Intended for

Huaxin Cement Jizzakh LLC

Date

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HUAXIN CEMENT JIZZAKH PLANT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

华新水泥股份有限公司
HUAXIN CEMENT CO., LTD.

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Ref

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ACRONYMS AND ABBREVIATIONS

AALA	Aydar Arnasay Lakes System
AIDS	Acquired Immune Deficiency Syndrome
AoI	Area of Influence
BAT	Best Available Technologies/Techniques
CAMP4ASB	Climate Adaptation and Mitigation Program for the Aral Sea Basin
CDM	Clean Development Mechanisms
CIA	Cumulative Impact Assessment
CIS	Commonwealth of Independent States
CM	Cabinet of Ministers
CMP	Construction Management Plan
CNY	Chinese Yuan
COD	Chemical Oxygen Demand
CSR	Corporate Social Responsibility
DCA	Designated Conservation Area
EBRD	European Bank for Reconstruction and Development
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
ESAP	Environmental and Social Action Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
FEZ	Free Economic Zone
GHG	Greenhouse Gases
GIIP	Good International Industry Practice
GRP	Gross Rating Point
HIV	Human Immunodeficiency Virus
IFAS	International Fund for Saving the Aral Sea
IFC	International Finance Corporation
IFIs	International Financial Institutions
ILO	International Labor Organization
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
IUCN	International Union for Conservation of Nature
JSC	Joint Stock Company
LLC	Limited Liabilities Company
MALs	Maximum Permissible Levels
MAWR	Ministry of Agriculture and Water Resources
MEA	Multilateral Environmental Agreement

MHRUz	Ministry of Health of Uzbekistan
MLSW	Ministry of Labor and Social Welfare
MPC	Maximum Permissible Concentrations
MVD	Ministry of Internal Affairs
NEACC	The North Eurasia Climate Centre
NPP	Nuclear Power Plant
NTS	Non-technical Summary
OMP	Operation Management Plan
OSRP	Oil Spills Response Plan
PANP	Program of Action on Nature Protection
PCDF	Polychlorinated Dibenzo-p- dibenzofurans
PCFF	Polychlorinated Dibenzo-p-dioxins
PGA	Peak Ground Acceleration
PM	Particulate Matter
PPE	Personal Protective Equipment
PS	Performance Standards
SCNP	State Committee for Nature Protection
SEE	State Environmental Expertise
SEP	Stakeholder Engagement Plan
SPZ	Sanitary Protection Zone
SSE	Shanghai Stock Exchange
STD	Sexually Transmitted Diseases
TMP	Traffic Management Plan
TOC	Total Organic Compounds, Total Organic Carbon
UNCCD	United Nations Convention to Combat Desertification in Countries Experiencing Serious Drought and/ or Desertification
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organization
USD	United States Dollar
VECs	Valued Environmental and Social Components
VIA	Visual Impact Assessment
VOC	Volatile Organic Compounds
WEF	World Economic Forum
WIS	Welfare Improvement Strategy
WMO	World Meteorological Organization
WMP	Waste Management Plan
WS	Weather Station

EXECUTIVE SUMMARY

INTRODUCTION

The IFC is considering to provide loan to Huaxin Cement Jizzakh LLC (Huaxin Jizzakh) to build a US$110m cement plant in Uzbekistan, with a capacity of 4,000 tons/day (the Project). Huaxin Jizzakh is a fully-owned by Huaxin Cement Co. Ltd (Huaxin or the Sponsor), a leading cement producer in Asia, headquartered in China.

Ramboll CIS LLC (the Consultant), an entity of the Ramboll Group, was assigned to develop Environmental and Social Impact Assessment (ESIA) for the Project in compliance with the IFC Environmental and Social policies and guidelines and other applicable standards.

ESIA package was prepared to include the ESIA report, non-technical summary (NTS), Environmental and Social Action Plan (ESAP) and recommendations for Framework Environmental and Social Management Plan (ESMP).

The E&S Assessment relates to a requirement to critically review the current environmental and social risks of the Project construction and operation as well as the Project's associated facilties and the Company's management capacity to manage and mitigate these risks.

The Project performance is therefore assessed against the standards provided within national and international environmental and social requirements. Should national regulations and/or international standards differ from the levels and measures presented in the applicable Lender standards, the Company's Project will apply the most stringent

PROJECT PROPONENT

Huaxin Jizzakh is a fully-owned by Huaxin Cement Co. Ltd, a leading cement producer in Asia. Established in 1907, The Huaxin Company was one of the first cement producers in China and has been recognized by now as cradle of this country's cement and concrete industry. In 1993, Huaxin implemented joint stock reform and became the first A and B shares listed corporation of China in building materials sector.

Currently titled as Huaxin Cement Co. Ltd., the Company produces annually about 70 million tons of cement varieties (graded as 32.5 MPa, 42.5 MPa or higher), some 2 million tons of ready-mixed concretes, and 4.5 million tons of aggregates. Additional products and services provided by Huaxin include cement equipment, cement packaging products, and treatment of solid waste materials.

Present in 10 provinces in China and abroad with over 100 production sites and total assets of over 26 billion CNY, sales of 3 billion USD, and with 17,000 employees, Huaxin Cement Co., Ltd is ranked in China's top 500 manufacturing companies and is also listed as a Fortune China 500 Company.

The Huaxin's headquarter is located in the City of Wuhan, Hubei Province of the Central China.

Since 2008, LafargeHolcim Ltd., the Swiss-based construction materials major, became the largest stakeholder of Huaxin with its current share being around 41.8 per cent[1]. Another large share of the Company is operated by Huaxin Group Co. Ltd. (some 25 per cent), and several companies are holding the shares of 1 to 3 per cent (Rongtong Fund Management Co. Ltd., China Investment Corp., UBS Group AG, The Goldman Sachs Group, Inc.). Huaxin is listed on the Shanghai Stock Exchange (SSE) with a market cap of ~$3.5 billion (bn). Huaxin has operations across China, Tajikistan, and Cambodia and has plans to expand to other developing markets.

To operate the Project, Huaxin established a limited liability entity, Huaxin Cement Jizzakh LLC, with a status of a foreign enterprise in Uzbekistan and a headquarter in Chimkurgon Rural Settlement of the Zafarabod District.

[1] According to the latest available quarter report of the Huaxin Cement Co. Ltd. (http://www.huaxincem.com/Investor-Relations/)

NEED FOR THE PROJECT

In 2016, the Republic of Uzbekistan consumed 8.5 million tons of cement which is 24 per cent higher than in 2012[2]. The growth continued in 2017-2018 and is expected to remain in coming years with the mean rate of 5 per cent a year due to the growing development and construction works within the country.

Domestic production of cement is also growing and covered about 70 per cent of consumption, so the year of 2018 gave 9.2 million tons of the national cement production and some 3.5 million imported (and in 2019 the inflow of cement has increased by 47 per cent as compared with the same reporting period of the previous year). Over 90 per cent of the cement is used directly (65 %) or as construction elements (25 %) for civil and industrial projects of Uzbekistan.

Figure ES1.: Location of major cement plants at the map of the Republic Uzbekistan

Source: Zaripov K.V., 2017[3], Huaxin Cement plant is marked by No 20); 1 - QizilqumCement JSC, 2 - AkhangaranCement JSC, 3 - KuvasayCement JSC, 4 - BekabadCement JSC, 5 - Jizzakh Cement Plant, 6 - Fergana Cement LLC, 7 - Turon Eco Cement Group LLC, 8 - Farkhadshifer LLC, 9 - Everest metall favorit LLC, 10 - Kezar LLC, 11 - Sing Lida LLC, 12 - Buyuk PE, 13 - TITAN CEMENT LLC, 14- Shangfeng-Bridge of Friendship JV, 15 - Yaypan Shifer LLC, 16 - GalloorolCement LLC, 17 - Sherobod Cement Zavodi JSC, 18 - SurkhanCementInvest LLC, 19 - Gansu Hengya Cement Co LTD, 20 - Huaxin Cement LLC

The proposed Project aims at alleviating the growing cement deficit in the domestic market which currently imports some 30% of the total cement consumed. It is anticipated that local cement production will substitute imports, thereby generating foreign exchange savings and a significant reduction in the cement price. The increase in local production will help support the development of infrastructure and housing projects, which will encourage new business opportunities in other industrial and service sectors of Uzbekistan (especially in Jizzakh and the neighboring Samarquand regions) and lead to further job creation (more specifically - over 300 new positions for the Project).

The facility represents an input of 300M USD, financed through direct investment and borrowed funds. Therefore, the Project will contribute substantial transfers to both regional and national budgets through

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[2] Zaripov K.V. Cement industry of the Republic of Uzbekistan // ‘Cement and its Applications’ Journal. 2019. No. 1 (available at https://jcement.ru/) Zaripov K.V. Cement industry of the Republic of Uzbekistan // ‘Cement and its Applications’ Journal. 2017. No. 2 (available at https://jcement.ru/)

[3] Zaripov K.V. Cement industry of the Republic of Uzbekistan // ‘Cement and its Applications’ Journal. 2019. No. 1 (available at https://jcement.ru/)

corporate and other taxes over its lifespan. Output from the plant is expected to be 40 per cent of M400 Portland cement and the rest 60 per cent of M500 cement with 10 per cent of the total volumes earmarked for export[4]. The Project is divided into two stages, with the first one starting in the beginning of 2020 with annual cement production of 1.5 Mt. Decisions relating to the second stage will be made with market conditions taken into account.

HUAXIN JIZZAKH PROJECT

Huaxin Jizzakh is approximately 25 km north of Jizzakh City, Jizzakh Oblast, Uzbekistan (Figure ES1). The site is barren steppe land with the nearest community approximately 5 km away. Another existing cement plant is approximately 8 km to the northwest of Huaxin Jizzakh site. There is no other industry in the project area.

The project consists of 81 ha cement plant site and the adjacent 440 ha limestone quarry. The associated facilities with the project are 3 km access road, 50 km power transmission line, and 17 km gas pipeline. The 3-km temporary access road was built by the local government a few years ago for construction material transportation from the current Huaxin Jizzakh site. The project site is adjacent to an existing railway and a water canal to deliver water from Syr Darya River to Aydar Lake. Limestone is transported to the plant through fully covered conveyor. Water is supplied by the adjacent canal and the sole source of energy is natural gas. 60% of the produced cement will be transported through adjacent railway and the other 40% will be transported by road trucks.

Huaxin built a cement plant in Sughd, Tajikistan in 2014. The proposed Huaxin Jizzakh is only 200 km east of Huaxin Sughd plant. Huaxin Equipment Engineering Co., a subsidiary of Huaxin, was the equipment supplier and engineering, procurement, and construction (EPC) contractor for Huaxin Sughd project. The same EPC contractor is selected for Huaxin Jizzakh project. The technologies for Huaxin Jizzakh project will be similar to the ones for Huaxin Sughd project.

LEGAL FRAMEWORK AND APPLICABLE STANDARDS

International Financial Institutions (IFIs) Requirements

Identified Applicable IFC Performance Standards (2012)

IFC is part of the World Bank Group and a recognised international leader in the sphere of development and implementation of environmental and social sustainability policies. In accordance with its Environmental and Social Sustainability Policy, IFC uses a set of environmental and social Performance Standards (PS) to assess proposed projects. In April 2012 IFC issued a new version of Environmental and Social Sustainability Policy and PSs.

PS 1: Assessment and management of environmental and social risks and impacts

PS 2: Labour and working conditions

PS 3: Resource efficiency and pollution prevention

PS 4: Community health, safety and security

PS 5: Land acquisition and involuntary resettlement

PS 6: Biodiversity conservation and sustainable management of living natural resources

PS 7: Indigenous peoples

PS 8: Cultural Heritage

The eight Performance Standards are supported by IFC EHS guidelines.

PS 1-5 are considered by Ramboll to be relevant to the Project, while PS 6, PS 7 and PS 8 are not considered relevant due to the following reasons. Natural protection area or protected species are not identified by desktop research, field visit, and meeting with local environmental agency. The site visit

[4] Huaxin Cement begins Zafarabad plant build in Uzbekistan // CemNet.com Portal of the cement manufacturing sector (available at https://www.cemnet.com/)

verifies that there are only stressed sparse grasses at the barren steppe during relative wet season in the spring. There is no other vegetations in the project area. There is no residential community near the project site. Therefore, PS6: Conservation and Sustainable Management of Living Resources, PS: 7 Indigenous Peoples, and PS8: Cultural Heritage are not considered to be applicable to the project.

Applicable WB/IFC Guidelines

The WB/IFC EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP), as defined in IFC Performance Standard 3 on Resource Efficiency and Pollution Prevention. The EHS Guidelines contain the performance levels and measures that are normally acceptable to the IFC and are generally considered to be achievable in new facilities at reasonable costs using existing technology.

The IFC EHS Guidelines comprise both general and industry-specific guidelines. The IFC General EHS Guidelines contain information on cross-cutting environmental, health, and safety issues potentially applicable to all industry sectors. It is designed and should be used together with the relevant industry sector specific guidelines.

IFC Environmental, Health and Safety (EHS) Guidelines applicable to the Project are:

- General EHS Guidelines, dated April 2007;
- Cement and Lime Manufacturing, dated April 2007;
- Construction Materials Extraction, dated April 2007;
- Mining, December 2007;
- Railways, April 2007;
- Electric Power Transition and Distribution, April 2007.

Other applicable procedures and guidelines of IFC:

- Environmental and Social Review Procedures, 2016;
- Environmental and Social Management System Implementation Handbook (General), 2015;
- Environmental and Social Management System Implementation Handbook for Construction, 2014;
- Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets, 2007;
- Good Practice Note: Managing Contractors' Environmental and Social Performance (October 2017);
- Use of Security Forces: Assessing and Managing Risks and Impacts (February 2017);
- Worker's Accommodation: Processes and Standards (Guidance Note by IFC and EBRD, 2009);
- Good Practice Handbook: Assessment and Management of Cumulative Impacts: Guidance for the Private Sector in Emerging Markets (August 2013).
- IFC. Good Practice Note: Addressing Grievances from Project-Affected Communities, 2009.

Uzbekistan Legal Framework for Sustainable Development and Environmental Performance and Protection

Since the onset of the new millennium, Uzbekistan passed a number of new laws and revised others relating to environmental management and sustainable development. The aims of the new or revised laws were to align them with relevant international laws and standards, including international conventions and treaties ratified by Republic of Uzbekistan, and also to provide implementation measures for basic normative laws. A basic overview of the latest developments relating to legal requirements of relevance to the Huaxin Cement ESIA is given below.

The Law on Nature Protection is the basic environmental law and was first enacted in 1992. The amendments focussed mostly on adapting the law to bring the law in line with other new laws and programmes or changes to government structures.

In 2004, the Law on Protected Natural Areas replaced the earlier 1993 Law on Specially Protected Natural Territories. This new law was aimed at facilitating alignment with the Convention on Biological Diversity, the Ramsar Convention[5] and the Bonn Convention[6].

In 2002, the Law on Subsoil (Law No. 444-II of 13.12.2002) was enacted. Provisions of this law have an implication on environmental management in general. In the context of the Huaxin Cement project, it requires activities that require licensing to undergo ecological studies, waste management and waste disposal procedures provided for as proponents have full liability in terms of ownership of the waste produced by such proponent.

The 2002 Law on Waste as most recently amended in 2011 addresses waste management in the general context (air and water contamination / pollution not included in this Act). It also refers to basic human rights where citizens of Uzbekistan have the right to a safe and healthy environment, to participate in the discussion of projects, and to compensation as a result of damages suffered as a result of a development / project. Waste transport requirements are also provided in this Act as well as the prohibition of storage or burial of radioactive waste. Waste recycling incentives are discussed in this Act.

The Land Code (1998) provides the requirements for most categories of land and specifies the procedures for land acquisition and termination of use, as a result of the fact that land is state owned and cannot be owned in a person's private capacity.

The 2001 Law on the Protection and Use of Objects of Cultural Heritage is primarily directed at the preservation and management of important elements of the built environment, but it also addresses the protection of territories representing historical archaeological, aesthetic, ethnological or anthropological value, as well as natural landscapes connected with historical events and persons.

The Town Planning Code of 2002 contains various provisions for stakeholder consultation, environmental management and access to information. The public have the right to comprehensive and timely information on environmental conditions as well as future plans that could have a potential adverse impact on the environment. Citizens also have the right to take part in discussions on town planning processes.

Uzbekistan is a member of the United Nations Organization, and therefore is obliged to comply with international human rights acts and also to apply them to the national policy and laws.

The Welfare Improvement Strategy (WIS) (2007) is focused on economic growth in order to reduce poverty nationally. Government remains committed to implementing measures for improving living standards, social services and quality of health care, education and rural development issues.

In line with these objectives, Uzbekistan launched reforms in agriculture, privatization, trade and tax reform, and support to public administration and decentralisation. Government provides loans regionally at subsidized interest rates to vulnerable households for home-based income-generating activities, family businesses and livestock development. The loans are financed from the Employment Fund (by the Ministry of Labour and Social Welfare), and qualifying households are identified and selected through the Citizens' (Mahalla) Committees.

PROJECT CATEGORIZATION

The greenfield cement plant and limestone quarry have a large footprint of total 521 ha with associated facilities of gas pipeline, power transmission line, and access road. Besides limestone, significant amount of water and natural gas will be consumed. Particulate matters (PM) and nitrogen oxide (NOx) are expected for the project emissions.

The key E&S issues and risks associated with this project include: i) an environmental and social impact assessment to fully understand the potential E&S risks and mitigations ii) E&S management for both construction and operation phases iii) energy efficiency and greenhouse gas (GHG) emissions iv) water availability and water efficiency v) emission controls for PM, NOx, and potential heavy metals vi) land

[5] Convention on Wetlands of International Importance especially as Waterfowl Habitat.
[6] Convention on the Conservation of Migratory Species of Wild Animals

acquisition and compensation and stakeholder engagement. This is therefore a Category A project according to IFC's Policy on Environmental and Social Sustainability.

PROJECT'S ALTERNATIVES

Siting Alternatives. As most of the other similar projects associated with deposits of mineral resources, the Huaxin Cement Plant cannot be located far from the limestone quarrying area and existing roads. The Project's geography also includes several remote areas from which the other raw materials like clay and Fe-containing minerals will be delivered. Shorter distance location of the Plant from the basic limestone deposit will reduce the transportation cost and in turn will lower the cost of cement production as well as minimize toxic and dust emissions and generation of greenhouse gases due to transport movement over shorter distance from quarry to the Plant.

The chosen site is also provided with very short assess to existing rail roads the capacity of which enables further increment of load with Project-related deliveries of both raw materials and products. Connection of the Plant to the local motor roadway network is not so convenient and requires construction of a 3 km long assess road across an area of irrigated croplands and fishery ponds.

The proposed site is located in an area which is devoid of any biodiversity including forestry, wildlife, migratory birds, game reserves, or protected species of fauna and flora. In addition, there is no cultural or any other heritage in the Project area, and all the residential areas are located at a distance of 4-10 km from the constructed plant.

Quarrying Method Alternatives. Sub-surface open cast mining has been selected as the most efficient method of mining and suitable for the quarry operation, as it is considered to be safer and more economical. In addition, the Company has to select the frequency of blasting that is generally stated as being twice a week. Consultant expects its recommendations will be taken into account to minimize the impact of explosions on communities and wildlife of the surrounding area.

Plant's Technology Alternatives. The technology being offered by Huaxin Cement Jizzakh is considered to be 'state of the art' in terms of environmental controls, energy efficiency and modern design. Dry process technology has been preferred over wet or semi-dry technologies as it is more economical in terms of power consumption as well as heat and manpower requirement and less capital intensive.

The new plant will be built according to the applicable Best Available Technologies (BAT) defined for the cement industry, which include the adoption of pre-calcining technology in the clinker production and dedusting bag filters/ESP for gases.

No-Project Alternative. The 'no-project" alternative means that the Project will not be developed, and The Republic of Uzbekistan will continue to import cement to meet its future needs and will be mostly dependent on the World's market fluctuations. Uzbekistan has abundant natural resources and especially the high quality and easily extractable limestone reserves which make the best location in Jizzakh Region for a cement plant. And that is why the other similar projects have already been launched here.

The Kuterminskoye Limestone Deposits which is planned to be used as a raw materials base for the Project were initially discovered and explored in 1986 but remained all the time unclaimed and has been therefore included into the governmental list of undeveloped mineral deposits offered for external investments. This single source alternative, if not utilized, will continue to sustain dependence on cement imports, but that could also very easily result in the cement supply shortages. Shortage of building material like cement will cause cement prices to rise.

The Region of Jizzakh has been recently declared to be a priority social and economic development area of Uzbekistan, and this implies the need for development the available natural resources of the territory and increasing demand for construction materials. According to the Company's forecast, the Project will enable Uzbekistan to become cement exporter, while "Do Nothing" alternative will place the country to further dependency on cement import and slow down its economic growth.

Although it will have some negative environmental impacts, the proposed cement plant is expected to provide about 1,000 job opportunities during its operation phase and additional job and economic opportunities (according to the Company's calculations – for 1,000 or 2,000 residents of Jizzakh Region) through development of supply/distribution chain and trucking. In addition, there will be a transfer of technology associated with installation, operation of the equipment and maintenance and savings on foreign exchange, hence this alternative was chosen.

The investment potential of US Dollar 300 million, as proposed by the Project Proponents, will not be utilized with "No-Project" option.

ESIA PROCESS

To ensure a robust and comprehensive impact assessment, the ESIA process is structured around a series of progressive and iterative stages. Stakeholders, entities and individuals responsible for development/implementation of the Project design, the ESIA team provide inputs to these stages. Public engagement is maintained at all stages of the ESIA process.

This ESIA covers all required stages: from scoping, stakeholder identification and consultations, review of alternatives, identification and assessment of benefits and adverse impacts of the Project, to development of mitigation and remediation measures, and proposals for the control and monitoring to be undertaken.

ENVIRONMENTAL AND SOCIAL CONDITIONS

The Project Area is situated within so-called Mirzacho'l Physiographic District[7], the most part of which is represented by semi-flat loess plain on the left bank of Syr Darya River, extending from the mouth of Ferghana Valley to the west across the Region of Jizzakh and having a sequence of mountain ridges (Turkestan, Marguzar and Nuratin) as its southern margin. Geographically, Mirzacho'l Steppe is a south-eastern extension of the Kyzyl Kum Desert, several parts of which have been transformed into man-made oases through supplying the Syr Darya water via long-distance main canals and creating numerous areas of irrigated lands. The Project has been sited at the periphery of such an oasis and occupies a variety of physiographic elements – a mountain ridge with adjacent footslopes and lowlands drained by a river valley.

Climate and Air Quality. The Region of Jizzakh is characterized as having a sharp continental climate, with hot and long summers and cold and wet winters. Mean annual precipitation for the region is 350-400 mm that falls almost entirely as snow during the winter months. The temperatures fluctuate highly throughout the year with summer temperatures reaching +45°C and winter temperatures dropping to below –25°C. Mean annual number of sunny days equals to 300, with soil surface temperatures during the summer often exceeding +50°C.

None of 25 stations of the national air quality monitoring network is located in the Jizzakh Region. The closest station in Samarqand measures the levels of NO_x, SO_2 and CO, with no data on particulates, VOCs, PAHs having been available. Furthermore, observations within a large town cannot provide a good reference base for the rural area of the Project, so this means that there's a lack of air quality information for the Project's area of influence. Huaxin has contracted an institute in Tashkent to measure SO2, NO2, and dust at five nearby communities.

Terrain and Natural Water Courses. The Project Area is situated at the western periphery of Tashkent-Golodnosteppe (Mirzacho'l) Lowland drained by the Kly (also named Qili or Sanzar) river and edged by a series of mountain ridges.

The East Chimkurgon area of the licensed limestone mining covers a 400 ha part of the eastern section of the Balykly-Tau Ridge with smaller pieces of adjacent lowland. The ridge is a part of the larger mountain system called Nuratin Mountains that is noted for occurrence of calciferous rocks.

The highest top of the ridge within the claims is 532 masl, with the adjacent lowland's surface ranging between 280 and 325 masl. The surface of the ridge is clearly divided into peaked summit, steep

[7] Gulomov P., Vakhobov Kh., Baratov P. Physical Geography of Middle Asia and Uzbekistan. – Toshkent: O'qituvchi Press, 2017

backslopes with exposed bedrock (the limestone) and, finally, more gentle footslopes formed by a mixture of friable slope deposits.

The River of Kly has V-shaped valley without a set of terraces and floodplains developed. It drains the surrounding lowland irrigated by a network of artificial channels.

Bedrock and Recent Deposits. The semi-flat area of the cement plant and accommodation camp is formed by a sequence of loess-like silty and sandy loams rich in gypsum and carbonaceous concretions. This surficial material has been found subject to a number of naturally occurring soil-movement processes like subsidence, suffusion, karst and fissuring; its overall thickness changes from 0.5-1 m to 5-6 meters depending on location. Depth to the gray-colored fissured limestone was measured as being the minimum (8 m) along the southern boundary of the Plant site, i.e. at the Balykly-Tau Ridge's footslope. There's a 6-10 m thick weathering crust between this bedrock and the surficial loess-like deposits that consists of limestone debris with inclusions of loam and clay originated from weathering and internal abrasion of the carbonaceous gravel.

Groundwater. Shallow groundwater table was found present at wide ranges of depths, from 2.6 to 13.8 m below surface, due to inhomogeneity of soils and nonuniform distribution of irrigation water throughout the area. According to laboratory analyses of groundwater samples, the water is aggressive to most of conventional construction materials due to increased salinity and some other properties.

Most of the residential areas closest to the Project Site are supplied with groundwater of Dustlik Aquifer the southern boundary of which goes along the A.A. Sarkisov Main Water Supply Canal. The aquifer's reservoir horizons demonstrate the overall thickness of 20 to 60 m, lie within quaternary deposits and are therefore affected by infiltration of irrigation water and channel water losses. The lower saturated horizon of the aquifer is less prone to contamination and contains relatively low mineralized (0.7-1.5 g/l) water, with the upper layers tending to increase their salinity to as much as 5 g/l[8].

The Company plans to extract some amount of water from this aquifer for technical purposes by drilling 2 boreholes near the Plant site. The overall water consumption of the Plant will be equal to 1056 m^3 a day as a maximum, so the capacity of water intake facility must be corresponding to this value.

It's very important to note that groundwater of the Project Area are not protected from contamination by water-tight strata.

Soils. The Project area belongs to a periphery of so called serozem belt - a strip of serozems[9] also titled as Calcic Xerosols by UN's FAO and Calcisols by WRB[10] along the piedmont of the Pamiro-Alay mountains. Historically, most part of the soils within the Project's area of influence (with the only exclusion of steeply graded mountain slopes and peaked summits) was used for sporadic grazing. In the 19th century, under the Russian Empire's protectorate, the area took the 150 years long path of irrigated farming. Supporting irrigation and associated agricultural expansion was one of the most important issues soil scientists addressed in both historical and man-made oases of the Jizzakh Region. From 1950-s onwards, the area became a part of the larger-scale irrigation zone where native soils have been deeply transformed to meet agricultural requirements.

The long-term irrigation essentially changed soil formation processes. More specifically, sufficient moistening along with systematic soil tillage and fertilizers application facilitated soil biological and physical-chemical activity, increased intensity of soil processes, stimulated removal of water-soluble salts and accumulation of organic carbon, and finally created relatively thicker humus horizons (as compared to non-irrigated variants). Therefore, according to many reviews[11], soils of the areas that were irrigated and cultivated for a long time must be considered in general as "gold reserves" of the Central Asia.

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[8] Tirkasheva M.B. et al. Structural and Geological Analysis of Groundwater Regime for Aquifers of Nuratin-Turkestan Region // Innovations in Agriculture. Proceedings of the International Research Conf. Moscow: 2015. P. 57-66. Available at https://moluch.ru/conf/agr/archive/127/7650/

[9] Rozanov A.N. Serozems of the Middle Asia. - Moscow: Academy of Sciences of the USSR, Soil Institute im. V.V. Dokuchaev, 1961. 541 p.

[10] World Reference Base for Soil Resources, the most internationally recognizable soil classification

11 Mirzabayev A. et al. Economics of Land Degradation in Central Asia. In: Nkonya E., Mirzabaev A., von Braun J. (eds) Economics of Land Degradation and Improvement – A Global Assessment for Sustainable Development. Springer, 2016.

Period of intensive irrigation development in this area was completed by 1990 due to basins water reservoir exhaustion and a number of ecological aggravations (especially in the downstream Aral Sea area). In after years the wide scale development of irrigated lands was stopped, and this triggered or speeded up a set of secondary degradation processes - salinization and water logging, water and wind erosion, overgrazing, loss of organic matter and soil fertility, loss of biodiversity.

Within the Project's footprint, the historically irrigated variants of Calcisols (or Serozems, see Figure 11) are associated with Calcaric Leptosols (weakly developed mountain soils), Leptic Skeletic Calcisols (a transition variety between Leptosols and Calcisols), exposed bedrock and friable deposits. Adjacent areas are occupied by cultivated variants of Calcisols (so-called Irragric Anthrosols) associated with Solonchaks (salt-affected soils), Gleysols (soils affected by groundwater), Fluvisols (soils of the Qili/Kly river valley), and Technosols (soils of fills, excavations, other disturbed locations). None of these soils are naturally/environmentally unique or specially protected by the law of Uzbekistan. It is also unlikely that soils affected by the Project serve as a natural or man-made reservoir for historically valuable artifacts or pose a specific hazard for the Project (like the one associated with natural infections, endemial diseases, radon or other gaseous appearances, UHO, etc.). At the same time, all of this cannot be fully ruled out in the absence of site surveys other than geological one.

The main function of soils of the Project area is agricultural, with the highest productivity and economic value having been historically made for the irrigated variants of serozems (Calcisols) and associated soils. Most of the soils listed above can be also characterised as vulnerable to both physical (mechanical) and chemical impacts due to their physical instability and very thin humified and/or root-spread layer (Leptosols and Skeletic Calcisols of slopes), unbalanced water regime and highly fluctuating profile distribution of salts (Gleysols, Solonchaks, Irragric Anthrosols), native exposure to wind and water erosion (Fluvisols, Technosols).

Natural hazards. The surveyor («O'ZGASHKLITI» DUK, 2018) recommends to remove all the fill materials that present onsite and indicates the following geomorphic processes that must be considered as hazardous when designing the Cement Plant:

- Subsidence of the loess-like loams;
- Groundwater and soil aggressivity to construction materials; and
- Suffusion.

Consultant would also make the following additions to this list:

- water and wind erosion the activity of which will be increasing especially within construction and quarrying sites and require a set of specific control measures;
- rockfalls and sloughing – for the quarrying areas only;
- waterlogging – for the Plant and Accommodation Camp areas;
- karst processes accelerated by irrigation.

As for the seismic conditions, the Project Area is characterized by seismicity level of 7 units, with average repeatability of earthquakes having this magnitude being assessed as once for the period of 200 years («O'ZGASHKLITI» DUK, 2018).

BIODIVERSITY

Terrestrial Ecosystems. The Project Area is historically dominated by desert-like steppes, environmental status of which is dependable strictly on the local soil, topography and groundwater conditions. A list of sub-dominating natural ecosystems includes scarcely vegetated mountain slopes, saline meadows of the lakes' periphery and unstable riverine communities. Native vegetation of this area demonstrates relatively low species diversity and consists mostly of herbs (incl. ephemeral ones) with

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Land Degradation and Desertification in Central Asia: Central Asian Countries Initiative for Land Management. - A final report for the Swiss GEF Council Member. CALCIM, 2010. Available at https://zoinet.org/wp-content/uploads/2018/02/CACILM.pdf local occurrence of shrubs and trees (in locations relatively rich in water). Three of the plant species recognized as rare or endangered are recorded as potentially present within the Project's area of influence (*Nonea calceolaris, Climacoptera malyginii, Salvia submutica*[12]) but for none of them the area is the only or essential part of its geographic distribution range. On the contrary, the Project footprint and its adjacent space are covered by a mixture of modified plant communities with increased role of weeds, pioneering and ruderal species, with the overall plant cover ranging from 0 to 10 per cent as a maximum. Such conditions appear generally unfavorable for supporting the plant diversity of the region.

Wildlife of the area is generally dominated by animals of subtropical and tropical origin, with few forest-steppe and steppe species occurring in river valleys. Warm conditions with sharp variations in water availability are the main limiting factors that shape wildlife structure of the Mirzacho'l Lowland. The high air and soil temperatures in spring, summer and autumn boost faunal proliferation, however viability of many groups is limited due to the lack of precipitation. In deserts, fauna is composed of species resistant to the parching environment and excessive heating due to exposure to sun at daytime, whereas the sparse vegetation does not provide any shelter. Hygrophilous and mesophilous animals can only survive near water, especially in floodplain thickets which are characterized by high temperature and fairly high humidity of air and soil, shadowiness and still air.

As for the birds of the Project Area, their total diversity equals to 78 species, 13 of which are listed in the national and/or international Red Data books. For the same reason as above, the footprint sites of the Project cannot be considered as preferred areas for these species.

Habitats. Within the Project's footprint and area of influence, most of the natural habitats (regarding to both flora and fauna) have been replaced by the modified ones in the course of irrigation farming (croplands) and livestock grazing (pastures) as well as more localized development of settlements, industrial facilities and infrastructure (urban lands). The survey performed in 2018 prior to the local environmental impact assessments did not reveal any rare or endangered flora and fauna species listed in the National Red Data Book[13]. Habitats that may be categorized as critical in terms of the IFC PS6 are most probably associated with designated conservation areas (DCA), the closest of which is situated at a distance of 14 km to the north of the proposed plant site (the Aydar Arnasay Ramsar Site).

Species of economic value. The Region of Jizzakh is inhabited by several species of game birds and mammals (i.e. those included in the List of game animals permitted for sport and amateur hunting as per Rules of Hunting and Fishing within the Republic of Uzbekistan)[14]: wild boar (*Sus scrofa*), hare (*Lepus*), porcupine (*Hystrix cristata*), nutria (*Myocastor coypus*), gophers (*Spermophilus*), fox (*Vulpes Vulpes*), corsac fox (*Vulpes corsac*), wolf (*Canis lupus*), jackal (*Canis aureus*), steppe cat (*Felis silvestris lybica*), reed cat (*Felis chaus*), badger (*Meles meles*), stone marten (*Martes foina*), mink (*Mustela lutreola*), steppe polecat (*Mustela eversmanni*), geese (*Anser*), ducks (*Anatinae*), coot (*Fulica atra*), water hen (*Gallinula chloropus*), common cormorant (*Phalacrocorax carbo*), dikkop (*Burhinus*), snowcock (*Tetraogallus*), chukar (*Alectoris chukar*), quail (*Coturnix coturnix*), partridge (*Perdix*), wild doves (*Columba livia*), turtle dove (*Streptopelia*), waders (*Charadrii*), starlings (*Sturnus*), and pheasants (*Phasianus*). The Project's footprint area consisting of the former croplands, infrastructure right-of-way strips and mountain slopes is unlikely to serve as important habitat for the game species and has not been used for regular hunting.

Aquatic Ecosystems. Hydrobiont communities of Jizzakh Region are associated with small-area water bodies (rivers, canals, lakes and ponds) conditions of which are generally limiting for habitats (due to unfavorable hydrology or increased water salinity), and therefore the species diversity of organisms is not high and has been observed as decreasing in recent decades. Fresh and brackish water habitats of the area can be divided into ones associated with natural and artificial water bodies. The formers are represented by the River Kly (Sanzar) that serves as drainage high-mineralized water receiver, and the

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[12] The Russian names of the first two plants are similar to their Latic titles – Noneya and Klimakoptera, with the third plant being generally known as Shalfey

[13] Conclusion of the State Environmental Expert Evaluation Committee dated 16.11.2018

[14] Annex to the Hunting and Fishing Rules of the Republic of Uzbekistan, approved by the State Committee for Nature Protection of the Republic of Uzbekistan, Order of 22.03.2006 No.27

drainless brackish lake Balykly that tends to dry up into solonchak each summer. Conditions of these water areas are not favorable for fish populations, as contrasted with the man-made water bodies of the Project Area including the waterways of the A.A. Sarkisov Yuzhno-Golodnostepsky Canal and aquacultural ponds.

Summarizing, the Project Area is unlikely inhabited by rare or endangered species of flora and fauna and does not serve as the only or essential part of their habitats. No DCAs are located in the closest proximity of the Project site; however, the Ramsar's Aydar Arnasay Lakes Site that is also listed as Important Bird Area No. UZ35 ('Tuzkan Lake') is at a distance of less than 20 km and, therefore, protected and rare bird species can be only met in the Project Area during their migrations.

SOCIAL CONDITIONS

The Project and associated facilities will be constructed in Jizzakh region. The cement plant itself will be located in Zafarobod district populated by 48,800 residents, most of whom are Uzbek (79.9%), Tajik (8.1%) and Kazakh (8.1%). The limestone mining operations area will be situated at the junction of three administrative districts: Zafarobod district, Forish district and Sharof-Rashidov district. Additionally, the associated facilities (gas pipeline, power lines, Project site rail and motor roads) will cross or will be located close to communities in Jizzakh town, Forish district and Sharof-Rashidov district.

The communities closest to the Project site are Balykly, Karatepa, Pistalikent, Nurafshon and Chimkurgon located at a distance about 5 km from the plant. Balykly, Pistalikent and Karatepa are also located in direct proximity or will be crossed by a temporary power line and twin 110 kV power line associated with the Project. Of the communities located in relative proximity to the Project, the largest are Nurafshon (5127 residents) and Pistalikent (4448 residents). Balykly, the community that may be potentially most affected by the Project, is populated by 341 individuals.

The area surrounding the Project is predominantly rural and has agricultural fields crossed by irrigation channels, fish farming ponds and several rural communities spread at some distance from the Project site. According to statistical data available, agriculture and fishery play central roles in the economy of Zafarobod district. Among agricultural activities, cattle breeding is the most important for Zafarobod district population. Seasonal cotton-picking jobs are significant for incomes of the locals as well.

