GBV/SEA/SH Complaints

To facilitate safe and confidential reporting, GBV/SEA/SH complaints may be submitted through:

- Locked complaint boxes at construction sites and community centers, accessible without passing through areas controlled by potential perpetrators.
- A dedicated toll-free phone line operated by PMO and PMC, available during working hours with recorded options for sensitive reporting outside hours.
- Email to the PMO E&S Specialist, accessible from personal devices.



- Directly to a female GRC member or gender focal point, including in a private setting arranged at the complainant's request.
- Anonymously through any of the above channels.

The PMO and PMC will publicize these channels at community centers (mahalla committees), construction sites, and through project outreach materials. Women's groups and vulnerable community members will receive dedicated briefings on GBV/SEA/SH risks and available reporting channels.

8.5.2. Handling of GBV/SEA/SH Complaints

Upon receipt of a GBV/SEA/SH complaint, the PMO and PMC will immediately initiate the following steps:

- Acknowledge receipt of the complaint to the complainant (where non-anonymous) within 24 hours and assure them of confidentiality and protection from retaliation.
- Clarify the facts confidentially and safely, without exposing the complainant to further risk.
- Provide information to the complainant on medical and social support services available for survivors of sexual violence and refer them to relevant services.
- Where the alleged perpetrator is a project employee, take immediate precautionary measures, including temporary suspension from duties, pending investigation.
- Refer the matter to judicial authorities for investigation and criminal proceedings where the severity of the allegation warrants it.
- Where acts of SEAH are proven, immediately terminate the contractual relationship of the perpetrator and include a record in AIIB and implementing agency records to prevent future engagement.
- Provide the complainant with a confidential preliminary investigation report and, if applicable, a report on criminal proceedings.
- Monitor the situation until it is fully and satisfactorily resolved.

All GBV/SEA/SH complaint records will be maintained separately from the general GRM database in a secure system with strictly controlled access. Anonymized data on GBV/SEA/SH case types and outcomes will be included in aggregate reporting to AIIB.

The Contractor and PMC will implement GBV/SEA/SH prevention measures as part of the Code of Conduct for all project personnel and will deliver mandatory training on GBV risks, unacceptable behaviors, and reporting obligations during induction and at regular intervals throughout construction.

8.6. Court of Law

At any stage of the project GRM process, if a grievance is not resolved or if the complainant is not satisfied with the outcome, they retain the right to submit their complaint to an appropriate court of law. Access to the courts is independent of, and not conditioned upon, use of the project GRM. Legal proceedings are governed by applicable national legislation of Uzbekistan.

Complainants pursuing judicial remedies are responsible for their own legal costs, unless otherwise provided under national law. The PMO will not take any action to discourage or penalize complainants who choose to pursue legal remedies.

8.7. National Complaint Handling System

The project GRM operates in a complementary, not substitute, manner to the national complaint handling system. Affected persons are encouraged to use the project GRM first, to enable rapid and project-specific resolution. However, use of the project GRM does not limit or replace the right of affected persons to access national mechanisms at any stage.

8.7.1. Virtual Reception of the President (pm.gov.uz)

The *Law on Appeals of Individuals and Legal Entities* (29 October 2014) guarantees the right to appeal and prescribes requirements for its form, content, and timelines. Under this law, affected persons may submit grievances through the *Virtual Reception of the President of Uzbekistan*, an online portal updated in February 2018, via the following channels:

- By calling the freephone number 0-800-210-00-00 or the short number 10-00.
- By using the online portal at pm.gov.uz and completing a special request form.
- By visiting *the People's Reception Office*. The addresses of the *People's Reception Offices* in Bukhara Province and corresponding offices in Navoi Province are available on the respective regional websites and at district khokimiyat offices.

8.7.2. Murojaat.gov.uz – Unified Online Appeals Platform

In addition to the *Virtual Reception of the President*, affected persons may submit applications, proposals, and complaints directly to the relevant government organization of their choice through murojaat.gov.uz, a unified online platform for registering, reviewing, and monitoring appeals. Login is via OneID, the national digital identity system. The website, www.murojaat.gov.uz, operates independently from the *People's Reception Offices*: complaints submitted through this platform are not filtered or centrally triaged, and the complainant selects the recipient organization directly. This makes murojaat.gov.uz a direct-to-agency channel, distinct from the centrally

coordinated Virtual Reception. Affected persons wishing to direct a complaint to a specific agency, such as the Committee of Roads or a relevant khokimiyat, without routing it through the *Presidential Reception* process, may use this channel.

8.7.3. Xalq Nazorati – Public Control Platform

Public Control or *"Xalq Nazorati"* (www.xalqnazorati.uz) is a geolocated, category-based civic monitoring platform that facilitates direct interaction between local residents and public servants on infrastructure and public service issues. Complaints are submitted through a three-step process: selecting a problem category, describing the problem, and providing the location. Relevant categories include urban cleanliness and infrastructure concerns, such as blocked or damaged drainage and irrigation channels. *Xalq Nazorati* may be a useful supplementary channel during the construction phase of the Project for reporting localized infrastructure impacts along the M37 corridor, such as road damage, drainage blockage, or dust nuisance in public areas. It is not, however, a substitute for Project GRM or the national complaint system described above for matters involving compensation, resettlement, or individual grievances, which should continue to be addressed through the channels set out in Sections 8.1–8.3 or through the *Virtual Reception* and murojaat.gov.uz.

8.7.4. Coordination with the Project GRM

After receiving a project-related complaint through the national system, the person responsible for the portal will provide the applicant with the contact details of the person responsible for the Committee of Roads under the Ministry of Transport. The Committee of Roads will contact Project GRM with a request for resolution. The PMO and Project GRM retain responsibility for coordination, follow-up, and monitoring of resolution outcomes for all project-related complaints received through national channels, particularly for safeguards-related matters.

The national online portal provides provisions for tracking complaint status and for further appeal. Protection against persecution for submitting a complaint is available through the portal's dedicated reporting function.

Submission of grievances through national mechanisms does not terminate PMO's follow-up obligations. Where a project-related complaint is submitted through national systems, the PMO and GRM remain responsible for coordination, follow-up, and documentation of outcomes.

8.8. Documentation of Grievances and Reporting

8.8.1. Documentation Requirements

The PMO is responsible for maintaining comprehensive and accurate documentation of all grievances received and their resolution. For each complaint, the following documentation will be maintained:

- The completed Grievance Form.
- Records of all actions taken to investigate the complaint, including correspondence, site visit reports, and meeting minutes.
- Documentation of the complaint handling team's deliberations and decisions.
- Written notification to the complainant of the outcome and any corrective actions.
- Evidence of complainant notification of the resolution, including acknowledgement of receipt where provided.
- Record of any appeal, escalation, or referral.
- Closure record confirming that the complaint is resolved and that the complainant has been notified.

All documentation will be maintained in the GRM database, with a parallel physical record in the PMO office. Sensitive cases, including GBV/SEA/SH complaints, will be stored separately in a restricted-access system with anonymized records retained in the general database for aggregate reporting purposes.

8.8.2. Monitoring of GRM Performance

Regular monitoring of GRM cases will be carried out by the PMO in coordination with the PMC and local administration. Each case is tracked using a unique identifier and categorized as summarized in the table below.

Table 98: GRM Monitoring Parameters

Monitoring Parameter	Information Recorded	Purpose
Type of complaint	Construction impact, compensation, land, OHS, GBV/SEAH, environmental nuisance, livelihood, worker rights, community relations, other	Enables pattern analysis and targeted mitigation
Project area / location	Identified district, community or contract section	Pinpoints geographic concentration of issues
Category of complainant	Community member, affected household, worker, vulnerable group, anonymous	Ensures inclusive tracking and equity monitoring

Monitoring Parameter	Information Recorded	Purpose
Status of resolution	Open / Under review / Resolved / Escalated / Closed	Tracks real-time caseload and bottlenecks
Response and closure timeline	Days from receipt to acknowledgement; days to resolution; days to close	Measures GRM performance against committed timeframes
Corrective actions taken	Description of remediation steps, decisions, referrals	Documents accountability and lessons learned
Satisfaction of complainant	Satisfied / Partially satisfied / Unsatisfied / No response	Quality indicator for GRM effectiveness
Escalation pathway used	Level escalated to; reason for escalation	Identifies systemic resolution failures
Sensitive cases flag	GBV/SEAH, child protection, vulnerable household	Triggers confidential handling protocol

(Source: ESIA)

The PMO, PMC, and local administration will convene monthly coordination meetings to review GRM trends, identify root causes of recurring issues, adjust project activities or communication strategies, and enhance community engagement practices. Findings will be used to refine mitigation measures and strengthen social safeguards implementation throughout the project lifecycle.

8.8.3. Reporting to AIIB

The PMO will prepare and submit consolidated GRM performance reports to AIIB on a monthly, quarterly, and semiannual basis. Reports will summarize:

- Number and types of grievances received during the reporting period, disaggregated by category, location, and complainant type
- Resolution rates and average closure timelines
- Actions taken and corrective measures implemented
- Unresolved complaints and plans for their resolution
- Escalated cases or serious incidents, including any GBV/SEAH cases (anonymized)
- Status of GRM implementation, including training completed, public awareness activities, and updates to procedures
- Qualitative assessment of complainant satisfaction
- Any systemic issues identified and corrective measures planned or taken.

Semiannual reports submitted to AIIB will include a dedicated GRM section as part of the broader environmental and social compliance report, consistent with AIIB ESS1 requirements.

8.9. 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. The PPM is governed by *AIIB Policy on the Project-affected People's Mechanism*[45] and *Rules of Procedure of the PPM guide the PPM*[46]. The Complaints Resolution, Evaluation, and Integrity Unit (CEIU) is responsible for the functioning of the PPM.

The PPM functions as an accountability mechanism of last resort. Consistent with the PPM Policy, requestors are expected to make good-faith efforts to resolve their concerns through the Project-level GRM and engagement with AIIB Management before submitting to the PPM. Good-faith efforts do not require full resolution or exhaustion of the Project-level GRM. The PPM policy recognizes exceptions where the GRM is non-existent or non-functioning, where AIIB Management has been non-responsive, or where there is a credible risk of retaliation from approaching the GRM.