In proximity to the Project construction site and accommodation camp several land users, both individuals and businesses, are involved into cattle herding and fishery activities. Namely, the land plots near the Project are used for sheep grazing and aquaculture ponds developing.

Infrastructure associated to the Project, including gas pipeline, power lines, Project site rail and motor roads, will also cross the rural areas used for agriculture. Some residential areas will, however, also crossed by the associated facilities that are being constructed by the Government of Uzbekistan.

ENVIRONMENTAL AND SOCIAL IMPACTS AND THEIR MITIGATION

Despite the Project is not chemically intensive, it is based on extensive limestone quarrying followed by energy-consuming high-temperature cement manufacturing associated with traffic and infrastructure operation, so it could not have all the adverse environmental and social effects fully prevented. Ramboll has classified, preliminary assessed and ranked these unavoidable impacts according to their expected magnitude, likelihood and recipient's sensitivity. Below is a brief summarized description of the impacts along with the mitigations proposed.

ENVIRONMENTAL IMPACTS

Huaxin Jizzakh will adopt its own technology of enhanced dry process and rotary kiln with multistage preheating and precalcination, which meets the good international industry practice (GIIP) required by the applicable WBG EHS Guideline. Environmental impacts of the Project are listed here by main and most sensitive recipients and in descending value of their significance – air quality; noise and vibration levels; availability of land and soil resources; soil and groundwater quality; subsoil resources and conditions, ecology, visual and aesthetic conditions of the area.

Air quality. Since the only fuel will be natural gas, the main air emission pollutants will be particulate matters (PM) from kiln, process dust from other processes, and nitrogen oxides (NOx). Based on the design parameters, all these emissions can meet both local regulatory standards and applicable WBG EHS Guideline limits.

Results of pollution dispersion modelling showed that pollutants' concentrations in the residential areas are much below MPC values; e.g. in Balykly (the nearest settlement to the Project) and the ambient air quality can also meet both local regulatory standards and applicable WBG EHS Guideline limits.

The risk of mercury and other heavy metals presence in limestone and their release in the chimney emissions is low due to the sedimenatary origin of the rocks.

The following measures are proposed as mitigation framework for this aspect:

- spraying of unpaved roads, roadsides and stockpiles of dusty materials with water or stabilizing solutions (to be selected as applicable to the Project's conditions and safe for the environment);
- sheeting rail cars and vehicles which carry the dusty materials at their leaving the site to prevent materials being blown from the cars/vehicles;
- establishing speed limits for gravel roads and unmade surfaces on site (incl. the quarrying area and associated haul routes) to minimize their dusting;
- source-specific measures for dust abatement (like filters, etc.);
- use of best practice management techniques during extraction, grinding and loading operations;
- preferable use of new, efficient vehicles and locomotives;
- drivers' and operators' training to minimize emissions (e.g. prevention of over revving, shut off engines when vehicles are not in use, etc.), rationalization of motor and rail traffic management system to optimize transport efficiency.

Noise and vibration levels. Due to advance renovation and development of the local motor and rail roads initiated and partially funded by Uzbekistan Government, the Project's traffic (vehicles rather than railroad) has only a minor potential to contribute to local congestion but can more likely induce complaints due to noise/vibration nuisance on a local basis. The cement plant and limestone quarry will also generate a variety of regular and sporadic noise effects to the adjacent space, with waves of the highest magnitude being likely associated with blasting events that will occur twice a week in the quarrying area.

A set of conventional measures is applicable for the Project, including:

- arranging the blasting events, with communities' opinion, weather conditions and similar practice at neighboring limestone quarries to be taken into consideration;
- defining access routes to the Project Sites with the smallest number of properties in proximity to them;
- maximizing the use of the rail network for bulk deliveries and abnormal loads;
- restricting delivery hours to reduce noise nuisance (in particular, avoiding of heavy truck movements during the night hours and holidays);
- keeping truck movements to a minimum;
- good site management;
- appropriate choice of machinery;
- efficient material handling;
- construction of noise barriers or baffles if requested by third parties;
- installation of noise warning signs in areas of above-limit noise or vibration levels.

Availability of land and soil resources. Construction of the Plant, limestone quarry and associated infrastructure will lead to a loss of soil resources and land capability due to temporal (e.g., within the right-of-way strips of the overhead power line and gas pipeline) and permanent allocation of land, topsoil stripping and covering with fill materials and structures. During construction, soils under the Plant, overburden spoil piles, linear infrastructure, and areas cleared for the quarry etc., will be lost from the landscape. The loss of this resource will result in a change in land availability from sporadic agriculture (grazing) and irrigated croplands to unavailable for supporting agriculture.

A set of measures to manage this issue includes:

- minimizing the disturbed footprint of the activity as far as practically possible along with preventing any violations of the agreed land parcel borders (the Company has already sited the Plant with maximum possible use of the non-cultivated piedmont area, and it is Ramboll's understanding that it wasn't possible to prevent acquisition of some part of adjacent farmlands the overall area of which is about 65 ha);
- ensuring that quarry, plant and any support vehicles and human movement are limited to dedicated access ways, with off road travel authorized when required for critical operations only;
- developing and implementing a soil management plan that will be Project-specific and give provisions for dealing with quarry's overburden material (if any), stripped topsoil, any other importing or exporting ground materials (excavations, stockpiling, stripping, backfilling, etc.);
- developing and implementing livelihood restoration and compensation measures specific for the areas where livelihood is impacted by temporary loss of agricultural lands; and
- developing and implementing the Project-specific soil monitoring program that covers all the aspects of activities as well as the whole area of their influence;
- preserving topsoil material of the former irrigated croplands for further rehabilitation works by its stripping in areas where buildings or structures are located, then stockpiling in conditions that save its mass and fertility to the maximum extent possible;
- minimizing the sediment load originated from the Quarry and construction sites of the Projects to the canals, the valley of Kly (Qili) river and associated ravines by stabilizing the surfaces of stockpiles and soil dumps, slopes and exposed grounds; and
- developing and implementing the Project-specific soil remediation plan that specifies, inter alia: all the locations the topsoil needs to be stripped (at least all the former irrigated agricultural plots); requirements for the storage of topsoil material; requirements for both technical (earthworks) and biological remediation of soils disturbed by the Project activity; requirements for reporting remediation works and further monitoring of reclaimed areas.

Since the Project is fundamentally land-intensive (with mining only taking up to 50-100 ha of the 440 ha sized licensed claims area) and will leave some part of the allocated land permanently unavailable for agriculture, the pre-management magnitude of this impact could be preliminary assessed as minor to moderate depending on recipients: the soil resources of Zafarobod, Forish and Sharof Rashidov rural municipalities won't be affected significantly, while a number of agricultural land users will share their land plots with the Company or operators of associated infrastructure facilities on a temporary basis and therefore be facing the need of additional land management and restrictions (to be further clarified when all the Project-related land allocation plans will become documented).

Offset activities like refilling historical pits with overburden material would enable to minimize stockpiling of soil and will expectedly retard mass movement processes along the pits' brinks and subsequent degradation of adjacent agricultural lands. The overall significance of the impact with all the management measures taken into account is assessed as medium, although the Project configuration has not been finalized, and distribution of soils within the Project Area cannot be assessed at a sufficiently fine scale.

Soil and groundwater quality. There're three main pathways for contaminants from the Project activities to penetrate to soils and groundwater:

- fall-out of air-borne pollutants;
- spills of wastewater and technical liquids; and
- seepages of chemicals from waste.

The quarrying and the hauling of raw material are likely to be the main sources of dust, during the operational phase. Dust will be emitted as a result of excavation, blasting, materials handling and vehicle movement in and out of the Quarry. Periodic earth moving to remove and stockpile the overburden of soil will also result in dust emissions. Dust from these sources tends to be of a larger particle size, so the major amount of it will be falling out locally within the surrounding area on soil or snow surface depending on the season.

To the contrary, all particulate and gaseous emission sources of the cement plant will be provided with dust, gas and vapor control measures, so the emission of regulated pollutants will be within internationally accepted standards, and the plumes will contain only the permitted remains of finely-dispersed particles, gases and vapors that have a potential to travel by large distances from the sources and therefore dissipate among the particles of similar size fractions originated from other sources.

Therefore, the proposed Plant as a new stationary point source of air emissions is unlikely to contribute significantly to soil contamination in any way including acid rains, fall-out of particulates, penetration of toxic gases and vapors into the soil, etc. One can resume now on the base of available research materials that Serozems and associated soils of the Project Area demonstrate very high level of buffer capacity related to acids. At the same time, the soils' potential to accumulate contaminants like trace metals and polycyclic aromatic hydrocarbons in upper horizons is much higher than their ability to translocate these elements and compounds to the subsoil or downslope positions of the landscape.

The effects of soil contamination associated with air emissions of the Project will be the most significant immediately around the sources, and the legislation of Uzbekistan required to organize a 500 m wide sanitary protection buffer zone (SPZ) within which the near-surface air levels of regulated contaminants can be above the established limits. The use of soils will also be restricted within SPZ, since they can share toxic compounds of the plowed layer with harvest. In this context, cultivated soils can be considered as having moderate sensitivity to this impact.

In addition to the Project-related closure of about 50 ha of fishery ponds, 65 ha more of the remaining ponds will be located within the statutory SPZ along with 28 ha of irrigated croplands and also several dozen hectares of areas that are used for irregulated grazing. In Ramboll's opinion, properties of the soils and bottom sediments of these impacted areas must be monitored to trace the levels of target contaminants the list of which is to be derived from the Project's emissions profile (currently unknown).

There's no need to develop any special measures to prevent soil contamination with air borne pollutants other than those already planned for emissions control:

- using of fabric and electrostatic filters for kilns, mills and separators (already provided by the Project);
- applying of dust suppressants to unpaved motor roads (especially the sections used routinely by Project vehicles that pass through or close to residential areas or agricultural fields);
- designing road alignments to minimize travel distances and eliminate unnecessary traffic;
- locating stockpiles within the Site boundaries considering the location of potential sensitive receptors and the predominant wind direction;
- setting speed limits for road traffic to minimize creation of fugitive dust;
- removing grass vegetation and topsoil together (mixed) so that plant matter will help to hold the soil material;
- where practical, rehabilitation of disturbed lands should be progressive, i.e. implemented as soon as quarry section is worked out or the land plot is abandoned after short-term (construction related) use; and
- stimulating grass and shrub vegetation within SPZ that plays important role in minimizing dust emissions by reducing surface wind speeds and trapping a lot of dust (an option could be to plant shrub or even forest lines around the Quarry and Plant as well as to perform runoff management in a way that gives additional water to the areas the vegetation cover of which is desirable).

The 'after-management' magnitude of the impact can be assessed as moderate for the area of SPZ and minor for the rest zone of Project's influence. Overall significance of the impact keeps medium for the sections of cultivated soils falling within SPZ and low for the uncultivated soil variants, both inside and outside SPZ.

Both construction and operational activities may lead to the contamination of soils and subsoil, particularly where there is the uncontrolled (accidental) spillage of technical liquids (incl. hydrocarbons), wastewater, contaminated snowmelt or storm water in areas where they are not contained and/or managed. There is the potential that during construction and operation of the cement plant, spillage of chemicals such as hydrocarbons could affect the soils over a wider footprint than that disturbed by the actual activity. Where this occurs, phytotoxins could potentially accumulate in soils resulting in these soils no longer having the potential to support plant growth. There are a number of activities which could result in this occurring as described briefly below:

- spills of the various hydrocarbons used for power, mining and lubrication requirements as well as any other reagents used in the processing activities;
- inadequate methods of storage and disposal of hazardous materials and waste resulting in seepage of effluent or discharge of contaminated runoff;
- breakdown of mobile equipment away from a workshop requiring the equipment to be repaired in areas where there may not be adequate protection from hydrocarbon spills;
- leaks or spills of process or sanitary wastewater; and
- spills of groundwater piped away from limestone pits (this can induce additional salinity and structural degradation of the soils impacted).

There may also be the potential that runoff of contact water from the overburden spoil pile (if any), coal yard (during the 2nd Stage of the Project) and spillage of any process water may affect soils in the flow path of this water. Where this occurs, phytotoxins could be accumulated in soil mass resulting in these soils no longer having the potential to support plant growth.

The pre-management significance of the impact can be assessed as moderate, with proposed measures including:

- providing appropriate conditions for the sites where hydrocarbons, solvents, lubricants, any other potentially hazardous materials are stored or reloaded (more specifically, this could imply impermeable pavement, secondary containment, storm water and runoff catchment, spillage traps, bunds, sheds or site-specific combinations of such preventive measures);
- developing and implementing a site-specific action plans for spills and other incidents/emergencies associated with leaks or spillage of liquids off the site to the adjacent environments;
- preparing procedures to ensure that spillage during mobile equipment maintenance is minimized; and
- providing stormwater management in a way that implies transporting of contaminated runoff to the special area equipped with catchment and treatment facilities.

Both action plans and procedures should be updated as necessary to ensure that they contain appropriate management and remediation strategies to limit the potential impacts associated with accidents and incidents associated with the spills of material which could impact on soil quality.

Implementation of the measures will reduce the impact's magnitude to minor, with its overall significance having been assessed as low thanks to the likely absence of highly sensitive or cultivated soils that could be directly affected by spills or effluents.

In addition, there's also a small chance that Project activities, especially earthworks, will mobilize residual (historic) contaminants (if any) through dust emissions, surface runoff, vertical transfer towards water-saturated horizons, exporting a surplus soil for remote locations, or some other minor ways like tracking of contaminated soil by personnel and equipment or with exported wastes. Taking into account that the site never was chemically intensive, one can suppose the presence of pesticides and other agricultural chemicals in soils, subsoil and groundwater of the northern (previously agricultural) part of the Project

Area, mobilization of which could be originating from the Project-related activities. Ramboll expects such effects being short-term, generally local and of minor amplitude, so their overall significance is assessed here as low.

Subsoil resources and conditions. Since the limestone deposits and aquifers were discovered and investigated at the Project Area with the purpose of future extraction, and the footprinted sites have no prospective uses other than limestone mining, the effect of *non-recoverable loss of subsoil material and extracted groundwater as commercial products or by-products in parallel with depletion of the operated mineral deposit and aquifer*s considered as having no need to be assessed in both environmental and social contexts. It is also very unlikely that the effect of lowering groundwater table that will result from water extraction and reduction of irrigated acreage, will create any trouble for the local communities.

At the same time, the Project will expectedly launch or speed up a variety of mass movement processes which have already become apparent or remain latent with a potential to be triggered by human activity. Some of these processes will likely be local and associated with earthen and subsurface structures, quarrying spaces and other areas of disturbed vegetation and soils (sloughing, slips and other gravitation-driven processes, karst, suffusion), with the others being able to go off the Project's footprint and spill over to adjacent areas (wind and water erosion, changes of groundwater conditions). Having qualified the significance of construction impacts on soils as low, Ramboll has no grounds to assign any other rating to the considered impact also. It's important to note here that some external hazards that are consider being very unlikely or having rare occurrence (like high-magnitude earthquakes, catastrophic rainfall flooding, breaking of upstream hydraulic facilities, etc.) can serve as triggers for movement of soil and subsoil material the stability of which has been undermined by quarrying and other Project-related activities.

In particular, the unmanaged operational activities have the potential to increase soil erosion, especially from the quarrying and the presence of infrastructure where runoff from disturbed areas is likely to be higher than would occur under natural conditions. For such locations, the increased water velocity at runoff during rainfall events may result in the erosion of soils on the periphery of the infrastructure and quarrying area followed by permanent loss of soil resource and change in soil properties.

If this was to occur, it could lead to a loss of a soil resource in the area of the erosion and possibly an increase in the sediment load where the eroded soils are deposited. This impact is likely to occur around the limestone quarry, the Plant Area, Accommodation Camp and other hard standing and from the slopes of the overburden spoil piles (if any).

Preliminary qualified as minor in magnitude and having low significance, this impact will be kept under appropriate control by many of the above-listed measures like:

- minimizing the area of physical disturbance;
- implementing storm and snowmelt water control provisions around infrastructure;
- providing appropriate management of soil stockpiles.

Terrain of the Project Area is formed by subsiding loams having medium to high potential of water-induced budging. The underlaying sands and weathered limestone do also not provide very stable foundation due to their fracture porosity and high potential to induce karst and suffusion events under water-saturated conditions (i.e. the forming of potholes due to dissolution and outwash of the rock material by water infiltrations or groundwater). Therefore, the grounds of the Plant Site can be characterized as generally unstable in wet conditions which predominate here thanks to the irrigation-induced supplying the local groundwater.

As it has been also indicated by geologists («O'ZGASHKLITI» DUK, 2018), the presence of water-soluble salts contributes significantly to the subsoil's corrosiveness to concrete and metal structures along with a potential of dissolution and leaching chlorides, sulfates and hydro-carbonates by groundwater following by volume deformations of the layer.

The highest amplitude of both static and dynamic deformations of soil is expected for the areas of historical waterlogging, irrigation, water channeling and ponding the conditions of which are significantly changing by increasing loads of Plant's and Camp's structures, fill materials, transportation.

All of this requires careful site-specific management of drainage, process, storm and snowmelt water in a way that minimizes its contact with subsoil material as well as the extent of subsoil influence zones associated with Project-related loads, both static (construction sites, building and structures) and dynamic (motor and rail roads, construction sites, blasting locations, etc.).

Most of the measures listed above for preventing or mitigating construction and operational impacts on soils will help to provide the subsoil stability within the Project sites. Geotechnical monitoring and groundwater observations will provide necessary data on the status of impacted subsoil.

Ramboll expects the overall impact of static and dynamic deformations will be limited on-site and immediate adjacencies and won't involve any sensitive areas or subsoil features. Indeed, most part of the Project-related traffic will be based on existing ways, so the associated dynamic loads will be put on the subsoil that was impacted for a long time by similar loads. Considering this, the overall significance of the impact can be preliminary qualified as medium to low on the understanding that local deformations induced by blasting events, excavations, pile works and static loads within previously undeveloped areas can be measured by much higher values as compared with subsoil already settled by existing or historical structures.

Ecology. The Project Site is remote from protected habitats and not favorable for vegetation and wildlife development or preservation. This area was historically disturbed by agriculture, rural development, construction of canals, roads and power lines. The undeveloped spaces of this area are currently occupied by desert-steppe and meadow successions that are not unique or having significant environmental value. At the same time, Ramboll expects the following adverse environmental effects being associated with the Project (left column of the Table ES1) and therefore requiring mitigation measures (the right column).

Table ES1: Ecological impacts of the Project and their proposed mitigation

Impacts	Mitigation	Comments
Withdrawal of land associated with partial loss of vegetation and soil cover, local destruction of habitats	A site-specific remediation plan is required to be developed and implemented	Despite vegetation loss cannot be avoided, successful restoration, improvement and long-term management of the surrounding areas for conservation and productive uses would provide significant compensation
Affecting wildlife through a number of construction and operational effects like emissions of noise and air pollutants	Performing the blasting, earthworks and installations outside the breeding and spawning season (generally, April to July) to minimize risks of disturbing birds and fishes	Since the area was developed for a long time, Ramboll does not expect highly-sensitive wildlife species present onsite or nearby. There should also be some habituation to lower reduced noise levels by some wildlife, but more sensitive species may avoid the impacted areas after construction works and quarrying will start
Increase in exploitative pressures on habitats neighboring the Project Site (like excessive grazing, irruptions, etc.)	None	The effect is unmanaged by the Company
Impacts associated with human presence and workforce activity (like removal of vegetation for firewood or medicine, the capture of wildlife and livestock, the presence of companion animals, littering up the area, etc.)	Thematic trainings and briefings for personnel Adequate waste management and sanitation facilities	Full compliance is unlikely and some illegal hunting, fishing and gathering can be expected. There should be some habituation to human presence by some wildlife, but more sensitive species may avoid the impacted areas
Additional fragmentation of habitats by roads, power lines, above-ground gas pipeline, fenced-in areas, the areas disturbed by earthworks, and other barriers that will limit migration pathways for terrestrial vertebrates	Avoiding the use of barbed wire and providing a 20-30 cm high unscreened space between the fence and soil surface	The Project's communications will go in parallel with or close to the other lines that minimizes additional fragmentation of habitats and farmlands.

Impacts	Mitigation	Comments
		Most of the roads to be used are also historical. At the same time, the quarry will occupy a large area of the Balykly-Tau Ridge, so this could affect migration routes related to watering points
Dust deposition on leaves leading to loss of vegetation productivity and health	The measures intended for mitigating air and soil quality impairment	Some dust emissions at the quarry sites and along the roads are inevitable but can be kept to an acceptable level by the use of latest technologies and best working practices
Reducing of productivity and quality of vegetation for herbivores		
Wildlife 'road-kills' along access roads	Road warning signs and speed limits (especially for crossings with livestock alleyways) Thematic trainings and briefings for drivers	Since no detailed environmental investigations have been performed in the Project Area, there's no adequate evidence that mitigation measures are needed for the Project area to reduce the risk of 'road-kills' and bird electrocution or collision associated with transmission lines. Most part of the Project's lines go in parallel with or close to existing ones, so it is unlikely that Project will increase significantly the bird mortality for the whole territory. As for the road-kills, they should be reduced but some are still inevitable, and additional study would indicate which locations are the most dangerous in this context
Bird casualties due to collision with overhead power lines	Equipping the power lines with bird protection system (like bird deflectors)	
Steppe fires (specifically, the seasonally important ones sparked by passing trains)	A set of specific measures to control sparking associated with railroad operations. Special provisions for the Site-specific Fire Safety Plan to control steppe fires	March to June period is the time when the steppe fire is most likely to occur in the Project Area

Visual and aesthetic conditions of the area. Taking into account that the Project Area was historically developed as an agri- and aqua-cultural cluster of the region, fragmented by a dense network of communications and recently recognized as an area of limestone mining and associated industrial applications (with another cement plant and quarry having been in operation nearby since 2014), Ramboll does not consider the Project as changing significantly the landscape's character. During the 1st Stage of the Project both limestone quarry and cement plant will not likely be visible from most viewpoints of the closest residential areas, so the list of potential recipients of the visual effects includes some residents of Balykly, Nurafshon, Chimkurgon and Pistalikent (with a distance of about 5 km to each of the settlements), local farmers and other visitors of the area adjacent to the plant and quarry. With regards to them, some exposure to alteration of the landscape character and loss of visual amenity is considered possible, predominantly due to associated (quarrying) activity rather than the cement plant. Considering additionally that the limestone claims of the Company extend not only to the north-eastern slope of the Balykly-Tau Ridge but to its south-western slope as well, one can expect the 2nd Stage of the Project will change the landscape much more significantly as far as the mining will gradually destroy the ridge. The overall Project-related damage to the landscape character and visual amenity due to introduction of incongruous features and activities in parallel with transformation of the native terrain is assessed as having minor to moderate magnitude and can be partially compensated by the following measures:

- sensitive planning of site works and compound;
- minimizing the lighting and night time operations;
- sensitive coloration of plant and vehicles;
- minimizing the window between working and restoration phase of quarry operations;
- landscaping the Project's area to the extent possible.

SOCIAL IMPACTS

During the process of ESIA, the following social impacts were identified as positive:

- The Project will generate additional tax revenues thus assisting local governmental bodies in regional socio-economic and infrastructure development activities.
- Employment opportunities will be created by the Company.
- Local goods and services will be contracted by for the Project development.
- During Project operations, it is expected that Huaxin Cement will implement corporate social responsibility programmes for local communities.
- Support to construction sector of Uzbekistan will be triggered by the Project as local businesses require additional cement for construction activities, including for housing development.

Ramboll suggested to develop and implement Local Employment Procedure and Local Procurement Procedure to ensure that the share of local content is enhanced.

The Project also identified potential negative impacts assessed its magnitude and significant following scientific approaches to determine if community way of life will be affected, and if so, what and to what degree of those impacts. The following impacts of medium or high significance were identified:

- Land acquisition;
- Influx;
- Construction nuisances;
- Plant operational nuisances
- Limestone quarry exploration and mining activities
- Road transportation and possible use of village road
- The use of security personnel;
- Associated facilities (Transmission line and gas pipeline)

The list of impacts and mitigation measures briefly described above is certainly not exhaustive. The full ESIA document presents analysis of these and other impacts in more details.

SUMMARY OF FINDINGS AND FURTHER STEPS

An ESIA has been conducted for Project in accordance with relevant environmental and social guidelines of the International Finance Corporation with an overall objective to ensure acceptable environmental and social performance of the Project. The ESIA identified potential impacts through a systematic scoping process whereby the activities (both planned and unplanned) associated with the Project have been considered with respect to their potential to interact with environmental and social resources or receptors, which may generate potentially significant environmental and social impacts have been further assessed in the ESIA, with appropriate mitigation and enhancement measures recommended for alleviating potential negative impacts or enhancing potential positive impacts from the Project. It is concluded in the ESIA that with proper implementation of the recommended mitigation measures, the residual environmental and social impacts causing by the construction and operation of the Project would be of no larger than moderate significance, as summarized in Table ES2 below.

To ensure proper delivery of the committed mitigation measures identified in the ESIA Study, an Environmental and Social Management Plan will be prepared for the Project which provides the procedures and processes to be applied to the Project activities in order to check and monitor compliance and effectiveness of the mitigation measures during the construction and operation of the Project. In addition, this ESMP will be used to ensure compliance with statutory requirements and corporate safety and environmental policies. Overall, it is expected that the Project will be constructed and operated with acceptable environmental and social performance under proper implementation of the ESMP.

The Company will manage and monitor the Project's environmental, social, health & safety (ESHS) issues throughout its life cycle – from design development to decommissioning. Specific mechanisms will be provided at each phase to ensure prevention, minimization, mitigation of potential negative impacts, as well as measures to enhance the positive effects including:

- Environmental and social impact assessment in compliance with international requirements, including concerns expressed by stakeholders during public discussions;
- Development of design documentation in line with the best industry practices and best available techniques, internal review of design solutions;
- Appointment of qualified contractors capable to ensure compliance with the Project Applicable Standards, and monitoring of contractor's practices for compliance with such requirements throughout the contract period;
- Procurement of modern equipment and materials which meet up-to-date environmental and safety standards;
- Ongoing supervision and monitoring of construction activities on the site, and use of modern construction technologies;
- ESHS training of the Company and contractor's personnel; and
- Day-to-day and long-term management of environmental, occupational health and safety, community safety impacts and risks through implementation of specific ESHS management plans.

The Project ESHS management plans and procedures shall be developed and implemented in order to provide adequate management of environmental, social, health and safety impacts and risks associated with the Project implementation, including respective site-specific construction and operational practices. The Project management and monitoring procedures shall be developed taking into account the findings of the current ESIA.

Table ES2: Impact Assessment

Classification of Impacts		
Sign and Magnitude	*Likelihood*	*Acceptability*
+ - Beneficial 0 - Neutral	N – Negligible (Rare)	Acceptable with monitoring (no mitigations are required)
–1 - Adverse Negligible	Mr – Minor (Unlikely)	
–2 - Adverse Minor	Mo – Moderate (Possible)	Acceptable with monitoring and minor mitigations
–3 - Adverse Moderate	Mj – Major (Likely)	Acceptable with monitoring and moderate mitigations
–4 - Adverse Major	C - Certain	Acceptable with monitoring, significant mitigations and compensations (when required)

Assessment of Impacts*

Activities as Sources of Impacts	*Air Quality*	*Noise, Vibration, EMR Levels*	*Water Resources*	*Land Resources and Land Use Practices*	*Visual and Aesthetic Resources of Landscape*	*Soil Resources*	*Subsoil Resources (incl. Groundwater)*	*Biodiversity*	*Cultural Heritage*	*Infrastructure and Traffic*	*Socio-Economy of districts and region*	*Local agriculture and aquaculture*	*Public Health and Safety*
Construction Phase:													
pre-project surveys;	–1Mr	–1Mr	–1Mr	–2Mo	–1N	–1Mr	–2Mo	–1Mo	–1Mo	–1Mr	+	–2Mo	–1N
relocation of the A.A. Sarkisov Main Water Canal;	–1Mr	–1Mr	–3Mj	–2Mo	–1Mr	–2Mo	–2Mo	–2Mo	–1Mr	–1Mr	0	–2Mo	–1Mr
siting and construction of the cement plant and accommodation camp;	–2Mo	–2Mo	–1C	–3C	–2Mj	–3C	–2Mo	–2Mr	–2Mr	–2Mo	+	–3C	–2Mr
siting and construction of infrastructure facilities (power lines, gas supply pipeline, access motor and rail roads)	–2Mr	–2Mr	–2Mr	–2C	–2Mo	–2C	–2Mr	–3Mo	–2Mo	–3Mj	+	–2C	–2Mr
Commissioning and Operation Phases:													
quarrying;	–3C	–3C	–2Mo	–2Mo	–3Mo	–3Mo	–3Mo	–2Mo	–2Mo	–2Mo	+	–3Mo	–3Mo
operations within the cement plant site;	–3Mj	–2Mj	–2Mj	–2Mo	–3Mo	–2Mo	–2Mo	–2Mj	–2Mr	–3Mj	+	–2Mo	–2Mo
operation of associated gas pipeline;	–2Mr	–1N	–2Mr	–2Mj	–2Mo	–2Mr	–2Mr	–2Mo	–2Mo	–2Mo	+	–3Mr	–3Mr
operation of associated power lines;	0	–2Mr	–1N	–2Mj	–2Mj	–2Mo	–1N	–3Mj	–2Mr	–2Mr	+	–2Mo	–3Mr
operation of accommodation camp;	–2Mo	–2Mo	–2Mo	–2Mr	–2Mo	–2Mr	–2Mo	–2Mj	–2Mr	–2Mo	+	–2Mo	–3Mo
transport operations (motor and rail roads)	–3Mj	–3Mj	–2Mr	–2Mr	–2Mr	–2Mr	–2Mr	–3Mj	–2Mr	–2C	+	–3Mo	–3Mo
Decommissioning and Closure Phases:													
remediation** of quarries;	–2Mo	–2Mr	–3Mr	–2Mo	–1N	–2Mo	–2Mo	–2Mo	–1Mr	–1Mr	+	–2Mo	–3Mo
closure, demolition and remediation works at the cement plant and accommodation camp sites;	–2Mo	–2Mo	–3Mr	–2Mo	–1N	–2Mr	–3Mo	–1Mo	–1Mr	–1Mr	+	–2Mr	–2Mo
decommissioning and demolition of associated infrastructure followed by remediation of its right-of-way areas	–2Mr	–2Mr	–2Mr	–2Mo	–1N	–2Mr	–2Mr	–1Mo	–1Mr	–1Mr	+	–2Mr	–1Mo

**Given the proposed mitigation is implemented **All the remediation activities are beneficial for the long run, but the Table indicates adverse effects associated with earthworks, soil rehabilitation and associated onsite activitie*

1. INTRODUCTION

Ramboll CIS LLC (the Consultant), an entity of the Ramboll Group, was assigned to develop Environmental and Social Impact Assessment (ESIA) for the Project in compliance with the IFC Environmental and Social policies and guidelines and other applicable standards as described in Chapter 2.

ESIA package is to include the ESIA report, non-technical summary (NTS), Environmental and Social Action Plan (ESAP), Framework Environmental and Social Management Plan (ESMP).

The current document represents the ESIA report, including the overview and analysis of legal requirements, methodology used, environmental and social baseline information, environmental and social impacts, recommendations on their mitigation and monitoring and control, as well as respective management measures and arrangements. ESAP and FESMP are provided as separate documents but discussed in the respective chapter of this report.

1.1 Project Location

The Region of Jizzakh (also spelled and written as *Dzhizzak* or *Jizzax*), where the Project is based, is currently the 20k km^2 area around the same-named town that historically served as a small oasis and a settlement on The Silk Road. Agriculture and construction materials are the main sectors of the regional economy that is also benefited by positioning on the main way between the cities of Tashkent and Samarkand.

Huaxin Jizzakh is approximately 25 km north of Jizzakh City, Jizzakh Oblast, Uzbekistan (Please refer to Figure 1.1. for further details). The site is barren steppe land with the nearest community approximately 5 km away. Another existing cement plant is approximately 8 km to the northwest of Huaxin Jizzakh site. There is no other industry in the project area.

The project consists of 81 ha cement plant site and the adjacent 440 ha limestone quarry. The associated facilities with the project are 3 km access road, 50 km power transmission line, and 17 km gas pipeline. The 3-km temporary access road was built by the local government a few years ago for construction material transportation from the current Huaxin Jizzakh site. The project site is adjacent to an existing railway and a water canal to deliver water from Syr Darya River to Aydar Lake.

The region is divided into 12 municipal districts, the three of which (Sharof Rashidov, Forish and Zafarobod ones) are affected by the Project to different extents. Most part of the region's area is a desert-like steppe that is edged by mountain ridges and dissected by scarce low-water streams. The expansion of irrigation in Soviet era created here a number of agri- and aquacultural areas the one of which (consisting of fishery ponds, irrigated croplands and waterway networks) is immediately touched by the Project, with the closest residential areas of the local rural communities being separated from the Project sites by a space of 4 to 7 km.

1.2 Objectives and Limitations on the Current ESIA

At the moment of this ESIA report preparation, the actual information about current site-specific environmental settings were limited to the geological surveys and engineering specifications provided by Huaxin Jizzakh

Thus, the current environmental and social impact assessment (ESIA) is focused to provide a preliminary but comprehensive (as far as possible using currently available information) and integrated assessment of negative impacts, benefits and potential risks of the Project, and to propose adequate prevention, mitigation and compensation measures to address the identified environmental and social effects.

Performance of the above scope has been structured in the following range of tasks:

- desk studies of the available limited Project studies and documentation;
- identification of scope for the surveys required for the Project against the applicable national and international requirements;
- supplementary desk studies, collection of missing information and comprehensive review of all collected information, stakeholder consultations;

- analysis of potential Project ESHS effects, impacts and risks, including secondary, cumulative, combined impacts and potential long-term effects of the proposed activities;
- development and planning of further mitigations and stakeholder engagement activities for the Project.

The Project ESIA package is to be prepared in English language and disclosed for stakeholder engagement process in accordance with the IFC environmental and social guidelines (see Chapters 4 and 8 for details).

Source map of the upper frame: R. Maitra. The Multiple Dimensions of China's 'One Belt One Road' in Uzbekistan - Washington, DC: The Schiller Institute, 2017

Figure 1.1: Site location map

1.3 Project Proponent

Huaxin Jizzakh is a fully-owned by Huaxin Cement Co. Ltd, a leading cement producer in Asia. Established in 1907, The Huaxin Company was one of the first cement producers in China and has been recognized by now as cradle of this country's cement and concrete industry. In 1993, Huaxin implemented joint stock reform and became the first A and B shares listed corporation of China in building materials sector.

Currently titled as Huaxin Cement Co. Ltd., the Company produces annually about 70 million tons of cement varieties (graded as 32.5 MPa, 42.5 MPa or higher), some 2 million tons of ready-mixed concretes, and 4.5 million tons of aggregates. Additional products and services provided by Huaxin include cement equipment, cement packaging products, and treatment of solid waste materials.

Present in 10 provinces in China and abroad with over 100 production sites and total assets of over 26 billion CNY, sales of 3 billion USD, and with 17,000 employees, Huaxin Cement Co., Ltd is ranked in China's top 500 manufacturing companies and is also listed as a Fortune China 500 Company.

The Huaxin's headquarter is located in the City of Wuhan, Hubei Province of the Central China (the postal address is Block B, Huaxin Building, No.426, Gaoxin Avenue, Donghu New Technology Zone, Wuhan, Hubei 430073; Phone: +86.27.8777.3896, Fax : +86.27.8777.3962, Web: http://www.huaxincem.com).

Since 2008, LafargeHolcim Ltd., the Swiss-based construction materials major, became the largest stakeholder of Huaxin with its current share being around 41.8 per cent[15]. Another large share of the Company is operated by Huaxin Group Co. Ltd. (some 25 per cent), and several companies are holding the shares of 1 to 3 per cent (Rongtong Fund Management Co. Ltd., China Investment Corp., UBS Group AG, The Goldman Sachs Group, Inc.). Huaxin is listed on the Shanghai Stock Exchange (SSE) with a market cap of ~$3.5 billion (bn). Huaxin has operations across China, Tajikistan, and Cambodia and has plans to expand to other developing markets.

Over 90 per cent of the Company's production capacities are located in China, with foreign facilities being located also within Asia, in Tajikistan and Cambodia. After visiting the Huaxin's plant in Tajikistan and looking over the facilities constructed with the use of its products, an official delegation of the Republic of Uzbekistan invited the Company to enter the growing cement and concrete market of this country with launching a new cement plant in Jizzakh Region (hereinafter referred to as 'Project').

To operate the Project, Huaxin established a limited liability entity, Huaxin Cement Jizzakh LLC, with a status of a foreign enterprise in Uzbekistan, a headquarter in Chimkurgon Rural Settlement of the Zafarabod District (Phone: +86.13.9999.06411). In addition, an operational office of the subsidiary has recently been opened in the town of Jizzakh. Mr. Yao Bingjun (Phone: +998.935.760.190, E-mail: yaobingjun@huaxincem.com) has been appointed to the position of the Project manager.

1.4 Need for the Project

In 2016, the Republic of Uzbekistan consumed 8.5 million tons of cement which is 24 per cent higher than in 2012[16]. The growth continued in 2017-2018 and is expected to remain in coming years with the mean rate of 5 per cent a year due to the growing development and construction works within the country.

Domestic production of cement is also growing and covered about 70 per cent of consumption, so the year of 2018 gave 9.2 million tons of the national cement production and some 3.5 million imported (and in 2019 the inflow of cement has increased by 47 per cent as compared with the same reporting period of the previous year). Over 90 per cent of the cement is used directly (65 %) or as construction elements (25 %) for civil and industrial projects of Uzbekistan.