Affected persons retain the right to approach the PPM at any time and without forfeiting access to any other available remedy, including national courts, administrative channels, or the National Complaint Handling System. Use of the PPM does not require prior exhaustion of national legal or administrative remedies and pursuing the PPM does not preclude concurrent or subsequent use of those remedies.

8.9.1. PPM Submission Types

The PPM handles three types of submissions:

- Project Processing Queries (PPQ): Enable project-affected people to resolve concerns about simple matters arising during AIIB's environmental and social due diligence, such as inquiries about the consultation process or requests to address environmental nuisances during project preparation.
- Requests for Dispute Resolution (RDR): Allow the PPM to facilitate and coordinate the resolution of disputes arising over mitigation of known environmental and social impacts during AIIB's due diligence or project implementation. The PPM may use consultative dialogue, information sharing, joint fact-finding, or mediation.
- Requests for Compliance Review (RCR): Involve an investigation by the PPM into allegations that AIIB has failed to comply with its obligations under the ESP in its

[45] AIIB Policy on the Project-affected People's Mechanism, No. ILF-2026-001, 01.01.2026, https://www.aiib.org/en/policies-strategies/_download/project-affected/PPM-policy.pdf (accessed June 2026)
[46] Rules of Procedure of the Project-affected People's Mechanism, No. ILF-2026-003, 01.01.2026, https://www.aiib.org/en/policies-strategies/_download/project-affected/AIIB-RofP-of-the-PPM-2026_For-Dissemination-and-Disclosure_24-12-2025.pdf (accessed June 2026)

environmental and social due diligence or oversight of the project, thereby causing or likely causing material adverse impacts on project-affected people.

8.9.2. Eligibility and Exclusions

Complaints or appeals cannot be considered by the PPM if they:

- Do not relate to a project approved for AIIB funding or for which Project Summary Information (PSI) has been disclosed.
- Are submitted anonymously.
- Make allegations of fraud, corruption, or other prohibited practices, or relate to procurement matters (such complaints should be directed to AIIB's CEIU).

The general time limit for filing PPM complaints is 24 months from the project closing date or the last disbursement date, depending on the financing modality.

8.9.3. PPM Contact Information

Complaints may be sent to the PPM by mail, email, fax, or delivered in person. The PPM can be contacted via the AIIB homepage[47] or through the following contact details:

Managing Director, Complaints-Resolution, Evaluation and Integrity Unit (CEIU)
Asian Infrastructure Investment Bank (AIIB)
Tower A, Asia Financial Center, No. 1 Tianchen East Road, Chaoyang District
Beijing 100101, People's Republic of China
Tel: +86-10-8358-0187 | Fax: +86-10-8358-0000 | Email: ppm@aiib.org

Information regarding the availability of AIIB accountability mechanisms has been disclosed to affected persons through stakeholder consultations, community meetings, and safeguard information materials. Grievance channels and escalation pathways, including the PPM, are communicated by the PMO in coordination with the khokimiyat during all consultations with affected people.

Consistent with AIIB's Directive on Protection against Retaliation[48], no person, including complainants, witnesses, or any other individual who raises a concern or participates in the resolution of a grievance, will be subject to intimidation, harassment, discrimination, coercion, adverse treatment, or retaliation of any kind for doing so, whether through the Project-level GRM, engagement with AIIB Management, or the AIIB PPM. This protection applies regardless of the outcome of the complaint and extends to any person who supports, assists, or provides information in connection with grievance. Any report of intimidation or retaliation will be treated as a serious matter and addressed through the appropriate channel, including referral to AIIB's CEIU where relevant.

[47] www.aiib.org
[48] AIIB Directive on Protection against Retaliation, 26 March 2019, https://www.aiib.org/en/about-aiib/who-we-are/role-of-law/.content/index/_download/Directive-on-Protection-against-Retaliation.pdf

8.10. Forms of Lodging Grievances

Grievances may be lodged in the following forms:

- Written letter addressed to a GRC member, the PMO, or the relevant khokimiyat.
- Telephonic complaint to the project phone line, noted in a telephonic grievance register by the receiving staff member.
- Email to the PMO or PMC' s E&S Specialists.
- Verbal complaint submitted directly to any GRC member or PMO/PMC field staff, who will complete the standard Grievance Form on behalf of the complainant.
- Completed Grievance Form deposited in a locked grievance box at a project site or community point.
- Text message (SMS or messaging application) to the designated project number.
- Submission through the national Virtual Reception portal (pm.gov.uz).

Any grievance or appeal from an individual should include the complainant's full name, place of residence, the substance of the appeal, and contact details of the complainant or their representative, unless submitted anonymously.

8.10.1. Anonymous Complaints

Complainants are informed of the option to submit grievances anonymously at the point of registration. Anonymous complaints will be registered and reviewed. The GRC will assess whether the complaint contains sufficient factual information to enable investigation and will act on behalf of the complainant where the situation described is credible and verifiable.

If the arguments in an anonymous complaint cannot be verified, a conclusion is drawn up stating the reasons for terminating the review. This conclusion is confirmed by GRC members, and the complaint is removed from active control. Decisions regarding anonymous complaints are published on information boards or local media and, where applicable, communicated back through the channel from which the anonymous complaint was received.

GRC members are responsible for ensuring that confidentiality and anonymity of all complainants, whether identified or anonymous, are strictly respected throughout the grievance handling process.

8.10.2. Guiding Principles of the Grievance Process

The following principles govern all aspects of the grievance redress process:

- Impartiality: Grievance receipt and resolution are guided by objective criteria. Members reviewing grievance must be free of conflict of interest and must recuse themselves and be replaced where any such interest exists.

- Awareness: Affected persons and the public are made aware of the GRM, the grievance resolution process, and the composition of the GRC. The PMO disseminates this information through its website, local media, public consultations, and project disclosure activities.
- Accessibility: The GRM is accessible in terms of physical location, language, and cultural appropriateness. Complaints can be received in multiple forms. Information materials are non-technical and in languages understood by affected communities.
- Timeliness: All complaints, regardless of their nature, are resolved and corrective actions taken within reasonable and committed timelines.
- Participation: Complainants and their representatives are part of the resolution process and are provided with opportunities to be heard and informed about the process and its outcome.
- Feedback: Timely feedback is provided to complainants at each phase of the process, including the basis of the decision, parties involved, information reviewed, and next steps regarding whether a resolution is accepted or rejected.
- Gender and social inclusiveness: The grievance process considers the roles, needs, and constraints of men and women. Project staff are trained in gender-sensitive approaches. Confidentiality and discretion are particularly important in gender-sensitive cases. Personal information is not disclosed without written consent, and sensitive records are stored securely with limited access.

8.11. GRM Disclosure and Public Awareness

Before contractors and PMCs are mobilized, responsibility for GRM awareness raising lies with the PMO in coordination with the district khokimiyat and mahalla committees. The objective is to ensure that all potentially affected persons – including vulnerable households, farmers, women, youth, and business owners – are fully informed about the GRM, its procedures, and their rights to lodge complaints.

Key objectives of GRM awareness activities are to:

- Ensure that all affected people understand their right to lodge grievances and the available channels.
- Provide information in accessible, culturally appropriate formats and in local languages.
- Build trust in the grievance process by emphasizing confidentiality, impartiality, and timeliness.
- Strengthen stakeholder engagement by involving khokimiyat and mahalla committees as trusted intermediaries.
- Provide special outreach to vulnerable groups, including women, elderly persons, persons with disabilities, and low-income households.

The GRM information dissemination strategy includes:

- Printed brochures and handouts, distributed through khokimiyat offices, mahalla committees, PMO field visits, and public institutions. Materials are provided in Uzbek and Russian, with step-by-step instructions on how to file a grievance, contact details of GRC members, and review timelines.
- Verbal dissemination during household visits, farmer consultations, and meetings with vulnerable groups, ensuring accessibility for people with limited literacy.
- Stakeholder consultations organized jointly by PMO and khokimiyat, targeting farmers, landowners, women's groups, and small businesses.
- Public community meetings facilitated by khokimiyat and mahalla committees, particularly in areas where construction or land acquisition impacts are anticipated.
- Information boards and posters installed at khokimiyat offices, mahalla centers, schools, health facilities, and active construction sites, displaying GRM procedures, complaint forms, and contact numbers.
- Local media and digital channels, including local newspapers, radio, and Telegram channels managed by the khokimiyat, reach wider audiences.
- Mahalla committee briefings, where local leaders are trained to verbally explain GRM procedures to residents and act as trusted intermediaries.

8.12. Contact Details

Contact details of implementing agency representatives responsible for receipt and management of grievances are provided in Table 99.

Table 99: GRM Contact Details

Entity / Contact Person	Contact Details	Role in GRM
PMO Director and Environmental and Social Specialist	Phone: +998 71 207-67-68, +998 71 200-02-04 Email: info@uzavtoyul.uz Website: www.uzavtoyul.uz	Project-level GRC (Level 2) lead; primary point of contact for all grievances; registration, tracking, and reporting.
Navoi Province Khokimiyat	Phone: +998 79 229-62-06 Hotline: +998 79 220-10-20 Email: info@navoi.uz Address: Islom Karimov Str. 77A, Navoi	Project-level GRC (Level 2) member; provincial administrative authority embedded within the GRC, no separate escalation step required.
Bukhara Province Khokimiyat	Phone: +998 65 224-41-10 Hotline: +998 65 222-22-22 Email: info@buxoro.uz Address: I. Karimov Str. 1, Bukhara	Project-level GRC (Level 2) member; provincial administrative authority embedded within the GRC, no separate escalation step required.
Kyzyltepa District Khokimiyat (Navoi Province)	Phone: +998 79 222-00-01 Hotline: +998 79 555-22-05 Email: qiziltepa@nv.uz Address: Uzbekistan Str. 43, Kyzyltepa	Settlement-level GRC (Level 1) member (District Khokimiyat GFP); first point of contact and local-level resolution.

Entity / Contact Person	Contact Details	Role in GRM
Bukhara District Khokimiyat	Phone: +998 65 542-57-62 Phone of Deputy Khokim for Family and Women's Affairs: +998 65 542-53-35 Address: Buyuk Ipak Yuli Ave., 54, Galaosiyo	Settlement-level GRC (Level 1) member (District Khokimiyat GFP); first point of contact and local-level resolution.
Gijduvon District Khokimiyat	Phone: +998 65 572-13-33 Phone of Deputy Khokim for Family and Women's Affairs: +998 90 637-08-30 Email: gijduvon-th@umail.uz Address: Mustakillik sq. 2, Gijduvon	Settlement-level GRC (Level 1) member (District Khokimiyat GFP); first point of contact and local-level resolution.
Vobkent District Khokimiyat	Phone: +998 65 332-35-50 Phone of Deputy Khokim for Family and Women's Affairs:+998 65 332-18-92 Email: info@buxoro.uz Address: Imam Bukhari Str. 55, Vobkent	Settlement-level GRC (Level 1) member (District Khokimiyat GFP); first point of contact and local-level resolution.
National: Virtual Reception of the President	Online: pm.gov.uz	National-level appeals; independent channel.
National: Murojaat.gov.uz	Online: murojaat.gov.uz Login via OneID	Direct-to-agency national appeals platform; independent of People's Reception Offices.
National: Xalq Nazorati	Online: xalqnazorati.uz	Supplementary platform for construction-phase infrastructure complaints (e.g., road damage, drainage); not a substitute for project GRM.
AIIB Project-affected People's Mechanism (PPM)	Email: ppm@aiib.org Tel: +86-10-8358-0187 Address: AIIB, Tower A, Asia Financial Center, No.1 Tianchen East Road, Chaoyang District, Beijing 100101	Last-resort accountability mechanism for AIIB-related concerns.

Note: Contractor contact details for the construction phase GRM will be confirmed upon contractor mobilization and will be publicly disclosed through information boards, PMO communications, and project disclosure materials.

9. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

This Chapter provides the Environmental and Social Management Plan (ESMP) for the M37 rehabilitation and bypass project. It describes the institutional arrangements for environmental and social management of the project, presents mitigation and monitoring plans, sets out monitoring and reporting requirements, recommends environmental and social training to be conducted by various project entities, and describes the GRM to be established.

9.1. Environmental and Social Management

ESMP will serve as a guide for the project's environmentally sound construction practices and facilitate effective communication among the PMC, PMO, Committee for Roads, and contractors.

The ESMP exists to convert the mitigation measures identified for each environmental and social impact into a workable management system. It is built around three phases of the project: pre-construction, construction, and operation. ESMP is intended to remain a living reference that project entities can act on directly.

The ESMP is intended to achieve the following objectives:

- Turn the mitigation measures into specific, assignable, and time-bound actions rather than general commitments.
- Set clear lines of accountability across the PMO, Design Consultant, PMC, Contractors, and any independent monitoring body, so that responsibility for a given measure is never ambiguous.
- Establish a monitoring and reporting system, with defined indicators, frequency, and reporting channels.
- Identify where project entities currently lack the environmental and social capacity to carry out their responsibilities and set out a schedule of training to close that gap.
- Set up, and keep functional throughout construction and operation, a grievance mechanism that is accessible to affected communities and project workforce.
- Estimate the staffing, budget, and other resources the ESMP will require and confirm how these will be funded and by whom.
- Build in the flexibility to update the ESMP as an adaptive management tool, so that it can be revised in response to design changes, monitoring results, or risks that only become apparent once construction is underway.
- Coordinate, where relevant, with other development activities already underway or planned in the same districts, to avoid duplicated effort and to make the most of the project's cumulative benefit for local communities.

Table 100: Environmental and Social Management Plan

No.	Project Activity	Impact	Mitigation Measures	Responsibility	Monitoring Indicators	Frequency of Monitoring
Planning Phase						
1.	Project Design	Incomplete design	1. A context-sensitive, optimized design tailored to traffic demand, settlement density, and spatial constraints, was selected. 2. Climate adaptation measures were developed as part of the Paris Alignment and Climate Finance Assessment. 3. The design strategy prioritizes upgrading within or immediately adjacent to the existing right-of-way, with deviations limited to locations where geometric, safety, or junction requirements make this necessary, minimizing new land take along most of the 69 km corridor. Land acquisition and resettlement impacts are addressed through the RAP. 4. The design integrates median separation, guardrails, safety barriers, signage, pavement markings, and lighting at interchanges, settlement sections, and pedestrian crossings. 5. The drainage design integrates longitudinal drainage, cross-drainage structures, and connectivity with the extensive irrigation and drainage network crossed by the corridor.	PMO, Design Institute, ESIA Consultant Associated costs will be covered by the project funds	Incorporated in the design and communicated to contractors	Prior to civil works
2.	Land Acquisition and Resettlement	Disruption of agriculture, livelihood, and business	6. Selection of the optimized design, with reduced land acquisition, structure impacts, and vegetation loss relative to the design alternatives considered. 7. Preparation of the RAP in accordance with the applicable national legislation, and AIIB ESS2. 8. No land acquisition or displacement will occur in any lot prior to the preparation, disclosure, and implementation of the applicable RAP. 9. Specific measures will be implemented to restore irrigation access and water supply to affected	PMO, Design Institute, ESIA Consultant Associated costs will be covered by the project funds	Incorporated in the design and communicated to contractors	Prior to civil works

No.	Project Activity	Impact	Mitigation Measures	Responsibility	Monitoring Indicators	Frequency of Monitoring
			landholders following construction, in coordination with irrigation and canal management authorities. 10. Where utility relocation is required, the PMO/PMC will coordinate with the relevant utility operators (electricity, gas, water) on relocation design, timing, and cost allocation prior to construction in the affected section, and any resulting additional land acquisition needs will be assessed and incorporated into the RAP through an addendum if required. 11. A Project-level GRM will be established and disclosed to affected persons prior to land acquisition. 12. Livelihood restoration support will be provided to economically displaced persons in accordance with the RAP. 13. Temporary land occupation for contractor camps, storage, laydown, and access roads will be subject to negotiated agreements or easements with landholders and compensation. 14. The PMC and PMO will monitor implementation of the RAP.			
3.	Tree Cutting and Management		15. A comprehensive, geo-referenced tree inventory will be carried out at the detailed design and pre-construction stage for each procurement Lot. 16. The TMP will be prepared for each Lot. 17. Compensation for trees within productive orchards, vineyards, or other agricultural land will be addressed through the RAP. 18. The monitoring program will be developed to track the effectiveness of tree removal avoidance measures, monitor replacement planting survival rates. 19. The detailed tree inventory, enumeration, marking, and mapping of affected trees will be undertaken for 2 Lots, and the corresponding Lot-specific TMP will be finalized prior to any tree removal.	PMO, Design Institute, ESIA Consultant Associated costs will be covered by the project funds	TMP	Prior to civil works

No.	Project Activity	Impact	Mitigation Measures	Responsibility	Monitoring Indicators	Frequency of Monitoring
4.	Existing Utilities and Infrastructure	Disruption of services	20. A comprehensive utility mapping and survey, undertaken in consultation with all affected utility operators. 21. A Lot-specific utility relocation plan will be prepared. 22. A contingency and emergency response protocol will be established for accidental utility strikes. 23. A monitoring and reporting framework will be established during pre-construction to track progress on utility relocation	Design Consultant, PMO/PMC Associated costs will be covered by the project funds	Bidding documents include a requirement for a contingency plan for service interruptions	During preparation of bidding documents
5.	Bidding Documents	Failure to conduct environmental and social monitoring during the construction activities	24. Bidding documents and the contract for each Lot will ensure the inclusion of environmental and social provisions. 25. Bidding documents and contract terms will require the Contractor to price and implement the mobile noise barrier system, including a costed BoQ item for barrier materials, installation, and relocation along the work front. 26. Bidding documents and contract terms will require the Contractor to price and plant compensatory trees and shrubs at a ratio of 10 seedlings for each tree or shrub removed, in accordance with Cabinet of Ministers Decree No. 464 (~11,351 trees, Lots 1–2). 27. Bid evaluation criteria will ensure the selection of a Contractor with demonstrated experience in environmentally and socially responsible construction. 28. The contract with the successful bidder will require submission of SSESMP/C-ESMP within 30 days of contract award and before commencement of any physical work. 29. Bidding documents will require the Contractor to provide qualified and experienced environmental and social personnel on-site. 30. Bidding documents will ensure the Contractor's obligation to reinstate any utilities, roads (including	PMO, PMC Associated costs will be covered by the project funds	Incorporated in design and communicated to contractors	Prior to civil works

No.	Project Activity	Impact	Mitigation Measures	Responsibility	Monitoring Indicators	Frequency of Monitoring
			access roads), and transmission/distribution lines damaged during construction.			
6.	Permits, consents, and certifications	Noncompliance with regulations, environmental protection, and overall quality of the built environment	31. The PMO and PMC will assist the contractors to obtain or ensure that contractors obtain, as appropriate, the permits, consents, clearance, and authorizations that are applicable to the project from relevant national authorities, in accordance with applicable laws and regulations.	Implementation by Contractor Supervision by PMO, PMC Associated costs will be covered by the Contractor	Permits and certifications registered in Permit Log	Prior to and during civil works During regular meeting of PMC/PMO with the contractor in line of construction supervision activities
7.	Gender and Social Inclusion	Exclusion of women from compensation processes; failure to identify women in male-headed households as affected persons; inadequate consultation processes that systematically underrepresent women's concerns	32. The GAP prepared for this project will be implemented, commencing prior to or alongside all other pre-construction activities in this ESMP, given that GAP capacity (Gender Specialist engagement) and gender clauses in bidding documents must be in place before RAP census, consultation, and contractor mobilization proceed. All measures below are drawn from, and must remain consistent with, the GAP (Table 3) and ESIA Section 6.2.7. 33. The RAP entitlement matrix and payment procedures will individually register women in male-headed households with demonstrated corridor-dependent livelihood exposure as affected persons, actively identify informal female-run enterprises and de facto female-headed households (labor-migrant-absent male head), and issue mandatory joint written notification of entitlements to both the registered owner and any female co-user/income earner. 34. Compensation payments will be offered via joint account for households with a female co-user/income earner (standard procedure, not requiring request), and paid directly to the	Implementation by government authority, PMC, PMO, and Contractor(s), as applicable per measure Associated costs covered per the RAP and GAP budgets	GAP Gender Specialist roles confirmed filled/operational; RAP payment/ consultation records disaggregated by sex; number of joint notifications and joint accounts established; number of women's FGDs/sessions conducted and attendance, per Lot; signed Codes of Conduct; SEA/SH referral protocol testing records;	During RAP disclosure and payment; throughout consultation, construction, and camp mobilization per Lot; reported in PMC/PMO semi-annual social monitoring reports