Most of the Uzbek cement plants work at or very close to their maximum productivity, with the mean sector-wide utilized capacity being over 95 %. Six large facilities provide the major portion of domestic cement production: KizilkumCement JSC (with a capacity of 3.5 million tons a year), AkhangaraCement

[15] According to the latest available quarter report of the Huaxin Cement Co. Ltd. (http://www.huaxincem.com/Investor-Relations/)
[16] Zaripov K.V. Cement industry of the Republic of Uzbekistan // 'Cement and its Applications' Journal. 2019. No. 1 (available at https://jcement.ru/) Zaripov K.V. Cement industry of the Republic of Uzbekistan // 'Cement and its Applications' Journal. 2017. No. 2 (available at https://jcement.ru/)

JSC (1.7), BekabadCement JSC (1.3), KuvaysayCement JSC (1.1), Jizzakh and Sherabod Cement Plants (both operated by Almalykskiy GMK, JSC; 1 and 1.5 million tons a year, respectively). Up to 10 minor producers annually give 0.6 to 1.0 million tons of cement.

Figure 1.2: Location of major cement plants at the map of the Republic Uzbekistan

Source: Zaripov K.V., 2017[17], Huaxin Cement plant is marked by No 20); 1 - QizilqumCement JSC, 2 - AkhangaranCement JSC, 3 - KuvasayCement JSC, 4 - BekabadCement JSC, 5 - Jizzakh Cement Plant, 6 - Fergana Cement LLC, 7 - Turon Eco Cement Group LLC, 8 - Farkhadshifer LLC, 9 - Everest metall favorit LLC, 10 - Kezar LLC, 11 - Sing Lida LLC, 12 - Buyuk PE, 13 - TITAN CEMENT LLC, 14-Shangfeng-Bridge of Friendship JV, 15 - Yaypan Shifer LLC, 16 - GalloorolCement LLC, 17 - Sherobod Cement Zavodi JSC, 18 - SurkhanCementInvest LLC, 19 - Gansu Hengya Cement Co LTD, 20 - Huaxin Cement LLC

The proposed Project aims at alleviating the growing cement deficit in the domestic market which currently imports some 30% of the total cement consumed. It is anticipated that local cement production will substitute imports, thereby generating foreign exchange savings and a significant reduction in the cement price. The increase in local production will help support the development of infrastructure and housing projects, which will encourage new business opportunities in other industrial and service sectors of Uzbekistan (especially in Jizzakh and the neighboring Samarquand regions) and lead to further job creation (more specifically - over 300 new positions for the Project).

The facility represents an input of 300M USD, financed through direct investment and borrowed funds. Therefore, the Project will contribute substantial transfers to both regional and national budgets through corporate and other taxes over its lifespan. Output from the plant is expected to be 40 per cent of M400 Portland cement and the rest 60 per cent of M500 cement with 10 per cent of the total volumes earmarked for export[18]. The Project is divided into two stages, with the first one starting in the beginning of 2020 with annual cement production of 1.5 Mt. Decisions relating to the second stage will be made with market conditions taken into account.

Another company from China, Gansu Hengya Cement Co. LTD, has also recently invested to a cement project in Uzbekistan, and the 2.4 Mt plant is now under construction in Kattakurgan District of the Samarkand Region.

[17] Zaripov K.V. Cement industry of the Republic of Uzbekistan // 'Cement and its Applications' Journal. 2019. No. 1 (available at https://jcement.ru/)

[18] Huaxin Cement begins Zafarabad plant build in Uzbekistan // CemNet.com Portal of the cement manufacturing sector (available at https://www.cemnet.com/)

1.5 Proposed Project E&S Categorization and Rationale

The Project categorization has been reviewed by the Consultant in order to determine the scope and types of environmental and social studies, mitigations, disclosure and stakeholder engagement required for the priority investments selected for IFC financing.

The Sustainability Policy of IFC 2012 requires that the proposed project undergo a process of environmental and social categorization to reflect the magnitude of risks and impacts, in order to define the applicable scope and type of environmental assessment. The IFC's institutional requirements for information disclosure are defined depending on the project category, in accordance with IFC Access to Information Policy. Projects may be attributed to one of the four categories depending on the nature and significance of their potential environmental and social impacts.

The Huaxin Jizzakh cement plant is greenfield project. Cement plant and limestone quarry have a large footprint of total 521 ha with associated facilities of gas pipeline, power transmission line, and access road. Besides limestone, significant amount of water and natural gas will be consumed. Particulate matters (PM) and nitrogen oxide (NOx) are expected as major project emissions.

The key E&S issues and risks associated with this project include: i) an environmental and social impact assessment to fully understand the potential E&S risks and mitigations ii) E&S management for both construction and operation phases iii) energy efficiency and greenhouse gas (GHG) emissions iv) water availability and water efficiency v) emission controls for PM, NOx, and potential heavy metals vi) land acquisition and compensation and vii) stakeholder engagement. This is therefore a Category A project according to IFC's Policy on Environmental and Social Sustainability.

1.6 Structure of the ESIA Report

In order to provide clear presentation of the ESIA procedures including their results, conclusions and recommendations, this Report is structured as follows:

Chapter 1 Project Overview (this chapter). The chapter introduces the Project by providing details of its location, scope, owner and developer.

Chapter 2 Legal Framework and Applicable Standards. This chapter provides an overview of the regional, national and international legal framework, within which the Project is to be developed and implemented. Environmental and social legal requirements of the Republic of Uzbekistan is considered together with the applicable international Lender requirements and guidelines.

Chapter 3 ESIA Methodology. This chapter provides an overview of the overall process of environmental and social impact assessment and applicability of the international methodology for the ESIA procedure. The chapter further addresses: definitions of key terms; identification of potential environmental and social impacts (through consultation and scoping process); description of the criteria used to determine the significance of impacts for various environmental and social topics; and how mitigation measures are considered within the assessment process.

Chapter 4 Stakeholder Engagement. This chapter describes the stakeholder engagement process adopted by the Project. It describes the results of consultation activities undertaken earlier and as part of the ESIA process. It also provides stakeholder identification.

Chapter 5 Project Description. This chapter describes the background and phasing of the Project, including descriptions of the main and auxiliary facilities, infrastructure, associated facilities, as well as definition of the Project boundaries in the form of the Project area of influence. Tentative project implementation timeline is provided.

Chapter 6	Analysis of Alternatives. The key process solutions are presented as they are seen at the current stage of planning, alongside with considered alternatives and justification of the preferred alternative. Tentative project implementation timeline is provided.
Chapter 7	Baseline Environmental Conditions. The existing environmental baseline is described and characterised in this chapter.
Chapter 8	Social and Economic Baseline Conditions. The existing social baseline is described and characterised in this chapter.
Chapter 9	Environmental Impact Assessment. This chapter presents the assessment of potential environmental impacts, including identification of mitigation measures and monitoring requirements. Impacts of the Project are assessed for each component of the environment. Climate change risks for the Project are estimated and options for mitigating them are considered. Probability of transboundary impacts is also assessed.
Chapter 10	Social Impact Assessment. This chapter presents the assessment of potential social impacts, including identification of mitigation measures and recommendations for monitoring. Impacts during the Project implementation are assessed on a topic-by-topic basis.
Chapter 11	Decommissioning. Potential impacts specifically associated with decommissioning, dismantling and disposal of the Project facilities and infrastructure are addressed in this chapter.
Chapter 12	Transboundary Impacts. This chapter considers potential long-term transboundary impacts.
Chapter 13	Cumulative Impacts. This chapter addresses potential cumulative impacts of the Project and other third-party economic activities in the region.
Chapter 14	Environmental and Social Management. This chapter describes the approaches to environmental and social management across all Project activities and recommends the management procedures and plans to be adopted to ensure compliance with the applicable international requirements throughout the life of the Project.
Chapter 15	Conclusion provides summary of the key significant impacts, mitigations and monitoring, as well as recommendations for further studies to remove uncertainties.

Additional graphical, tabular and text materials are provided in the Appendices of the report.

The ESAP and NTS are to be provided as separate documents but ESAP is discussed in Chapter 14.

2. LEGAL FRAMEWORK AND APPLICABLE STANDARDS

2.1 Introduction

The Company is seeking to procure project financing for the Project development in Uzbekistan. The required funding is expected to be raised from the IFC funds and other prospective lending institutions (collectively, the “Lenders”). In line with this financing strategy, the Project will be developed in compliance with the following environmental and social requirements:

- Applicable regional and national environmental, social, health and safety laws and regulatory requirements;
- IFC’s Performance Standards (PS), dated January 2012;
- World Bank Group/IFC Environmental, Health, and Safety Guidelines; and
- all relevant international substantive environmental directives and standards, including EU Industrial Emission Directive and relevant BAT BREF Guidances (both national and international),

together considered as “Applicable Standards” and can be considered as Project benchmark.

The Project performance will therefore be assessed against the standards provided within the above national and international environmental and social requirements. Should national regulations and/or international conventions differ from the levels and measures presented in the applicable Lender standards, the Company’s Project will apply the most stringent standard except where there is a strong justification to deviate from the most stringent standard.

2.2 International Financial Institutions (IFIs) Requirements

2.2.1 IFC Performance Standards (2012)

IFC is part of the World Bank Group and a recognised international leader in the sphere of development and implementation of environmental and social sustainability policies. In accordance with its Environmental and Social Sustainability Policy, IFC uses a set of environmental and social Performance Standards (PS) to assess proposed projects. In April 2012 IFC issued a new version of Environmental and Social Sustainability Policy and PSs.

PS 1:	Assessment and management of environmental and social risks and impacts
PS 2:	Labour and working conditions
PS 3:	Resource efficiency and pollution prevention
PS 4:	Community health, safety and security
PS 5:	Land acquisition and involuntary resettlement
PS 6:	Biodiversity conservation and sustainable management of living natural resources
PS 7:	Indigenous peoples
PS 8:	Cultural Heritage

PS 1 Assessment and management of environmental and social risks and impacts applies to all projects that have environmental and social risks and impacts. PS 1 defines seven minimum requirements or system elements that must be addressed in the project ESMS, which are summarized as follows:

- Establishment of a policy framework for achieving and maintaining compliance with host nation laws and regulations, as well as achieving the environmental and social objectives of the project;
- Establishment of processes for the identification of risks and impacts, with ongoing iterations to address the effect of project changes, over the project life cycle;

- Establishment of management programs or procedures to address specific risks and impacts, and the means for adjusting those programs to accommodate project changes;
- Provisions for maintaining organizational capacity and competency;
- Establishment of appropriate emergency preparedness and response mechanisms;
- Establishment of processes for ongoing stakeholder engagement/ communication; and
- Establishment of processes for monitoring and reviewing environmental and social performance as the basis for continual improvement.

The requirements of PS 2 Labour and working conditions are guided in part by a number of international conventions negotiated through the ILO and the UN. The specific objectives of this PS are:

- To establish, maintain and improve the worker- management relationship;
- To promote the fair treatment, non-discrimination and equal opportunity of workers and compliance with national labour and employment laws;
- To protect the workforce by addressing child labour and forced labour;
- To promote safe and healthy working conditions; and
- To protect and promote the health of workers.

The major objectives of PS 3 Resource efficiency and pollution prevention are to:

- Avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities;
- Promote more sustainable use of resources, including energy and water; and
- Reduce project-related GHG emissions.

PS 4 Community health, safety and security addresses the client's responsibility to avoid or minimize the risks and impacts to community health, safety, and security that may arise from project related-activities, with particular attention to vulnerable groups. The specific objectives of this PS are therefore:

- To the extent possible, anticipate and avoid adverse impacts on the health and safety of the affected communities during project life, from both routine and non-routine circumstances; and
- To ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the Affected Communities.

PS 5 Land acquisition and involuntary resettlement recognizes that project-related land acquisition and restrictions on land use can have adverse impacts on communities and individuals that use the land. Involuntary resettlement refers both to physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or other means of livelihood) as a result of project-related land acquisition and/or restrictions on land use. The main objectives of this PS are:

- To avoid and minimize to avoid forced evictions;
- To anticipate and avoid or minimize adverse social and economic impacts from land acquisition or restrictions on land use;
- Improve, or restore the livelihoods and standards of living of displaced persons; and
- To improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure at resettlement sites.

PS 6 Biodiversity conservation and sustainable management of living natural resources is developed with due consideration of the Convention on Biological Diversity and recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development.

The objectives of this PS are therefore to:

- Protect and conserve biodiversity;
- Maintain the benefits from ecosystem services, which are defined as the various functions and valued benefits an ecosystem provides for other resources and for human beings; and

- Promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.

To achieve the goals of this Standard, habitats are identified and divided into modified, natural and critical ones. Critical habitat is a subset of modified and natural habitat.

PS 7 Indigenous peoples recognizes that indigenous people, as social groups with identities that are distinct from mainstream groups in national societies, are often among the most marginalized and vulnerable segments of the population.

The objectives of this PS are therefore to:

- Ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of indigenous peoples;
- Forecast and prevent adverse impacts of projects on IP communities or, when this cannot be avoided, minimize and/or compensate damage and loss caused by the impact;
- Offer a way to enjoy the benefits and opportunities of sustainable development in a manner that is acceptable within a given culture;
- Establish and maintain, on the basis of informed consultation and participation, the ongoing relationship with indigenous peoples being under the project influence during the entire project life;
- Ensure free, prior and informed consent of IP communities under the circumstances considered in this Performance Standard; and
- Respect and preserve the IP culture, knowledge and customs.

IFC PS 7 is considered as not applicable to the Project (see Chapter 6 for details).

PS 8 Cultural Heritage reflects an important role of cultural heritage of present and future generations. Based on the Concerning the Protection of the World Cultural and Natural Heritage, the PS is aimed at ensuring protection of the cultural heritage by the clients during their activity under the Project.

The eight Performance Standards are supported by IFC EHS guidelines.

PS 1-5 are considered by Ramboll to be relevant to the Project, while PS 6, PS 7 and PS 8 are not considered relevant (please refer to Section 2.2.3 below).

2.2.2 Applicable IFC Guidelines

The WB/IFC EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP), as defined in IFC Performance Standard 3 on Resource Efficiency and Pollution Prevention. The EHS Guidelines contain the performance levels and measures that are normally acceptable to the IFC and are generally considered to be achievable in new facilities at reasonable costs using existing technology.

The IFC EHS Guidelines comprise both general and industry-specific guidelines. The IFC General EHS Guidelines contain information on cross-cutting environmental, health, and safety issues potentially applicable to all industry sectors. It is designed and should be used together with the relevant industry sector specific guidelines.

IFC Environmental, Health and Safety (EHS) Guidelines applicable to the Project are:

- General EHS Guidelines, dated April 2007;
- Cement and Lime Manufacturing, dated April 2007;
- Construction Materials Extraction, dated April 2007;
- Mining, December 2007;
- Railways, April 2007;
- Electric Power Transition and Distribution, April 2007.

Other applicable procedures and guidelines of IFC:

- Environmental and Social Review Procedures, 2016;
- Environmental and Social Management System Implementation Handbook (General), 2015;

- Environmental and Social Management System Implementation Handbook for Construction, 2014;
- Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets, 2007;
- Good Practice Note: Managing Contractors' Environmental and Social Performance (October 2017);
- Use of Security Forces: Assessing and Managing Risks and Impacts (February 2017);
- Worker's Accommodation: Processes and Standards (Guidance Note by IFC and EBRD, 2009);
- Good Practice Handbook: Assessment and Management of Cumulative Impacts: Guidance for the Private Sector in Emerging Markets (August 2013).
- IFC. Good Practice Note: Addressing Grievances from Project-Affected Communities, 2009.

2.2.3 Identified Applicable IFC Performance Standards

The list of international standards and their applicability to the Project are presented in Table 2.1.

Table 2.1: Applicability of international standards to the Huaxin Cement Project

IFC Performance Standard	Applicability
I. Assessment and Management of Environmental and Social Risks and Impacts	Applicable This Performance Standard is applicable to projects with social and environmental risks and impacts to be managed through all project phases.
II. Labour and Working Conditions	Applicable The requirements of the Standard are intended to secure safe and healthy working conditions.
III. Resource Efficiency and Pollution Prevention	Applicable The requirements of the Standard are intended to prevent and minimize adverse impacts on health and environment through environmental pollution abatement during implementation of the Project.
IV. Community Health, Safety and Security	Applicable The requirements of the Standard are intended to prevent and mitigate risks and impacts on community health and safety during the Project life cycle
V. Land Acquisition and Involuntary Resettlement	Applicable The requirements of this Standard are intended to minimise the adverse social and economic effects of limitations on land use. These requirements is applicable to the proposed Project as, probably, a Livelihood Restoration Plan will be required. No resettlement activities are deemed to be necessary based on the information received to date.
VI. Biodiversity Conservation and Sustainable Management of Living Natural Resources	Not Applicable The requirements of the Standard are intended to protect and conserve biodiversity and to stimulate sustainable nature management. Natural protection area or protected species are not identified by desktop research, field visits, and meeting with local environmental agency. The site visit verifies that there are only stressed sparse grasses at the barren steppe. There is no other vegetations in the project area. There is no residential community near the project site.
VII. Indigenous Peoples	Not Applicable The Standard is primarily aimed at the prevention of adverse Project impacts on indigenous communities, and mitigation and appropriate compensation if such impact is unavoidable. Areas of traditional nature use and communities of indigenous peoples are not present in the Project area of influence..

IFC Performance Standard	Applicability
VIII. Cultural Heritage	Not Applicable Archaeological sites are not present in the Project's impact area.

2.3 International Agreements and Conventions Signed by Uzbekistan

Uzbekistan's foreign policy is compiled in accordance with the principles of compliance with the requirements of international law. This policy and supporting documents, is aimed at facilitating Uzbekistan to comply with multilateral environmental agreements (MEAs) and to enable Uzbekistan to take part in international conservation programs and projects. The *Programme of Actions on Nature Protection for 2013 – 2017 (Decree of the Cabinet of Ministers No.142 as of 27.05.2013),* provides the most recent framework for international environmental cooperation.

Uzbekistan is signatory to some international agreements and conventions of environmental significance. These therefore render them relevant to the Huaxin Cement project. In addition, international financing groups (e.g. World Bank, IFC, Bank of Asia, etc.) published certain standards with which projects like the Huaxin Cement project would have to comply with in order for the proponents to apply for project funding from the financing groups. The international agreements / conventions and financing standards, and how they relate to the Huaxin Cement project, are discussed in more detail below.

Uzbekistan is signatory of the following international agreements and conventions, which are of relevance to the Huaxin Cement project:

Table 2.2: International agreements and conventions signed by Uzbekistan

No.	International Conventions and Treaties	Date of ratification	Date of coming into force for Uzbekistan
1.	UN Framework Convention on Climate Change	20 June 1993 (acceptance)	21 March 1994
2.	Kyoto Protocol to UNFCCC	20 August 1999	16 February 2005
3.	Montreal Protocol on Substances that Deplete the Ozone Layer (with London, Copenhagen, Montreal amendments)	18 May 1993 (succession) London – 01.05.1998; Copenhagen – 01.05.1998; Montreal – 07.09.2006	18 May 1993 London – 08.09.1998; Copenhagen – 08.09.1998l; Montreal – 29.01.2007.
4.	Vienna Convention on the Protection of Ozone Layer	18 May 1993 (succession)	18 May 1993
5.	Ramsar Convention on Wetlands of International Importance Especially as Wildlife Habitat	30 August 2001 (accession)	8 February 2002
6.	UN (Rio) Convention on Biological Diversity	6 May 1995 (accession)	17 October 1995
7.	Convention on International Trade of Endangers Species of Wild Flora and Fauna	25 April 1997 (accession)	8 October 1997
8.	Convention on Migratory Species of Wild Animals	1 May 1998 (accession)	1 September 1998
9.	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal	22 December 1995 (accession)	7 May 1996
10.	United Nations Convention to Combat Desertification	31 August 1995	29 January 1996

No.	International Conventions and Treaties	Date of ratification	Date of coming into force for Uzbekistan
11.	UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (UNECE Water Convention)	9 August 2007 (accession)	3 December 2007
12.	Convention on the Law of the Non- Navigational Uses of International Watercourses	9 August 2007 (accession)	Has not entered into force yet
13.	Paris Convention on Protection of the World Cultural and Natural Heritage	2 December 1995	15 June 1996
14.	European Convention on the Protection of Archaeological Heritage		
15.	Aarhus Convention on Access to Information, Public Participation and Decision making and Access to Justice in Environmental Matters		
16.	Aarhus Convention on Access to Information, Public Participation and Decision making and Access to Justice in Environmental Matters		
17.	Geneva Convention on Transboundary Long-term Air Pollution 1979		
18.	Environmental Modification Convention		

Notes:

(green)	Accession / ratification date applies
(orange)	Uzbekistan is not a contracting party

2.4 Legal and Policy Requirements of the Republic of Uzbekistan

This chapter provides an overview of the relevant legal and policy requirements as applicable to Uzbekistan. Local and international environmental and social standards and requirements, of relevance to the Huaxin Cement Project, are also discussed.

2.4.1 Uzbekistan Administrative and Legislative Organisations -Constitution of the Republic of Uzbekistan

The Constitution of the Republic of Uzbekistan was adopted on 8 December 1992. The Constitution of the Republic of Uzbekistan consists of the following sections:

- Preamble;
- Fundamental Principles (Articles 1-17);
- Basic rights, freedoms and obligations of the citizens and human being (Articles 18-52);
- Society and Person (Articles 53-67);
- Administrative-Territorial and State Composition (Articles 68-75);
- Organization of State Power (Articles 76-126);
- Procedure of incorporation amendments into Constitution (Articles 127-128).

According to the Constitution of the Republic of Uzbekistan, the Fundamental Principles of the Constitution of the Republic of Uzbekistan include the following:

- The Nation is only single source of state power. The powers of the state are exercised in the interest of the people and exclusively by the state bodies authorized under Constitution and legislative acts;
- adopted based on it (Article 7);
- The most critical issues of social and political life is subject to nationwide discussion (referendum). The procedure of conducting referendum is envisaged in the law (Article 9);
- Oliy Majlis (Parliament) and the President represent the nation of the Republic of Uzbekistan (Article 10);
- State power system of the Republic of Uzbekistan is based on the concept of separation of powers into legislative, executive and judicial (Article 11);
- Democratic rights and freedoms are protected by Constitution and laws (Article 13);
- None of the provisions of this Constitution shall be interpreted to prejudice the rights and interests of the Republic of Uzbekistan. Neither any law nor legal normative act must be consistent with provisions and principles of the Constitution (Article 16).

According to the Constitution of the Republic of Uzbekistan the basic rights, freedoms and obligations of the citizens and human being include the following main principles:

- The rights and freedoms according to international treaties of the Republic of Uzbekistan are provided for citizens and stateless persons in the Republic of Uzbekistan (Article 23).
- The right to life (Article 24);
- The right to liberty and security (Article 25);
- The right to free movement within the territory of the Republic of Uzbekistan and departure from the country (Article 28);
- The freedom of thought, speech, opinion and information (Article 29);
- The freedom of conscience and religion (Article 31);
- The freedom of meetings, demonstrations and other events according to legislation of the Republic of Uzbekistan (Article 33);
- The freedom of labour unions, political parties and public organisations (Article 34);
- The right to property and banking confidentiality (Article 36);
- The right to paid leave (Article 37);
- The right to social welfare benefits in respect of old age, disability, loss of breadwinner and in other cases envisaged in the laws (Article 39);
- The right to qualified medical service (Article 40);
- The right to education (Article 41);
- Judicial protection of rights and freedoms (Article 44);
- Any property shall not inflict harm to the environment, rights and freedoms of individuals, legal entities and state (Article 54); and
- Land, subsoil, water, flora, fauna and other natural resources are protected by the state and subject to rational use (Article 55).

According to the Constitution of the Republic of Uzbekistan, the obligations of the citizens include the following:

- All citizens shall bear obligations envisaged in the Constitution (Article 47);
- The citizens are obligated to follow Constitution and laws, respect rights, freedoms, honour and dignity of other persons (Article 48);
- All citizens are obliged to protect the environment (Article 50);
- All citizens are obligated to pay taxes and local charges (Article 51).

The concept of separation of state powers is envisaged in the following articles of the Constitution of the Republic of Uzbekistan and other legislative acts of the Republic of Uzbekistan.

2.4.1.1 The Legislative Power According to The Constitution of The Republic of Uzbekistan

The legislative power is governed by the Oliy Majlis (Supreme Assembly) consisting of the Legislative Chamber and the Senate (Parliament) (Article 76). Oliy Majlis fulfils the following principal functions:

- Adoption of the Constitution, incorporation of amendments and supplements thereto;

- Adoption of constitutional laws, laws of the Republic of Uzbekistan, incorporation of amendments and supplements thereto;
- Adoption of strategic programs;
- Determination of system and authorities of legislative, executive and judicial powers of the Republic of Uzbekistan; and
- Determination of taxes and other mandatory payments.

In addition to the provisions outlined in the Constitution of the Republic of Uzbekistan the following laws and legal normative acts, regulating legislative power, were adopted in the Republic of Uzbekistan: the Constitutional Laws On Legislative Chamber of Oliy Majlis of the Republic of Uzbekistan (2002) and Senate of Oliy Majlis respectively (2002), Rules and Procedures of the Legislative Chamber of the Republic of Uzbekistan (2003) and Senate of the Republic of Uzbekistan (2005).

2.4.1.2 The Executive Power According to the Constitution of the Republic of Uzbekistan

The Cabinet of Ministers of the Republic of Uzbekistan governs the executive body in the Republic of Uzbekistan as per Constitution of the Republic of Uzbekistan (Article 98), Law On the Cabinet of Ministers of the Republic of Uzbekistan (2003), Rules and Procedures of the Cabinet of Ministers of the Republic of Uzbekistan (2005). The Cabinet of Ministers (CM) exercises the following main functions: implements measures on rational use and protection of natural resources, coordinates the work of state bodies on joint conducting of natural protection events, implements a large-scale ecological programs of republican and international importance, and takes measures to eliminate the consequences of accidents and disasters as well as natural disasters. It should be noted that each of the law regulating environmental issues contain provisions related to authority of the Cabinet of Ministers of the Republic of Uzbekistan.

2.4.1.3 The Judicial Power According to the Constitution of the Republic of Uzbekistan

The judicial system in the Republic of Uzbekistan is consisting of the Constitutional Court, Supreme Court, Supreme Commercial Court, supreme courts of the Republic of Karakalpakstan on civil and criminal cases, Commercial Court of the Republic of Karakalpakstan, Tashkent city court on civil and criminal cases, interdistrict, district courts on civil and criminal cases, city courts on civil and criminal cases, military courts and commercial courts (Article 107).in order to implement provisions envisaged in the Constitution of the Republic of Uzbekistan the following laws were adopted: Law On Courts (2000), Law On Constitutional Court of the Republic of Uzbekistan (1995) and Law On Arbitration Courts (2006). The Court in the Republic of Uzbekistan is intended to exercise the judicial protection of the rights and freedoms of citizens and business entities, institutions and organisations in the Republic of Uzbekistan.

2.4.1.4 Local State Authorities According to the Constitution of the Republic of Uzbekistan

Representative bodies of state authorities in regions, districts and towns (except for towns under regional jurisdiction and city districts) of towns are Councils of People’s Deputies (Kengash) led by governors (“khokim”) (Article 99). In addition the Law On Local State Authorities (1993) was adopted in the Republic of Uzbekistan. The Kengash among other authorities is responsible for environment protection and enforcement of the laws of the Republic of Uzbekistan.

Gathering of citizens (Makhalla) in the settlements, kishlaks and auls is an independent local form of self-government in Uzbekistan (Article 105). The Law on Local Self-Governing Institutions was adopted in the Republic of Uzbekistan (new edition in 2013). Makhalla is responsible for protection of nature, infrastructure improvement and development, provision of social aid to low-income families and etc.

2.4.1.5 Hierarchy of Principal Sources of Law

The hierarchy of the principal sources of law in Uzbekistan is based on The Constitution of the Republic of Uzbekistan as the most important element of the law system. The following legal documents are applied in the execution of the Uzbek legal system (ranked in order of importance):

- Constitutional laws;
- Ordinary laws;
- Resolutions of Chambers of Oliy Majlis of the Republic of Uzbekistan;
- Decrees of the President;

- Decrees of the Cabinet of Ministers; and
- Regulatory acts.

2.5 Uzbekistan Legal Framework for Sustainable Development and Environmental Performance and Protection

Since the onset of the new millennium, Uzbekistan passed a number of new laws and revised others relating to environmental management and sustainable development. The aims of the new or revised laws were to align them with relevant international laws and standards and also to provide implementation measures for basic normative laws. A basic overview of the latest developments relating to legal requirements of relevance to the Huaxin Cement ESIA is given below.

2.5.1 Protection of Nature

The Law on Nature Protection is the basic environmental law and was first enacted in 1992. The amendments focussed mostly on adapting the law to bring the law in line with other new laws and programmes or changes to government structures.

This law is largely normative and does not provide mechanisms for implementation. The subsequent compilation of regulations relevant to this Act is aimed at addressing this constraint. Examples of these are:

- “Cabinet of Ministers Resolution (2003) on the Improvement of the System of Payments for Environmental Pollution and Waste Disposal” legislated the amounts payable for environmental
- pollution and waste;
- “Cabinet of Ministers Resolution (2005) on the Procedure of Application of the Compensation Payments for Environmental Pollution and Waste Disposal” is applicable to the handling of mining wastes;
- “Cabinet of Ministers Resolution (2006) on the Improvement of the System of Payments for Special Nature Use” is an amendment on an earlier regulation on the responsibilities of the State Committee for Nature Protection (SCNP) relating to the collecting and distribution of compensation payments for environmental pollution; and
- “Cabinet of Ministers Resolution (2010) on Measures to Adjust Payments to Non-Budget Funds of the Ministries and Other Government Agencies” creates the legal platform for adjustments to the rates of compensation payments set forth by the Cabinet of Ministers Resolution (2003) above.

In 2004, the Law on Protected Natural Areas replaced the earlier 1993 Law on Specially Protected Natural Territories. This new law was aimed at facilitating alignment with the Convention on Biological Diversity, the Ramsar Convention[19] and the Bonn Convention[20].

2.5.2 Sectoral Legislation

In 2002, the Law on Subsoil (Law No. 444-II of 13.12.2002) was enacted. Provisions of this law have an implication on environmental management in general. In the context of the Huaxin Cement project, it requires activities that require licensing to undergo ecological studies, waste management and waste disposal procedures provided for as proponents have full liability in terms of ownership of the waste produced by such proponent.

The Law on the Rational Use of Energy (1997 as amended in October 2013) is aimed at reducing energy use through a number of measures. This includes for example the formulation of energy use standards and indicators, performing energy efficiency inspections, promoting the development of energy efficient products and projects.

The 2002 Law on Waste as most recently amended in 2011 addresses waste management in the general context (air and water contamination / pollution not included in this Act). Through this Act, the SCNP is tasked with relevant administrative functions (coordination, inspection, ecological expertise and the

[19] Convention on Wetlands of International Importance especially as Waterfowl Habitat.
[20] Convention on the Conservation of Migratory Species of Wild Animals

determining of regional monitoring parameters for waste processing). It also refers to basic human rights where citizens of Uzbekistan have the right to a safe and healthy environment, to participate in the discussion of projects, and to compensation as a result of damages suffered as a result of a development / project. Waste transport requirements are also provided in this Act as well as the prohibition of storage or burial of radioactive waste. Waste recycling incentives are discussed in this Act.

2.5.3 *Other Applicable Legislation*

The Land Code (1998) provides the requirements for most categories of land and specifies the procedures for land acquisition and termination of use, as a result of the fact that land is state owned and cannot be owned in a person's private capacity.

The 2001 Law on the Protection and Use of Objects of Cultural Heritage is primarily directed at the preservation and management of important elements of the built environment, but it also addresses the protection of territories representing historical archaeological, aesthetic, ethnological or anthropological value, as well as natural landscapes connected with historical events and persons.

The Town Planning Code of 2002 contains various provisions for stakeholder consultation, environmental management and access to information. The public have the right to comprehensive and timely information on environmental conditions as well as future plans that could have a potential adverse impact on the environment. Citizens also have the right to take part in discussions on town planning processes.

The Law on the State Programme for Forecasting and Preventing Emergency Situations (2007) make provision for the preparation for, and the monitoring of, conditions underlying potential technological and natural emergency situations.

The Law on the Principles and Guarantees of Freedom of Information (2002) only limits the access to information where it protects the rights and freedom of individuals, their moral values, and spiritual, cultural and scientific potential and national security. Other information for example demographic, sanitary, ecological, meteorological and epidemiological emergencies (including other information required for the safety of people, settlements, industrial facilities and communication) is not considered as confidential.

The Law on the Appeals of Citizens (2002) provides citizens with the rights of administrative appeals and outlines the procedures available for this process.

2.5.4 *Regulations*

In order to efficiently implement the laws in Uzbekistan, the majority of them require additional administrative and / or legal for full execution. During recent years a significant amount of legal administrative work was done in Uzbekistan to establish a regulatory framework, with special focus on the following:

- Reducing emissions and managing air quality;
- The conservation of nature;
- Reducing contamination of land and water;
- Improved waste management practises; and
- Forest conservation.

2.5.5 *State Committee for Nature Protection (SCNP)*

The State Committee for Nature Protection that reports directly to the Uzbekistan Senate. SCNP's are generally charged with the following responsibilities:

- Integrated environmental management and conservation activities in various sectors in Uzbekistan;
- Overseeing and coordination of various industrial / developmental / mining activities to promote favourable environmental conditions and appropriate rehabilitation of the environment;
- Enforcing and promoting state policy on environmental security, conservation, natural resources use etc.; and

- Conservation inspections and environmental audit.

The following lists and tables summarise the legislative and regulatory standards that are applicable to the Huaxin Cement project at the local, national and international level.

2.5.6 *List of Major Environmental Laws*

1. “Law on water and water usage” dated 6/5/1993 No 837-XII;
2. “Law on protection of nature” dated 9/12/1992 No 754-XII;
3. “Law on protection of the atmosphere” dated 27/12/1996 No 353-I;
4. “Law on subsoil” dated 23/9/1994 No 2018-XII);
5. “Law on land” dated 20/6/1990 No 97-XII – expired law. It was replaced with the “Land Code” dated 30/4/1998 No 598-I,;
6. “Law on specially protected natural territories” dated 7/5/1993 No 871-XII – expired. It was replaced with the law on “Protected natural territories” dated 3/12/2004 No 710-II;
7. “Law on state sanitary supervision” dated 3/7/1992 No 657-XII; and
8. Article 15 of Environmental review Act № 73-II dated 25.05.00.

2.5.7 *Regulatory Acts Subordinate to Environmental Laws*

1) Unified Rules for the protection of subsoil during development of mineral deposits (Annex No 42 Decree of the Cabinet of Ministers No 20 dated 13/1/1997);

2) Decree of the Cabinet of Ministers dated 9/12/1996 No 435 “On adoption of the Regulation on the State Committee for Geology and Mineral Resources” – expired. It was replaced with the Decree of the Cabinet of Ministers dated 5/2/2007 No 26 “On adoption of the Regulation on the State Committee for Geology and Mineral Resources”; – expired. It was further replaced by the Decree of the Cabinet of Ministers dated 08/06/2011 No.165 “On approval of the Regulation on the State Committee of the Republic of Uzbekistan for Geology and Mineral Resources” as amended by the Decrees of the Cabinet of Ministers dated 02/11/2011 No.294 and 08/10/2013 No.276;

3) Regulation “On the Ministry for Agriculture and Water” (Annex No 12 to the Decree of the Cabinet of Ministers No 419 dated 26/11/1996) – expired. It was replaced with the Decree of the Cabinet of Ministers dated 28/6/2003 No 290 “On improving the organization of activity of the Ministry of Agriculture and Water” , last amendment was made on 25/12/2012 (Decree of the President No.PP- 1887); and the Decree of the Cabinet of Ministers dated 21/07/2003 No.320 “On Improving Water Resources Management”, last amendment was made on 16/10/2013 (Decree of the Cabinet of Ministers No.282);

4) Regulation “On the State Committee of the Republic of Uzbekistan for the Nature Protection” (adopted by a Decree of the Oliy Majlis No 232-I dated 26/4/96);

5) Regulation “On state supervision over the use and protection of subsoil, over the geological study of subsoil and the rational use of mineral resources” (Annex No 2 to the Decree of the Cabinet of Ministers No 19 dated 13/1/97) – expired.); It was replaced by Regulation “On state supervision over geological study, the use and protection of subsoil” (Annex 1 to the Decree of the Cabinet of Ministers dated 28/07/2011 No.220);

6) Regulation “On the State Committee for Industrial Safety and Mining” (Annex No 1 to the Decree of the Cabinet of Ministers No 17 dated 10/1/96) – expired. It was replaced with the Decree of the Cabinet of Ministers dated 10/7/2004 No 323 “On organization of activity of the State Inspection for supervising safe conduct of works in industrial, mining and municipal-domestic sectors”; It was further replaced by the Decree of the Cabinet of Ministers dated 11/05/2011 No.131 “On Measures for Further Improvement of the Structure of the State Inspection Service for Supervising Geological Study of Subsoil, Safety Operation in Industry, Mining and Municipal-Domestic Sectors under the Cabinet of Ministers of the Republic of Uzbekistan”. Last

amendment was made on 01/11/2012 (Decree of the Cabinet of Ministers No.313);

7) Paragraph 11 of the Regulation on the State environmental review in the Republic of Uzbekistan (Annex No 1 to the Decree of the Cabinet of Ministers “On approval of the Regulation on the State environmental review in the Republic of Uzbekistan” № 491 dated 31/12/2001);

8) SanPiN of the Republic of Uzbekistan dated 22/12/2004 № 0179-04 – “Hygienic regulations. List of maximum permissible concentrations (MPC) of contaminants in the atmospheric air of inhabitant areas in the territory of the Republic of Uzbekistan” –expired. It was replaced by SanPiN 0293-11 dated 16/05/2011 “Hygienic regulations. List of maximum permissible concentrations (MPC) of contaminants in the atmospheric air of inhabitant areas in the territory of the Republic of Uzbekistan”;

9) SanPiN of the Republic of Uzbekistan dated 12/7/2004 № 0157-04 “Sanitary requirements to the storage and neutralization of solid domestic waste on special grounds in Uzbekistan”;

10) SanPiN of the Republic of Uzbekistan dated 29/7/2002 No 0127-02 – “Sanitary rules for inventory making, classification, storing and rendering harmless of industrial wastes”;

11) SanPiN of the Republic of Uzbekistan dated 29/7/2002 No 0128-02 – “Hygienic classifier of toxic industrial wastes in the Republic of Uzbekistan”;

12) SanPiN of the Republic of Uzbekistan dated 16/11/2011 No 0300-11 “Sanitary Rules and Standards for managing collection, inventory, classification, treatment, storage and disposal of industrial waste in the context of Uzbekistan; and

13) Regulation “On the Procedure for the Disposal, Collection, Pay Settlement, Storage and Removal of Waste Industrial Oils” annexed to the Decree of the Cabinet of Ministers dated 04/09/2012 No.258.