No.	Project Activity	Impact	Mitigation Measures	Responsibility	Monitoring Indicators	Frequency of Monitoring
			individual account of female-headed households, with no intermediation through a male relative or community representative. 35. The SEP and GAP will require a dedicated women's session or separate FGD at all consultation events, facilitated by female staff/consultants where possible, with women's findings reported separately in semi-annual monitoring, and proactive outreach to women in male-headed households through mahalla, school, and health facility channels. 36. 35. All contractor contracts will require a signed Code of Conduct prohibiting harassment, intimidation, and SEA/SH; a survivor-centered SEA/SH referral protocol established and independently tested per Lot, with defined roles for the Contractor, PMC, PMO, and local authorities; and separate women's community awareness sessions prior to construction in each district. 37. 36. The Project GRM will designate at least one woman GRC member per settlement as gender/SEA-SH contact point with disclosed contact details, maintain sex-disaggregated complaint tracking, resolve general gender-related grievances within 14 days, and apply a survivor-centered protocol (not a fixed deadline) to SEA/SH grievances.		sex-disaggregated GRM complaint log and resolution rates	
Construction Phase						
7.	Landscape and Topography	changes to topography and landscape character	1. Green landscape design (roadside planting, green strips, and landscaped medians) and selection of the optimized alignment. 2. Construction camps, borrow areas, and spoil disposal sites will be sited at suitable locations agreed with the PMC and PMO. 3. Vegetation clearance will be kept to the minimum extent necessary within the confirmed construction footprint.	Implementation by Contractor Supervision by PMO, PMC Associated costs will be	No visible land degradation to nearby territories due to construction activities Number of complaints from local populations	Visual inspection by PMC on weekly basis

No.	Project Activity	Impact	Mitigation Measures	Responsibility	Monitoring Indicators	Frequency of Monitoring
			4. Following completion of construction, compensatory tree planting will be carried out at the required 10:1 ratio. 5. In the desert and semi-desert sections, disturbed surfaces will be subject to rapid stabilization measures following earthworks. 6. All areas temporarily affected by construction activities, including borrow pits, spoil sites, and camp areas, will be restored to their original or an equivalent stable condition. 7. GRM will be used to record, investigate, and respond to any complaints related to project activities. The impacted receptors will have access to raise complaints regarding project activities during the construction phase.	covered by the Contractor		
8.	Soils	Topsoil stripping, compaction, structural degradation, and a risk of contamination from fuel, oil, and construction materials	8. Topsoil within the confirmed construction footprint will be stripped, stockpiled separately from subsoil, and protected prior to earthworks commencing. 9. Temporary works areas, contractor camps, access tracks, and material storage/laydown areas will be sited. 10. Fuel, oil, and construction chemicals will be stored, handled, and refueling/maintenance activities conducted within designated, bunded areas with appropriate spill containment measures. 11. In the saline sections, excavated saline subsoil will be managed separately from surface topsoil. 12. Construction traffic and machinery movement will be restricted to designated haul routes and works areas. 13. Soil reinstatement, including de-compaction and topsoil replacement, will be verified by the PMC prior to demobilization from each work area. 14. GRM will be used to record, investigate, and respond to any complaints related to project activities. The impacted receptors will have access to raise complaints regarding project activities during the construction phase.	Implementation by Contractor Supervision by PMO, PMC Associated costs will be covered by the Contractor	Number of complaints from sensitive receptors	Visual inspection by PMC on weekly basis Quarterly inspection by PMO's Environmental and Social Specialist

No.	Project Activity	Impact	Mitigation Measures	Responsibility	Monitoring Indicators	Frequency of Monitoring
9.	Water Resources	Water contamination of rivers, canals, irrigation system; runoff from ineffective stockpiled materials, infiltration of fuels and lubricants, and inadequate wastewater management may cause siltation and reduce groundwater quality	15. The Contractor will prepare and implement a pollution prevention plan. 16. The Contractor will prepare a bridge/culvert construction management plan for each crossing, addressing environmental impacts of construction. 17. The Contractor will comply with applicable national legislation on water discharge. 18. Areas intended for storage of fuels, oils, and other hazardous materials will be bunded. 19. For treatment of any construction-related effluent, sedimentation ponds will be provided. 20. Sewage from construction camps will be directed to septic tanks or equivalent treatment facilities. 21. Oil and water separators and settling ponds will be installed where appropriate. 22. Concrete batching, vehicle washing, and machinery maintenance will be confined to designated areas. 23. Vehicle and machinery movements near water bodies will be avoided. 24. At the canal-convergence zone, construction will be phased across multiple crossings. 25. GRM will be used to record, investigate, and respond to any complaints related to project activities. The impacted receptors will have access to raise complaints regarding project activities during the construction phase.	Implementation by Contractor Supervision by PMO, PMC Associated costs will be covered by the Contractor	Number of complaints from sensitive receptors	Visual inspection by PMC on weekly basis Quarterly inspection by PMO's Environmental and Social Specialist
10.	Air quality	Working during the dry season and transporting construction materials may increase dust, carbon, monoxide, sulfur oxides, and nitrous oxides. particulate matter,	26. The Contractor will prepare comprising earthworks and topsoil management plans and a traffic management plan, including dust suppression measures. 27. Unpaved access roads, excavation areas, and stockpiles will be sprayed with water regularly, at a minimum of 3–4 times per day during dry and windy conditions, with increased frequency in settlement sections. 28. Soil, sand, and other dust-forming stockpiles will be sited downwind of sensitive receptors, lightly	Implementation by Contractor Supervision by PMO, PMC Associated costs will be covered by the Contractor	Number of complaints from sensitive receptors	Visual inspection by PMC on weekly basis Quarterly inspection by PMO's Environmental and Social Specialist

No.	Project Activity	Impact	Mitigation Measures	Responsibility	Monitoring Indicators	Frequency of Monitoring
		methane in the air environment	wetted, compacted, and covered with tarpaulins or geotextile sheeting. 29. All trucks transporting soil, sand, gravel, or other loose/fine materials will be fully covered during transport. 30. High-dust activities will be scheduled outside periods of strong wind and suspended during regional dust storms. 31. Concrete and asphalt batching and hot-mix plants will be sited at a suitable setback distance from populated areas. 32. All vehicles, plant, and equipment will comply with applicable Uzbek emissions legislation. 33. Diesel generator sets will use low-sulphur diesel, be fitted with adequate stack height, and be placed on drip trays sized to contain any leaked fuel/oil in the event of a spill. 34. Refueling will be conducted only at designated refueling stations. 35. Concrete mixers and similar mixing equipment will be properly calibrated, cleaned, and maintained. 36. Cement and other fine bulk materials will be stored in sealed containers or closed, ventilated facilities. 37. Incineration of domestic, construction, or landscaping waste at construction sites is prohibited. 38. Hazardous materials with potential gas emissions will be stored in sealed containers within well-ventilated, secure, low-risk areas. 39. Dust masks will be provided to workers, and a dust collection system will be maintained at crushers. 40. Ambient air quality monitoring will be carried out during construction at sensitive receptor locations. 41. The Contractor will conduct community consultations. 42. GRM will be used to record, investigate, and respond to any complaints related to project activities.			

No.	Project Activity	Impact	Mitigation Measures	Responsibility	Monitoring Indicators	Frequency of Monitoring
11.	Noise and Vibration Level	Temporary increase in noise level and vibrations by excavation equipment, and the transportation of materials, equipment, and people	43. Construction equipment and vehicles will be fitted with effective silencers and mufflers. 44. High-noise and high-vibration activities (piling, heavy earthworks, rock breaking) will be restricted to daytime and nighttime hours in settlement sections. 45. A mobile noise barrier system will be installed close to active equipment. 46. The loudest equipment (graders, excavators, cranes, generators) will be scheduled. 47. Vibration-generating activities near the bypass cemetery and any other identified sensitive structures will be preceded by a condition survey. 48. Affected communities, schools, and health facilities will be informed in advance of planned high-noise construction activities. 49. Haul routes and vehicle movements will be scheduled to avoid concentration of heavy traffic during periods of highest sensitivity (early morning, late evening) in settlement sections. 50. Ambient noise and vibration monitoring will be carried out during construction at representative sensitive receptor locations. 51. GRM will be used to record, investigate, and respond to any complaints related to project activities.	Implementation by Contractor Supervision by PMO, PMC Associated costs will be covered by the Contractor	Number of complaints from sensitive receptors	Visual inspection by PMC on weekly basis Quarterly inspection by PMO's Environmental and Social Specialist
12.	Solid Waste and Wastewater Management	Generation of solid waste, wastewater from labor camps and other construction waste may cause pollution	52. The Contractor will develop a waste management plan. 53. Before commencing any demolition or repair work on structures identified for demolition, the Contractor will carry out a pre-demolition ACM survey. 54. The Contractor will minimize waste generation through a reduce/reuse/recycle approach. 55. The Contractor will identify appropriate locations for temporary storage of construction and domestic waste within project sites, camps, and the ROW.	Implementation by Contractor Supervision by PMO, PMC Associated costs will be covered by the Contractor	Number of complaints from sensitive receptors	Visual inspection by PMC on weekly basis Quarterly inspection by PMO's Environmental and Social Specialist

No.	Project Activity	Impact	Mitigation Measures	Responsibility	Monitoring Indicators	Frequency of Monitoring
			56. Dumping of waste in trenches, along canal banks, within the biodiversity-sensitive canal-convergence zone, or in any area not designated for waste disposal is strictly prohibited. 57. Concrete washout water will be captured in designated, lined washout pits or containers. 58. The Contractor will provide training on waste segregation, handling of non-hazardous and hazardous waste, spill response. 59. All containers, drums, and tanks used for storage will be maintained in good condition, sealed, clearly labeled, and regularly inspected for leaks. 60. Incineration of domestic, construction, and landscaping waste at construction sites is strictly prohibited. 61. The Contractor will maintain all construction sites in a clean, tidy, and safe condition. 62. End-of-life tires will be collected and stored to prevent contact with soil and will be disposed of at an approved facility. 63. Medical waste from any site clinics or first aid stations will be disposed of in accordance with national medical waste regulations. 64. A recording system will be established to track all waste types and quantities generated. 65. GRM will be used to record, investigate, and respond to any complaints related to project activities.			
13.	Biological Environment	Disturbance of wildlife, cutting trees and shrubs, haphazard site clearing, parking, and movement of construction vehicles and equipment stockpiling resulting	66. The Contractor will appoint a Biodiversity Specialist/Environmental Specialist for the duration of construction in Lots 1–2, responsible for supervising pre-clearance surveys, verifying compliance with this section's measures, authorizing temporary work stoppages where protected species or active nests are encountered, and maintaining biodiversity-related records (survey results, nest and roost checks, incident log).	Implementation by Contractor Supervision by PMO, PMC Associated costs will be covered by the Contractor	Number of complaints from sensitive receptors	Visual inspection by PMC on weekly basis Quarterly inspection by PMO's Environmental

No.	Project Activity	Impact	Mitigation Measures	Responsibility	Monitoring Indicators	Frequency of Monitoring
		in disturbance to the biological environment	67. The Contractor will conduct biodiversity induction training for all workers, covering protected and Red Book species present in the corridor (Zarafshan Pheasant, Bukhara Tit, Marsh Frog), prohibited behaviors (hunting, feeding wildlife, harassment, unauthorized handling), emergency response for wildlife or livestock encounters in the work area, and restricted/buffer zones. 68. The Contractor will maintain a wildlife and livestock incident log recording sightings, injuries, mortalities, and corrective actions taken, reviewed periodically by the PMC/PMO. 69. Sensitive habitat features identified along the corridor and the approximately 12 km greenfield bypass, including Phragmites reed beds, canal margins will be clearly demarcated and, where works are adjacent, fenced to prevent inadvertent encroachment. 70. No works or access outside the approved right-of-way and confirmed construction footprint will be permitted across Lots 1–2 sections; this control is particularly critical in the greenfield bypass, where no pre-existing disturbed corridor constrains the work area informally. 71. Vegetation clearance will be minimized and micro-sited to avoid higher-value habitat features (dense shelterbelt stands, mature orchard blocks, riparian margins) within the confirmed footprint, consistent with the avoidance measures above. 72. Pre-clearance surveys for active bird nests and bat roosts will be conducted in trees and bridge structures scheduled for removal or works, timed to avoid the bird breeding season where feasible; a qualified ecologist is authorized to halt works locally if protected species or active nests are encountered, until young have fledged or an alternative resolution is agreed with the environmental authority.			and Social Specialist

No.	Project Activity	Impact	Mitigation Measures	Responsibility	Monitoring Indicators	Frequency of Monitoring
			73. Targeted pre-earthworks fauna checks (burrows of reptiles, rodents, hedgehogs) will be conducted in the greenfield bypass sections prior to clearance, given the absence of any existing road-related disturbance baseline there; any fauna found within the work footprint will be allowed to disperse naturally before works proceed. The surveys will be conducted in orchards and shelterbelt habitat scheduled for clearance in the bypass and Lots 1–2 corridor prior to works; where individuals or active breeding have habitat, clearance in that sections will be timed outside the breeding period where feasible, or subject to micro-siting adjustment agreed with the ecologist. 74. Bat roost checks at bridge structures (including the Zarafshan River crossing, Lot 1) will be conducted by a qualified ecologist prior to any works affecting the structure; where active roosts are confirmed, works will be scheduled outside sensitive roosting periods or subject to an exclusion/deterrent protocol agreed with the environmental authority before proceeding. 75. Amphibian check at canal crossings will be conducted prior to works at hydraulic structures identified as Marsh Frog habitat, in addition to the breeding-season scheduling restriction; where breeding activity is confirmed outside the anticipated period, works at that crossing will be temporarily suspended pending ecologist advice. 76. Active relocation of fauna encountered within the work footprint will only be carried out by the district environmental authority or another authorized/qualified ecologist, and only for species for which handling is legally permitted; Contractor personnel are prohibited from handling, chasing, feeding, or photographing wildlife at close range. Fauna that cannot disperse from the area unaided will be reported to the			

No.	Project Activity	Impact	Mitigation Measures	Responsibility	Monitoring Indicators	Frequency of Monitoring
			Contractor's Biodiversity Specialist for handover to the responsible authority. 77. Where vegetation clearance in native/semi-natural habitat is unavoidable, native seed or propagule collection will be carried out by a trained biologist prior to clearance, in coordination with the district Environmental Protection Department and other competent agencies, for use in site restoration; collection and subsequent use will be limited to native species, with no introduction of non-native or ornamental species in ecologically sensitive areas. 1. The Contractor will coordinate with local herders and mahalla representatives in advance of works in the bypass sections to confirm grazing/transit patterns and agree work scheduling and temporary access arrangements that minimize disruption to livestock movement. 2. Temporary fencing or signage will be installed at active worksites in the bypass sections to prevent livestock straying into hazardous construction areas, particularly excavation and equipment-operation zones. 78. Any livestock found within the active work footprint will not be handled or moved by Contractor personnel. The Contractor will contact the owner/herder or, where the owner cannot be identified, the relevant local authority. 79. Vehicle wheel-washing will be conducted before vehicles enter or leave designated stockpile, laydown, and greenfield bypass work areas, to limit spread of Acroptilon repens and other invasive flora, in accordance with a designated stockpile and vehicle-cleaning procedure. 80. Rehabilitated surfaces (temporary works areas, disturbed soils, batter slopes) will be monitored for invasive establishment during the post-construction monitoring period, with control			

No.	Project Activity	Impact	Mitigation Measures	Responsibility	Monitoring Indicators	Frequency of Monitoring
			measures applied where new infestations are identified. 81. In accordance with Cabinet of Ministers Decree No. 464 of 22 August 2022, replacement planting of trees and shelterbelt vegetation at a ratio of 10 seedlings for each tree or shrub removed, with seedlings of minimum age 5 years (trees) or 3 years (shrubs) and aggregate value not less than the value of the vegetation removed, grown and maintained for a minimum of two years, informed by the joint tree and asset inventory (~11,351 trees, Lots 1–2), prioritizing native and regionally appropriate species and reinstatement of connectivity at overpass and junction locations. 82. Topsoil across all Lots 1–2 work areas, including the greenfield bypass sections will be stripped and stockpiled separately prior to earthworks and reused for restoration of temporary work areas and batter slopes, to support faster re-establishment of ground cover and reduce erosion risk on newly disturbed soils. 83. Crossing structures designed to maintain existing flow regime, bank vegetation, and aquatic connectivity, incorporating Nature-based Solutions (NbS) such as bio-engineered bank protection and native vegetation buffers in preference to hard engineering where technically feasible, avoiding channelization or realignment beyond the minimum required for the works. 84. The PMC/PMO will conduct periodic (at minimum monthly during active clearance and earthworks) supervision of the measures above, including nest/roost check records, replanting survival rates, invasive species control effectiveness, and livestock/fauna incident logs, with findings reported through the ESMP's monitoring and reporting protocol.			

No.	Project Activity	Impact	Mitigation Measures	Responsibility	Monitoring Indicators	Frequency of Monitoring
			85. Post-construction ecological surveys will be conducted to confirm restoration success and inform any corrective replanting. 86. The Project-level GRM will be accessible to herders and other community members for concerns related to livestock disruption, access restriction, or other biodiversity-management matters arising during construction in the bypass and rehabilitation sections.			
14.	Socioeconomics		87. The Contractor will give preference to local, unskilled and semi-skilled workers. 88. The Contractor will procure goods, services, and materials from local suppliers and vendors. 89. The Contractor will schedule canal crossing works to avoid critical irrigation periods where feasible. 90. The Contractor will give affected farming households advance notice of the timing and duration of works. 91. The Contractor will maintain designated livestock crossing points and coordinate directly with pastoralist households. 92. The Contractor will give advance notice to roadside vendors and small businesses affected by the works. 93. The Contractor will implement a Labor Management Plan. 94. Landholders and business operators not eligible for RAP compensation who experience verifiable temporary income loss due to construction activity (crop damage, irrigation interruption, access-related loss of custom) may submit a claim through the project GRM. The PMC/PMO will establish a simple assessment procedure and response timeline for such claims, distinct from the RAP entitlement matrix process. 95. The Contractor, supported by the PMC and PMO, will provide host communities with advance information on workforce presence.	Implementation by Contractor Supervision by PMO, PMC Associated costs will be covered by the Contractor	Number of complaints from sensitive receptors	Visual inspection by PMC on weekly basis Quarterly inspection by PMO's Environmental and Social Specialist