2.5.8 List of Health and Safety Laws

1) “Law on water and water use” dated 6/5/1993 No 837-XII;

2) “Law on protection of nature ” dated 9/12/1992 No 754-XII;

3) “Law on protection of the atmosphere” dated 27/12/1996 No 353-I;

4) “Law on subsoil” dated 23/9/1994 No 2018-XII (New edition, approved on 13/12/2002 No 444-II);

5) “Law on land” dated 20/6/1990 No 97-XII – expired law. It was replaced with the “Land Code” dated 30/4/1998 No 598-I;

6) “Law on state sanitary supervision” dated 3/7/1992 No 657-XII; and

7) “Law on the Health of the Citizens” dated 29/08/1996 No.265-I as most recently amended on 19/05/2010 (ZRU-246).

2.5.9 Normative Acts Subordinate to Health and Safety Laws

1) Unified Rules for the protection of subsoil during development of mineral deposits (Annex No 42 Decree of the Cabinet of Ministers No 20 dated 13/1/1997);

2) Regulation “On the State Committee for Industrial Safety and Mining” (Annex No 1 to the Decree of the Cabinet of Ministers No 17 dated 10/1/96) – expired. It was replaced with the Decree of the Cabinet of Ministers dated 10/7/2004 No 323 “On organization of activity of the State Inspection for supervising safe conduct of works in industrial, mining and municipal-domestic sectors; It was further replaced by the Decree of the Cabinet of Ministers dated 11/05/2011 No.131 “On Measures for Further Improvement of the Structure of the State Inspection Service for Supervising Geological Study of Subsoil, Safety Operation in Industry, Mining and Municipal-Domestic Sectors under the Cabinet of Ministers of the Republic of Uzbekistan”;

3) SanPiN of the Republic of Uzbekistan dated 22/12/2004 № 0179-04 – “Hygienic regulations. List

of maximum permissible concentrations (MPC) of contaminants in the atmospheric air of inhabitant areas in the territory of the Republic of Uzbekistan" expired. It was replaced by SanPiN No. 0293-11 dated 16/05/2011. "Hygienic regulations. List of maximum permissible concentrations (MPC) of contaminants in the atmospheric air of inhabitant areas in the territory of the Republic of Uzbekistan";

4) SanPiN of the Republic of Uzbekistan dated 12/7/2004 № 0157-04 "Sanitary requirements to the storage and neutralization of solid domestic waste on special grounds in Uzbekistan";

5) SanPiN of the Republic of Uzbekistan dated 29/7/2002 No 0127-02 – "Sanitary rules for inventory making, classification, storing and rendering harmless of industrial wastes";

6) SanPiN of the Republic of Uzbekistan dated 29/7/2002 No 0128-02 – "Hygienic classifier of toxic industrial wastes in the Republic of Uzbekistan"; and

7) SanPiN of the Republic of Uzbekistan dated 16/11/2011 No 0300-11 "Sanitary Rules and Standards for managing collection, inventory, classification, treatment, storage and disposal of industrial waste in the context of Uzbekistan.

2.5.10 Social (gender, labour, governance, security, cultural heritage, indigenous people, macroeconomics)

Uzbekistan is a member of the United Nations Organization, and therefore is obliged to comply with international human rights acts and also to apply them to the national policy and laws.

The Uzbekistan has ratified more than 40 international acts on human rights, including:

- Universal Declaration of Human Right (1948), ratified by Uzbekistan in 1991;
- Convention on the Elimination of All Forms of Discrimination against Women (1979), ratified by Uzbekistan in 1995;
- International Covenant on Civil and Political Rights (1966), ratified by Uzbekistan in 1995; and
- Convention on the Elimination of All Forms of Intolerance and of Discrimination Based on Religion or Belief (1981), ratified by Uzbekistan in 1997.

All key provisions of the Universal Declaration of Human Rights (1948) were introduced in 1992 in the Constitution of Uzbekistan. The social policy in Uzbekistan is applied at national government level and is reflected in the relevant laws, regulations as well as national social programmes.

The Welfare Improvement Strategy (WIS) (2007) is focused on economic growth in order to reduce poverty nationally. Government remains committed to implementing measures for improving living standards, social services and quality of health care, education and rural development issues.

In line with these objectives, Uzbekistan launched reforms in agriculture, privatization, trade and tax reform, and support to public administration and decentralisation. Government provides loans regionally at subsidized interest rates to vulnerable households for home-based income-generating activities, family businesses and livestock development. The loans are financed from the Employment Fund (by the Ministry of Labour and Social Welfare), and qualifying households are identified and selected through the Citizens' (Mahalla) Committees.

Laws relating to land are as follows:

1) "Law on subsoil" dated 23/9/1994; and

2) "Law on land" dated 20/6/1990 No 97-XII – expired. It was replaced with the "Land Code" dated 30/4/1998 No 598-I, last amendment was made on 20/01/2014 (No ZRU-365).

Key social laws and regulations are summarized below in Table 2.3.

Table 2.3: Key social laws and regulations applicable to Huaxin Cement project

Category	National Laws
Employment and Occupational H&S	Law No.657-II of the Republic of Uzbekistan on State Sanitary Supervision of 03.07
	Labour Code of the Republic of Uzbekistan of 01.04.1996

Category	National Laws
	Law No.265-I of the Republic of Uzbekistan on Protecting Health of Citizens 29.08.1996 (
	Law No.ZRU-57 of the Republic of Uzbekistan on Occupational Safety at Hazardous Industrial Facilities of 25.08.2006
	Law No.ZRU-174 of the Republic of Uzbekistan on Mandatory State Social Insurance against Occupational Accidents and Diseases of 10.09.2008
	Law No.ZRU-210 of the Republic of Uzbekistan on Compulsory Civil Liability Insurance of the Employer of 16.04.2009 (as amended on 30.04.2013)
Community H&S	Law No.1064-XII of the Republic of Uzbekistan on the Appeal of Citizens of 06.05.1994
	Law No.ZRU-353 of the Republic of Uzbekistan on the Prevention of the Disease Caused by Human Immunodeficiency Virus (HIV) of 23.09.2013
	Law No.123-II of the Republic of Uzbekistan on Psychiatric Services of 31.08.2000
	Law No.215-II of the Republic of Uzbekistan on Protecting the Population against Tuberculosis of 11.05.2001
	Law No.402-II of the Republic of Uzbekistan on Donation of Blood and its Components of 30.08.2002
	Law No.ZRU-97 of the Republic of Uzbekistan on Preventing Iodine Deficiency Disorders of 03.05.2007
Women's rights	Family Code of the Republic of Uzbekistan of 01.09.1998
Social Protection and Welfare	Law No.ZRU-162I of the Republic of Uzbekistan on Social Protection of Disabled Persons in the Republic of Uzbekistan of 11.07.2008
	Law No.938-XII of the Republic of Uzbekistan of the Republic of Uzbekistan on State Pensions of 03.09.1993
	Law No.616-I of the Republic of Uzbekistan on Employment of 01.05.1998
Indigenous peoples	1992 Constitution of the Republic of Uzbekistan
	Resolution of Oliy Majlis of Uzbekistan on Approval of the Declaration on the Elimination of All Forms of Intolerance and of Discrimination Based on Religion or Belief No.505-I of 30.08.1997
	Resolution of Oliy Majlis of Uzbekistan on ratification of the Convention Concerning Discrimination in Respect of Employment and Occupation No.499-I of 30.08.1997
Land allocation and use	Civil Code of the Republic of Uzbekistan of 01.03.1997
	Land Code, approved on 30.04.1998
	Law No.600-I of the Republic of Uzbekistan on Shirkat (Cooperative) Farm of 30.04.1998
	Law No.602-I of the Republic of Uzbekistan on Private Farm of 30.04.1998;
	Law No.604-I of the Republic of Uzbekistan on Dehkan (Individual) Farm of 30.04.1998;
	Law of the Republic of Uzbekistan on State Land Cadastre No.666-I of 28.08.1998
	Housing Code of the Republic of Uzbekistan of 24.12.1998
	Urban Code of the Republic of Uzbekistan of 04.04.2002

2.6 Environmental and Social Regulators

2.6.1 Environmental Regulators

The State Committee for Nature Protection (SCNP) of the Republic of Uzbekistan ('Goskompriroda') is the primary environmental regulator. The Goskompriroda reports directly to the Parliament and is responsible at national, regional (oblast) and local (district) levels for the development and enforcement of the national environmental and conservation policy, overseeing environmental compliance, the integrated environmental management across various sectors, and securing healthy environment conditions across the country. Other ministries and agencies also have responsibilities related to environment protection and control.

Other state bodies of the Republic of Uzbekistan dealing with environment related issues are:

- Ministry of Agriculture and Water Resources (MAWR);
- Ministry of Health (or MHRUz);
- State Committee for Geology and Mineral Resources (or Goskomgeologia);
- Centre of Hydro-meteorological Service (or Uzhydromet);
- State Committee for Land Resources, Surveys, Cartography and the State Cadastre (or Goskomgeodezkadastr);
- State Inspectorate for Exploration Supervision, Operations Safety Supervision of Industry, Mining and Utilities Sector (or Sanoatgeokontekhnazorat) and
- Ministry of Internal Affairs (or MVD).

2.6.2 *Social Regulators*

Social regulations are compiled, adopted, revised or amended by Oliy Majlis. Other national regulations are developed by the Cabinet of Ministers as advised by respective ministries and agencies responsible for social issues. These include:

- Regional (Oblast), municipal and local governments;
- Ministry of Labour and Social Welfare (or MLSW);
- State Inspectorate for Exploration Supervision, Operations Safety Supervision of Industry, Mining and Utilities (or Sanoatgeokontekhnazorat);
- Ministry of Health (or MHRUz);
- State Committee for Nature Protection (or Goskompriroda);
- State Committee on Land Resources, Surveys, Cartography and State Cadastre (Goskomgeodezcadastre); and
- Trade Union Federation Council.

The main regulator for social matter is the Ministry of Labour and Social Welfare of the Republic of Uzbekistan (MLSW), in line with the provisions of the Regulations on the Ministry of Labour and Social Welfare enacted by the Cabinet of Ministers in 2010 (Decree of the Cabinet of Ministers No.10 as of 02.02.2010). This Ministry deals with issues such as labour, employment, pension, social welfare and migration. The MLSW monitors compliance with the law and reports to the Cabinet of Ministers of the Republic of Uzbekistan.

2.7 Environmental Protection through Economic Instruments

In the Uzbekistan legal context, the legal foundation for applying economic instruments (e.g. payments, tax benefits, credit subsidies etc.) for environmental performance was established in the Law on Nature Protection (1992). Article 33 of this Law lists the appropriate economic instruments for environmental management. The State Committee for Nature Protection (SCNP) is the lead agency charged with devising state policy and also with the coordination of other government departments for environmental issues. In addition, the SCNP administers environmental funds however it is alleged that the effectiveness of SCNP actions is limited at times by staff and funding constraints.

All new construction projects are evaluated by the SCNP to assess environmental impacts. For this reason, enterprises should retain emissions, effluent and waste monitoring data. Taxes and pollution charges may be raised against proponents. Other vehicles to improve environmental performance can include for example Clean Development Mechanisms (CDM) and the World Bank Carbon Partnership Facility (opportunities for carbon finance projects).

2.8 Climate Change

In 1993, Uzbekistan became a partner in the United Nations Framework Convention on Climate Change (UNFCCC), as a non-Annex I party. In 1999, Uzbekistan ratified the Kyoto Protocol. The first Uzbek legal document addressing greenhouse gases (GHGs) was the 1992 Law on Nature Protection. This law is aimed at addressing ozone-depleting substances rather than climate change per se. In 1996, The Law on Ambient Air Protection became the legal vehicle for the implementation of management measures relating to climate change. In Article 6, the SCNP is mandated for setting atmospheric air protection standards. Article 24 lists the responsibilities of companies / entities to mitigate adverse effects of GHGs. Article 26 makes provision for government registration of the types and volumes of GHGs as well as self-reporting activities.

The Uzbekistan National Strategy on Greenhouse Gas Emissions Reduction was approved in 2000 by the Uzbek Cabinet of Ministers. This placed the responsibility for the implementation and monitoring of the Strategy upon the Centre of Hydrometeorological Service (Uzhydromet) and the Ministry of Macroeconomics and Statistics (subsequently became the Ministry of Economy). In 2004, the "Cabinet of Ministers Resolution on the Improvement of the Hydrometeorological Service of the Republic of Uzbekistan" identified Uzhydromet as the institution responsible for UNFCCC obligations and activities. It also included the responsibilities in terms of the United Nations Convention to Combat Desertification in Countries Experiencing Serious Drought and/ or Desertification, Particularly in Africa (UNCCD). In 2006, a Presidential Decree on "Measures on the Realization of Investment Projects in the Framework of the Interdepartmental Council on the Clean Development Mechanism of the Kyoto Protocol" provides an institutional and legal framework for the implementation of Clean Development Mechanisms (CDM) in Uzbekistan.

In 2007, Cabinet of Ministers Resolution on the "Approval of the Regulations for the Development and Implementation of the Investment Projects in the Framework of the Clean Development Mechanism of the Kyoto Protocol" combined preparation and realization of investment projects within the CDM. This Resolution gave rise to the Interdepartmental Council. This council is charged with management / monitoring of the overall mechanism.

2.9 Specific Environmental Standards Applicable to Huaxin Cement Project for the Air Quality

The ambient AQS used in this assessment are a combination of IFC World Bank Guidelines and Uzbekistan Regulation (the most stringent are applied). The AQS used in this assessment are detailed in Table 2.4.

Table 2.4: Ambient Air Quality Standards applicable for Huaxin Cement Project (maximal permissible concentration for residential areas in µg / m³)

		Project Standard (strictest of IFC or Uzbekistan)			
Air Quality Parameter	Averaging Period	Concentration	Regional Quota	Regional concentration	Source of Standard
Sulphur Dioxide (SO_2)	1 year	50		-	Uzbekistan
	1 month [2]	100		-	Uzbekistan
	24 hour	20		-	IFC
	10 minute	500		-	IFC
	One time	500	(Uz 0.33)	165	Uzbekistan
Nitrogen Dioxide (NO_2)[21]	1 year	40	-	-	IFC/Uzbekistan
	1 month	50	-	-	Uzbekistan
	24 hour	60	-	-	Uzbekistan
	10 minute	200	-	-	IFC/Uzbekistan
	One time	85	(Uz 0.25)	21	Uzbekistan
Nitrous Oxide NO_x	1 year	60		-	Uzbekistan
	1 month	120		-	Uzbekistan
	24 hour	250		-	Uzbekistan
	One time	600	(Uz 0.33)	198	Uzbekistan
Carbon Monoxide (CO)	1 year	3000	-	-	Uzbekistan
	1 month	3500	-	-	Uzbekistan

[21] One-time maximal permissible concentration of NO_2 in Uzbekistan is very stringent and is based on initially introduced hygienic standard in Russia (please see explanation of this fact below)

Air Quality Parameter	Averaging Period	Project Standard (strictest of IFC or Uzbekistan)				
		Concentration	Regional Quota	Regional concentration	Source of Standard
	24 hour	4000	-	-	Uzbekistan
	One time	5000	(Uz 0.5)	2,500	Uzbekistan
Hydrocarbons saturated C12- C19 (HC)	1 time	1000	(Uz 0.5)	500	Uzbekistan
Si-PM[22]	20 min	300			Uzbekistan
	1 month	140	-	-	Uzbekistan
	24 hour	200	-	-	Uzbekistan
	1 year	100			Uzbekistan
Ca-PM	20 min	500	-	-	Uzbekistan
	24 hour	350	-	-	Uzbekistan
	1 month	200			Uzbekistan
	1year	150			Uzbekistan

Notes: The Uzbek SanPiN-0293-11 sanitary hygienic rules regulate concentrations of particulates with their dependence on the share of SiO2 in the dust particles and are applicable as Si-PM and Ca-PM standars.

One-time maximal permissible concentration of NO_2 in Uzbekistan is very stringent and is based on initially introduced hygienic standard in Russia. However, Russia and other CIS countries re-consider this standard and harmonized this standard with the EU and WHO standards. Similar work in Uzbekkistan is still continued.

Country (Region)	MPC (NO_2), mg/m^3	Source
Russia	0.2	GN 2.1.6.3492-17. Maximum Permissible Emissions into the Atmospheric Air of urban and rural settlements
Kazakhstan	0.2	Order of National Economy Minister of the Republic of Kazakhstan dated February 28, 2015 No. 168 “On approval of hygienic standards for atmospheric air in urban and rural settlements”
European Union	0.2	Commission Directive (EU) 2015/1480 of 28 August, 2015 amending several annexes to Directives 2004/107/EC and 2008/50/EC of the European Parliament and of the Council laying down the rules concerning reference methods, data validation and location of sampling points for the assessment of ambient air quality
Uzbekistan	0.085	SanPiN RUz No. 0293-11. List of maximum permissible concentrations (MPCs) of air pollutants in residential areas of the Republic of Uzbekistan

World Health Organization recommended MPC level is 0.2 mg/m^3.[23]

Thus, based on justification above standard for NO_2 emissions is adopted at the level 0.2 mg/m^3.

2.10 Standards / Guidelines Related to Dust Emissions

Particulate Matter (PM) is derived from a wide variety of sources, both natural and anthropogenic. ‘Dust’ is the generic term which the ISO Standard 4226:1993 (Air quality - General aspects - Units of measurement) uses to describe particulate matter in the size range 1–75 µm in diameter. With regard to

[22] The SanPiN-0293-11

[23] Air Quality guidelines for particulate matter, Ozone, Nitrogen, Dioxide, Sulfur Dioxide. Global update 2005. Summary of risk assessment – WHO, 2006. – 22 p.

ambient air monitoring, particles are usually described in terms of their aerodynamic diameter which determines their aerodynamic behaviour and their separation during ambient sampling.

Loss of amenity is predominantly caused by large dust particulates >10 µm. Amenity impacts from dust may arise from both, increases in airborne dust concentrations, and dust deposition levels. Dust depositions on cars, windows and the outside of houses are among the most frequently reported impacts. The perception of such surface soiling is determined by a number of factors including (ODPM 2005):

- Deposition on a surface which is usually expected to remain free from dust;
- The colour contrast between the deposited dust and the surface upon which it settles;
- The nature of the illumination of the surface (‘dinginess’);
- The presence of nearby clean ‘reference’ surfaces against which comparisons may be made;
- The identity of the area and the composition of the local community;
- Social factors, such as lifestyle and patterns of working;
- The personal experiences and expectations of the observer; and
- Adverse publicity influencing the expectations of the observer.

In relation to perceived loss of amenity caused by dust, international guidelines advise that dust deposition levels should not exceed 130-350 mg/m^2/day to prevent amenity impacts due to dust soiling. However, the perception of dust will be influenced by the rate of deposition and the time it takes for dust depositions to become visible. Deposition rates may vary widely depending on meteorological factors such as wind speed and direction and variations in the background dust concentrations. The coarser particles causing dust amenity loss are likely to settle close to the source. The dust assessment therefore focuses on receptors located within 500 m of the facility (width of Sanitary Protective Zone) and any associated infrastructure.

2.11 Specific Environmental Standards for Noise

In order to provide rules on acceptable noise levels for habitable areas Uzbekistan utilises the SanPiN number 0267-09[24][25]. This document presents a table of noise levels for a variety of internal and external applications, the most relevant of which is replicated below in Table 2.5.

Table 2.5: Noise Limits from SanPiN No. 0267-09

Allocation of Premises and Territories	Time	Sound Pressure Level, dB(A), of Inconstant Noise
Areas adjacent to homes, clinics, dispensaries, rest homes, boarding houses, boarding homes for the elderly, childcare facilities, schools and other educational institutions, libraries	From 7 am to 11 pm	55
	From 11pm to 7 am	45

**Note – If the noise generated by both internal and external sources is impulsive or tonal, then the parameters should be lowered for 5 dB(A) below than in the table*

The noise levels presented in this SanPiN are aligned with the guidance of the “Environmental, Health and Safety (EHS) Guidelines” published in 2007 by the International Finance Corporation (IFC/World Bank Group).

Section 1.7 of the “Environmental, Health and Safety (EHS) Guidelines” published in 2007 by the International Finance Corporation (IFC)/World Bank Group addresses the “impacts of noise beyond the property boundary of the facilities”. It advises that noise prevention and mitigation measures should be applied where predicted or measured noise impacts from a project facility or operations exceed the applicable noise level guideline at the most sensitive point of reception. Noise impacts should not exceed the levels presented in the table below or result in a “maximum increase in background levels of 3 dB at the nearest receptor location off-site”.

[24] SanPIN No. 0267-09; *Sanitary norms and rules in housing premises, public buildings and in residential areas*

Table 2.6: IFC Noise Limits

Receptor	One Hour L_{Aeq} (dBA)	
	Daytime 07:00 – 22:00	Night-time 22:00 – 07:00
Residential; institutional; educational	55	45

The noise level guidelines specifically reference “Guidelines for Community Noise”[26]8 by the World Health Organisation (1999) when determining the noise limits presented in the Table 2.7. below.

The World Health Organisation ‘Guidelines for Community Noise’ have been derived from scientific knowledge on the impact of community noise. The guidance aims to provide regulators and professionals with suitable standards whereby people may be protected from the harmful effects of noise in non-industrial environments.

The guidelines for annoyance responses in external amenity areas are covered within section 4.2.7 of the WHO guidelines and are reproduced below.

“During the daytime, few people are seriously annoyed by activities with LAeq levels below 55 dB; or moderately annoyed with LAeq levels below 50 dB. Sound pressure levels during the evening and night should be 5-10 dB lower than during the day. Noise with low frequency components requires even lower levels.”

Consequently, the guidelines recommend environmental daytime and evening limits of 55 dB LAeq or less over the 16-hour daytime period (07.00-23.00) to avoid minimal serious annoyance, and 50 dB LAeq to avoid minimal moderate annoyance.

Table 2.7: WHO Guidelines

Specific environment	Critical Health Effect(s)	L_{Aeq} [dB(A)]	Time Base [hours]
Outdoor living area	Serious annoyance, daytime and evening	55	16
	Moderate annoyance, daytime and evening	50	16
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8

In order to protect the health of staff in the workplace Uzbekistan utilises the SanPiN number 0120-01 – “Sanitary norms and rules to ensure acceptable noise levels in the workplace”. This SanPiN presents a table of noise levels for a variety of internal and external applications, the most relevant of which is replicated below in Table 2.8.

Table 2.8: Noise limits from SanPiN No. 0120-01

Type of work, workplace	Sound Pressure Level, dB(A), of Inconstant Noise
Performing all types of work on the permanent workplaces in industrial premises and in the enterprises operated from March 12, 1985	80

[26] Guidelines for Community Noise, WHO

2.12 Specific Standards Applicable During the Soil Impact Assessment

The following standards and guidelines are relevant to soil management:

The Project is designed to meet regulatory requirements and commonly accepted international environmental, and social, and consultation standards. The standards are primarily guidelines and standards of the International Finance Corporation (IFC), a unit of the World Bank, which form the de facto standards applied to many major operations seeking investments and guarantees from multilateral, bilateral and commercial financial institutions.

The guidelines and standards relevant to the soil study include the following:

- IFC's Performance Standards (PS) on IFC's General Environmental, Health, and Safety Guidelines (April 2007): Environmental Contaminated Land; and
- Performance Standard 3: Pollution Prevention and Abatement.

Contaminated lands may involve surface soils or subsurface soils that, through leaching and transport, may affect groundwater, surface water, and adjacent sites. Where subsurface contaminant sources include volatile substances, soil vapour may also become a transport and exposure medium and create potential for contaminant infiltration of indoor air spaces of buildings.

The *General Guidelines* (April 2007) in the IFC EHS, contains specific provisions with respect to soil erosion and essence specify the need to reduce or prevent erosion and off-site sediment transport through appropriate reinstatement.

2.13 Specific Standards Applicable for Surface Water

In terms of managing the surface water environment of the site, the IFC EHS considers, but is not limited to, the wastewater discharge, water conservation, water quality and the overall environment following construction and decommissioning.

In general, the Huaxin Cement project has the potential to generate significant amounts of process wastewater, sanitary (domestic) sewage, or stormwater and Huaxin Cement should incorporate the necessary precautions to avoid, minimize, and control adverse impacts to human health, safety, or the environment.

Table 2.9: Uzbekistan Discharge Standards

Parameter	Units	Standards			
		Fish Pond Specific[27]	Domestic Specific[28]	Irrigation Specific[29]	Drinking Water[30]
Metals					
Chromium (VI)	mg/L	0.001	0.1	0.1	
Strontium (Sr)	mg/L		2		
Arsenic (As)	mg/L	0.05	0.05	0.1	
Calcium (Ca)	mg/L				
Cadmium (Cd)	mg/L	0.005	0.01		
Cobalt (Co)	mg/L	0.1	1		
Chromium (Cr)	mg/L	0.001			
Copper (Cu)	mg/L	0.001	1	1	

[27] Uzbekistan Local Requirements for Waste Water Discharge to fish ponds (MPC contaminants in water)
[28] Uzbekistan Local Requirements for Waste Water Discharge for domestic use (MPC contaminants in water)
[29] Uzbekistan Local Requirements for Waste Water Discharge for irrigation (MPC contaminants in water)
[30] Uzbekista n Local Requirements for drinking water

Parameter	Units	Standards			
		Fish Pond Specific[27]	Domestic Specific[28]	Irrigation Specific[29]	Drinking Water[30]
Iron (Fe)	mg/L	0.05	0.5	5	0.3
Mercury (Hg)	mg/L				
Potassium (K)	mg/L	50			
Magnesium (Mg)	mg/L				
Molybdenum (Mo)	mg/L	0.0012	0.5		
Nickel (Ni)	mg/L	0.01	0.1		
Phosphor total (P)	mg/L				
Phosphor total (PO_4)	mg PO_4/L	0.3	1	1	
Phosphor total (P_2O_5)	mg P_2O_5/L				
Lead (Pb)	mg/L	0.03	0.1	0.2	
Selenium (Se)	mg/L	0.001			
Zinc (Zn)	mg/L	0.01	1	5	
Mono Aromatic Hydrocarbons					
Benzene	mg/L	0.5			
Toluene	mg/L	0.5			
Ethylbenzene	mg/L				
o-Xylene	mg/L				
m,p-Xylene	mg/L				
Xylenes (sum)	mg/L	0.05			
BTEX (sum)	mg/L				
TPH					
Oils and fats IR (TCE)	mg/L	0.05	0.3	0.3	
Organic Compounds					
Total Organic Carbon (TOC)					
Total suspended solids		15	30	50	Not limited
Dry residue					
Inorganic Compounds					
Ammonia as NH_4-N	mg N/L	0.5	2	1.5	Not limited
Ammonia (NH_4)	mg/L				
Chemical oxygen demand (COD)	mg/L	15	40	40	
Chloride	mg/L	300	350		250
Nitrate equivalent NO_3-N	mg N/L	9.1	25	25	
Nitrate (NO_3)	mg/L	40	45		45
Nitrite as NO_2-N	mg N/L	0.02	0.5	0.5	
Nitrite (NO_2)	mg/L	0.08	3.3		3
Sulphate dissolved (SO_4)	mg SO_4/L	100	500		400

Parameter	Units	Standards			
		Fish Pond Specific[27]	Domestic Specific[28]	Irrigation Specific[29]	Drinking Water[30]
Sulphate expr. as (SO_4-S)	mg S/L				
Sum volatile phenols					
Phenol index	mg/L	0.001	0.001	0.001	
Biologic and or toxicologic research					
BOD_5	mg O_2/L				

2.14 Wastewater Effluent and Stormwater (IFC, 2007)

The IFC (2007) guidelines that are relevant to wastewater effluent and stormwater for this project infer the following:

- Understand the quality, quantity, frequency and sources of liquid effluents in its installations;
- Plan and implement the segregation of liquid effluents principally along industrial, utility, sanitary, and stormwater categories, in order to limit the volume of water requiring specialized treatment;
- Identify opportunities to prevent or reduce wastewater pollution through such measures as recycle/reuse within their facility, input substitution, or process modification (e.g. change of technology
- or operating conditions/modes);
- Assess compliance of their wastewater discharges with the applicable:

  i) discharge standard (if the wastewater is discharged to a surface water or sewer); and
  ii) water quality standard for a specific reuse, such as irrigation, domestic or raw water use.

2.15 Water Supply and Resources (IFC, 2007)

The IFC (2007) guidelines that are relevant to water supply and resources for this project infer the following:

- Implement water conservation programs bearing considering the economic implications thereof;
- Harvest and utilize storm/rainwater;
- Implement a zero discharge design and/or the use of treated wastewater to be included in project design processes; and
- It is recommended a water management program include:

  i) The identification, regular measurement, and recording of principal flows (inputs and outputs) within a facility;
  ii) Defining and regularly reviewing performance targets, adjusted to account for changes in major factors affecting water use (e.g. industrial production rate); and
  iii) A regularly comparison of water flows with performance targets to identify where action should be taken to reduce water use

2.16 Specific Standards Applicable to the Waste Management

Section 55 of the Constitution of Uzbekistan (RUz) states that "… *land, its resources, flora and fauna and also other nature resources are the national wealth and should be rationally used and is protected by the state*". Section 94 states that all laws, orders, statements and decrees passed under the Constitution are applicable to the whole territory of Uzbekistan.

2.16.1 *Law of the Republic of Uzbekistan on Nature Protection (No. 754-XII, December 9, 1992)*

The Law on Nature Protection (1992) is the most important environmental law in Uzbekistan. The treatment of wastes must be carried out in terms of the Law of RUz on Wastes. The generator of waste is responsibility for safe treatment and disposal of wastes. Regulatory decisions on the construction of waste treatment facilities and landfills are the responsibility of the public authorities.

In 2003 the Cabinet of Ministers passed an amendment on the Improvement of the System of Payments for Environmental Pollution and Waste Disposal and approved the amount of compensation paid for environmental pollution and waste. In 2005 the Procedure of Application of the Compensation Payments for Environmental Pollution and Waste Disposal was amended to also address mining waste. The amendments in 2006 by the Cabinet of Ministers related to the Improvement of the System of Payments for Special Nature Use, amending an earlier regulation regarding the responsibilities of the State Committee for Nature Protection (SCNP) in terms of the collection and distributing of compensation payments for environmental pollution. These amendments provide an indexation of 1.3 for compensation payments for pollution and waste disposal transgressors.

The law further provides specific sections related to waste management. It is forbidden to keep and dispose wastes on the land of settlements, on nature protection, health-improving, re-creational and historical-cultural areas, within the borders of water protective zones and zones of sanitary protection of water resources and in other places where there is a risk to life and health of citizens and also for natural areas and objects which are specially protected.

Disposal of wastes in sub soils is permitted in exceptional cases, based on special investigations, on adherence to requirements for provision of safety of life and health of citizens, environment and of nature resources. Treatment of wastes, disposal or storage of wastes on landfills can only be performed with the authorisation of SCNP. It is forbidden to use raw materials, implement technological processes and provides or sells ready products (including food products) without ecological or hygienic certificates and/or if deviating from prescribed parameters. Ecological certification is also administered in cases provided for by Law. The order of ecological certification is approved by the Cabinet of Ministers of the Republic of Uzbekistan (Cabinet of Ministers Resolution No.151 as of 19.04.2000 with the latest amendment made on 13.01.2003 No.14).

Sufficient infrastructure currently exists to accommodate the hazardous wastes that will be generated by the Huaxin Cement project. It is the intention to use hazardous waste management contractors to manage hazardous waste in line with the IFC requirements, and to ensure that hazardous waste is disposed of in a suitable destination. During construction, hazardous waste will be produced and this will be managed as stated above. No hazardous process waste will be produced. During operations, a smaller volume will be produced but will be hazardous <u>process</u> waste. Alternative disposal options will be investigated should additional information become available.

2.16.2 *Law of the Republic of Uzbekistan on Wastes (No. 362-II, April 5, 2002)*

The purpose of this Law is to regulate all waste management activities in the Republic of Uzbekistan. The main objectives of this Law are to prevent the potential harmful effects of waste materials on the lives and health of the public, environment and to encourage the minimization of waste generation and re-use. The following are a summary of some of the sections contained in the Law:

Section 2: Basic concepts:

This section list a number of waste related definitions.

Section 3: Legislation on the treatment of waste:

Legal requirements on the treatment of waste are stipulated in this Law but also appear in other applicable laws of the Republic of Uzbekistan. The Law is not applicable to emissions and air quality and also excludes waste water and water pollution. This section states that where an international agreement with the Republic of Uzbekistan establishes rules other than those provided for by the legislation of the Republic of Uzbekistan on the treatment of waste, the regulations contained in the international agreement will take precedence.

Section 4: Ownership of the wastes:

Waste belongs to the owner/generator of the raw materials, of the semi-finished products, of other products or of the goods from which the waste emerged. Ownership of the waste may be transferred to another person under a sale contract, exchange, donation or a lawful transaction for the disposal of the waste. The owners of waste are obliged to dispose of waste within the requirements of the established laws.

The transfer of ownership and responsibility for the potential harmful effects of the waste when changing ownership shall be done in accordance with the relevant laws.

Section 5: Powers of the Cabinet of Ministers of the Republic of Uzbekistan in the field of waste management:

This section describes the responsibilities and duties of the Cabinet of Ministers in terms of trans-boundary movement of waste, record keeping of waste generation and enforcement, monitoring and supervising of the state and other authorities.

Section 6: Specially authorized State bodies in the field of waste management:

The following authorities are important in the management of waste in Republic of Uzbekistan:

- State Committee for nature protection of the Republic of Uzbekistan (Goskompriroda (SCNP));
- Ministry of health of the Republic of Uzbekistan;
- Uzbek Agency ("Uzkommunkhizmat"); and
- State Inspection Service for Supervising Geological Study of Subsoil, Safety Operation in Industry, Mining and Municipal-Domestic Sectors under the Cabinet of Ministers of the Republic of Uzbekistan ("State Inspection "Sanoatgeokontehnazorat").

Section 7: Powers of the State Committee of the Republic Uzbekistan on nature protection in the field of waste management:

The State Committee for Nature Protection (SCNP) of the Republic of Uzbekistan has the following powers:

- Exercise State supervision over compliance with the requirements of the legislation on the treatment of waste;
- Coordinates the activities of specially authorized state bodies regulating waste management;
- Maintains the State Cadastre for graves and recycling;
- Conducts state ecological examination of research and technological development and design and determine documentation required in waste management industry;
- Approves applications related to waste generation and waste disposal facilities;
- Approves waste disposal limits; and
- Exercise other powers allocated in accordance with the law.

Section 8, 9 and 10 refers to powers of waste related agencies:

These authorities encompass powers to the Ministry of Health, sections dealing with waste management in general.

Powers are also allocated to The Uzbek Agency “Uzkommunkhizmat”, the agency responsible for the development of state waste projects for approval by the Cabinet of Ministers, monitoring the status of collection, transportation, processing and recycling of household waste and executes other authorities envisaged in the laws.

Another State Inspection ”Sanoatgeokontehnazorat" carries out state control and supervision over accounting, storage and disposal of waste, geological study the mining and processing industries. It also includes state supervision over radiation safety during storage, transport, recovery and disposal of radioactive waste other powers in accordance with the law.

Section 11: Powers of local authorities in the field of waste management:

Local authorities have the following powers and responsibilities:

- Participate in the implementation of national strategies and programmes for the management of waste;
- Approve the local waste management programs;
- Create conditions for development of entrepreneurship in the field of waste management;
- Providing of waste handling facilities in the territory concerned;
- Monitor compliance of management of waste activities in terms of applicable legislation;
- Facilitate the creation of an enterprise for collection and recycling; and
- Exercise other powers allocated in accordance with the law.

The law further provides for powers of citizens' self-governance bodies in waste management, rights and duties of citizens in the treatment waste management, rights and responsibilities of legal persons (waste generators/companies/businesses etc.) in waste management. The law further provides for rights of citizens, entrepreneurs, for health and safety, transportation of hazardous waste and certification of waste materials, storage and disposal requirements, compensation and incentive schemes, import of waste materials, funding for waste management and education, State Cadastre of waste disposal sites and recycling facilities and dispute resolution measures. Particular relevance is Section 15 relating to the responsibilities of waste generators and Section 22 relating to the requirements for storage and disposal of waste:

Section 15: Obligations of legal entities in the field of waste management entail the following:

- To comply with the sanitary norms and regulations relevant to waste management;
- To keep proper records of waste in the manner prescribed by the legislation;
- Determine the degree of risk posed to the health and safety of the public and environment;
- Develop rates of waste generation and waste disposal limits;
- Implement proper collection, storage and disposal measures and prevent the spoilage (pollution) of recyclable wastes;
- Take measures as owners of waste to develop and implement technologies for waste management;
- Prevent the mixing of waste streams (separate wastes streams) with the exception in cases where technologies or processes do not require this;
- Avoid storage, processing, recycling or disposal of waste in unauthorized facilities or areas;
- Monitor the compliance and environmental status of their own waste disposal facilities;
- To rehabilitate and restore disturbed land (environments) used for the treatment of waste;
- Implement measures to maximize waste recycling, disposal or transfer these legal obligations to other legal and natural persons (waste companies) engaged in the collection, storage and disposal of waste.
- Ensure that environmentally sound disposal of waste is only considered as a last option;
- Report to the local authorities and specially authorized State bodies responsible for waste management, incidences of unauthorized diversion to and the use of or disposal of wastes in the
- environment;
- Contribute within the framework of the established order compensatory payments for the placement of waste;
- Compensate for damages caused to life, health or public property or the environment that resulted from the handling of wastes; and
- Comply with other obligations ascribed by the Law.