No.	Project Activity	Impact	Mitigation Measures	Responsibility	Monitoring Indicators	Frequency of Monitoring
			96. The PMC and PMO will track local employment and procurement figures. 97. GRM will be used to record, investigate, and respond to complaints related to project activities during construction.			
15.	Traffic and Transportation	increase heavy vehicle movements along the existing M37 carriageway; temporary restricted access to properties, businesses, and agricultural land; traffic safety risks; disruption to public and informal transport services	98. The Contractor will prepare and implement a traffic management plan. 99. The Contractor, supported by the PMC and PMO, will provide advance public notification of planned traffic diversions, lane closures, and work zone schedules. 100. The Contractor will maintain temporary access to homes, businesses, schools, and agricultural land throughout construction. 101. The Contractor will restrict heavy vehicle movement through settlement sections. 102. The Contractor will route haul traffic to avoid local and secondary roads not designed for sustained heavy vehicle loading. 103. The Contractor will provide clearly signed and, where necessary, physically separated temporary passage for pedestrians, cyclists, and non-motorized traffic through active work zones. 104. The Contractor will coordinate with public and informal transport operators. 105. The Contractor shall enforce driver training, journey management, and speed limits for all construction vehicles operating on public roads. 106. The PMC and PMO will monitor traffic-related incidents and accidents during construction. 107. The PMO and PMC shall ensure the project grievance redress mechanism is accessible for traffic- and access-related complaints, with defined response timelines.	Implementation by Contractor Supervision by PMO, PMC Associated costs will be covered by the Contractor	Traffic management plan included in SSESMP Temporary road safety infrastructure Number of accidents	Visual inspection by PMC on weekly basis Quarterly inspection by PMO's Environmental and Social Specialist
16.	Restricted Access	Access to facilities, shops, businesses, and houses might	108. The Contractor, with the PMC, will prepare and maintain an access register of all schools, health facilities, mosques, markets, major business	Implementation by Contractor	Register in place and updated	Visual inspection by

No.	Project Activity	Impact	Mitigation Measures	Responsibility	Monitoring Indicators	Frequency of Monitoring
		be blocked during works	frontages, farm accesses, irrigation control points and crossings along the Lot, updated monthly. 109. The Contractor will keep access to homes, businesses, agricultural land and irrigation control points open or provide an agreed alternative at all times, using staged works, temporary ramps or plates, and temporary field access tracks; no household or plot will be fully cut off. 110. The Contractor will keep pedestrian and vehicle access, including ambulance access, open at all times to schools and health facilities, avoid work and heavy vehicle movements near school gates during opening and closing periods, and agree any alternative entrance with the facility in advance. 111. The Contractor will agree with the water user associations the timing of canal crossing works, provide a temporary irrigation bypass before any flow is interrupted, and restore canals, gates and culverts to at least their pre-project function with the association's sign-off. 112. The Contractor will agree priority routes with local authorities and emergency services, keep them open, and notify closures in advance. 113. The Contractor will notify affected households, businesses, schools, health facilities and water user associations at least 3 days before any planned access restriction, with the expected duration and the alternative route. 114. The Contractor will prepare an Access Restoration Plan (ARP) for each Lot with the content set out in Section 6.3.10, and submit it with the Traffic Management Plan for review by the PMC and approval by the PMO before physical works start. 115. The Contractor will record the pre-construction condition of each access point and reinstate it with the owner's or user's sign-off before demobilizing from each section.	Supervision by PMO, PMC Associated costs will be covered by the Contractor	Access maintained at 100% of registered receptors; interruptions logged No blocked or delayed emergency or facility access attributable to the works Bypass in place before each interruption; sign-off obtained Priority routes agreed and open Notices issued at least 3 days ahead (notice log) ARP approved before works start Access points reinstated and signed off Complaints acknowledged within 2 days and resolved within the SEP timeframes; claims register	PMC on weekly basis Quarterly inspection by PMO's Environmental and Social Specialist Weekly inspection; monthly report Monthly review of the log Monthly log; semi-annual report

No.	Project Activity	Impact	Mitigation Measures	Responsibility	Monitoring Indicators	Frequency of Monitoring
			116. The PMO and PMC will ensure the project GRM has an access channel with expedited handling for emergency service and essential facility access, and will report the access indicators in the Monitoring Plan in the semi-annual monitoring report.			
17.	Community Health and Safety	Bringing noise, communicable diseases, and unethical behavior of workers in the adjacent communities	117. The Contractor will secure all active work sites, open excavations, and materials and equipment storage areas with fencing, signage. 118. The Contractor will implement dust suppression (water spraying, vehicle speed restrictions). 119. The Contractor will implement a communicable disease awareness and prevention program for the workforce. 120. The Contractor will coordinate with communities and local water authorities on the scheduling of canal crossing works, provide temporary alternative water supply arrangements. 121. The Contractor will store and handle fuels, chemicals, and other hazardous materials, including secondary containment, spill kits, and trained personnel. 122. The Contractor will manage borrow pits, drainage works, and workforce camps to minimize standing water. 123. The Contractor, supported by the PMC, will provide advance community awareness on construction site hazards, work schedules, and emergency contact procedures. 124. The PMO and PMC will ensure the project grievance redress mechanism is accessible for health and safety-related community complaints, with expedited response procedures for urgent safety concerns. 125. The PMO and PMC will monitor community health and safety incidents and complaints.	Implementation by Contractor Supervision by PMO, PMC Associated costs will be covered by the Contractor	Health and safety management plan included in SSESMP Equipped first-aid stations Number of accidents Condition of workers eating areas Record of H&S orientation training Availability of PPE for all workers at the construction site Signage for storage and disposal areas Condition of sanitation facilities for workers	Visual inspection by PMC on weekly basis Quarterly inspection by PMO's Environmental and Social Specialist

No.	Project Activity	Impact	Mitigation Measures	Responsibility	Monitoring Indicators	Frequency of Monitoring
18.	Occupational Health and Safety	Inadequate sanitation facilities and drinking water supply, poor housing conditions, mishandling of hazardous substances lead to health and safety hazards to the workers	126. The Contractor will implement an OHS plan, consistent with the LMP. 127. The Contractor will implement safe systems of work. 128. The Contractor will provide task-appropriate PPE. 129. The Contractor will adjust work schedules during periods of extreme heat. 130. The Contractor will manage on-site vehicle and equipment movement. 131. The Contractor will maintain on-site first aid capacity and emergency response procedures. 132. The PMC will monitor OHS performance, incidents, and near-misses, and report on these in its semi-annual environmental and social monitoring reports.	Implementation by Contractor Supervision by PMO, PMC Associated costs will be covered by the Contractor	Equipped first-aid stations Number of accidents Conditions of workers' eating areas Conditions of sanitation facilities for workers Availability of safe drinking water	Visual inspection by PMC on weekly basis Quarterly inspection by PMO's Environmental and Social Specialist
19.	Cultural Heritage	The project will not encroach into or be near cultural resources	133. The Contractor will micro-site works, laydown areas, and access tracks. 134. The Contractor will implement a chance-find procedure. 135. The Contractor, supported by the PMC, will identify and record any local religious. 136. The Contractor will consult with local religious and community leaders and mahalla authorities. 137. The Contractor will conduct a condition survey of built heritage structures. 138. The Contractor will implement dust suppression and, where warranted by the condition survey. 139. The PMO and PMC will ensure the project grievance redress mechanism. 140. The PMC will report on cultural heritage chance finds, heritage site protection measures, and any related grievances in its semi-annual environmental and social monitoring reports.	Implementation by Contractor and PMC Supervision by PMO, PMC Associated costs will be covered by the Contractor and PMC	Cultural Resources Management Plan Records of chance finds Number of accidental damages to ACHS Training on architectural and cultural sites management, including on Chance Find Procedure	Visual inspection by PMC on weekly basis Quarterly inspection by PMO's Environmental and Social Specialist

No.	Project Activity	Impact	Mitigation Measures	Responsibility	Monitoring Indicators	Frequency of Monitoring
20.	Site Restoration/ Reinstatement	The leftover construction material, debris, spoils, scraps, and other waste can create hindrance and encumbrance for the local communities and block natural drainage and irrigation canals	141. The Contractor will prepare and implement a site restoration and reinstatement plan. 142. The Contractor will reinstate temporary works areas on agricultural land to pre-construction condition or better. 143. The Contractor will backfill, grade, or otherwise stabilize borrow pits, quarries, and other excavations not required for permanent project features. 144. The Contractor will promptly hand back temporarily acquired land to landowners or communities. 145. The Contractor will remove all construction waste, debris, and surplus materials from temporary works areas and the corridor. 146. The Contractor will reinstate compensatory tree and shelterbelt planting commitments at agreed locations as part of site restoration. 147. The PMC will inspect and certify satisfactory completion of site restoration and reinstatement. 148. The PMC will monitor and report on site restoration and reinstatement progress and any related grievances in its semi-annual environmental and social monitoring reports.	Implementation by Contractor Supervision by PMO, PMC Associated costs will be covered by the Contractor	Number of complaints from sensitive receptors	Visual inspection by PMC on weekly basis Quarterly inspection by PMO's Environmental and Social Specialist
Operation Phase						
21.	Biological Environment	Habitat fragmentation and vehicle-wildlife collision risk in desert-transition sections; reduced connectivity until shelterbelt replanting matures.	149. Livestock-crossing warning signage and speed controls at identified grazing or transit points along the bypass. 150. Fauna-passable culvert design retained at existing drainage or connectivity points for small mammals and reptiles. 151. Coordination with local herders or mahalla on livestock crossing patterns and timing. 152. Continued monitoring of replanted and compensatory vegetation.	RC's own cost	Number of complaints from sensitive receptors	Quarterly inspection by RC's Environmental Specialist

No.	Project Activity	Impact	Mitigation Measures	Responsibility	Monitoring Indicators	Frequency of Monitoring
22.	Socioeconomics	Beneficial: reduced transport costs, better market access, stronger trade for the project districts. Adverse: risk of unregulated roadside development.	153. Coordination with local land use authorities on roadside development control.	RC's own cost	Number of complaints from sensitive receptors	Quarterly inspection by RC's Environmental Specialist
23.	Traffic and Transportation	Improved regional connectivity from higher speeds/ volumes; potential increase in accident severity if not addressed at design stage.	154. Permanent safety features (signage, crossings, speed management) in final design; routine maintenance.	RC's own cost	Number of complaints from sensitive receptors	Quarterly inspection by RC's Environmental Specialist
24.	Restricted Access	Permanent physical barrier from the widened/ rebuilt road, particularly in settlement sections and where the bypass crosses farmland.	155. Pedestrian crossings, underpasses, and access points incorporated into final design.	RC's own cost	Number of complaints from sensitive receptors	Quarterly inspection by RC's Environmental Specialist
25.	Community Health and Safety	Ongoing noise and vehicle emissions exposure for roadside communities; safety risk for pedestrians at higher speeds.	156. Speed management, signage, and pedestrian infrastructure near schools and settlements.	RC's own cost	Number of complaints from sensitive receptors	Quarterly inspection by RC's Environmental Specialist
26.	Occupational Health and Safety	Limited to routine maintenance crews exposed to live traffic during	157. Standard traffic management and PPE protocols during maintenance.	RC's own cost	Number of complaints from sensitive receptors	Quarterly inspection by RC's