Section 22: The storage and disposal of waste:

- Storage of waste must be carried out in compliance with the sanitary norms and regulations promulgated under the "Law on Wastes" dated 05.04.2002 #362-II;
- Provision/development of waste disposal areas (landfills, except hazardous waste sites which are approved by the SCNP) is determined by the local authorities in compliance with the law;
- Recycling of waste in the Republic of Uzbekistan without relevant technologies available to manage it shall not be permitted (free interpretation);

- The storage and disposal of waste is prohibited on land under settlements and allocated for nature protection, health improvement, recreational and historic-cultural purposes . This prohibition also
- applies to other locations where there may be a risk to life and health of the public and also specifically to protected natural territories and objects; and
- The disposal of waste is only permitted in exceptional cases subsequent to proper specialist investigations and in compliance with the health and safety requirements to protect the health of citizens, the environment and to conserve natural resources (free interpretation).

2.16.3 Other Waste Legislation

Apart from the Law on Nature Protection and the Law on Waste various regulations applicable to waste management during general waste management activities, design, construction and operation of waste facilities are promulgated under these the mentioned laws. The relevant regulations are listed below:

- O'zRH 84.3.15:2005 "Handling of Product and Consumption Wastes. Procedure of organization and carrying out of waste inventorization"; the State committee for nature protection of the Republic of Uzbekistan. Tashkent, 2005;
- O'zRH 84.3.16:2005 "Handling of Product and Consumption Wastes. Procedural guidelines for detection of distribution limit of waste products".- the State committee for nature protection of the Republic of Uzbekistan. Tashkent, 2005;
- O'zRH 84.3.17:2005 "Handling of Product and Consumption Wastes. Organization and order of project development on distribution limit of product and consumption wastes". -the State committee for nature protection of the Republic of Uzbekistan. Tashkent, 2005;
- O'zRH 84.3.18:2005 "Handling of Product and Consumption Wastes. Waste descriptor"-the State committee for nature protection of the Republic of Uzbekistan. Tashkent, 2005;
- O'zRH 84.3.19:2005 "Handling of Product and Consumption Wastes. Terms and definitions".-the State committee for nature protection of the Republic of Uzbekistan. Tashkent, 2005;
- O'zRH 84.3.21:2005 "Handling of Product and Consumption Wastes. Procedural guidelines for detection of wastes generation standards"; the State committee for nature protection of the Republic of Uzbekistan. Tashkent, 2005;
- O'zRH 84.3.22:2005 "Handling of Product and Consumption Wastes. Procedure of approval and validation of projects on waste inventorization and limits of their distribution". -the State committee for nature protection of the Republic of Uzbekistan. Tashkent, 2005;
- SanPiN of the Republic of Uzbekistan № 0068-96 "Sanitary requirements for collecting, storage, transportation, neutralization and utilization of solid domestic waste"; and
- Instruction on the order of recording of formation, use and storage of toxic waste as to the form 3 – toxic waste (biannual annual). The State Department of Statistics of the Republic of Uzbekistan. 1997.

The common purpose of the above legislation is to prevent any harmful effects caused by waste materials to the health and life of the public, the environment and to encourage the minimization of waste and to ensure it is re-used efficiently in production processes.

2.16.4 International Finance Corporation (IFC) Standards

The following standards and guidelines are relevant to waste management:

2.16.4.1 General EHS Guidelines: Environmental Waste Management

These guidelines apply to projects that generate, store, or handle any quantity of waste across a range of industry sectors. It provides guidance in terms of general non-hazardous waste, hazardous waste and waste monitoring options. It is not relevant to projects or facilities where the primary intent is the collection, transportation, treatment, or disposal of wastes.

A waste is defined as any solid, liquid, or gaseous containing material that is being discarded by disposal, recycling, burning or incineration. It can be a byproduct of a manufacturing process or an obsolete commercial product that can no longer be used for its intended purpose and requires disposal.

Solid (non-hazardous) wastes generally include any garbage or refuse. Examples of such waste include domestic trash and garbage, inert construction/demolition materials, refuse such as metal scrap and empty containers (except those previously used to contain hazardous materials which should, in principle, be managed as a hazardous waste) and residual waste from industrial operations, such as boiler slag, clinker, and fly ash.

Hazardous waste shares the properties of a hazardous material (e.g. ignitability, corrosivity, reactivity, or toxicity), or other physical, chemical, biological or toxic characteristics that may pose a potential risk to human health or the environment if improperly managed. Wastes may also be defined as “hazardous” by local regulations or international conventions, based on the origin of the waste and its inclusion on hazardous waste lists, or based on its characteristics.

Sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility, and other discarded material, including solid, liquid, semi-solid, or gaseous material resulting from industrial operations needs to be evaluated on a case-by-case basis to establish whether it constitutes a hazardous or a non- hazardous waste. Facilities that generate and store wastes should practice the following:

- Establishing waste management priorities at the outset of activities based on an understanding of potential Environmental, Health, and Safety (EHS) risks and impacts and considering waste generation and its consequences;
- Establishing a waste management hierarchy that considers first prevention then reduction (minimization), reuse, recovery, recycling, removal and finally disposal of wastes:
    - Avoiding or minimizing the generation of waste materials, as far as practicable;
    - Where waste generation cannot be avoided, minimize, recover and reuse waste; and
    - Where waste cannot be recovered or reused, treating, destroying, and disposing of it in an environmentally sound manner;
- Develop procedures and operational controls for onsite storage; and
- Define options/procedures/operational controls for treatment and final disposal.

Other industry specific guidelines already discussed in this Chapter include the EHS Guidelines for Natural Gas Processing, Petroleum Refinery, Waste Management Facilities and Water and Sanitation industry guidelines.

2.17 Uzbek National Requirements on Environmental Impact Assessment

The EIA procedure is regulated by Law on Environmental Expertise and The Regulation on State Environmental Expertise (SEE) approved by Decree No.491 of the Cabinet of Ministers on 31 December 2001 and amended in 2005 and 2009. The regulation defines the legal requirements for EIA in Uzbekistan. SEE is a review process conducted by the *Goskompriroda* Department for SEE (‘*Glavgosecoexpertiza’*) at either the national or the regional level, depending on the project category.

State Committee of the Republic of Uzbekistan for Nature Protection (*Goskompriroda*) is specially authorized supreme and coordinating authority, implementing state control and intersectoral governance in Nature protection, using and reproducing nature resources. *Goskompriroda* of the Republic of Uzbekistan is under governance of and accountable to *Oliy Majlis* of the Republic of Uzbekistan.

Goskompriroda on state environmental expertise is a uniform system of State Environmental Expertise, methodological guidance of which implemented by *Glavgosecoexpertise*. *Glavgosecoexpertise* undertakes the state environmental expertise on below objects:

- Pre-project and project documentations, operating enterprises and other objects effecting negative impact on environment and population health, objects with special legal status (on activities belonging to Category I and II);
- Materials of integrated monitoring of the territory for assigning the status of conserving nature territories, emergency environment situation zone, as well as environmental disaster (Paragraph in the Cabinet Ministers’ Decree of the RUz No.95

from 01.04.2005);
- Documentation on creation new types of technique, technology, materials, stuffs, productions;
- Programs of State projects, concept, schemes of location and productive forces development in economic and social sectors;
- Town planning documents for object designing with a total population of 50 thousand people;
- Projects of standard technical, instructional and methodological documents (technical specifications, standards, environmental standards, rules, instructions...), regulating economic and other activities related to the use of nature resources.

Pursuant to Section 10 of the Regulation on SEE, the developer must conduct the EIA assessment process ('OVOS' is the national acronym) in a staged approach, providing the *Glavgosecoexpertiza/Gosecoexpertisa* with OVOS documents for review at three distinct stagesof the Project. Section 11 of the Regulation on SEE outlines the information that should be within the documentation at each of these stages. The three OVOS stages and their required deliverables are summarised as follows:

Stage I: *The 'Concept Statement on Environmental Impact'* ('PZVOS' is the national acronym), to be conducted at the planning stage of the proposed project prior to development funds being allocated.

Stage II: *The 'Statement on Environmental Impact'* ('ZVOS' is the national acronym), to be completed where it was identified by the *Glavgosecoexpertiza/Gosecoexpertise* at Stage I that additional investigations or analyses were necessary. The Statement must be submitted to the *Glavgosecoexpertiza/Gosecoexpertise* before approval of the project's feasibility study, and therefore before construction.

Stage III: *The 'Statement on Environmental Consequences'* ('ZEP' is the national acronym) represents the final stage in the SEE process and is to be conducted before the project is commissioned. The report details the modifications to the project design that have been made from the *Glavgosecoexpertiza/Gosecoexpertise* review at the first two stages of the EIA process, the comments received through the public consultation, the environmental norms applicable to the project and environmental monitoring requirements associated with the project and principal conclusions.

SEE approval (*Glavgosecoexpertiza/Gosecoexpertise* opinion) is a mandatory document for project financing by Uzbek banks and other lenders (Section 18) at Stages I and II and for project commissioning at Stage III of the national EIA procedure. An overview of the national EIA process is provided in Figure 1.

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

- Categories I and II — "high and medium risks of environmental impact" (SEE is conducted by the national SNPC within 30 days, all EIA materials are required);
- Category III — "low risk of impact" (SER is conducted by regional branches of SNPC within 20 days, all EIA materials are required); and
- Category IV – "low impact" (SEE is conducted by regional branches of SNPC within ten days, only a draft EIA is required).

2.18 Uzbek National Requirements During Stakeholder Consultation

At the national level, the Constitution of the Republic of Uzbekistan outlines rights related to freedom of information. Article 29 states that all have the right to seek, obtain and disseminate information unless such information is directed against the constitutional system. Similarly, Article 30 obliges all state bodies, public associations and officials to allow any citizen access to documents, resolutions and other materials that related to their rights and interests.

The provision for consultation in Uzbekistan is included the Regulation "On State Environmental Expertise in the Republic of Uzbekistan", which states that the impact assessment should include a statement of environmental impact that, when necessary, includes the results of public hearings. It should also include and Environmental Impact Statement that explains adjustments of the design decisions that result from the governmental review, as well as the suggestions about the Project made during public hearings (Decree of the Cabinet of Ministers No.491 as of 31.12.2001 with latest amendment made on 03.03.2014 No.45).

Article 23 in the Law “On State Environmental Expertise” in the Republic of Uzbekistan includes a provision to allow non-governmental and non-commercial organisations and other citizens to conduct a “Public Environmental Expertise”. The conclusions of such a review are considered as recommendations by the government’s review process (Law No.73-II as of 25.05.2000 with latest amendment made on 04.01.2011 No. ZRU-278).

In the Programme of Action on Nature Protection (PANP)[9] for the period of 2008 to 2012, there is information to suggest that Uzbekistan is moving toward accession of the Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention) (UNECE, 2010). Ratifying the Aarhus Convention will further expand the commitments of the Government of Uzbekistan to provide information to the public in projects that have environmental impacts on citizens.

The Aarhus Convention differs from international standards explained below in that the responsibility for disclosure resides with the government and not the project sponsor. However, government representatives can only fulfil the requirements of the Aarhus Convention if a project sponsor has fully disclosed all information relating to environmental and social impacts.

Compliance with the national requirements will be fulfilled through the implementation of the international requirements outlined below.

2.19 International Consultation Requirements

The Project considered international requirements, specifically those of the IFC of the World Bank Group. The IFC Performance Standards, the basis for the Equator Principles, stress that public consultation should be started early in project development and that involvement of stakeholders at every stage should be:

- “free” (free of intimidation or coercion);
- “prior” (timely disclosure of information); and
- “informed” (relevant, understandable and accessible information).

Stakeholder engagement should be integrated from the ESHSIA process throughout the Project lifecycle. The Equator Principles and IFC Performance Standards require consultation to be documented by the project sponsor and often to be formalized in a Stakeholder Engagement Plan. This plan should complement ESHSIA documentation and is intended to demonstrate how and when consultation has taken place, what concerns and suggestions were made by stakeholder groups and how the project sponsor adapted or improved project plans to reflect stakeholder feedback. As part of the impact assessment, which aims to measure and predict actual impacts, stakeholder engagement attempts to capture the perceived impacts of the project. This information can assist project development in the following ways:

- Misperceptions or incorrect information about either positive or negative impacts can be appropriately addressed if perceived impacts are accurately recorded; and
- Stakeholder preferences can be incorporated into project design and social investment programs, increasing the chances that resources target the perceived needs.

2.20 Specific Standards Applicable for the Cultural Heritage

The following laws / policies / standards were applied during the cultural heritage study:

1) Uzbekistan’s Law on the Protection and Use of Objects of Cultural Heritage (2001)) - primarily directed at the preservation and management of important elements of the built environment, but also addresses the protection of territories representing historical, archaeological, aesthetic, ethnological or anthropological value, as well as natural landscapes connected with historical events and persons;

2) The International Finance Corporation's (IFC 2007) Guidance Notes: Performance Standards on Social and Environmental Sustainability (Guidance Note 8: Cultural heritage); and

3) The Environmental Assessment Sourcebook Update No. 8, 'Cultural heritage in Environmental Assessment' (The World Bank 1994).

IFC Guidance Note 8 states:

'….*cultural heritage refers to tangible forms of cultural heritage, such as tangible property and sites having archaeological (prehistoric), paleontological, historical, cultural, artistic, and religious values, as well as unique natural environmental features that embody cultural values, such as sacred groves….intangible forms of culture, such as cultural knowledge, innovations and practices of communities embodying traditional lifestyles, are also included*'.

Guidance Note 8 also explains that tangible cultural heritage resources can include:

1) Archaeological sites (including natural sites of cultural importance);

2) Historic structures;

3) Historic districts;

4) Historic or cultural landscapes; and

5) Archaeological artefacts.

2.21 Specific Standards Applicable During the Visual Impact Assessment

The International Organization for Standardization (ISO) Standard 14011 dictates the Environmental Impact Assessment (EIA) process and includes key steps for carrying out the assessment. This standard has been compiled as a response to the European Union Directive 85/337/EEC (as amended by Directive 97/11/EC), which defines the EIA process requirements. Visual Impact Assessment (VIA) is a sub-category of EIA and must therefore adhere to the requirements of the above. Furthermore, the International Finance Corporation (IFC) Performance Standard 1 describes the requirements for Social and Environmental Assessment and Management Systems, which also apply to visual and landscape assessment.

A significant body of industry-accepted procedures and guidelines accept for VIA and landscape character assessment, however due to the (at least partially) subjective nature of such assessments; limited legislative requirements exist for these. An accepted international guideline for VIA is the *Guidelines for Landscape and Visual Assessment, Second Edition* (Sue Wilson) 2002, Spon Press, London. This guideline is however not exhaustive, and other references were also used as reference material for methods, concepts and terminology commonly accepted in the field of VIA.

3. ESIA METHODOLOGY

3.1 ESIA Approach

The Project ESIA is intended to provide an accurate and comprehensive assessment of adverse impacts, benefits and potential risks of the planned operations, and develop prevention, mitigation and remediation measures for the identified environmental and social impacts, as well as the approaches to monitor and control them.

The methodology used for the ESIA has been developed and successfully applied by Ramboll for assessment of impacts of major complex projects seeking loan finance from International Financial Institutions and Export Credit Agencies. The methodology is based on the provisions of the EU Directive 2011/92/EU "On the assessment of the effects of certain public and private projects on the environment[31] and Performance Standard 1 of the International Finance Corporation (IFC) of the World Bank Group[32]. These two documents describe environmental and social impacts as any change to an environmental or social receptor (including community, workers, etc.), whether potential or actual, resulting from the business activity to be financed.

This chapter provides a structured description of the ESIA methodology including:

- Main stages of ESIA process (Section 3.2);
- ESIA scoping (Section 3.3);
- Baseline studies (Section 3.4);
- Impact identification and evaluation of significance (Section 3.5); and
- Mitigation measures (Section 3.6).

The current ESIA findings are based on the preliminary Project design solutions and will be limited by the Project information available to date and inaccuracies in a forecast on environmental and social conditions. Therefore, the assessment is meant to provide initial identification of impacts and their receptors, to give stakeholders an early notice of the proposed operations and the mitigation efforts made in the course of the Project development. The respective potential uncertainties are discussed in Chapters 8 and 9.

The Project ESIA studies are informed by the relevant survey reports, environmental impact assessments, design and other documentation which have been prepared so far for the Project components and associated activities, as well as scientific publications, statutory reports, etc. listed in more detail in Appendix 1 to this report.

Specific recommendations are to be prepared as part of the ESIA process for implementation of management, mitigation and remediation measures, additional studies, as well as approaches to monitoring and control, in order to make sure that Project activities are fully compliant with the applicable requirements (refer to Chapter 2) at all stages of its life cycle.

3.2 ESIA Process

To ensure a robust and comprehensive impact assessment, the ESIA process is structured around a series of progressive and iterative stages (Figure 3.1). Stakeholders, entities and individuals responsible for development/implementation of the Project design, the ESIA team provide inputs to these stages. Public engagement is maintained at all stages of the ESIA process.

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[31] Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the Assessment of the Effects of Certain Public and Private Projects on the Environment (amended by Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014)

[32] Performance Standard 1. Assessment and management of environmental and social risks and impacts. / Performance Standards on Environmental and Social Sustainability. - IFC, 2012. Can be accessed at https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/policies-standards/performance-standards

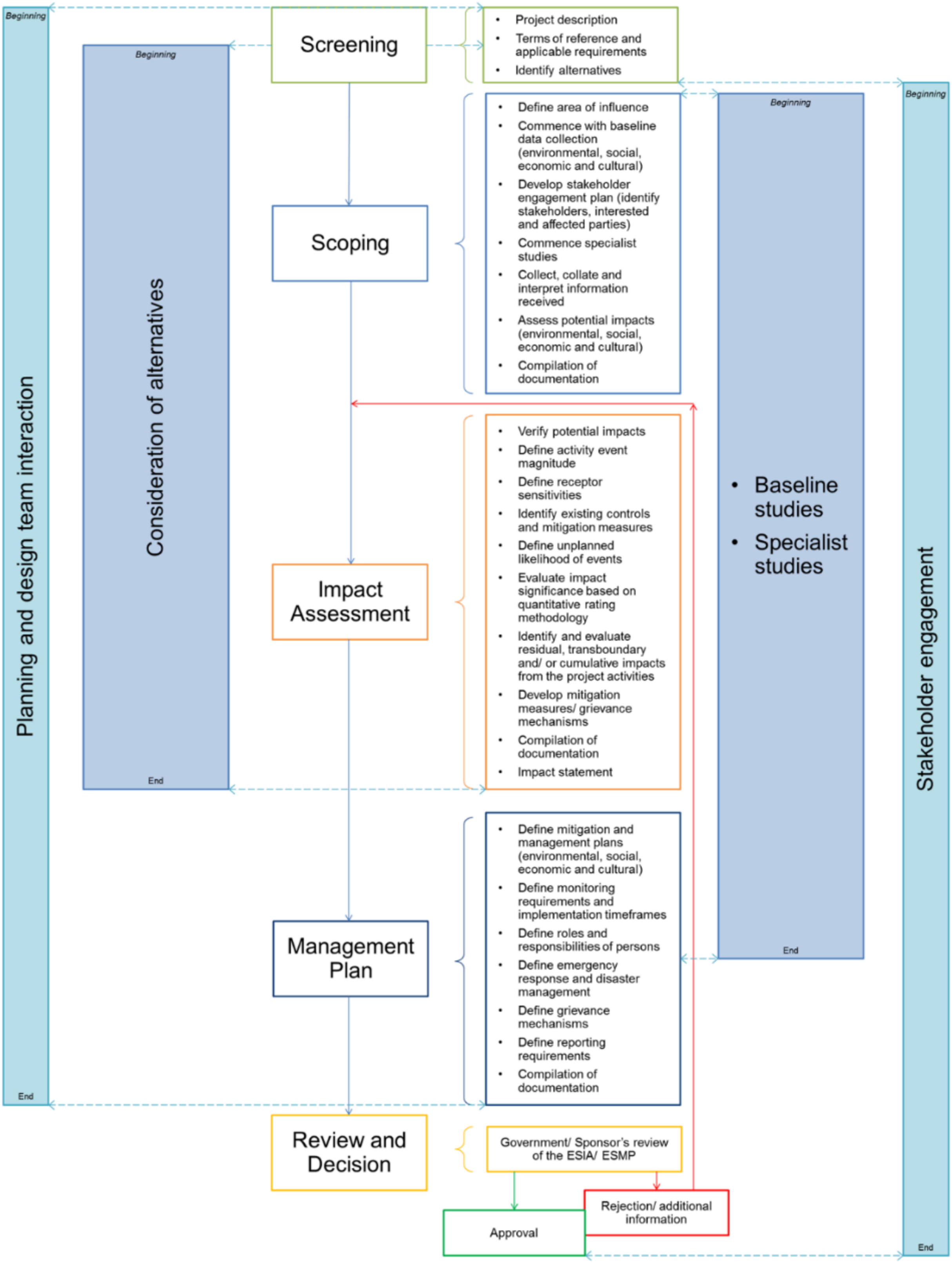


Figure 3.1: ESIA Process

This ESIA shall cover all required stages: from scoping, stakeholder identification and consultations, review of alternatives, identification and assessment of benefits and adverse impacts of the Project, to development of mitigation and remediation measures, and proposals for the control and monitoring to be undertaken.

3.3 ESIA Scoping

Scoping of studies to be conducted for assessment of the Project impacts is a vital element of ESIA preparation. Scoping is the process of determining the content and extent of the matters that should be covered in the ESIA and associated documentation as well as identifies methods for assessment of impacts. The scoping process is intended to identify the types of the environmental and social impacts to be examined and documented by the ESIA, considering the most significant potential aspects and risks.

The main objectives at the scoping stage are:

- Preliminary review (screening) of documents provided by the Client regarding proposed operations and potential alternatives;
- Collection and high-level analysis of the available information of the environmental and social conditions at the Project site and wider area, and identification of the most sensitive (vulnerable) receptors;
- Identification of the applicable local and international requirements and standards, international Lenders' requirements;
- Identification of similar projects for benchmarking of the proposed operations;
- Preliminary identification of stakeholders and initial consultations with them; and
- Initial identification of the Project impacts.

3.4 Baseline Studies

Baseline studies are primarily undertaken at two key stages, i.e. scoping and impact assessment. However, as shown in Figure 3.1, they are an ongoing activity throughout the ESIA Process. During scoping work, relatively 'high-level' baseline data are required to assist identification of likely gaps and key impacts to be considered in more detail at later stages. Where gaps are identified between available baseline data and data required for the ESIA at the scoping stage, then additional surveys or studies are undertaken to collect the required data. The work included desk-based studies and the site visit conducted by environmental and social teams of Ramboll.

It is important to ensure that receptors are identified and analysed, and their sensitivity is determined during scoping and baseline studies. Receptors are environmental and social components that may be affected, adversely or beneficially, by the proposed operations. Three high-level categories of receptors can be identified:

- Environmental (such as air quality, water bodies, landscapes, terrestrial soils, marine sediments, etc.);
- Biodiversity and biological resources (such as habitats, species and ecosystem services, for example, flood protection provided by nearby wetlands); and
- Social (such as residents of local communities, businesses, land and other resource users, cultural heritage resources).

Details of receptor categorization and the approach to assessment of their sensitivity to identified impacts are provided in Section 3.5.6.

3.5 Impact Identification and Evaluation of Significance

3.5.1 Identification of Impacts

The following approach supports identification of environmental, social and cumulative impacts:

- Review of previous studies, surveys, impact assessments, environmental monitoring data in the proposed location area of the Plant and associated facilities within the scope of the Project;
- Review of the design documentation, including potential alternatives, as well as characteristics of the proposed operations (separately for construction, operation, decommissioning) and associated activities which may cause environmental, social and human health impacts;
- Consideration of the local area development plans and strategic development programmes for the region;

- Review of applicable national and international requirements and standards, and requirements of the International Financial Institutions;
- Stakeholder consultation, including their input to identification, mitigation and control of Project impacts. Stakeholder engagement should be initiated early in the Project, to ensure open access to all relevant information;
- "Source - Path - Receptor" Analysis. Potentially significant social and environmental impacts are also identified by structured analysis of potential sources of impacts, ways they can impact the environment and human health (e.g. direct impact or transport of pollution emissions/discharges in the environment), and sensitivity of potentially affected receptors.

Potential impacts on individual components of the environment are identified for all phases of the planned operations, and their magnitude is assessed.

3.5.2 Project Implementation Phases

A phase of any project is a period of time when certain activities are implemented that collectively shape a stage in the Project life cycle. The following phases are considered by the ESIA Report:

- Construction;
- Commissioning;
- Operation; and
- Decommissioning (including demolition/dismantling and remediation).

The above Project phases may be combined (integrated) for assessment, or they may be separated for a more detailed review, as appropriate.

3.5.3 General Approach to Impact Assessment

An impact is any change to an environmental or social (including community health and safety) receptor, whether direct or indirect, expected to result from the construction, operation and decommissioning of a proposed Project[33]. Impacts on individual receptors may be negative (adverse) or positive (beneficial).

The actions undertaken to determine and evaluate the significance of potential Project impacts is illustrated in Figure 3.2 and involves four key steps:

- Prediction: What will happen to the status of specific receptors as a consequence of this Project (direction, extent, duration, reversibility)?

- Evaluation of significance: How significant is the impact? What is its relative significance when compared to other impacts?

- Mitigation: If there are impacts of concern (adverse), can anything be done to avoid, minimise, or offset the impacts? Or to enhance potential beneficial impacts? and

- Residual impact assessment: After mitigation, are the impacts still of concern?

If yes, the process needs to be repeated at least once before the 'final' determination of residual impact significance occurs. A *residual impact* is the impact that remains following the application of mitigation measures.

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

[33] This definition reflects the wording provided in the internationally recognized standard ISO 14001:2015: "Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects. Environmental aspect - element of an organization's activities or products or services that can interact with the environment".

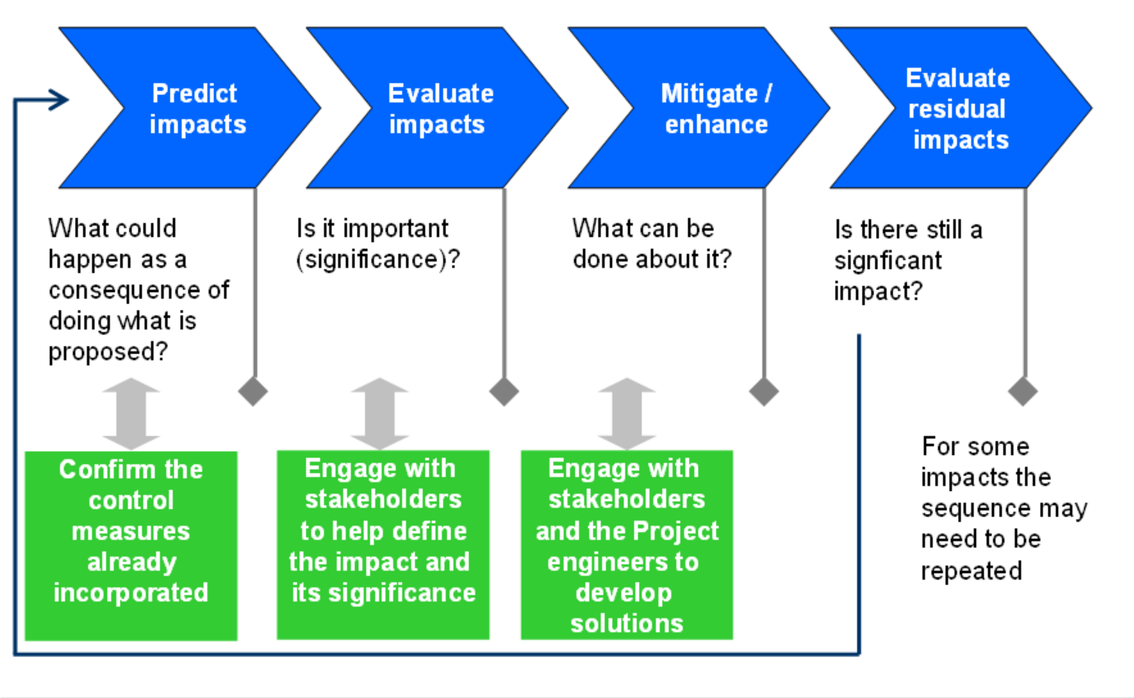


Figure 3.2: Impact Evaluation Process

3.5.4 *Prediction*

Impact prediction involves determining the magnitude or extent of a change or changes in the status of a receptor or linked receptors resulting from the planned operations, through application of forecast models, analysis of experience of similar operations, or environmental science. Impact prediction provides valuable information to determine the broader characteristics of impacts.

3.5.5 *Impact Types*

Impacts can be divided into types, and also exhibit a number of characteristics. The degree to which an impact may be managed or modified by the mitigation measures is dependent upon the impact type and its characteristics. Table 3.1 provides definitions of key impact types.

All of these impact types exhibit certain characteristics in terms of:

- Reversibility;
- Extent;
- Duration; and
- Frequency.

Table 3.1: Classification of Project Impacts

Classification of Impacts	Definition	Characteristics
By overall effect	Beneficial	Impacts expected to result in positive changes at the identified receptors
	Adverse	Impacts expected to result in negative changes at the identified receptors
By origin	Direct	An impact that results from a direct interaction between a planned activity and the receiving environment (receptors)
	Indirect	An impact that follows on from the primary interactions between the Project and its environment as a result of subsequent interactions within the environment (e.g. increased demand for resource as a result of workforce drift to the area of planned activities from other regions, or feedback effects in ecosystems affected by direct impacts)
By the nature of secondary effects	Cumulative	Project impacts which may be amplified if combined with impacts caused by third party operations (projects) on the same resources and/or receptors

Cumulative impacts include impacts on the receptors identified for the Project, as well as other existing, planned or reasonably defined projects (in the studied area) and activities which are not directly related to the Project and its associated facilities. The approach to assessment of cumulative impacts is provided in Section 3.7.

3.5.6 *Evaluation of Significance: Planned Events*[34]

Impacts significance is assessed in this Report using the qualitative, and where possible quantitative methods applicable for major project ESIAs. The quantitative methods provide an outlook of the measurable changes induced by the Project, based on available design documentation or experience of similar facilities. Quantitative assessment of the Project impacts on receptors can be also provided using the official Uzbek methodologies for estimation of potential damage which may be caused by specific impacts.

The qualitative methods are based on expert estimations, experience of other projects of similar nature and scale, and follow a structured format to produce consistent and logical projections. It should be noted that environmental impacts are sometimes difficult to evaluate in quantitative terms, due to their intangible nature (e.g. emotional impacts or sensitivity), or due to interrelation of the change and specific local situation (e.g. scale of migrant inflow compared to the baseline population).

The impacts are assessed in a structured and coordinated manner throughout the ESIA process. The approach adopted enables attribution of potential impacts to specific environmental and social aspects. For adverse impacts, significance is assigned based on determining impact magnitude and receptor sensitivity, after which mitigation is identified depending on impact characteristics.

Beneficial impacts are identified, assessed and evaluated, making use of impact magnitude (as per the guidance below), but not receptor sensitivity. Instead, beneficial impacts are described and evaluated based on available data, alignment with government policies/targets, stakeholder inputs and professional expert judgement. Measures to enhance them will be identified to try to maximize the expected benefits.

The magnitude of an impact is a measure of the scale of a change from baseline conditions for a receptor. This measure of change can be described by considering the following criteria in combination:

- Reversibility: Restoration of the pre-impact status of a receptor.
- Extent: Spatial extent (e.g. pollution dispersion or habitat impacted) or population / community extent; and
- Duration: Period of time over which an impact will interact with a receptor. This factor may also cover the frequency and regularity criteria, or they can be considered separately.

The magnitude of each impact is assessed using the above criteria and the characteristics provided in Table 3.2.

Table 3.2: Description of impact criteria

Criterion	Description	Definition
Reversibility	Irreversible	Impacts that cause a permanent change in the affected receptor
	Reversible	Restoration of the pre-impact status of a receptor due to mitigation/reinstatement measures and/or natural recovery. Duration of an impact and a subsequent recovery period should be considered
Extent (spatial)	Site	Within the boundaries of land and water area allocated for the Project and associated use-restricted zones (sanitary protection, security, etc.)
	Local	Within the boundaries of local municipality

[34] Planned events (ESIA Methodology – Ramboll, 2017)

Criterion	Description	Definition
	Regional	Within the boundaries of a region, territory, republic
	National	Impacts that affect more than one region or constituent entities of the Republic of Uzbekistan, water flows/bodies of the national significance
	Transboundary	Impacts that affect receptors beyond the boundaries of the country in which the project is located and producing transboundary/ global effects (e.g. impacts of greenhouse gas emissions)
Duration	Short-term irregular or occasional	Impacts caused by short-term single or recurrent events
	Mid-term regular or associated with a phase of activities	Impacts with duration equal or nearly equal to that of certain activity or a phase of the planned operations
	Long-term	Impacts with duration equal or comparable to the Project lifetime. Impacts of this category may cease after completion of Project activities

Assessment of duration of an impact also considers its frequency (e.g single, rare, periodic, constant) for a more detailed characterization of duration of time when impact is felt. All characteristics listed above are factored into the assessment of impact magnitude.

Table 3.3 provides generic criteria to be used to determine the impact magnitude. Taking the results derived from the previous step a decision can be made on impact magnitude (negligible, low, moderate, high). Discipline specific criteria have been determined if appropriate and presented in Chapters 8 and 9, respectively.

Table 3.3: Impact Magnitude

Impact	Criteria
Negligible	No persistent discernible impact. The change is essentially indistinguishable from natural background variation.
Minor	Limited impacts that can be identified by the available means of monitoring, with no effect on functions of ecosystems and communities Extent: local Duration: short / medium term Reversibility: reversible
Moderate	Noticeable impacts which may result in quantitative changes in ecosystems, however without their quality transformation, and without loss (partial or complete) of their natural functions. Extent: local / regional Duration: medium / long term Reversibility: reversible / irreversible
Major	Prominent impacts that may result in temporary or permanent transformation of ecosystems, with loss of their functions, and transformation of communities' life style and quality. Extent: regional / national / transboundary Duration: medium / long term Reversibility: reversible / irreversible

Once the respective magnitudes of each impact have been allocated the next step is to determine receptor sensitivity. Receptor sensitivity is based on two components: the degree to which a receptor is resilient to a change and the value attributed to the receptor by stakeholders or applicable regulations/policies.

Receptor resilience takes into consideration not only activity - receptor- impact pathways, but also the characteristics of a receptor that might make it more or less resilient to change. As such, a receptor can be considered as existing within a spectrum of ‘vulnerable’ to ‘resilient’.

Receptor value considers importance represented by conservation status, socio-cultural importance and/or economic value. Certain receptors are deemed to be of greater importance than other receptors.

The final step is to combine the impact magnitude and receptor sensitivity results to determine impact significance in relation to its receptors. For known (planned) impacts, significance is determined by their intensity, based on the impact magnitude and sensitivity of the receptor. For example, an impact of low magnitude affecting a receptor of moderate sensitivity is an impact of low/moderate significance (the actual significance determination - low or moderate - in this case can be made by the ESIA team) or an impact of high magnitude affecting a receptor of moderate sensitivity results in an impact of high significance.

Table 3.4 provides an account of the key features (definitions) of each of the impact significance classifications (from Not Significant to High); specifically linking them to need for mitigation measures.

Table 3.4: Impact Significance Matrix

		Receptor Sensitivity			
		Negligible	Low	Moderate	High
Impact Magnitude	Negligible	Not Significant	Not Significant	Not Significant	Not Significant / Low[35]
	Minor	Not Significant	Low	Low / Moderate	Moderate
	Moderate	Not Significant	Low / Moderate	Moderate	High
	Major	Low	Moderate	High	High

Definitions of the above significance ranks adopted in international ESIA practice are provided in Table 3.5.

Table 3.5: Project impacts ranking by significance

Impact significance	Description
Negligible	Impacts are expected to be indistinguishable from the baseline or within the natural level of variation. These impacts do not require mitigation and are not a concern of the decision-making process.
Low	Impacts with a “Low” significance are expected to be noticeable changes to baseline conditions, beyond natural variation, however well below the applicable standards (e.g. environmental quality standards, and are not expected to cause hardship, degradation, or impair the function and value of receptor. These impacts warrant the attention of decision-makers and should be avoided or mitigated where practicable.
Moderate	Impacts with a “Moderate” significance are likely to be noticeable and result in lasting changes to baseline conditions, which may cause hardship to or degradation of a receptor, although the overall

[35] Allows technical discipline author to decide which significance level is applicable in the given situation

Impact significance	Description
	function and value of a receptor is not disrupted. These impacts must be mitigated to avoid or reduce the impact.
High	Impacts with a "High" significance are likely to disrupt the function and value of a receptor and may have broader systemic consequences (e.g. ecosystem or social well-being). They may also result in a failure to maintain adverse effects within the permissible regulatory levels. These impacts are a priority for mandatory mitigation to avoid or reduce the significance of the impact.

This method is applied at least twice: to both pre- and post-mitigation scenarios for all impacts identified. In general, residual impacts classed as "Not Significant" or "Low Significance" are not considered to be of concern for the assessment[36]. For adverse impacts of "Moderate" and "High" significance, an iterative process is undertaken to further investigate opportunities for mitigation, according to the hierarchy above. Where the significance cannot be further reduced, an explanation is provided of why further reduction is not practicable. Monitoring may be required to confirm the measures used to mitigate adverse impacts are working properly and that the impact is not worse than predicted. Monitoring requirements are presented in Chapters 8 and 9.