No.	Project Activity	Impact	Mitigation Measures	Responsibility	Monitoring Indicators	Frequency of Monitoring
		maintenance activities.				Environmental Specialist
27.	Cultural Heritage	No significant impact anticipated once construction-phase avoidance measures are implemented; residual risk limited to long-term traffic vibration near historic Bukhara.	158. Periodic condition monitoring of nearby heritage structures, if warranted.	RC's own cost	Number of complaints from sensitive receptors	Quarterly inspection by RC's Environmental Specialist
28.	Air Quality	Modest increase in vehicle emissions (NO_2, PM) from higher traffic volumes/speeds, partly offset by improved traffic flow versus the pre-project road.	159. Routine pavement maintenance; enforcement of vehicle emission standards; retention of shelterbelt vegetation to aid dispersion.	RC's own cost	Number of complaints from sensitive receptors	Quarterly inspection by RC's Environmental Specialist
29.	Noise	Increased roadside noise from higher traffic volumes/speeds, particularly in settlement sections and near sensitive receptors.	160. Speed management; retention of shelterbelt vegetation as a noise buffer; targeted noise barriers if monitoring identifies exceedances.	RC's own cost	Number of complaints from sensitive receptors	Quarterly inspection by RC's Environmental Specialist

9.2. Monitoring

Monitoring the environmental and social aspects during project implementation is essential for understanding its actual impacts and social consequences. It also assesses the effectiveness of mitigation measures and ensures compliance with the Environmental and Social Management Plan (ESMP). This information enables the PMO and PMC to evaluate the success of the mitigation strategies and the contractors' adherence to requirements as part of project oversight. Additionally, it allows for timely corrective actions to be taken when necessary.

Compliance monitoring tracks whether labor and ESHS requirements, and the mitigation measures identified in the ESMP mitigation plan, are being implemented as intended within each Contractor's SSESMP, and whether any corrective measures triggered along the way are actually carried out. Contractors are expected to run standard daily checklists on their own sites, while the PMC provides an independent layer of oversight through routine inspections and unannounced spot checks, rather than relying solely on Contractor self-reporting.

Environmental quality monitoring, by contrast, measures actual conditions, air, noise, water, and other parameters relevant to the project, against the applicable standards described in the baseline chapter of this ESIA, following the monitoring plan set out later in this chapter. Where results exceed the relevant standard, the PMC and PMO will propose corrective actions, and Contractors will implement them promptly.

An independent third-party monitoring party will be engaged and will produce a semi-annual environmental and social monitoring report. This report is expected to (i) assess compliance with national regulations, contractual agreements, and the commitments made in the ESMP and RAP; (ii) summarize the results of environmental quality monitoring together with capacity-building activity and any recorded accidents; (iii) review how the grievance mechanism is functioning in practice; and (iv) recommend corrective actions or amendments to the ESMP, SSESMPs, or RAP where these are warranted.

This arrangement continues into operation. Once construction is complete, the Committee for Roads will engage a third-party agency to monitor the ESHS performance of the finished road, again producing semi-annual Environmental and Social Monitoring Reports. Separately, specialists from the project's financing institution are expected to carry out site visits roughly twice a year to independently verify compliance. Where these visits identify a case of non-compliance, the PMO is responsible for establishing why it occurred and agreeing what corrective action is needed to bring the project back into compliance.

Table 101: Monitoring Plan

Issue	Monitoring	Locations	Schedule	Responsibilities	Reporting	Budget
Construction Phase						
Air Quality	Establish routine ambient air quality monitoring throughout the construction period. Parameters to be monitored: PM10 & PM2.5, Sulfur Dioxide (SO2), Nitrogen Oxides (NOx), and Carbon Monoxide (CO).	Monitoring locations near settlement sections and other sensitive receptors along the corridor, to be finalized by the PMC/PMO.	Monthly during the construction period and as required in the event of complaints.	The PMC shall engage a certified laboratory to carry out the monitoring activities.	The certified laboratory shall provide results to the PMC within seven days of the monitoring activity.	Associated costs included in the civil work contract
	Ensure routine dust inspection at active construction sites.	Construction sites (rehabilitation corridor and bypass).	Daily during the construction period (36 months).	Contractors shall conduct dust measurements with a dust meter on a weekly basis.	Contractors shall document inspection results and report to the PMC in monthly reports.	
Noise	Ensure routine noise monitoring is undertaken throughout the construction period. Parameters to be monitored: Leq 1h (dBA); Leq 24h (dBA), day and night.	Locations at settlement facades and other sensitive receptors along the rehabilitation corridor and bypass.	Monthly, with daytime and night-time measurements during the construction period (36 months).	The PMC shall engage a certified laboratory to carry out the monitoring activities.	The certified laboratory shall provide results to the PMC within seven days of the monitoring activity.	Associated costs included in the civil work contract
	Ensure routine monitoring of occupational and site noise. Parameters to be monitored: Leq 1h (dBA).	Construction sites.	Weekly at construction hours during the construction period (36 months).	Contractors shall conduct weekly measurements with a noise meter.	Contractors shall document measurement results and report to the PMC in monthly reports.	
Surface Water Quality	Establish routine water quality monitoring throughout the construction period at canal crossings and the Zarafshan River bridge works. Parameters to be monitored: pH; Suspended Solids; BOD5; COD; Coliforms; Nitrate (NO3); Phosphate (PO4); Oil and Grease; and turbidity.	Upstream and downstream of the Zarafshan River crossing and major canal crossing works across all lots; within the Lake Dengizkul influence zone.	Monthly, during active canal and river crossing works (36 months).	The PMC shall engage a certified laboratory to carry out the monitoring activities.	The certified laboratory shall provide results to the PMC within seven days of monitoring activity.	Associated costs included in the civil work contract

Issue	Monitoring	Locations	Schedule	Responsibilities	Reporting	Budget
	Ensure routine inspection of water pollution and sediment/erosion control at canal and river crossing works.	Construction sites at canal and river crossings.	Daily during the construction period (36 months).	Contractors conduct visual inspections daily.	Contractors document inspection results and report to the PMC in monthly reports.	
Biodiversity	Monitor survival and establishment of compensatory tree and shelterbelt replanting.	Replanting sites, Lots 1–2 (rehabilitation corridor) and bypass Sections 1–10.	Quarterly during the establishment period (up to 24 months following planting).	Contractors shall carry out and report on replanting maintenance; the PMC shall verify survival rates.	Contractors shall report quarterly to the PMC and PMO.	Associated costs included in the civil work contract
	Monitor the extent of invasive species and control measures.	Bypass sections and Gijduvon district.	Quarterly during the construction.	Contractors verified by the PMC.	Contractors report quarterly to the PMC.	
Operational Phase						
Air Quality	Parameters to be monitored include PM10, PM2.5, NO2, SO2, and CO.	At the same locations monitored during the construction phase.	Twice per year	The PMO shall engage a certified laboratory to carry out the monitoring activities.	The certified laboratory shall provide monitoring results to the PMO.	---
Noise	Noise monitoring: Leq 1h (dBA); Leq 24h (dBA), both daytime and night-time.	At all sensitive receptors within the project corridor; behind any noise barriers installed as part of the project.	Twice per year	The PMO shall engage a certified laboratory to carry out the monitoring activities.	The certified laboratory shall provide monitoring results to the PMO.	---
Surface Water Quality	Parameters to be monitored include pH, Suspended Solids, BOD5, COD, Coliforms, Nitrate, Phosphate, and Oil and Grease.	At the Zarafshan River crossing, canal crossings, and Lake Dengizkul influence zone.	Twice per year	The PMO shall engage a certified laboratory to carry out the monitoring activities.	The certified laboratory shall provide monitoring results to the PMO.	---
Biodiversity	Final verification of compensatory tree and shelterbelt replanting survival; monitoring of wildlife-vehicle collision incidents.	Replanting sites; desert-transition sections and canal crossings.	Twice per year	The PMO/relevant road maintenance authority.	The certified laboratory shall provide monitoring results to the PMO.	---

9.3. Documentation and Reporting

Monitoring elements of the ESMP will be documented and controlled by PMC and communicated to PMO. Records demonstrating compliance with legal requirements and conformance with the ESMP will also be maintained. PMO 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 PMO.

The following reports will be produced:

- The Contractor will prepare monthly reports on SSESMP/C-ESMP implementation under the project and submit them to PMO and PMC.
- To ensure the contractor implements the SSESMP/C-ESMP accordingly, PMC will conduct environmental monitoring throughout the project 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 project sites, and compliance of the contractor's activities with SSESMP/C-ESMP.
- The project status and compliance with ESMP will be reported to the AIIB through semi-annual environmental monitoring reports prepared by PMC and approved by PMO.

9.4. Institutional Arrangements

Accountability for the project's environmental and social performance sits, ultimately, with the RC under the Ministry of Transport of Uzbekistan, which will establish a PMO to run day-to-day implementation. The PMO will be led by a Project Director, supported by Environmental and Social Specialists whose job is to keep the ESMP alive and to manage the project's own environmental and social issues directly.

Oversight runs from the Ministry of Transport down through the Committee for Roads and to the PMO, which in turn directs and reviews the work of the Design Institute, the Project Management Consultant, and the Contractors.



Figure 56: Institutional Arrangements

Institutional arrangements are summarized below.

Table 102: Institutional Arrangements

Party	Key Roles and Responsibilities	Reports To	Reporting Instrument / Frequency
Committee for Roads (RC), Ministry of Transport	▪ Accountability for the project's E&S performance; ▪ Establishes the PMO	AIIB (financier)	Project-level reporting per financing agreement
Project Management Office (PMO)	▪ Led by Project Director; ▪ E&S Specialists keep the ESMP "alive" ▪ Manage E&S issues project-wide ▪ Review/quality-check PMC's E&S work ▪ Ensure Contractor SSESMP/C-ESMP compliance ▪ Establish and maintain GRM channels (community and worker), ▪ Contract independent third-party E&S monitor, ▪ Maintain E&S issue log, fold ESHS into quarterly reporting, ▪ Submit semi-annual monitoring reports and project completion report to AIIB, ▪ Identify and close training gaps, ▪ Review/update the ESMP as conditions change	Committee for Roads / Ministry of Transport (institutionally); reports to AIIB	▪ Semi-annual monitoring reports; ▪ Project completion report; ▪ Quarterly progress reporting (ESHS folded in)
Design Institute	Engineering design	PIU	Design review reports per Lot
Project Management Consultant (PMC)	▪ Staffed with E&S specialists; ▪ Trains Contractors on SSESMP/C-ESMP ▪ Supervises and guides Contractor ESMP implementation ▪ Monitors Contractor environmental performance ▪ Approves site materials ▪ Prepares semi-annual E&S monitoring reports (for PIU approval)	PIU	▪ Monthly, quarterly, and semi-annual reports to PIU; ▪ Final E&S Monitoring Report at post-construction audit

Party	Key Roles and Responsibilities	Reports To	Reporting Instrument / Frequency
	▪ Conducts post-construction audit ▪ Liaises with communities/mahalla committees ▪ Leads and runs the settlement-level GRM		
Contractor(s)	▪ Prepares SSESMP/C-ESMP within 30 days of contract signing, prior to physical works ▪ Implements environmentally responsible construction and mitigation measures ▪ Assigns full-time qualified E&S/OHS specialists	PMC (reports submitted to PMC before PIU)	▪ Monthly reporting
AIIB	▪ Financing institution; reviews PIU semi-annual reports and project completion report ▪ Supervises overall E&S compliance ▪ Operates the Project-affected People's Mechanism (PPM) as an independent recourse channel	–	▪ Receives semi-annual and completion reporting from PIU

9.4.1. Committee for Roads and Project Implementation Unit

The PMO's E&S Specialist(s) are expected to keep project activities aligned with three overlapping sets of requirements at once: national EIA law and procedure, the standards of the financing institution, and the commitments made in this ESIA and ESMP. This is a coordinating and enforcing role rather than a purely administrative one, and its core responsibilities include:

- managing environmental and social issues across the project rather than leaving them solely to the PMC or Contractors;
- reviewing and quality-checking the PMC's environmental and social work;
- working with the PMC to make sure each Contractor produces a Site-Specific Environmental and Social Management Plan (SSESMP) and meets its environmental, social, health, safety, and labor (ESHS) obligations;
- setting up separate grievance channels for affected communities and for workers, and actively keeping both channels operating for the full duration of the project, not only during construction;
- contracting an independent, certified third-party monitor to carry out external environmental and social monitoring and produce the associated reports;
- keeping a record of environmental and social issues as they arise, folding ESHS matters into quarterly progress reporting, and submitting semi-annual monitoring reports and a project completion report to the financing institution;
- spotting training gaps among the parties involved in ESMP implementation and organizing the sessions needed to close them; and

- reviewing and, where necessary, updating the ESMP itself as the project progresses, so that it continues to reflect actual site conditions and emerging risks rather than only the assumptions made at the design stage.

9.4.2. Project Management Consultant

The project will engage Project Management Consultant (PMC) with responsibilities for assisting PMO in project management, overseeing the implementation of ESIA and 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 specialists to perform properly environmental and social supervision and guidance during the design and the construction. PMC will have the following responsibilities:

- PMC will provide training on SSESMP/C-ESMP 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 PMO.
- PMC will conduct a post-construction audit before the project commissioning and verify sites' compliance with ESMP.
- PMC will liaise with the communities and makhalla committee's heads in the project 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 PMO monthly, quarterly, and semi-annual. The Final Environmental and Social Monitoring Report will be submitted upon post-construction audit to demonstrate that the project is appropriately completed.

9.4.3. Contractor

The contractor will be responsible for the preparation of the Site-Specific Environmental and Social Management Plan (SSESMP/C-ESMP) within thirty days upon signing the contract and prior to commencing any physical work. Contractors will implement environmentally friendly construction and the corresponding mitigation measures.

Contractors 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, mitigation measures, performed tests, delivered training activities, received, and addressed complaints, accidents, etc. The contractor will submit its report to the PMC before the submission of report to the PMO.

9.5. Capacity Building

Capacity building is essential for the effective implementation of ESMP. This process needs to occur at all levels of the project, including the RC, PMO, PMC, and contractors. At the construction site, the PMC will take the lead in executing the capacity building plan. However, contractors will also be responsible for conducting training for their own staff and workers. The capacity building program will encompass various topics, including general environmental and social awareness, identification of sensitive receptors in the area, key environmental and social impacts of the project, ESMP requirements, OHS considerations, and labor requirements.

The table below summarizes the environmental and social training programs planned for the construction and operation phases. The PMO may revise this plan as needed during project implementation. During the operation and maintenance (O&M) phase, the PMO staff will continue to provide training for all relevant O&M personnel.

Table 103: Capacity Building

Training topics	Period	Training Participants	Training Provider	Tentative cost (USD)
AIIB ESF; national EIA regulations; ESIA, ESMP, RAP, GRM; incorporation of ESHS requirements into bidding documents.	During the first year of project implementation. Duration: 1 day.	PMO's Project Director, engineers, procurement specialist.	PMO	Associated cost included in E&S Specialist's contract
Training in SSESMP/C-ESMP preparation	Upon signing the contract and prior any construction activities Duration: 3 days	PMO; Contractor	PMC	Associated cost included in PMC's contract
Training in waste disposal practices and procedures, including training on hazardous waste management	Prior construction activities and during civil work Duration: once a month; 0.2 day	EHS staff and site supervisors of Contractors.	Contractor	Associated cost included in the civil works contract

Training topics	Period	Training Participants	Training Provider	Tentative cost (USD)
Training in OHS (equipment and machinery maintenance, specific hazards of their work, first aid, basic sanitation, and health care), environmental protection, and GRM and gender issues	Prior construction activities and during civil work Duration: daily before start of works.	EHS staff and site supervisors of Contractors.	Contractor	Associated cost included in the civil works contract
Workforce Code of Conduct; gender issues; prevention of and response to GBV/SEA; other social issues relevant to labor influx.	During construction, with refresher sessions for new workers. Duration: once a month; 0.2 day	EHS staff and site supervisors of Contractors.	PMC	Associated cost included in PMC's contract
Chance-find procedure and cultural heritage awareness, including recognition of and response to potential archaeological finds and avoidance of the identified cemeteries.	Before commencement of earthworks. Duration: once a month; 0.2 day	EHS staff and site supervisors of Contractors.	PMC	Associated cost included in PMC's contract
Biodiversity awareness and natural desert vegetation, shelterbelt and tree replanting requirements, and invasive species identification and control.	Before commencement of earthworks in Lots 3–5 and the bypass; refresher sessions during construction.	Contractors' workers and site supervisors.	PMC	Associated cost included in PMC's contract
Community awareness program on the project, its schedule, anticipated impacts, and the grievance mechanism.	During project implementation.	Public and main stakeholders in the project districts.	PMO & RC	-
Training in emergency preparedness/	Continuously during construction.	EHS staff and site supervisors of Contractors. PMO	PMC Contractor	Associated cost included in PMC's and in the civil work contract

9.6. 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 project ESMP implementation is shown in the table below.

Table 104: Cost Estimates for Environmental and Social Management, US$

Cost item	Quantity	Unit cost	Total cost	Comments
I. Environmental Monitoring			**174,00**	
Air quality (gaseous monitoring + PM 2.5 and PM10)	14 = 6 locations in bypass + 8 locations (at least 2 monitoring stations per district) every quarter for 36 months: 14x4x3=168	25	4200	costs are included in the civil works contract
Noise and vibration	14 = 6 locations in bypass + 8 locations (at least 2 monitoring stations per district) every quarter for 36 months: 14x4x3=168	25	4200	costs are included in the civil works contract
Soil quality	20 = 12 locations in bypass + 8 locations (new road junctions) every quarter for 36 months: 20x4x3=240	20	4800	costs are included in the civil works contract
Surface water quality	14 = 6 locations in bypass + 8 locations (at least 2 monitoring stations per district) every quarter for 36 months: 14x4x3=168	25	4200	costs are included in the civil works contract
II. Environmental Mitigation Measures/Permissions			**3,099,770**	
Compensatory planting trees (~11,351 trees, Lots 1–2)	~11,351x10=113,510	20	2,270,200	costs are included in the civil works contract
Permit for tree felling in the project facilities	11,351x 35 (basic calculation value in Uzbekistan) x 2		794,570	costs are included in the civil works contract
Health check-up of the contractor's personnel	Lump sum	5,000	5,000	costs are included in the civil works contract
Management of liquid waste (installation and operation of wastewater treatment facilities on each site)	Lump sum	5,000	5,000	costs are included in the civil works contract
Management of solid waste (storage facilities and transportation to the disposal site)	Lump sum	20,000	20,000	costs are included in the civil works contract
III. Training in the preparation of Site-Specific Environmental and Social Management Plan	Lump sum	---	5,000	costs are included in the PMC contract
IV. Staffing			**544,000**	

Cost item	Quantity	Unit cost	Total cost	Comments
PMO E&S Specialist	36 months	2,000	72,000	Individual contract
PMO Gender Specialist	36 months	2,000	72,000	Individual contract
PMC Environmental Specialist (international + local)	Lump sum	---	200,000	costs are included in the PMC contract
PMC Health and Safety Specialist	Lump sum	---	100,000	costs are included in the PMC contract
PMC Gender Specialist	Lump sum	---	100,000	costs are included in the PMC contract
IV. GAP Implementation	---	---	**204,600**	costs are included in the PMC and contractor contract; details on cost items provided in GAP
RAP Implementation	---	---	**2,758,103.40**	details on cost items provided in RAP; funding is provided from the State Budget of the Republic of Uzbekistan
		Subtotal:	**6,623,873**	---
		Miscellaneous	**662,387**	**10% of Subtotal**
		Total	**7,286,261**	---