3.5.7 *Risks and Unplanned Events*[37]

Where there is uncertainty about occurrence of an event (e.g. intrinsically occasional event during normal operation and/or where impacts are caused by unplanned/emergency situations), the magnitude of *risk* associated with such event is determined as a function of its occurrence *probability* and *intensity* of potential impact. Probability criteria applicable to this ESHIA are described below (Table 3.6). They are set for the whole ESHIA process and are equally applicable to all types of impact.

Table 3.6: Risk occurrence criteria

Likelihood	Qualitative assessment of impact / event probability
High	Impacts/events which are observed in the sector (studied operations or region) and reoccur more than once a week
Moderate	Impacts/events regularly observed in the sector and region, including seasonal cycling, which can be considered as very likely for the design lifetime of the planned operations
Low	Impacts/events which are rarely observed in the sector and region, or regularly observed in other sectors. These would generally occur 1 to 2 times per year
Not significant	Impacts/events that have never been observed in a wider range of sectors or in the region. Impact/event which can be considered as unlikely for the design lifetime of the proposed operations

The criteria of general risk / impact (change) occurrence risk are shown in Table 3.7.

Table 3.7: General risk / event occurrence risk criteria

Impact probability	Impact intensity			
	Not significant	Low	Moderate	High
High	Insignificant	Medium / Minor	Medium / high	Critical
Moderate	Insignificant	Minor	Medium	High
Low	Insignificant	Minor	Medium / minor	Medium / high
Not significant	Insignificant	Insignificant	Minor	Medium

[36] A more stringent approach may apply for the assessment of ecological receptors of high sensitivity, such as critical habitat, or species classified as having vulnerable or above conservation status. In this case, residual impact significance of Low and above is very likely to be a concern to the further development of the Project.
[37] *Unplanned events* (ESHIA Methodology – Ramboll, 2017)

Unplanned events will often result in a *high* impact significance, even with mitigation/remedial measures in place e.g. major oil spills. In such cases, not only the specific measures must be in place to manage an unplanned event, but the probability has to be minimised to levels seen to represent good industry practice. In this table, unplanned events with *high* residual impact significance would need to be minimized to extremely unlikely ("Improbable") events. Sometimes, if such events can be assessed quantitatively, a special analysis of risks is required to define numeric value of the event probability. In this case the probability value should be less than $1x10^{-6}$.

3.6 Impact Mitigation

Mitigation measures are developed as necessary or appropriate to minimize the risk intensity and/or impact probability, and therefore make the impact or risk less significant. Assessment of significance of potential impact/risk has been assessed during the ESIA process based on potential and residual impacts, using the criteria mentioned in Section 3.5.6.

As part of the ESHIA process, when adverse impacts are identified, measures for mitigation, minimization and control of risks, and monitoring of residual impacts are developed (as necessary or appropriate). A *residual impact* is the impact that remains following the application of mitigation measures.

The process of identifying design controls and mitigation measures must follow the sequence of the mitigation hierarchy (Figure 3.3), as specified in IFC's Performance Standard No. 1, which is widely regarded as the best practice approach to managing impacts.

First, efforts are made to avoid or prevent, then minimize or reduce adverse impacts. If the impact cannot be fully avoided by application of design controls, they are supplemented by further engineering measures for minimization and mitigation of the adverse impacts. These measures are supplemented by additional mitigation measures to be applied through the effective management of project-related activities during construction, operation and decommissioning. Any remaining residual impacts are then addressed via mitigation measures such as restoration and remediation (e.g. at the end of construction) and/or offsetting and compensation. The measures are developed and implemented in the same order as they are listed above.

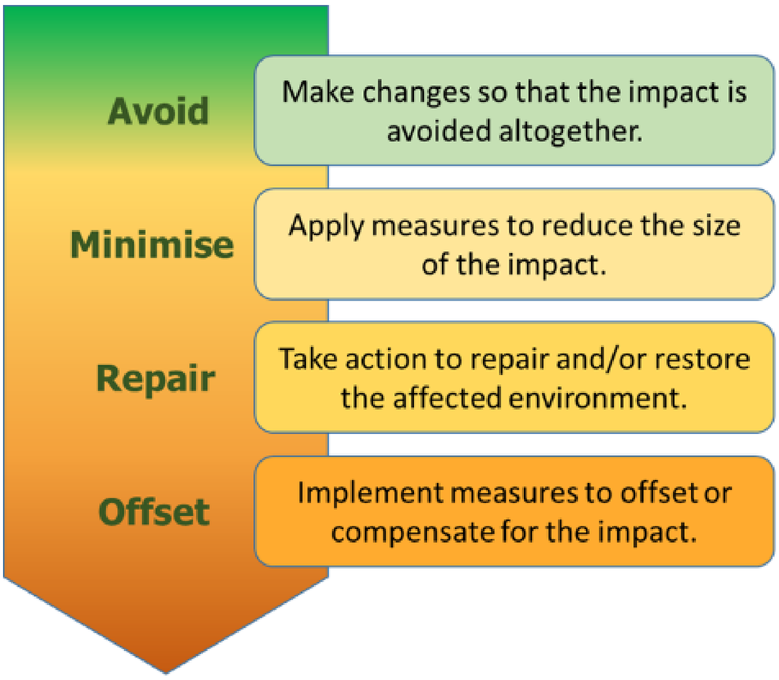


Figure 3.3: Mitigation Hierarchy

Development of mitigation measures will be primarily focused on minimization of the impacts of "High" significance. However, where possible and appropriate, mitigations are also proposed for the impacts of "Moderate" and "Low" significance, in order to reduce environmental and social effects / risks to the lowest level.

3.7 Cumulative Impacts

3.7.1 *Definition and Applicable Guidelines*

Cumulative impact assessment (CIA) is one of the requirements set for a comprehensive ESIA. Performance Standard 1 defines the Area of Influence (AoI) to encompass “cumulative impacts that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned, or reasonably defined developments at the time the risks and impact identification process is conducted.” Performance Standard 1 offers some context to limit the cumulative impacts to be addressed to “those impacts generally recognized as important on the basis of scientific concerns and/or concerns from Affected Communities”.

The CIA methodology is mainly based on the six steps approach outlined in the *Good Practice Handbook on Cumulative Impact Assessment and Management Guidance for the Private Sector in Emerging Markets (2013)*. This document is a supplement to the IFC Performance Standards and Guidance Notes and provides recommendations relating to practical assessment of cumulative impacts recognizing some of the uncertainties and constraints faced by private sector proponents. It also introduces the concept of valued environmental and social components (VEC) in the assessment of cumulative impacts.

Recommendations related to CIA are also provided in the EU commissioned document entitled 'Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions' (1999) applied extensively by European companies in the EIA process as a primary source of practical guidance. Although a relatively old document, it advocates an approach that is consistent with more recent IFC guidance described above.

3.7.2 *CIA goals*

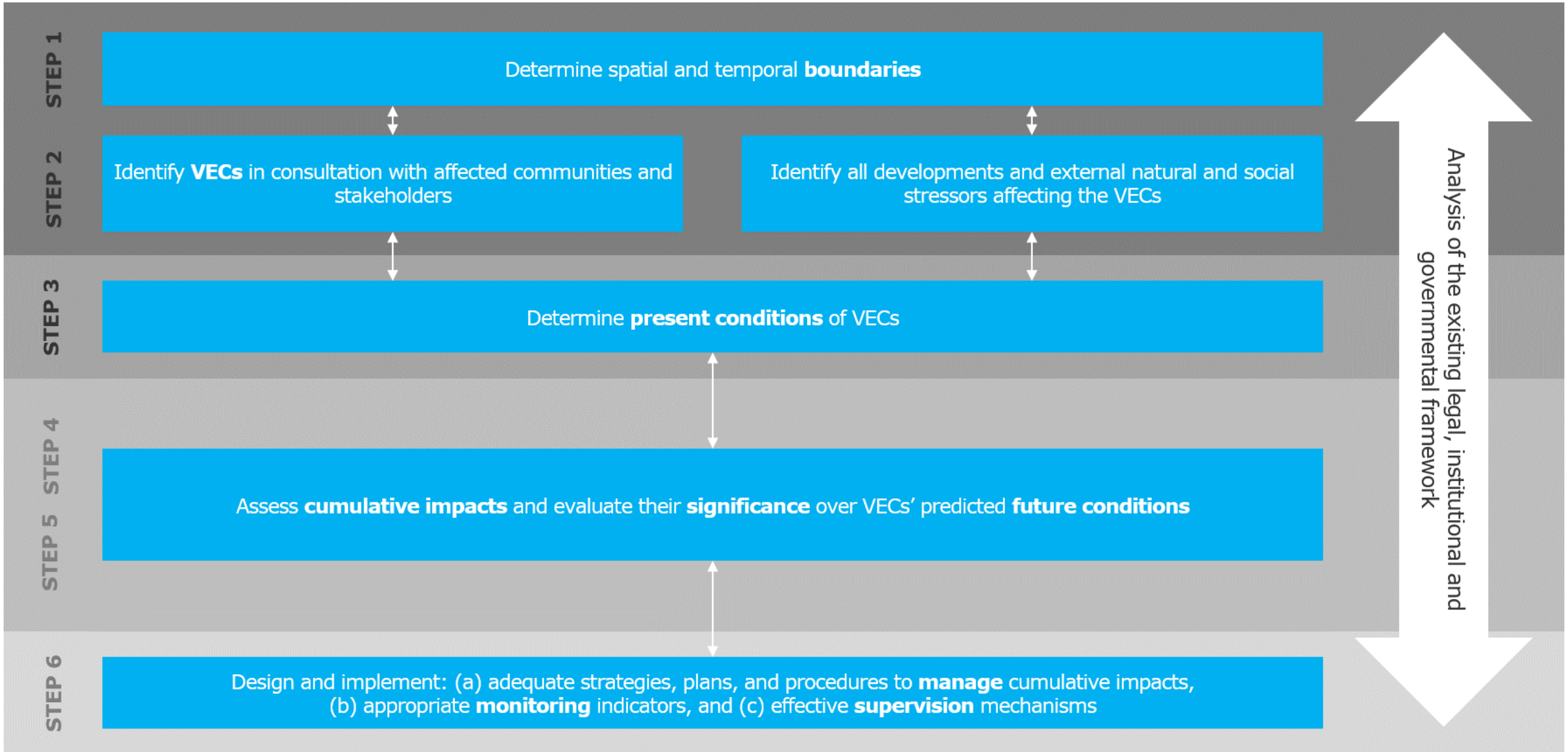
The CIA analysis has two goals:

- To determine if the combined impacts of: the project, other projects and activities, future developments and natural environmental drivers will result in VEC condition that may put the sustainability of a VEC at risk (i.e., exceed a threshold for VEC condition which is an unacceptable outcome); and
- To determine what management measures could be implemented to prevent unacceptable VEC condition, this may include additional mitigation of the project being assessed, additional mitigation of other existing or predictable future projects, or other regional management strategies that could maintain VEC condition within acceptable limits.

3.7.3 *CIA Methodology*

A six-step process described in the IFC’s Good Practice Handbook that should be used in conducting a CIA for the project includes the following steps:

- Scoping phase I – VECs, spatial and temporal boundaries
- Scoping phase II – Other activities and environmental drivers
- Establish information on baseline status of VECs
- Assess cumulative impacts on VECs
- Assess significance of predicted cumulative impacts
- Management of cumulative impacts – design and implementation



Source: Good Practice Handbook – Cumulative Impact Assessment and Management

Figure 3.4: IFC Six Steps Rapid Cumulative Impact Assessment Approach

Step 1. Scoping Phase I – VEC's, Spatial and Temporal Boundaries

The first stage of the CIA is aimed at identifying potential VECs and defining the spatial and temporal boundaries.

VECs

VECs are those receptors that are considered to be important when assessing the risks posed from cumulative impacts. VECs have been identified throughout the ESIA process, including consultations undertaken with stakeholders and reviews and assessments undertaken as part of the ESIA.

Consistent with the above-mentioned guidance, the assessment is limited to impacts generally recognized as important on the basis of scientific / expert concerns and concerns from Affected Communities and excludes any potential impacts that would occur without the Project or independently of the Project. In addition, only those environmental and social receptors on which the Project itself is assessed to have potentially significant effects are included in the CIA. In practical terms, this means that:

- If the impact of the Project on a receptor has been assessed negligible then it is not considered as a VEC in the CIA (i.e. scoped out in all cases);
- Receptors on which the assessed Project impact is low are considered on a case-by-case basis for inclusion as a VEC in the CIA.

Spatial Boundaries

The CIA considers a larger spatial area outside of the Project AoI. The precise spatial boundaries are defined on the basis of the geographic range of specific VECs as well as the spatial distribution of other third-party activities, future developments or influences that might impact the VECs.

Temporal Boundaries

Consistent with established EU guidance[38], consideration is normally given to existing projects or those expected to be initiated within a period of 5 years from the data of the CIA completion, with an exception of development projects that may be initiated after 5 years, but for which reliable information and certainty is available. The temporal boundary is therefore defined based on the availability and quality of information about existing and reasonably foreseeable projects or projects with a conceptual plan.

The overall Phase I scoping is undertaken through consideration of the VECs, spatial and temporal boundaries and also the Phase II scoping, in a systematic manner, taking the assessed Project impacts to each social and environmental receptors identified in the course of ESIA (Chapters 8 and 9), and taking into account the following aspects:

1. All the different types of Project impacts on those receptors and the assessed significance of the residual Project impact;
2. Spatial extent of a receptor in this particular region;
3. Consideration of how the spatial extent of the receptor may overlap with the influence of other industrial activities and future developments identified through the Phase II Scoping process;
4. Consideration of the relative temporal boundaries of the different stressors (e.g. whether or not such stressors are concurrent, consecutive etc.) and the duration of such impacts;
5. Other non-industrial influences that may affect a receptor (within the determined spatial and temporal boundaries).

The above aspects are determined, and the potentially affected receptors identified in the CIA process are taken into consideration for the above factors, which are then considered as VECs.

[38] In the "'Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions" (1999), it is indicated that normally most of project proposals are associated with too many uncertainties outside of a period of 5 years. *It is recommended, therefore, to assume a time limit of maximum 5 years.*

Step 2. Scoping Phase II – Other Activities and Environmental Drivers

This part of the scoping exercise identifies historical, existing and planned future activities and the presence of natural influences and stressors that have the potential to affect the VECs identified in Step 1 that will require further assessment within the CIA.

Natural influences and stressors that are unrelated to the Project activities are also considered, for example, the potential impact of climate change in terms of the climatic extremes and impacts on permafrost, migratory and predatory animals. Given the inherent uncertainty and variability associated with climate change projections, these factors are only considered in terms of a high-level and qualitative assessment.

Step 3. Baseline Conditions

Baseline data for the Project AoI is based on detailed studies and survey works undertaken by the Project and as described in baseline chapters of ESIA (Chapters 5 and 6). These Project-specific studies are supplemented by readily available information at the regional scale beyond the Project AoI.

Project and as described in Chapters 5 and 6. These Project-specific studies are supplemented by readily available information at the regional scale beyond the Project AoI.

Step 4. Assessment of Cumulative Impacts

The Project CIA has adopted a VEC centric approach, i.e. VECs and their resilience have been identified / determined then the impacts from various activities on these VECs were assessed.

The assessment presented in this Chapter considers only the residual impacts associated with the Project, i.e. the impacts that will persist after implementation of the planned mitigation measures. The VECs, potentially affected according to the assessment to an insignificant degree, should not necessarily be included in the cumulative impact assessment (Table 3.8).

Table 3.8: Criteria for including valued environmental and social components

Residual impact			
Insignificant	Low	Moderate	High
Not included in CIA	Considered for assessing the potential cumulative impact	Included in CIA	Included in CIA

Predicted future conditions for VECs are analyzed taking into consideration all impact factors, including the contribution of this Project to the overall cumulative impacts.

Due to the inherent uncertainties in the nature of cumulative impacts, the CIA has by necessity been performed in a qualitative manner, but nevertheless provides useful context for determining the significance of the Project's contribution to the overall impacts.

Step 5. Significance of Cumulative Impacts

The methodology described in Section 3.4 was developed primarily for assessing Project-specific impacts, although can be broadly applied to cumulative impacts.

Step 6. Management of Cumulative Impacts

Many of the mitigation measures defined during the assessment of Project impacts will also be applicable to the mitigation of cumulative impacts. However, it is also recognized that the cumulative impact assessment may generate additional mitigation measures and strategic or long-term actions, for example, the need to share findings of assessments and cooperate with third parties such as future developers and regional authorities or local government bodies.

Consistent with the approach taken elsewhere in the ESIA and described in Section 3.5, the mitigation hierarchy, which broadly requires that consideration be given to avoidance, minimization, mitigation and offsetting in that order of preference, has been applied.

3.8 Presentation of ESIA Results

The table below contains a form of a summary table which is designed to provide a visual presentation of the environmental and social impact assessment (refer to Chapters 8 and 9), including types of activities, impacts and their receptors, description of mitigations and assessment of the residual impact. A key to the alphabetical symbols of stages of the Plant Project, receptors sensitivity, impact significance and risk category is provided under the summary table form. The table can be adjusted or extended to accommodate for specific features of some types of impacts and provide an appropriate presentation of the results of assessment.

Table 3.9: Evaluation of impact significance: a form of a summary table

Impact	Direction	Receptor	Receptor Sensitivity	Stage	Impact significance	Risk Significance	Mitigation measures	Residual significance		
								Likelihood	Impact Rating	Risk Rating

Parameter	Abbreviation	Description	Parameter	Abbreviation	Description
Stage	C	Construction	Risk	Cr	Critical
	O	Operation		H	High
	Cm	Commissioning		M	Medium
	DCm	Decommissioning		Mr	Minor
Recipient Sensitivity	H	High		I	Insignificant
	M	Moderate	Impact significance	H	High
	L	Low		M	Moderate
	N	Negligible		L	Low
Sign	P	Positive		N	Insignificant
	N	Negative			

4. STAKEHOLDER ENGAGEMENT

4.1 Overview

This Chapter outlines the information disclosure, consultation and participation activities that have been undertaken as part of the project preparation and the ESIA process. It further summarises the outcomes of these activities, and defines those actions planned for future phases in the Project lifecycle, for the preparation of the Stakeholder Engagement Plan (SEP).

This Chapter discusses:

- Principles of consultation;
- Consultation requirements;
- Core stakeholders and consultees;
- Project consultation activities and their outcomes; and
- Project grievance redress mechanism.

4.2 Principles of Consultation

Early and ongoing consultation, disclosure and meaningful stakeholder engagement are key requirements for projects financed by the International Lenders. Engagement with stakeholders is of key importance in ensuring that potential adverse impacts are identified and managed, and that benefits to the community stemming from the Project are enhanced. The SEP is a strategic document for planning meaningful and appropriate consultation with the key stakeholders and will be updated periodically as the Project progresses.

Initiating the engagement process in the early phase of the Project helps ensure timely public access to all relevant information and gives stakeholders an opportunity to provide their input into the Project design, the identification and assessment of impacts and mitigation/enhancement measures. To best facilitate this process, the Project will develop a Stakeholder Engagement Plan which will be updated periodically throughout the lifecycle of the Project. The SEP will include the following components:

- The identification of key stakeholders;
- The information on past consultation activities;
- Procedures and activities as part of future stakeholder engagement process at all stages of the Project lifecycle; and
- Grievance mechanism.

Stakeholder engagement should be free of external manipulation, interference, coercion and intimidation and conducted on the basis of timely, relevant, understandable and accessible information. Consultation activities should always be well planned and based on principles of respectful and meaningful dialogue.

4.3 Consultation Requirements

4.3.1 Overview

This Section provides an overview of the national and international disclosure, consultation and stakeholder engagement requirements applicable to the Project. It is anticipated that financing for the Project will be sought from International Lender and therefore that the Project will need to meet IFC Performance Standards and the Guidence Notes (2012). These requirements have been considered in planning stakeholder engagement and have guided the consultation process of the Project as described below.

4.3.2 National Consultation Requirements

A number of developments under the Project as well as the associated project facilities are subject to national EIA (Chapter 2). Stakeholder engagement, including disclosure of planning and environmental information is regulated as part of the EIA process (described in Section 2.18).

The national requirement[39] specifies two non-mandatory mechanisms for consultation during the EIA process: the public environmental review (PER) and public hearings. PER might be undertaken by an independent expert panel and the opinion granted by PER will not have mandatory implications.

There is no official regulatory guidance as to which type of project requires a public hearing or how public hearings should be conducted. The EIA Procedure Manual provides some guidance. It recommends that public hearings to be held when the draft EIA Report is prepared and suggests how to organise such events and who potential attendees might be.

The Law on Environmental Expertise (2017) states that a project promoter could announce locally that the EIA procedure is underway. In this case, after completion of the EIA process, the EIA findings should be made public within one-month period. However, there is no specific legislation that guides the disclosure procedure. The national guidance specifies that results of public hearings and disclosure should be included in the EIA documentation to be submitted for SEE review. The Statement on Environmental Consequences (Step 3 in the EIA process) shall detail all comments received through the public hearings, if undertaken.

Since the existing approach to public consultation in Uzbekistan does not involve extensive engagement of the general public and is sometimes limited to consultation with local authorities rather than the general public, the approach to planning engagement and disclosure for the Project has been guided by IFC's PS1 on Assessment and Management of Environmental and Social Risks and Impacts.

4.3.3 International Consultation Requirements

IFC's PS1 on Assessment and Management of Environmental and Social Risks and Impacts includes the relevant disclosure and stakeholder consultation requirements which include the following:

- Start as early as possible in the project cycle;
- Continue throughout the life of the project;
- Be free of external manipulation, interference, coercion, or intimidation;
- Where applicable enable meaningful community participation; and
- Conduct consultation on the basis of timely, relevant, understandable, and accessible information in a culturally appropriate format.

4.4 Identification of Key Stakeholders

Stakeholders are persons or groups who are directly or indirectly affected by the proposed construction and operation of the Plant and associated facilities, as well as those who may have interest in the proposed activity and/or the ability to influence its outcome, either positively or negatively[40]. Stakeholders for the Project include locally affected communities and their formal and informal representatives, the Company's employees and contracted workers, national, regional and local governments and authorities, civil society organisations and groups with special interests, the academic community, or businesses.

At this phase, the Project has identified seven classified groups of key stakeholders:

1) Communities directly affected by the Project and its actitivies, including:
    - Balykly;
    - Pistalikent;
    - Chimkurgan;
    - Nurafshon;
    - Karatepa;
2) Communities directly affected by the associated facitlies and its activities (such as transmission line and gas pipeline establishments), including:
    - o Sharof-Rashidov district
        - Pakhtaabad;
        - Sharillok;

[39] The Regulation on State Environmental Expertise in the Republic of Uzbekistan approved by Decree of the Cabinet of Ministers of the Republic of Uzbekistan of 22.11.2018 No.949.

[40] IFC. Stakeholder Engagement Handbook, 2007

        - Khairabad;
        - Gandumtosh;
        - Toshkentlik;
    - Gallaorol district
        - Zargar;
    - Jizzakh subdistricts:
        - Bunyod;
        - Sangzor;
        - Navruz;
        - Kipchok;
        - Khairobod.

3) Local land users and businesses affected by the Project associated facilities, including:
    - Affected land users:
        - Zafaragro Keladjak;
        - Ismail Anora;
        - Other local land users to be potentially affected by development of the Project and associated facilities in Zafarobod district, Sharof-Rashidov district, the town of Jizzakh and Gallaorol district, including those performing agricultural activities;
    - Local fish farming organisations, including:
        - Beliy Amur;
        - Mir Asrar Babo;
        - Chimkurgon Sara Gelos;
        - Forestry Authority of Jizzakh.
4) Regional, district and local governmental authroties (permitting and supervisory authorities);
    - Republican authorities in in charge of environmental protection, public health, subsurface management, industrial policy, construction and housing policy, and economic development;
    - Authorities of Jizzakh region, including the agencies in charge of environmental regulation, emergency management, industrial policy, economic development, and land use management;
    - District authorities including:
        - Hokimiyat of Zafarobod district;
        - Hokimiyat of Sharof-Rashidov district;
        - Hokimiyat of Forish district;
    - Hokimiyat of Chimkurgon rural settlement;
    - Hokimiyat of Pistalikent rural settlement;
    - Hokimiyat of Nuravshon rural settlement.
5) National and international Non-Government organisations (NGOs) and Civil society orgnasations (CSOs), e.g. Tashkent office of Regional Environmental Center for Central Asia, etc.;
6) National, regional and district news media;
7) Interested parties, such as academic instituions in Uzbekistan.

The affected communities' profile is described in Chapter 8.

4.5 Completed Project Consultation Activities and Outcomes

This Section describes the consultation activities undertaken since the Project preparation and during the ESIA process.

4.5.1 Overview of Huaxin Jizzakh Consultation Activities and Outcomes

Huaxin Jizzakh's early interaction was focused on governmental agencies who are responsible for permitting. The Company has developed very good partnership with the regional and districts. Huaxin Jizzakh's interaction with local communities started from mobilization and site preparation. In 2018 together with the Head of Zafarobod district hokimiyat, the Company held approximately 10 meetings with the heads of local rural settlements. During the meetings general information on the Project (schedule, job opportunities for local residents, etc.) was presented and discussed. The company has maintained good relations with local communities with the construction offices and the camp located in the project sites where neighboring communities can raise any concerns. There were no material concerns raised previously and during ongoing construction activities based on the information provided by Huaxin and local authorities (include regional, district and local level of the authorities).

4.5.2 *ESIA Consultation*

In line with the international best practice and applicable international requirements, the consultation has been undertaken to inform both the ESIA process and Project consultation and disclosure planning. In 2019, as part of ESIA preparation Ramboll consultants held a series of meetings with the district and local communities include following:

- Representative of agricultural organisation Zafaragro Keladjakh;
- Representatives of Hokimiyat of Zafarobod district;
- Hokimiyat[41] of Chimkurgon rural settlement;
- Hokimiyat of Pistalikent rural settlement;
- Hokimiyat of Nuravshon rural settlement.

The meetings aimed at collection of baseline data for the ESIA. The details on issues discussed during the meetings are provided in Section 8.1. Representatives of the stakeholders listed above were generally positive about the Project.

4.6 Planned Consultation and Disclosure

Current planned consultation and information disclosure will take in place in two forms: 1) public consulation meeting/meetings to be held with Project directly affected communities, in a place/places where it could be easily accessed by local community villagers; 2) disclosure of the ESIA (in English) and the Non-Technical Summary (in Uzbek).

4.6.1 *Public Consultation Meetings*

Two weeks prior to the public ESIA consultation meeting(s), advertisements will be placed in local newspapers, on local radio, and Hokimiyats' websites for one week identifying dates and locations of the public meetings. Letters of invitation will be forwarded to Hokimiyats, environmental authorities and other Project stakeholders if relevant. The adverts will include links and addresses where the NTS will be accessible in electronic and hard copies.

It is recommended to perform a public meeting in Chimkurgon at a local public building, as well as 'open house'[42] activities in Pistalikent and Nurafshon at a local public buildings.

Comment boxes and feedback forms will be provided in all meeting locations to allow for comments (including anonymous) to be submitted. A telephone number and email address for the local Project contact person will be also provided.

The Company will also seek to obtain information on the consultations and information disclosure performed for the communities affected by the Project associated facilities. If the engagement performed would not be considered adequate, the Company will seek to initiate the relevant consultations and information disclosure (in cooperation with companies responsible for construction of the associated facilities and/or relevant authorities). At a minimum, these communities will be provided with information on the Project and will have access to grievance mechanism.

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[41] Administration. It's not a village. A rural settlement may include several villages.

[42] An 'open house' is an event performed for several hours (for example, between 15:00 and 20:00). The recommended number of participants - 20-25 people at a time. Several thematic tables are organised in the premise (for example, regarding air pollution and noise impacts, social impacts and employment, etc.). Representatives of the Company/ specialists at each thematic table respond to residents'/ participants' questions. The participants can freely choose the table, change it, enter or leave the premise of the open house.

4.6.2 *Disclosure of the ESIA Materials*

The ESIA Report and documentation will be disclosed via District Hokimiyats' web-sites and/or on the Company's (or should it be Project's) website. A comment and response table will also be released providing information about how the ESIA takes into consideration the feedback provided by stakeholders, and an opportunity for submitting additional comments.

4.7 Grievance Mechanism

The Company will establish a grievance mechanism in line with the IFC Performance Standards in order to provide a fair system of registration and prompt consideration of any complaints and queries in relation to the Project.

The grievance management and closing-out process includes the following steps:

- Submission, registration and categorization;
- Transfer for examination and decision making;
- Review and decision making;
- Providing feedback on the proposed solution;
- Appeal (if applicable);
- Closing out.

Interested parties can lodge grievances or other queries in person, by e-mail, by phone, or to the mailing address of the information center using the following contact details:

- Address: Republic of Uzbekistan, Jizzax viloyati, Zafarobod tumani ,Chimgo'rg'on, CHIMQO'RG'ON QFY
- Working hours: 08:00-18:00 (12:00-14:00 lunch)
- Contact person: Li Mingyue
- Tel.: +998 932928333
- E-mail: limingyue@huaxincem.com

Anybody may submit a claim or query in any form, and may opt to remain anonymous if deems it necessary. However, provision of an address where the Company will direct the feedback is also important.

Grievances and queries will be automatically screened out of the grievance process as a "spam" category (without giving a notice to the grievant) in case of:

- Advertisement content;
- Coarse language;
- Lack of relevance to the Project and the Company operations.

The Company will register all received grievances/queries (except for those screened out as "spam") in a special log. Receipt of each grievance will be verified in writing. All grievants who provided their contact details will be informed about the reference number of their grievance on the day of submission (in case of submission personally or by telephone), or within seven days from submission (if sent by post or e-mail).

The grievance log (paper or electronic) will also hold records of the following details:

- Reference number, date and identity of signatory of the grievance receipt letter;
- Details of the Company's employee to whom the grievance was communicated, and subsequent resolution;
- Reference number, date and identity of signatory of the letter with proposed solution or any other correspondence to the grievant;
- Identification of grievance type:
    - Grievance relevant to the Project;
    - Not related to the Project and/or the Company operations;
    - Spam.

- Query/grievance categorization:
    - Land acquisition and applicable compensations;
    - Remediation of land (upon completion of construction);
    - Recruitment and employment;
    - Nuisances (dust, noise, vibration);
    - Water resource issues (water quality, waste water, etc.);
    - Biodiversity issues (impacts on flora and fauna);
    - Issues of access to information (lack of available information);
    - Other.

4.7.1 Submission for examination and decision making

The grievance officer will transfer each received grievance/query to an officer in the Company or contractor organization, depending on the technical scope of the raised issue (e.g. to a lead engineer responsible for construction supervision at the site in question, manager responsible for land acquisition and compensations, environmental officer, etc.).

If actions required to address the grievance fall within the scope of a construction contractor, a responsible person shall be appointed in the Company to monitor the contractor's progress in resolving the problem.

4.7.2 Review and decision making, and feedback with proposed solution

Each grievance shall be examined within 30 days from receipt/collection from the box[43]. Feedback shall be provided in writing, to the postal or e-mail address stated by the grievant. The Company shall keep copies of all grievances and feedback documents in dedicated archive (electronically or on paper), where the grievance materials are arranged in chronological order.

Provision of feedback within the above terms, as well as follow-up of the grievant's acceptance of the proposed solution, is responsibility of the grievance officer (or reception officer with similar functions). The officer is also responsible for monitoring of the progress of implementation of the proposed solution in relation to each grievance or query.

4.7.3 Appeal

If the grievant is not satisfied with the proposed solution, the process of negotiation can be continued till a mutually acceptable solution is found for the problem. In situations where grievance cannot be resolved and closed out through negotiations between the Company and grievant, a special mediation committee shall be appointed. The committee membership may include local leaders and representatives of local administrations (both district and rural settlements' administrations).

If the grievance is not resolved by the mediation committee, the parties may appeal to the court. As soon as either party takes a legal action, the procedure set out in this document is terminated (in respect of such grievance).

4.7.4 Grievance closing out

A grievance is registered in the Grievance Log as "closed out" if:

- grievant accepted the proposed solution (in writing, if possible), and the proposed measures were implemented to the grievant satisfaction;
- the Company applied all best efforts to resolve the issue but did not succeed in reaching an agreement with the grievant; in this case the grievant may appeal to the court, and the grievance procedure herein is terminated.

4.7.5 Grievance monitoring and reporting

Grievance statistics will be prepared on a quarterly basis, including the following indicators:

- Number of queries and grievances opened in the quarter;

[43] Grievances are collected from the boxes each Monday.

- Number of queries and grievances closed out in the quarter;
- Number of pending queries and grievances by end of the quarter, and comparison with results of the previous quarter;
- Categorization of new queries and grievances.

The Grievance logging and re-address matrix is shown on the figure below:

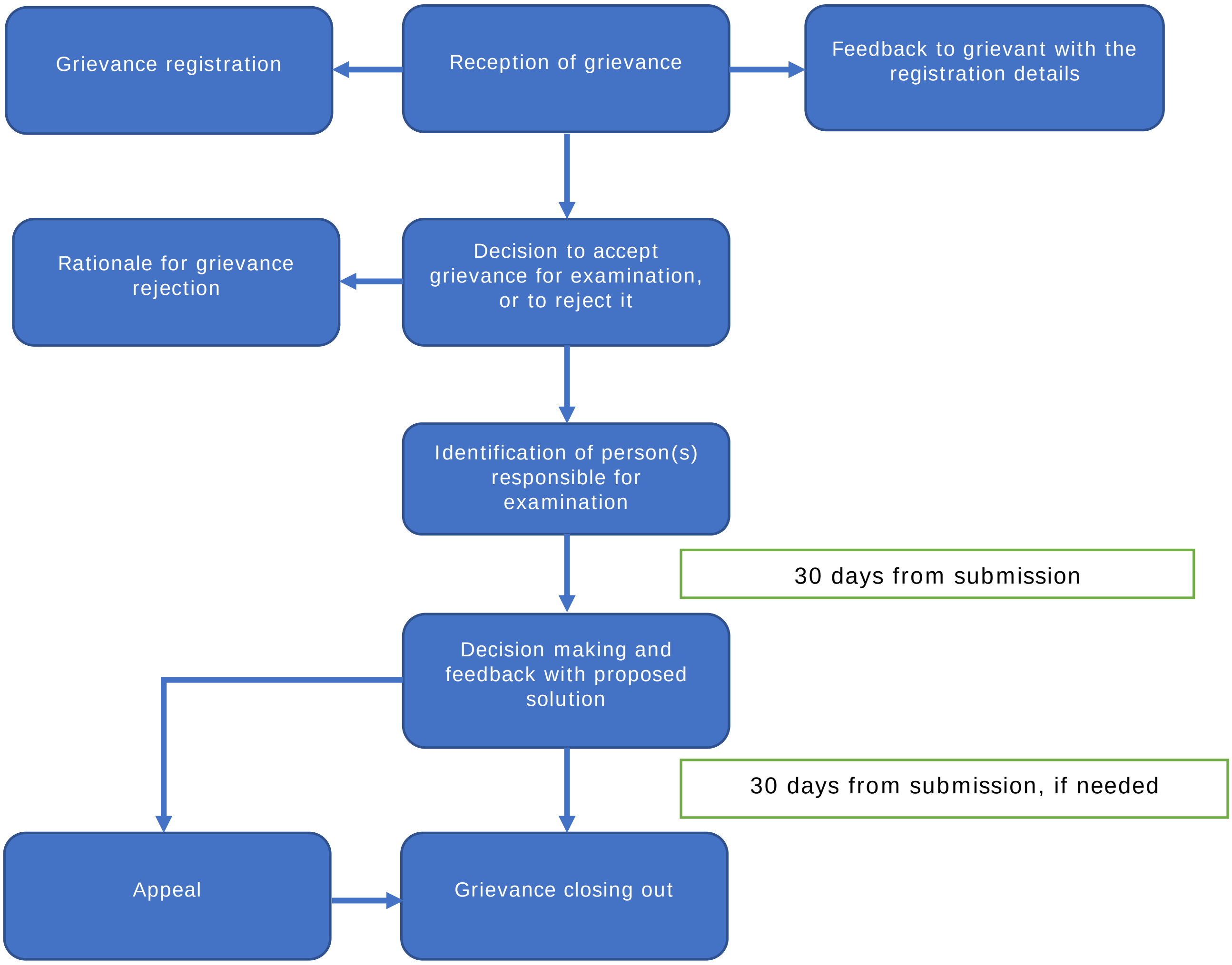


Figure 4.1: Grievance procedure

4.8 Confidentiality and Anonymity

The Project will aim to protect the person's confidentiality when requested and will guarantee anonymity in annual reporting. Individuals will be asked permission to disclose their identity if this helps the resolution of a particular grievance. Investigations will be undertaken in a manner that is respectful of the aggrieved party and the principle of confidentiality. The aggrieved party will need to recognise that there may be situations when disclosure of identity is required, and the Project will identify these situations to find out whether the aggrieved party wishes to continue with the investigation and resolution activities.

5. PROJECT DESCRIPTION

5.1 Project History and Timeline

The Kuterminskoye Limestone Deposits were initially discovered and explored in 1986 as reserving more than 130 million tons of cement raw limestone with a ratio of CaO and MgO being as 54.88 and 0.47%)[44]. Having been all the time unclaimed, the field have been put in 2014 into the governmental list of undeveloped mineral deposits offered for external investments.

The mineral claims known as the East Chimkurgon (in Russian - Vostochniy Chimkurgan) claims located over the proposed quarry were staked in 2018 by Huaxin Cement Jizzakh LLC for the period of 2 years in which the Company is required to perform all the necessary exploration works and prepare a mine development design documentation. So the G5-Category (Exploration) License No. GZ-0031 will be valid until December 06th, 2020 and must then be prolonged or replaced by a mining license.

Another site of mineral deposits that is also explored for the Project (and funded by Huaxin) is the Kizil-Tepa Loess Area situated in Navoi Region (about 200 km east of the Project sites).

The plans of exploration works at both sites (East Chimkurgon and Kizil-Tepa) contain EIA reports that were reviewed and approved by The Uzbekistan State Environmental Expert Evaluation Committee (the Opinion No. 03-01/13-08-2428 issued on November 16th, 2018).

According to the Company's representatives, a subcontractor (named as 'Geological and Surveyor Service' State-Owned Company) has completed most part of the exploration works and is now developing the mining projects and plans to submit it for state review by September 2019.

On February 1st 2019, The Governmental Decree No. 81 was issued that establishes a priority conditions for the Company as a strategic investor and requires both regional and municipal authorities to support the Project within their competencies. This Decree launched a government-managed process of land acquisition that have resulted by now in allocation of the four parcels: 400 ha for the limestone claims, 71 ha for the cement plant, 10 ha for the accommodation camp and 4.63 ha for the access motor road (Figure 5.1). Additional land plots are still required to locate facilities like the crushing station, conveyor belts and other communication corridors between the quarrying area and the Cement Plant site, as well as the access way to the Accommodation Camp.

All the necessary infrastructure including gas pipeline, power lines, Project site rail and motor roads are currently under construction by governmentally managed companies, and Huaxin Cement Jizzakh does not participate in this activity. In addition, a local geological company is drilling 2 wells for extraction of groundwater for the Project's technical purposes.

As for the Cement Plant itself, a ceremony of laying its foundation was held in May 2019, and during the site visit on July 8th and 9th Consultant has found construction works going at full capacity at both the Plant site and at the area of Accommodation Camp (the access motor road to both sites has been already constructed).

[44] The list of undeveloped mineral deposits within Djizzakh Region offered for investments. - Tashkent: The Geology and Subsoil Use Committee of the Republic of Uzbekistan, 2014. Available at http://uz.denemetr.com/

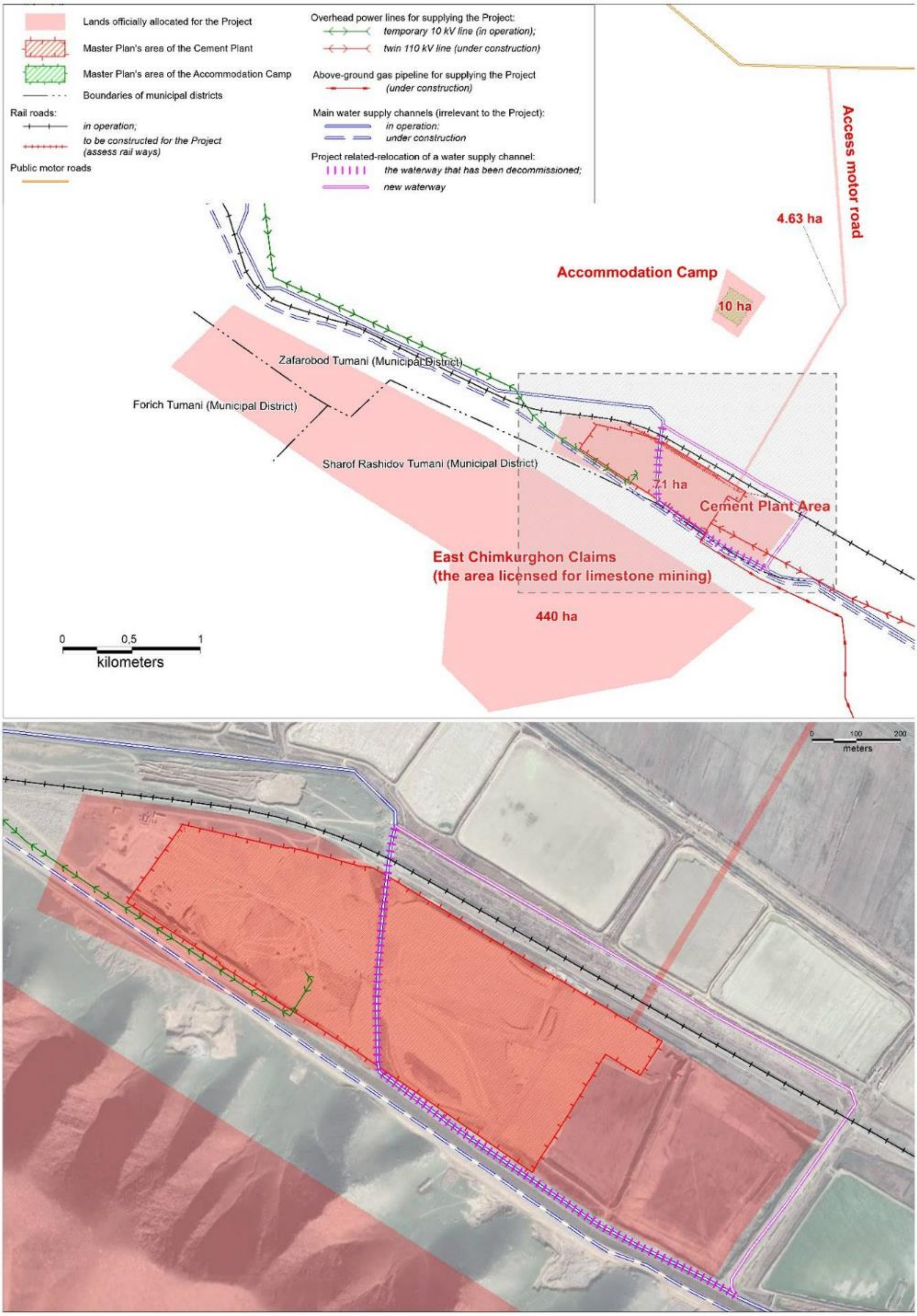


Figure 5.1: Project footprint

5.2 Raw Materials Base and Material Balance of the Project

East Chimkurgon Sector of Kuterminskoye Limestone Deposits (discovered in 1986 as reserving more than 130 million tons of cement raw limestone with a ratio of CaO and MgO as 54.88 and 0.47%)[45] have been selected as a main raw materials base, with the cement plant to be adjacent with the future quarrying area.

The updated limestone reserves of the Sector have been assessed to be equal to 206 million cubic meters. Another sector of the same deposits is already exploited for Jizzakh Cement Project launched in 2014 by Almalyk GMK, JSC: the open pit is located at the north-eastern edge of the same ridge (named as Balycly-Tau, see Figure 5.4) at a distance of 4.7 km from the Huaxin's claims, and the space between the cement plants will be about 8 km.

According to the G5-Category License No. GZ-0031 that has been issued on Dec. 06th, 2018 for 2 years of exploration works and must be then prolonged or replaced by a mining license, the claims area of the East Chimkurgon Sector occupies 440 ha, with 82, 8 and 10 per cent of this space being situated within the boundaries of Sharof Rashidov, Forish and Zafarobod Districts of the Jizzakh Region, respectively.

The rate of limestone extraction is not specified in the available Company documents, but the minimum lifecycle demand of the Project is set equal to 200 Mt of limestone. Depending on market conditions, Huaxin will be able to expand the capacity of both quarrying and plant operations in the future.

The Project's need for the clay will be supplied by extraction of the loess-like deposits within the Kizil-Tepa Claims (Navoi Region, some 200 km east of the Cement Plant Site).

Along with the basic raw represented by the limestone and clay, a number of correction additives including gypsum, Si- and Fe-containing agents, and composites - will be delivered to the Plant from remote sources which are currently not specified. Table 5.1 indicates the overall material balance of the Project, where the limestone forms over 75 per cent of the final products and must be extracted at a rate of 140 tons an hour or some 4500 tons a day.

Table 5.1: Material balance of the cement production

Name	Natural moisture, %	Share in final product, %	Consumption quota (tons/ton of clinker)		Volume (tons)		
			Dry base	Wet base	Every hour	Every day	Every Year
Limestone	2	77.43	1.12	1.143	140.03	4491	1482010
Sandstone	10	17.57	0.289	0.321	31.76	1019	336290
Iron ore	10	5	0.037	0.042	9.05	290	95700
Raw meal		100	1.45		241.67	5800	1914000
Clinker		88			166.67	4000	1320000
Gypsum	4	5	0.044	0.046	9.47	227	75000
Mixing materials	8	7	0.070	0.076	13.26	318	105000
Cement		100			189.39	4545	1500000

According to media sources, there's a prospective to provide the Project with locally mined Fe-containing materials: development of an iron ore deposits was recently started in Jizzakh Region to replace the import of pyrites as necessary admixtures for some varieties of concrete[46].

[45] The list of undeveloped mineral deposits within Jizzakh Region offered for investments. - Tashkent: The Geology and Subsoil Use Committee of the Republic of Uzbekistan, 2014. Available at http://uz.denemetr.com/

[46] Akhmedov N. Conditions of available mineral resources for the cement production in the Republic of Uzbekistan // Construction Materials (in Russian - Stroitel'nye Materialy'). 2002. No. 2. P. 27-28

Coal is also considered as a co-fuel (along with natural gas) but for the 2nd Project's stage only, with the ash to be added to the clinker as a correction additive.

5.3 Technologies and Design of the Project

Huaxin will adopt its own technology of enhanced dry process and rotary kiln with multistage preheating and precalcination, which meets the good international industry practice (GIIP) required by the applicable WBG EHS Guideline.

To fit with the key Project's targets, the Plant must be able to produce up to 4,000 tons of clinker a day and 1,500 Mt of cement a year. Main stages of the overall manufacturing process include (Figure 5.2):

- limestone quarrying;
- limestone crushing, storage, homogenising and pre-blending;
- other raw materials delivery, grinding and blending;
- burning;
- clinker cooling;
- finish grinding; and
- packing and distributing.

5.3.1. Design Principles

The process plan takes many factors into account, such as the construction site, the original fuel, the logistics of the factory, etc. The design ideas of the Project are as follows:

(1) Fully absorb the mature process and equipment technology of the completed 4000T/D production line, optimize the process configuration, to achieve the "reliable and efficient" goal.

(2) Make reasonable and effective usage of mineral resources, such as low-grade raw materials and fuels.

(3) The system fan that affects the system's power consumption index is optimized.

(4) This design pays attention to details and the needs of people. Not only consider the convenient maintenance of equipment, but also set up protection measures for the safety of production personnel.

(5) This design adopts advanced and reliable energy-saving and environmental protection technology and equipment, which can meet the national energy-saving and environmental protection emission requirements, realizing the goals for energy conservation and emission reduction, clean production.

(6) In order to make full use of resources by using a variety of low-quality raw materials, and to ensure the quality of clinker, the simple homogenization are used for limestone and auxiliary raw materials. The online analysis system is used to effectively control the fluctuation of raw material composition.

5.3.2. Summary of the production process

Limestone crushing, transport and storage. Limestone crushing is done by a single-stage hammer crusher. Limestone from the mine is trucked into the plant, discharged into the feeding silo of the crushing system and fed by plate feeder to crusher. The crushed limestone is sent by belt conveyor to the limestone stockpile site for storage.

Limestone is stored in a circular storage shed of Φ84m with a central silo of Φ16x30m. The capacity of storage shed is 70,000t. The limestone in the stockpile is removed by the plate feeder and transported by a belt conveyor to the limestone mixing chamber at the raw material mixing station.

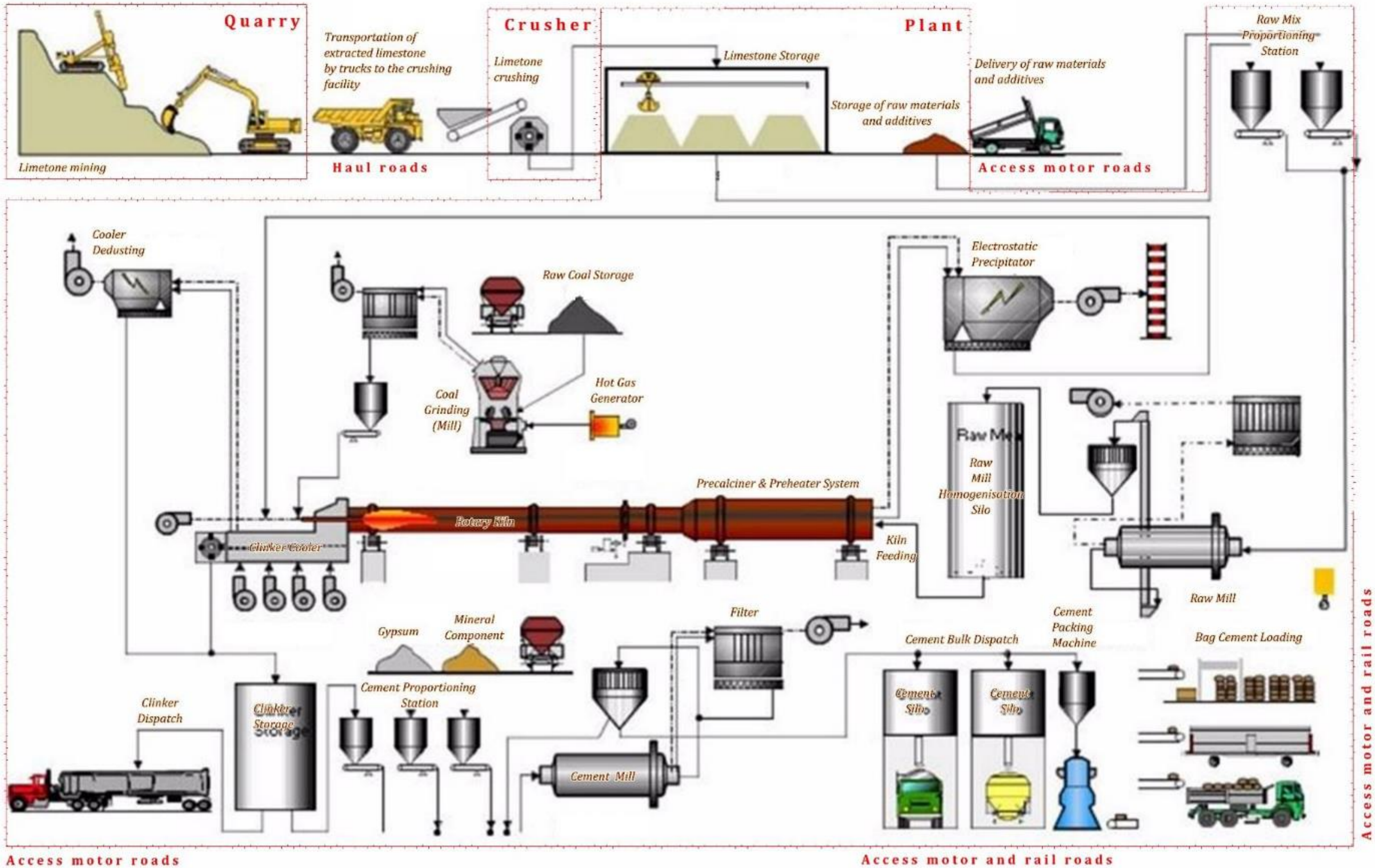


Figure 5.2: Process flow chart

Auxiliary raw materials crushing, transport and storage. Auxiliary raw materials are transported by train into the factory, discharge into the silo which is equipped with a plate feeder at the bottom to feed the materials into the impact crusher. The crushed materials are transported by the belt machine to the long storage shed.

The plant has a 35.5x135m long storage shed, which is used to store auxiliary raw materials except limestone and clinker, and its total capacity is 7800t. The shed uses belt conveyors to take in materials. When the material is to be taken out, they will be taken by forklifts to belt conveyor to measure the weight and then sent to each grinding system.

Proportioning and transportation of raw materials. The raw material proportioning station has two limestone proportioning bins, three auxiliary material proportioning buckets outside the common storage shed, a belt scale with speed-control features under the limestone bins and the buckets for measurement. After being weighted, all the auxiliary raw materials and limestone are sent through the belt conveyor to the raw mill. A PGNAA system is installed on the conveyor to conduct on-line analysis of the composition of the materials, and the ratios of various raw materials are adjusted on real time basis according to the analysis results, effectively ensuring the passing rate of the final raw meal.

Raw material grinding and flue gas treatment. Raw material grinding uses a roller mill and the high temperature exhaust gas from the kiln is used to dry the materials. Raw materials are dried and ground in the mill, and qualified raw materials are fed into the kiln inlet bag dust collector by air flow. The collected raw meal powder is fed into the raw meal homogenization silo through the slope chute and the bucket lifter. The dust-filtered exhaust gas enters the fan as a circulating wind, and the remaining flue gas is discharged into the atmosphere.

When the grinding process stops, the kiln exhaust gas is cooled by the pipe humidification system and directly into the kiln inlet bag dust collector. The exhaust gas temperature is automatically controlled within the acceptable range of the bag dust collector by spraying water in the kiln inlet pipe. The exhaust gas after dusting by the bag dust collector is discharged into the atmosphere by the exhaust fan, and the kiln ash is collected and fed into the kiln feeding system through the pipe humidification system or fed into the raw meal homogenization silo by the conveyor.

The raw meal quality is controlled by an X-fluorescence analyzer and an automatic adjustment system for material proportioning.

Homogenization of raw meal and kiln feeding system. The storage and homogenization of raw meal is carried out by using a Φ16m raw meal homogenization silo, and its effective storage capacity is 7500t. The raw meal from the grinding system is stored into the shed through the raw meal distributor at the top, and at the bottom ring area there is an inflatable chute, and the Roz fan is placed to provide air supply to the circular area at the bottom one by one in accordance with the set program, so as to ensure that the raw meal enters the kiln feeding system through the discharge device.

The discharged raw meal is unloaded to the discharge tank at the bottom of the silo, and the raw meal metering tank is equipped with a load sensor and an inflatable device. Under the silo there is a flow control valve and a flow meter, and the metered raw meal is fed into the kiln inlet preheater system through the air transport chute and the bucket lifter.

The lifter to the kiln inlet is equipped with a sampler, which guides the operation of the burning system through sampling and sample analysis of the discharged raw meal.

This project adopts the raw meal homogenization silo, which integrates raw meal storage, homogenization and feeding. It is cost efficient, provides good homogenization, occupies small area, consumes little power, and has a simple system which makes it easy to operate. Its main features are summarized as follows:

(1) Gas usage per unit is little

(2) Low power consumption.

(3) The homogenization effect is good.

(4) The raw meal feeding system to the kiln is placed in the large cone at the base of the raw meal storage, saving a separate building for the kiln feeding equipment, which leading to less usage of land and lower investment.

(5) The civil engineering structure is reasonable, with low cost, easy maintenance, safety and reliability.

Clinker calcination system. The kiln inlet is followed by a five-stage cyclone preheater and an on-line decomposition furnace. After the raw meal enters the preheater, it gradually warms up and decomposes while moving from top to bottom. The preheater has a high thermal efficiency. Raw meal, after going through the preheater and decomposition furnace which has decomposed most of the calcium carbonate, enters into the Φ4.4x60m rotary kiln calcination. The hot wind used in the decomposition furnace comes from the kiln outlet, and the 3rd time wind temperature can reach over 850 C because of the use of a new type of grate cooler. Clinker out of the kiln goes into the cooler for cooling and crushing and the crushed clinker is sent to the clinker storageby a chain bucket conveyor. The clinker temperature out of the cooler is 65 degrees C plus ambient temperature. The exhaust gas of the cooler is purified by an electric dust collector before discharged into the atmosphere, and the exhaust emission concentration is less than 50mg/Nm3.

Clinker storage and shipment. The crushed and cooled clinker is fed by the chain bucket conveyor into a shed of Φ124m with a central silo of Φ16x36m for storage, the storage capacity of which is 210,000 t; The clinker in the shed is sent by the chain conveyor to the clinker batching bin of the cement batching station.

Cement batching Station. Cement batching station has a clinker batching silo, three (gypsum and mixed materials, etc.) batch silos, with each silo equipped two sets of speed adjustable belt scale for batching measurement. After metering, the gypsum, mixed materials and clinker are sent by the belt conveyor to the cement grinding mill.

Cement grinding system. Cement grinding is done by a roller mill and two sets of tube grinding system. The fine powder after the roller mill flow together with the air flow into the bag dust collector. The fine powder collected can be delivered to the cement bank as a finished product through a chute and a tape bucket, and the finished product is delivered to the cement warehouse by the finished product delivery system.

Cement storage, packaging and bulk. The project is proposed to build 4 circular storage buildings, each with a Φ15m decompression cone for the storage and homogenization of cement, and the cement storage capacity is 4x5000t. The grinded cement is sent through the lift and the chute lift machine to the top of the building where a bag dust collector is installed. Cement storage building is equipped with an electric valve for flow control and the air transport chute. The outgoing cement is directly sent to the bulk workshop and packaging workshop through the bucket lifter and the air transport chute.

Cement packaging adopts 4 sets of 8-outlet rotary packaging machine, with the capacity of 100t/h for each. The cement from the cement storage is fed into the vibration sieve by the chute. Bags of cement are shipped directly by the loader. Cement truck for bulk shipping uses two bulk cement silos, each equipped with a set of bulk cement loading system, with a capacity of 100 to 150t/h, respectively.

Cement train for bulk shipping uses two bulk cement silos, which share a bulk cement loading system with a capacity of 120t/h.

Compressed air station. Two new air compressor stations to be built, including a total of 5 screw-type air compressors, each having an air flow of 22 m3/min and a pressure of 8.0kg / cm3. The compressed air, after purification and drying, is as the air source for the kiln inlet preheater blow-blocking, the pneumatic valves, the pulse valves and meters, etc.

Central Control and Laboratory. The whole plant will have a central control and a laboratory, responsible for the factory's inspection and quality control of original fuels, semi-finished products and finished products.

5.3.3. Project's Layout and Main Components

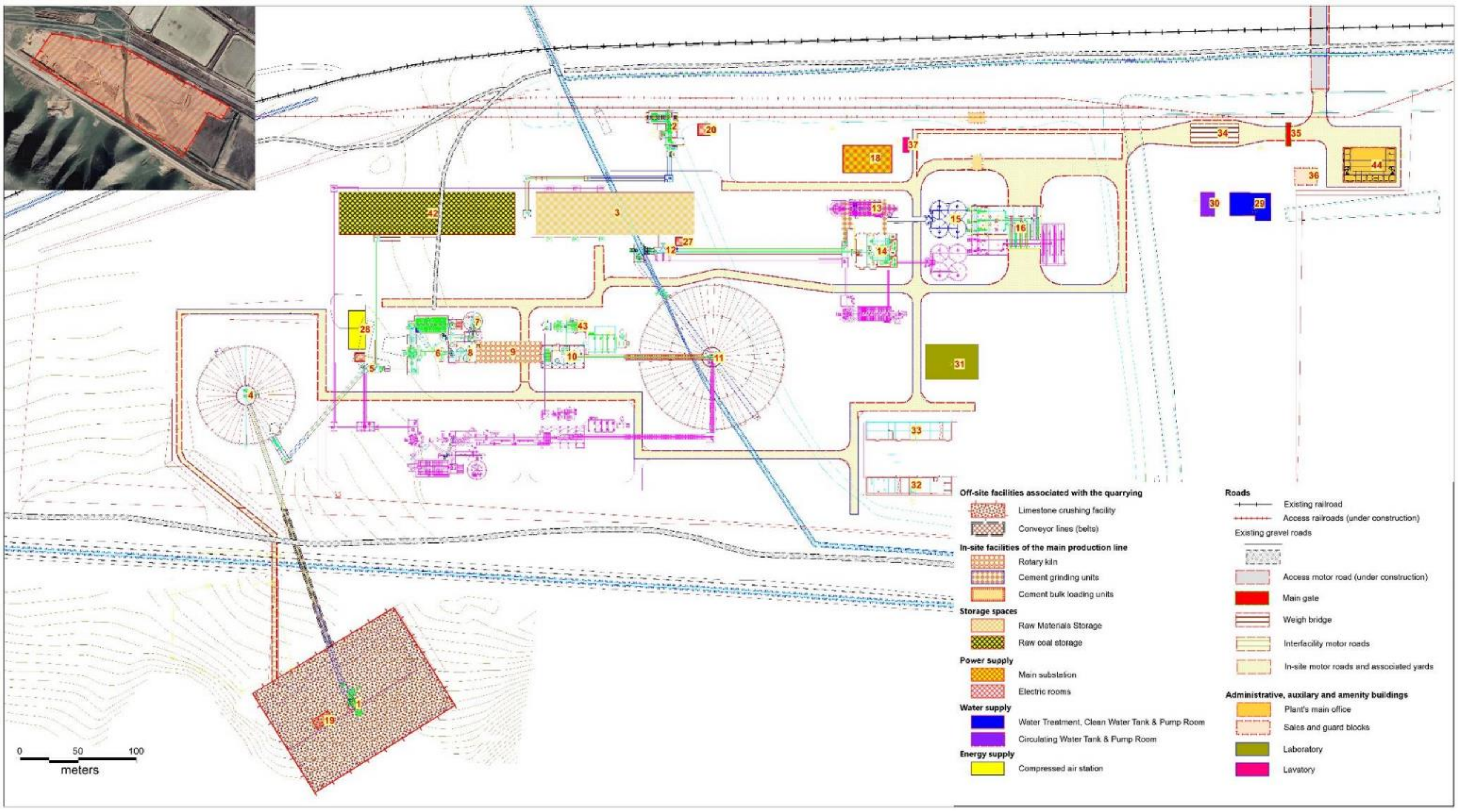
The Figure 5.3 shows how the Project's main components will be distributed over the occupying area.

Quarrying. The limestone used in the cement production will be excavated in the nearby East Chimkurgon quarry. There is no or limited topsoil and unsuitable rock at the limestone mine. No detailed information is available on the mining techniques. It is only stated that explosions will be conducted twice a week for breaking the rock massive by licensed professional companies, and most of the other operations will supposedly be conducted after blasting with conventional opencast mining methods. There's no documented information on staging of the limestone mining, but it is anticipated the Company will start at the north-eastern side of the ridge which is the closest to the plant. The limestone quarry is proposed to ultimately cover an area of 400 hectares, with the initial focus for the mining operations will be some 50 to100 hectares of the north-eastern block (to be contoured based on a geologic resource model developed from the exploration drilling data and geological studies. The mine development design will include a reclamation plan with financial deposit to ensure proper reclamation after the Project's closure.

Limestone transportation. The uncrushed stone will be transported to the crushing facility using a connecting haul road, which will approximately be within 1-2 km long (depending on at which part of the block the mining will start). The proposed haul road will not cross any land uses, public or private roads or canals, since the crushing facility is positioned right between the quarrying area and the cement plant with spaces of 60 to 80 m (Figure 5.3). The haul road will be supposedly designed in line with national regulatory requirements to safely accommodate at least two-way truck traffic and to ensure surface water runoff is managed appropriately. Taking into account the wide-spreading practice for such operations, Consultant expects the road will be graded into the natural ground and surfaced with crushed limestone. A small network of service vehicle roads will probably be also developed within the proposed quarry disturbance limits that will allow access to the quarry and facilities of the Project site.

Crushing, storage and pre-homogenising facilities. Most of the raw materials, like limestone, clay, iron ores, and coal (for the 2nd stage of the Project), must be crushed before their pre-homogenization. Limestone is the primary material in this line, and due to its large particle size and high hardness, its good crushing plays an important role in the whole line. The extracted limestone will be delivered from the quarry to the nearby crushing facility by haul roads and then crushed by a single-stage hammer crusher. Special stacking and reclaiming technology will be used in the pre-homogenizing process so that all the other raw materials can be better primarily homogenized. Limestone from the crushing facility will then be supplied by covered conveyors to a circular storage shed (with a central silo); there will also be a long storage shed for gypsum, iron ore, and other auxiliary raw materials, where also the clay imported from the remote Kizil-Tepa loess deposits, and other additives are supplied.

Blending, grinding and drying facilities. The limestone and clay mixture and adjusting additives - sand and iron ore - are distributed by conveyors to respective bunkers. After that, dosed raw materials are supplied by conveyors to the crusher and the raw material roller mill, where the material is crushed to the required fineness and dried. The gravity-type raw meal homogenizing silo with good homogenization effect will be used onsite. Blending of raw meal is achieved by extracting from three different outlets at a time and which are changed at regular intervals. This method of controlling the extraction helps achieve a well-balanced and homogenized raw meal by allowing the latter to mix with the different "layers" in the silo. Further blending occurs in a mixing tank located below the silo which subject to strong aeration hence fluidizing the raw meal to enhance the mixing. The raw meal is then transported to the preheater top by an elevator.



Facilities of the Project

ID	Title	Note
1	Limestone Crushing	
2	Corrective Crusher & Transport	
3	Storage of Raw Materials and Additives	
4	Limestone Storage	
5	Raw Mix Proportioning Station	
6	Raw Milling & Waste Gas Treatment	
7	Raw Mill Homogenising Silo & Kiln Feeding	
8	Precalciner & Preheater System	
9	Rotary Kiln	
10	Clinker Cooler	
11	Clinker Storage	
12	Cement Proportioning Station	
13	Cement Mill	
14	Cement Grinding	
15	Cement Storage	
16	Cement Packing & Bag Cement Loading	
17	Cement Bulk Loading	
18	Main Substation	
19	Electrical Room of Limestone Crushing	
20	Electrical Room of Additive Crushing	
21	Electrical Room of Raw Mix Proportioning	
22	Electrical Room of Raw Mill	Not shown (located inside the Contours No. 7, 8, 10, 13, 16)
23	Electrical Room of Preheater	
24	Electrical Room of Cooler	
25	Electrical Room of Cement Mill	
26	Electrical Room of Packing	
27	Electrical Room of Cement Proportioning Station	
28	Compressed Air Station	
29	Water Treatment, Clean Water Tank & Pump Room	
30	Circulating Water Tank & Pump Room	
31	Laboratory	
32	Maintenance Workshop	
33	General Storage	
34	Weigh Bridge	
35	Main Gate	
36	Sales Building and Guard Room	
37	Lavatory	
38	Canteen	
39	Dormitory 1	
40	Dormitory 2	
41	Sewage Treatment (Domestic)	
42	Raw Coal Storage	
43	Coal Grinding and Transport	
44	Administrative Offices	

Figure 5.3: Cement Plant's Layout

Preheating and decomposing facilities. A five-stage cyclone preheater is used for initial heating up as well as decomposing the raw meal (this enables to use a shortened rotary kiln). The energy-efficiency design of this element provides that the raw meal can fully exchange heat with the hot gases from the kiln. Because of its rapid and high-efficiency heat transfer, the productivity and heat consumption of such a line are greatly improved. In the pre-calciner, calcining i.e. decarbonation of calcium carbonate of the raw meal is carried out in seconds with a decomposition rate of $CaCO_3$ exceeding 92%. Physically, the charge powder will be fed into the ground and dried charge silo from which it is lifted by the elevator into the cyclone heat exchanger. A number of phases (alite, belite, aluminate, and ferrite) are formed in the clinker feed before the proper burning zone is reached. However, these intermediate phases are not found in the final clinker minerals due to their dissociation in the burning zone.

Burning and cooling facilities. After its preheating and pre-decomposing, the raw meal will be calcined in the rotary kiln of 4.4x60 m, where the generated carbonate will be further decomposed. Kilning is considered the last stage in converting the raw mixture into clinker. During this stage, the raw mixture is heated from 1000 to 1450 degree Celsius, breaking the bonds of the raw elements and calcium enters a chemical reaction with aluminum, silica and Fe-oxides. All exhaust gas released from the raw mill and kiln circuit is handled by the gas conditioning tower and electro-static precipitators in charge of de-dusting operations. After cooling, clinker from the clinker cooler is supplied by the conveyor to the clinker silos. The clinker from the silos is transported to the cement mills.

Facilities for finish grinding and preparation for distributing. As the last process, the finish cement grinding will consume a great deal of electricity. And in this process, special size granule cement will be obtained. During grinding of clinker and gypsum in cement mills, cement is produced. Depending on the type of cement, granulated blast furnace slag, coal ash, limestone, etc. may additionally be used in cement production. Ground cement is stored in cement silos, from where it is loaded into railway cars or tank trucks (i.e. for bulk transportation), or packed into paper bags.

5.4 Rail and Motor Roads

Rail is expected to be the primary means of transporting cement products to customers and receiving the imported raw materials. A rail spur will connect the Plant site with the existing Boytog-Chimkurgon one-gauge rail way. Once the rail spur is connected to the Plant area, it will branch off into several parallel sidings to facilitate both empty and loaded railcars.

An existing public motor roads currently surround the Project Site at distances of 2 to 6 km (Figure 5.4). The 3260 m access road connects to the northern edge of the Plant with a 785 m long turn out to the Accommodation Camp. Trucks will be used to ship and receive a lesser quantity of the lime products and raw materials as well as to transport relatively small volumes of consumables and manufactured products. By the access road, the Projects trucks and other vehicles will be able to enter the Chimkurgan-Zafarobod public road near the bridge over the Kly river.

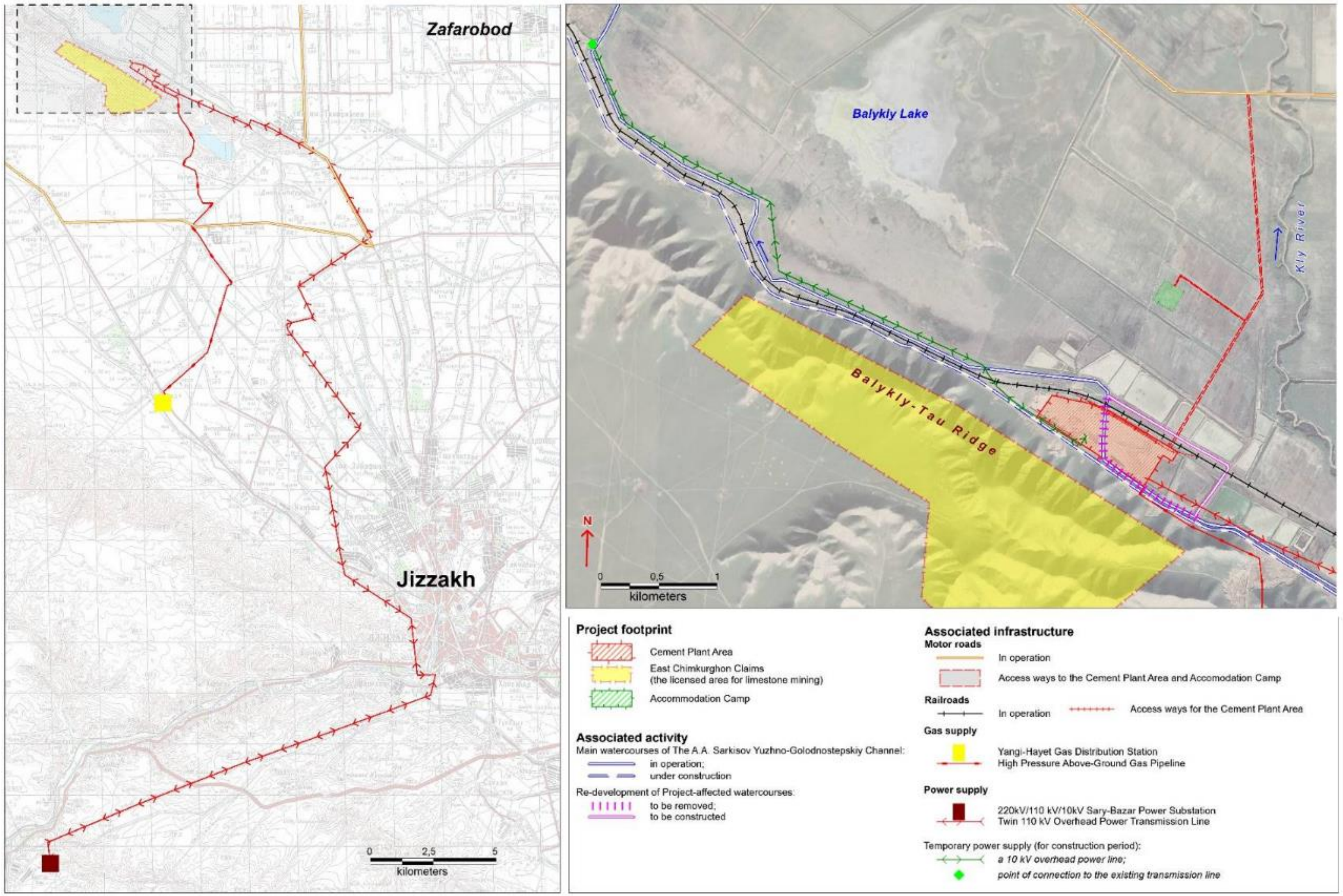


Figure 5.4: Associated infrastructure and activities

5.5 Co-product Storage and Handling

Co-products will be generated through quarrying and processing the limestone, as it follows:

- overburden and excess rock associated with the quarrying operation; the overburden and excess rock (if any[47]) will be stockpiled for later use as reclamation materials within the quarry;
- undersized materials or material rejects removed from the lime process prior to thermal treatment; these materials will also be stockpiled for later use in reclamation activities within the quarry;
- the lime collected from dust collection and partially calcined limestone minerals from the lime manufacturing process and emission control systems will be reused within the process or sold where possible; where no other use can be found for the lime kiln dust, it will be disposed of in an authorized non-hazardous landfill.

5.6 Fuel Type and Source

The 16.5 km high pressure above-ground gas pipeline that is now under construction will supply the Plant with natural gas as a main fuel. The pipeline starts at the Yangi-Hayet Gas Distribution Station (Sharof Rashidov district). Gas consumption for the first stage of the Plant is assessed to be about 500,000 m^3 a day, for the second (prospective) stage it will increase up to 750,000 m^3 a day.

The use of coal is also typical for cement plants, since it enables to increase the temperature of the burning process, the coal ash serves as a correction additive for the clinker, and this finally saves 2 to 3 per cent of the raw materials consumption.

The Company has announced the use of coal as a co-fuel for the 2nd stage of the Project, so the Plant's layout shows two coal related positions, the Raw Coal Storage (Figure 5.3, No. 42) and Coal Grinding Facility (No. 43). Consultant expects the low sulfur (low volatile) bitumen coal will be delivered from a third party by rail, then stored and milled onsite, with the coal dust to be entered into the kiln as it is shown on the process flow chart (Figure 5.2).

5.7 Water Supply. Wastewater Treatment and Discharge

The estimated water demand for the operation is 1056 m^3 a day as a maximum. This number includes 655 m^3 of the make-up process water, 131 m^3 as a reserve process water (calculated as 20 per cent of the 655 m^3 regular volume) and additionally 270 m^3 for supplying fire control systems of the Plant. For the second stage of the Plant, the water demand will increase up to 1500 m^3 as a maximum.

General water efficiency of the Project can be illustrated with the following numbers: the 1.57 mn tons of cement per year plant will consume approximately 200,000 tons of water, with efficiency being equal to 127 l/t, which is well below Lafarge's corporate averages at 239 l/t in water stressed regions or 299 l/t of the overall Group's mean value.

The process water will be supplied from waterway of the A.A. Sarkisov Yuzhno-Golodnostepskiy Canal. The use of this public water source has been sanctioned by The Water Supply Canals Authority of the Republic of Uzbekistan (in Uzbek - Ushbu Shartnoma Uchtom Irrigatsyia Tizimi) and will be regulated by appropriate agreements. Upon pumping, the water will be discharged into raw water tanks. To mitigate water risk, a 100,000 m^3 water storage pond will be built onsite to store water for consumption in the summer, which is the peak water consumption season.

The collected water is expected to undergo a chemical treatment process consisting of a "primary demineralization and mixed bed" system. The purpose of the chemical water treatment process is to reduce the levels of electrical conductivity, hardness and silica (SiO_2) as required of the water quality feeding the boiler.

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[47] According to the Company representatives and IFC Notes, the quarrying area has no soils and the limestone is exposed for mining. Nevertheless, Consultant expects some amounts of the waste soil and rock will appear in the course of the mining

As for the potable water, it will be delivered by third parties in bottles. The Company announces that there're no plans to use natural water bodies or groundwater resources of the Project area during operation phase of the Plant.

Process wastewater, sanitary wastewater, and first 5-cm contaminated rainwater will be treated at the onsite wastewater treatment unit through physical/chemical/biological treatments. The treated wastewater will be stored at an onsite treated wastewater storage pond with the capacity of 57,600 m^3. The treated wastewater will be partly recycled back to the processes, with the rest portion of it to be used for greenbelt and process dust control. The large storage pond is also worked as an evaporation pond; therefore, there is no wastewater discharge from the Site. The accommodation camp will be equipped with its own wastewater treatment facility.

5.8 Power Supply

A 55 km long twin 110 kV overhead power transmission line is constructed starting at the 220kV/110 kV/10kV Sary-Bazar Power Substation to supply the Plant with energy at a level of 28 MWt and annual consumption of 100 million kWth during the first stage. The second stage would increase these levels to 42 MWt and 200 million kWth per annum. The Plant will be equipped with its own 110/10.5 kV electrical substation (No. 18 on the plan) and a number of transformer stations associated with end-users of the energy.

5.9 Communication Networks

The Company announces the Plant will be provided with a 1024 Mb/sec wire-connected broadband web access canal with a capacity for 2000 users and all the Project area covered with mobile telephony of a national provider.

5.10 Process Controls and Laboratory

Consultant expects the Plant to be controlled by a distributed control system from the central control room located in administrative block (No. 44 on the plan). Process variables in all manufacturing departments must be continuously monitored in order to regulate and optimize cement production, i.e. from raw material storage to cement storage, packing and loading. Manual intervention shall be warranted during process upsets, equipment malfunction or emergency conditions. Process temperatures and pressures will be continuously monitored for any abnormal conditions to ensure that abnormalities can be detected and rectified. Operation of the burning system will be monitored since product quality will be largely determined in the kiln.

At every stage of the cement manufacturing, the raw and intermediate materials as well as the end products will be analysed at the plant's laboratory to ensure that they conform to set quality standards on a consistent basis. The laboratory (No. 31) will be equipped for testing of major process related materials, sample preparation, chemical analysis and physical testing. Large part of the tests will be made dry with the use of modern equipment and therefore this would require minimal amount of chemicals, water and other resources.

5.11 Hazardous Materials and Explosives

The Project is not chemically intensive, with most of the materials stored and used onsite being inert and non-hazardous. It can be expected that some amounts of liquid fuels, lubricants and some other chemicals will be stored onsite for efficient operation of the Plant's equipment and machinery. Consultant expects their volumes will be corresponding to weekly or monthly demand, and all the chemicals will be delivered and stored packaged and then used within specially equipped maintenance and service areas only.

Explosives will be used twice a week for blasting of the quarry to remove limestone, and will need to be stored onsite for this purpose. No data on dealing with such materials are available, so Consultant can only suppose that an explosive storage will be located in a suitable non-sensitive area to ensure at least 500 m radius safety zone which is clear of infrastructure. The exact location of this facility has not yet been determined. Traditionally, such storages comprise of a concrete and brick structure raised above the ground, are surrounded by earth berms, and contained within a security fence with an airlock security entrance. Consultant expects the storage will be sited, with its makeup, capacity, and location of the other Project facilities, primarily the Accommodation Camp, having been carefully taken into account.

5.12 Fire Fighting and Emergency Systems

The Plant will supposedly be fitted with an adequate fire-fighting system consisting of:

- high pressure pipes system, includes enough taps;
- independent network to provide fire taps with water;
- heavy powder extinguishers that shall be put in important places such as electrical instrumentations places;
- portable CO_2 extinguishers;
- automatic extinguishing system;
- fire alarm system including smoke sensors and manual switches wired to a central display panel.

5.13 Ancillary Structures

Additional ancillary structures of the Plant include: an administrative office (No. 44 at the map, Figure 5.3), truck weigh bridge (34), maintenance shop (32), sales and guard block (36), main gate (35), compressed air station (28), amenity blocks (37).

5.14 Accommodation Camp

The Camp will occupy a 10 ha land parcel located 1000 m off the Plant's area. This space will be developed with 2 dormitory buildings with total capacity of 400 persons, a canteen, wastewater treatment facility, 2 play grounds and a landscaped area.

5.15 Associated Facilities and Activities

The following infrastructure and activities meet the IFC criteria of associated ones as related to the Project (all having been indicated on the map of Figure 5.4):

- A 55 km long twin 110 kV overhead power transmission line that goes to the Project site from the 220kV/110 kV/10kV Sary-Bazar Power Substation to supply the Plant with energy;
- A 16.5 km high pressure above-ground gas pipeline that starts at the Yangi-Hayet Gas Distribution Station and will supply the Project with natural gas as a fuel;
- A 3260 m long access road that connects the Chimkurgan- Zafarobod public road with the northern edge of the Plant site and has a 785 m long turn out to the Accommodation Camp;
- A rail spur (less than 1 km in length) that connects the Plant site with the existing Boytog-Chimkurgon one-gauge rail way.

In addition, two more activities can be also considered as associated but for the construction period only:

- Operation of a 5.9 km long10 kV overhead power transmission line that has been built to supply the Project Site with electricity for the construction period;

Re-development of the Project-affected waterway of The A.A. Sarkisov Yuzhno-Golodnostepskiy Canal (both previous and new locations of this canal are shown on the map, Figure 5.4).

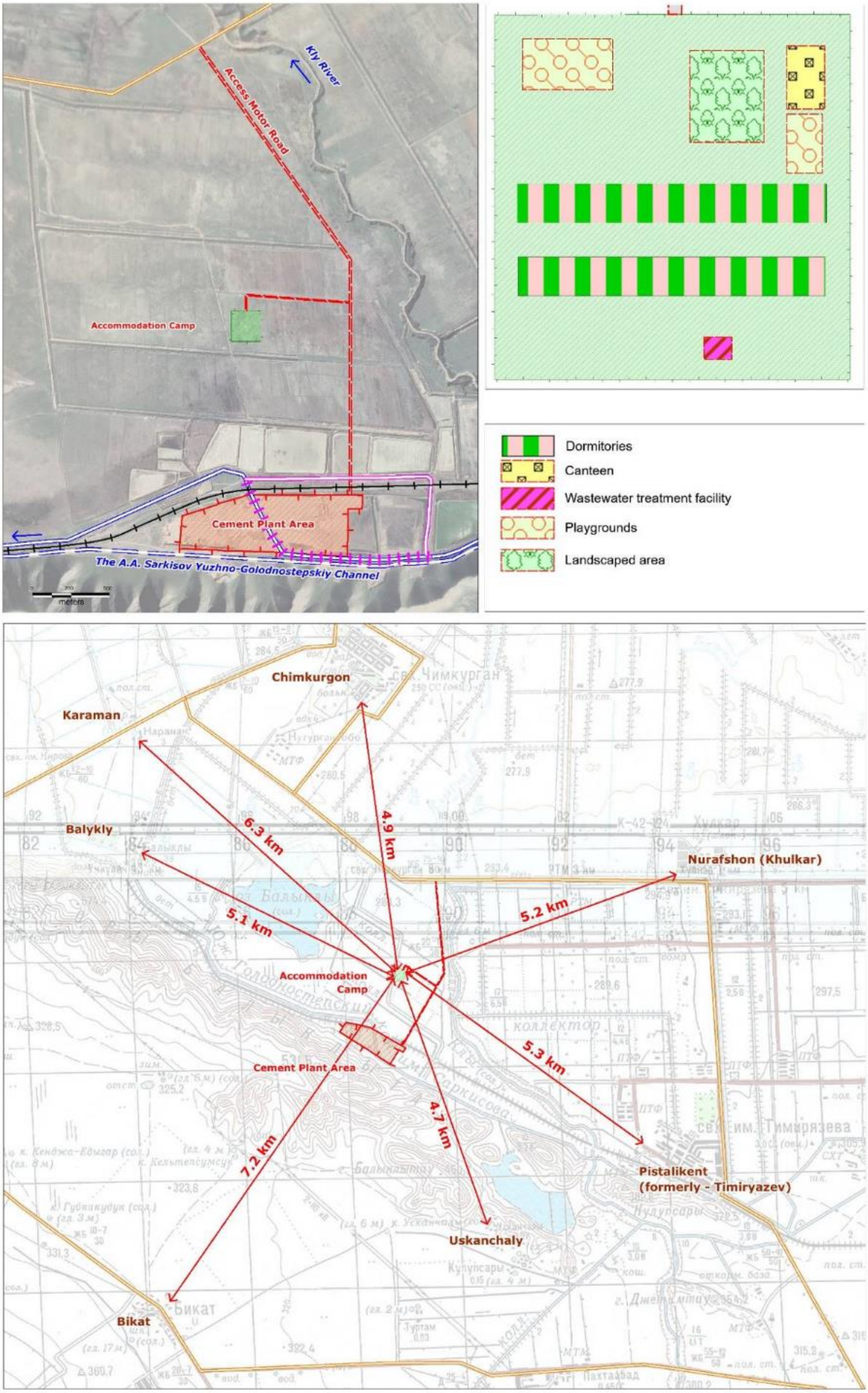

Figure 5.5: Accommodation camp

5.16 Construction Details

The Plant-related construction activities were started in 2019 and will last until Q2 of 2020. During peak construction, an estimated 1,500 Chinese workers will be required on site, with some workers being sourced from nearby areas of Uzbekistan.

A 5.9 km long10 kV overhead power transmission line has been built to supply the Project Site with electricity for the construction period. The line goes from a pillar of an existing line 5 km west of the Plant (Figure 5.4) and will likely be demounted after switching the Site to the 110 kV line that is now under construction.

The water for construction purposes comes from the nearby canal via a flexible hose and electric pump. The use of this public water source was sanctioned by The Water Supply Canals Authority of the Republic of Uzbekistan (in Uzbek - Ushbu Shartnoma Uchtom Irrigatsyia Tizimi) and is regulated by the Agreement No. 5 dated April 1st 2019 according to which the Project can take 768 000 m^3 of water monthly from April to December of the year 2019 at a rate of 889 m^3/h[48].

Two onsite wells are also using to supply some part of construction activities with groundwater. The Company announces decommissioning of the wells before the Plant will be put into operation.

All construction materials and tools are transported to the construction sites by existing motor roads via trucks.

[48] That was a technical mistake in the Company's water supply agreement following to which the intake was erroneously equaled to 889 cubic meters per second, while Consultant assumes the correct value being 889 m3/h

6. ANALYSIS OF ALTERNATIVES

6.1 Introduction

This Section presents a discussion on the various alternatives considered during project planning and design, as well as reasons for the selection of the preferred alternative.

A systematic comparison of feasible project alternatives, in terms of both the Project (i.e., technology, design, operation, etc.) and site selection is provided. The assessment of project alternatives and site selection includes environmental, and social factors and includes the no-project (i.e. the situation if the project were not developed) scenario.

Prior to arriving at a decision regarding establishment of a greenfield cement plant in Zafarobod district, different project alternatives were examined and reviewed. The options considered were:

- No-project option;
- Establishment of a new cement plant close to the quarry for production of cement.

6.2 No-Project Alternative

The ‘no-project” alternative means that the Project will not be developed, and The Republic of Uzbekistan will continue to import cement to meet its future needs and will be mostly dependent on world market fluctuations. Uzbekistan has abundant natural resources and especially high quality and easily extractable limestone reserves which make the best location in Jizzakh Region for a cement plant. And that is why the other similar projects have already been launched here.

The Kuterminskoye Limestone Deposits which is planned to be used as a raw materials base for the Project were initially discovered and explored in 1986 but remained all the time unclaimed and has been therefore included into the governmental list of undeveloped mineral deposits offered for external investments. This single source alternative, if not utilized, will continue to sustain dependence on cement imports, but that could also very easily result in the cement supply shortages. Shortage of building material like cement will cause cement prices to rise.

The Region of Jizzakh has been recently declared to be a priority social and economic development area of Uzbekistan, and this implies the need for development the available natural resources of the territory and increasing demand for construction materials. According to the Company’s forecast, the Project will enable Uzbekistan to become cement exporter, while “Do Nothing” alternative will place the country to further dependency on cement import and slow down its economic growth.

The ease of availability to basic building materials including cement and concrete is needed to further develop Uzbekistan’s economy. The ‘Do Nothing’ alternative does not seem plausible given the legitimacy of the proposed project rationale and the benefits to be derived. Uzbekistan’s trade deficit would not improve, and the country will remain susceptible to fluctuating cement prices.

Although it will have some negative environmental impacts, the proposed cement plant is expected to provide about 1,000 job opportunities during its operation phase and additional job and economic opportunities (according to the Company’s calculations – for 1,000 or 2,000 residents of Jizzakh Region) through development of supply/distribution chain and trucking. In addition, there will be a transfer of technology associated with installation, operation of the equipment and maintenance and savings on foreign exchange, hence this alternative was chosen.

The investment potential of US Dollar 300 million, as proposed by the Project Proponents, will not be utilized with “Do Nothing” option.

6.3 Project Site Alternatives

Given that limestone represent over 75 % of the raw materials from which cement is manufactured, the availability of this unexploited raw material is another primary criterion for determining potential sites for a new cement plant. The proposed plant site is located nearby the large reserve of good quality limestone without overburden. Shorter distance location of the plant from the limestone deposit will reduce the transportation cost and in turn will lower the cost of cement production as well as minimize toxic and dust emissions as well as generation of greenhouse gases due to transport movement over shorter distance from quarry to the plant site.

As for additional sources of raw materials like clay or Fe-containing materials, their reserves are also located not very far from the selected site: the clay will be supplied by extraction of the loess deposits within the Kizil-Tepa Claims (Navoi Region, some 200 km east of the site); the origin of the Fe-containing materials is currently not specified by the Company, but Uzbekistan media sources announce a prospective to provide the Project with locally mined iron ore deposits the development of which has been recently started in Jizzakh Region to replace the import of pyrites from Kazakhstan.

The chosen site is also provided with very short assess to existing rail roads the capacity of which enables further increment of load with Project-related deliveries of both raw materials and products. Connection of the Plant to the local motor roadway network is not so convenient and requires construction of a 3 km long assess road across an area of irrigated croplands and fishery ponds. By dates of Consultant's visit to the site, construction of this road has been almost completed.

The proposed plant site is to be located in an area which is devoid of any biodiversity including forestry, wildlife, migratory birds, game reserves, or protected species of fauna and flora. In addition, there is no cultural or any other heritage in the project area, and all the residential areas are located at a distance of 4-10 km from the proposed Plant site.

At the same time, the selected siting option of the Project results in disposing agricultural and fishery plots, i.e. the areas of high social sensitivity, and relocating a water supply canal: all the associated legal procedures and civil works have been already completed before Consultant's visiting the site, and it has been stated and documented by Huaxin Cement Jizzakh that affected farmers are satisfied with compensations paid for the transfer of their land, and the Company has not come into conflict with anybody over this issue.

Summarizing, the proposed location of the cement plant has been determined to be the most convenient location in close proximity to the limestone reserves and, alongside this, such a siting option provides the least environmental and social impacts of the Project.

6.4 Project Layout Alternatives

During Ramboll team's visit to the site and subsequent consultations with Huaxin representatives, a question has been taken up with regard to the placement of various components of the project layout (such as the overburden stockpile, haul road, explosive materials storage, and waste landfill site) to avoid environmentally and socially sensitive areas. Further information on this issue will be provided by the limestone quarrying project that is now under development.

6.5 Quarrying Method Alternatives

Two options can be considered for limestone quarrying, within the proposed site, i.e., sub-surface open cast mining and underground mining. Sub-surface open cast mining has been selected as the most efficient and suitable for the quarry operation, as it is considered to be safer and more economical. In addition, the Company has to select the frequency of blasting that is generally stated as being twice a week. Consultant expects its recommendations (see Chapter 9 for more details) will be taken into account to minimize the impact of explosions on communities and wildlife of the surrounding area.

6.6 Plant's Technology Alternatives

In the European Union, cement is primarily produced using modern "dry-method" technology. This requires approximately 50% less energy than burning clinker in kilns using the wet method.

Reducing the heat energy used to burn clinker – the raw material of the cement industry which, once milled and mixed with other ingredients, produces cement – is of vital importance for producers as fuel represents one of the highest costs in the cement production process.

The technology being offered by Huaxin Cement Jizzakh is considered to be 'state of the art' in terms of environmental controls, energy efficiency and modern design. Dry process technology has been preferred over wet or semi-dry technologies as it is more economical in terms of power consumption as well as heat and manpower requirement and less capital intensive.

The new plant will be built according to the applicable Best Available Technologies (BAT) defined for the cement industry, which include the adoption of pre-calcining technology in the clinker production and dedusting bag filters/ESP for gases (see Chapter 5 for more detail).

6.7 Resource Provision Alternatives

Natural gas is a preferred alternative due to its low cost and availability (the gas supply pipeline is now under construction by a governmental company). The only other alternative considered is coal, the use of which is also energy-efficient and provides the cement with coal ash as a corrective addition. The Company states that the use of coal as a co-fuel (i.e. along with natural gas) is planned for the Project's 2nd stage only, with the 1st stage being coal-free.

Power will be supplied from the national electrical grid (the twin 110 kV power line is also under construction). The only other alternative is the use of a generator, which is less favorable due to the cost involved. The electrical power supply will only connect to the Plant area.

The potable quality *water* for domestic supply will be delivered from remote sources in bottles and water lorries. The Plant will utilise raw water for cooling in the process. Two alternatives with regard to sourcing this technical water exist – abstraction from surface water resources (the A.A. Sarkisov Canal), or groundwater abstraction. According to the pre-project Company's estimations, the use of the canal would pose no water related risks to irrigation systems and other water users of the region, since the cement plant will take less than 1 per cent of the canal's waterflow at the season of its minimum rate.

7. BASELINE ENVIRONMENTAL CONDITIONS

This Section is structured to provide information on the environmental baseline characteristics and conditions in the Project Site and its AOI. The discussion is limited to the factors and environmental components that could have a direct impact on the Project, or which may be impacted by the Project.

Baseline information has been collated from a range of sources including publicly available information, primary data collection and through consultation.

7.1 Area of Influence

The Area of Influence will include areas both directly and indirectly affected by the Project within and beyond the Project area.

The areas directly affected by the Project include those affected by the direct physical impacts from the cement plant and associated auxiliary facilities, which are all within the Project area.

The Area Of Influence (AOI) of the Project encompasses:

- the primary Project Site including the cement plant and associated limestone quarry;
- the clay mine and associated staging areas and access roads; and
- areas potentially affected by the cumulative impacts from other developments or future expansion of the Project as well as induced activities of the Project.

It should be noted that the AOI for a particular resource/ receptor may vary depending on the nature of the change caused by the Project activities and the type of effect being considered, but in each case it is defined to include all the area within which it is likely that potentially significant impacts could result. For example, a 500 m AOI would be considered as sufficient for noise given the localised nature of noise impacts while the AOI for water quality impacts due to unplanned spills would cover the downstream area where elevated pollutant level is expected, which is often more than 300 m. As such, the AOI for each specific resource / receptor / impact will vary and these are defined in the sections below.

Taking into account the nature of activities during the construction and operation phases of the Project and the relative locations of sensitive receptors,an AOI of 500 m (width of sanitary protection zone) and 5 km (approximate distance to nearest residential area) around all project sites has been established for the construction and operational phases, respectively. The AOIs have been determined so that all potentially impacted sensitive receptors closest to the Project activities during both construction and operation phase have been identified.

Sensitive receptors are split into three categories as described below.

- Human – these are locations of human settlement, schools, hospitals, clinics and government offices. The relevant pollutants of interest for sensitive human receptors are particulate matter as dust, PM_{10} and $PM_{2.5}$, NO_2 and SO_2.
- Ecological – these are locations where there are local, national or internationally protected habitats. The relevant pollutants of interest for sensitive ecological receptors are particulate matter as dust, SO_2 and NO_x.
- Agricultural - these are locations where there are crop growing activities, as crop growth may be detrimentally affected and crops soiled as a result of project activities. The relevant pollutants of interest for sensitive agricultural receptors are particulate matter as dust, SO_2 and NO_x.

Where the project involves specifically identified physical elements, aspects and facilities that are likely to generate impacts, environmental and social risks and impacts are considered in the context of the project's area of influence.

7.2 Physical Environment

This section describes the physical setting of the Project AOI. This is based on a desk top review, a site visit undertaken in July 8-9, 2019 as well as the other baseline data and survey available at the moment from other sources.

7.3 Climate, Meteorological Conditions and Air Quality

7.3.1 General information

The climate of Uzbekistan is classified as sharp continental, with hot summers and cool winters, and is typical for semi-arid territories of Central Asia. The central part of Uzbekistan is desert-like areas, the cause of which is the significant distance from the sea, the close vicinity of the Kizilkum Desert and high mountain ridges located to the south. Cold air entering from northern regions of Asia causes sharp fluctuations in temperature throughout the Uzbekistan territory. Frosts still occur in late spring and middle autumn. Mountain ridges with direction close to East-West contribute to stagnation of cold Northern air[49].

The main characteristic of the climate is a large influx of solar radiation, which causes extreme aridity of the summer period. Precipitation data indicates that the rainfall occurs predominantly in winter and spring, and annual average precipitation is relatively small due to the significant distance from the sea.

7.3.2 Meteorological study

The climate of the Project area has been studied to a satisfactory degree. Meteorological conditions are described based on long-term observations at the weather station (WS) of Jizzakh[50], located 21 km South-East of the Project area (Figure 7.3.1). Since 1962, WS Jizzakh was used for systematic observation of the of meteorological parameters such as duration of sunshine, air temperature and humidity, atmospheric pressure, wind conditions, precipitation, cloudiness, surface temperature, the height and density of snow cover, ice-frost deposits, adverse weather conditions and horizontal visibility.

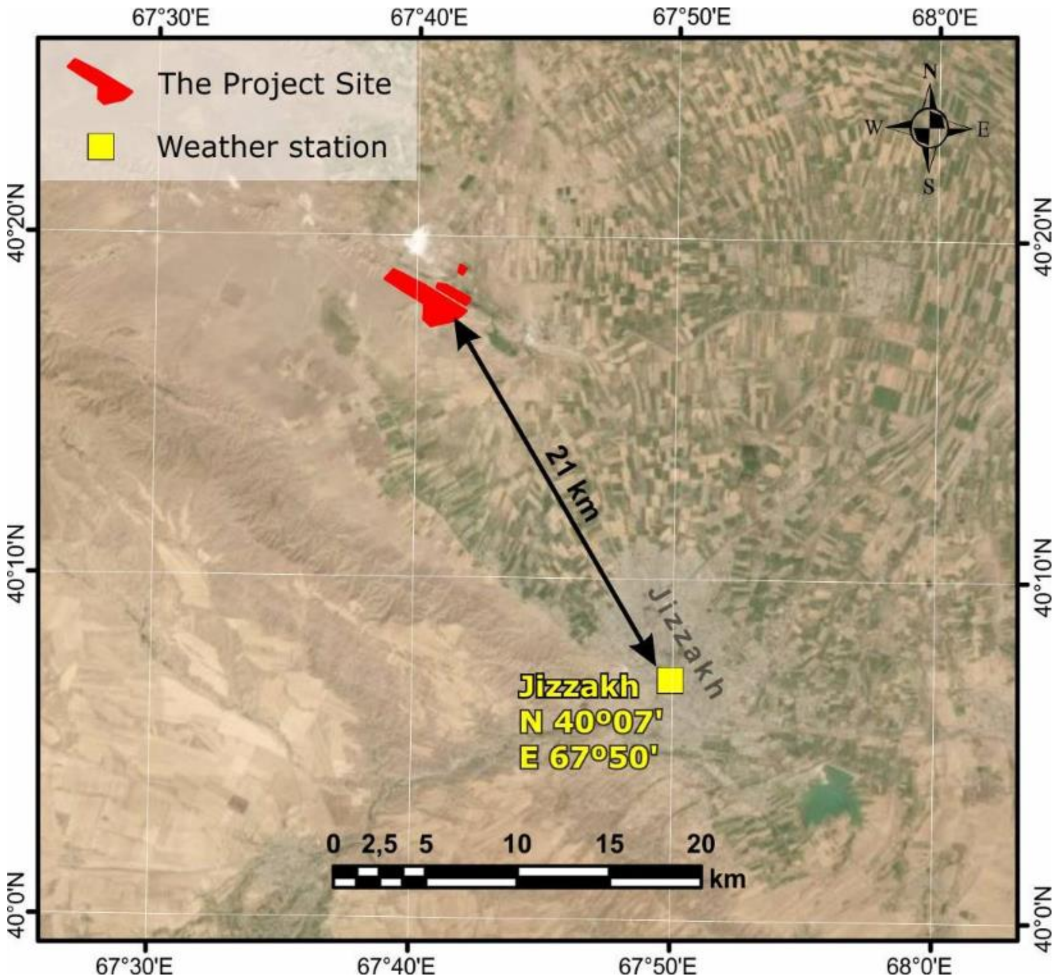

Figure 7.3.1: The weather station of Jizzakh near the Project Site

[49] Alibekov L.A., Nishanov S.A. Natural conditions and resources of Jizzakh region. – Tashkent: "Uzbekistan", 1978. – 254 p.
[50] Data archive at weather station Jizzakh for the period 2005 – 2019 // "Raspisanie pogody" JSC https://rp5.ru/Архив_погоды_в_Джизаке

7.3.3 *Temperature regime*

The severity of the thermal regime is primarily characterized by an average annual air temperature of 15.2°C (Table 7.3.1). The coldest month is January, its average monthly temperature is 2°C. The average minimum temperature is also observed in January and is equal to -1.8°C. The warmest month is July, with average monthly temperature of 28.5°C. The highest value of average maximum temperature is observed in July – 34.9°C (Figure 7.3.2). The absolute maximum air temperature reaches 42.3°C, the absolute minimum is -19.8°C.

Table 7.3.1: The mean annual (1981 – 2010) temperature observations at Jizzakh WS[51].

Month	Air temperature				
	Average	Average minimum	Absolute minimum	Average maximum	Absolute maximum
I	2.0	-1.8	-19.8	6.3	24.6
II	3.4	-0.4	-17.8	8.9	26.6
III	10.7	4.6	-9.4	14.8	31.2
IV	16.2	10.1	-0.4	22.2	37.5
V	22.4	14.5	5.3	28.0	39.4
VI	27.1	18.7	10.0	33.7	42.2
VII	28.5	20.2	10.3	34.9	42.3
VIII	26.4	18.3	9.8	33.4	41.2
IX	20.9	13.0	3.1	28.5	38.2
X	14.2	7.8	-2.9	22.0	36.5
XI	7.6	3.5	-12.7	14.7	33.4
XII	2.8	-0.7	-16.3	8.1	22.4
Year	15.2	9.0	-19.8	21.3	42.3

[51] Climate data for province centers of the Republic of Uzbekistan (1981-2010) // Centre of hydrometeorological service at Ministry of Emergency Situations of the Republic of Uzbekistan (Uzhydromet). Data in open access https://www.meteo.uz/#/en/open-data/climate

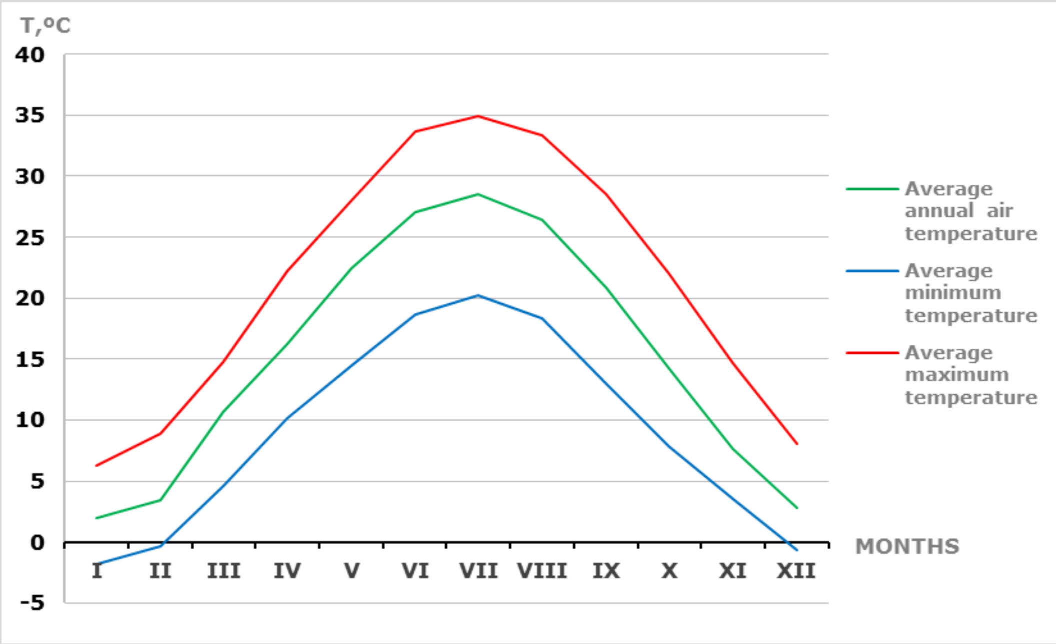

Figure 7.3.2: Annual course of air temperatures (according to the Jizzakh WS)

The average air temperature remains positive for all the year. In some years, up to 30 days are observed with negative daily average temperatures in the winter months. Usually, these days do not form a continuous period. From December to February, negative temperatures are observed at night, but the average daily temperature remains positive. The average date of stable transition through 0°C is observed in early February.

The duration of period with positive average daily air temperatures averages to 332 days (Table 7.3.2). The number of days with temperature plus 5°C and above is 261 days. Days with temperatures above 15°C lasts approximately for a half-year long.

Table 7.3.2: Days with different mean daily temperatures (according to the Jizzakh WS)[52]

Indicator	Duration, days	Average date	
		of the beginning	of the end
Time period with temperatures above 0°C	332	1 February	31 November
Time period with temperatures above 5°C	261	5 March	22 November
Time period with temperatures above 10°C	219	26 March	1 November
Time period with temperatures above 15°C	177	16 April	11 October
Frostless time period	219	23 March	29 October

7.3.4 *Precipitation and humidity*

7.3.4.1 Air humidity

The partial pressure of water vapor in the considered territory is relatively high, its average value is about 8.6 mb (Table 7.3.3). The partial pressure of water vapor is low in winter. Its minimum is observed in January–February and does not exceed 5.5 mb. With the increase in air temperature in spring, the humidity increases and reaches its maximum in July, when it exceeds 12 mb.

[52] Alibekov L.A., Nishanov S.A. Natural conditions and resources of Jizzakh region. – Tashkent: “Uzbekistan”, 1978. – 254 p.

The average annual relative humidity is close to 63%, in winter it is equal to 76-78% and in summer it is 48-52%. During the year, the highest relative humidity is observed in December (78%), minimum – in June (48%) (Table 7.3.3).

Table 7.3.3: Monthly and annual average values of partial pressure and relative humidity

Characteristic	Month												Year
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
Partial pressure, mb[53]	5.1	5.9	7.5	10.3	12.0	11.6	12.2	11.4	8.6	7.4	6.1	5.3	8.6
Relative humidity, %[54]	76	76	70	65	55	48	49	52	56	63	73	78	63

7.3.4.2 Precipitation

The amount and distribution of precipitation in this region is determined mainly by features of the general circulation of the atmosphere. On the Jizzakh WS 381 mm of precipitation falls on an average per year (Table 7.3.4). Such a relatively low amount of precipitation is associated with the low moisture content of the prevailing air here. The major rainfall takes place in winter and spring, with a maximum in March and April. Minimum of precipitation falls on July-September (Figure 7.3.3).

Table 7.3.4: Average monthly and average annual precipitation (mm) and average number of precipitation days (1981-2010)[55]

Indicator	Month												Year
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
Precipitation	40.7	50.4	63.4	57.7	36.4	10.7	4.1	1	4.7	20	40.4	51.8	381.3
Precipitation days	13	14	14	11	9	5	2	2	3	6	9	12	100

A characteristic feature of precipitation is its high intensity. In winter and spring average daily precipitation is 2-6 mm, reaching in some years extreme values of 30-60 mm. Most precipitation falls in the form of showers, especially in the cold season. In the spring-early summer period, thunderstorms occur.

[53] Alibekov L.A., Nishanov S.A. Natural conditions and resources of Jizzakh region. – Tashkent: "Uzbekistan", 1978. – 254 p.
[54] Data archive at weather station Jizzakh for the period 2005 – 2019 // "Raspisanie pogody" JSC https://rp5.ru/Архив_погоды_в_Джизаке
[55] Climate data for province centers of the Republic of Uzbekistan (1981-2010) // Centre of hydrometeorological service at Ministry of Emergency Situations of the Republic of Uzbekistan (Uzhydromet). Data in open access https://www.meteo.uz/#/en/open-data/climate

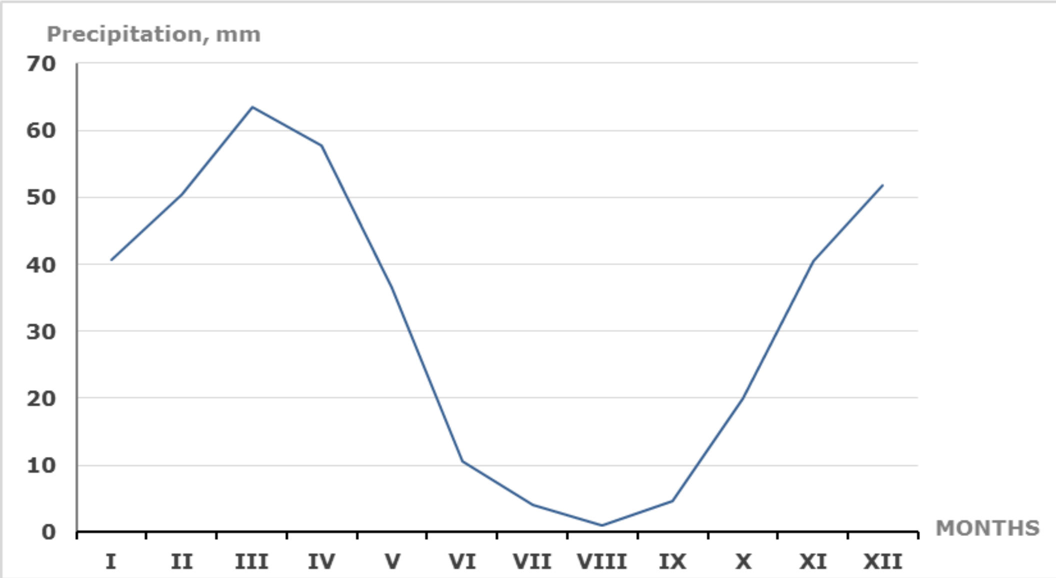

Figure 7.3.3: Annual course of average monthly precipitation

The average amount of days with snow is 36. Usually, snow cover lasts no more than one week, steady snow cover is not formed. The average height of snow cover is 7-11 cm, but in snowy winters it increases to 25 cm.

7.3.5 *Wind regime*

The wind regime of the Project Site is formed under the influence of air masses of the temperate zone with the invasions of Arctic air. Winds of Northern directions dominate all the year, except December, where Western winds are dominated.

Table 7.3.5 shows the average annual recurrence of wind directions and calm according to the Jizzakh WS.

Table 7.3.5: Recurrence of wind directions and calms, %[56]

Month	Wind direction								Calm
	North	Northeast	East	Southeast	South	Southwest	West	Northwest	
I	10.2	6.6	8.5	8.2	7.1	8.3	9.7	8.5	32.7
II	12.8	8.5	9.3	6.8	6.0	7.3	8.9	11.0	29.2
III	11.1	9.1	9.8	10.0	7.2	7.4	8.7	11.6	24.9
IV	10.6	9.9	9.9	7.6	6.1	9.0	10.8	11.5	24.4
V	10.6	12.0	9.0	5.6	5.5	9.5	9.6	9.5	25.6
VI	13.4	14.8	8.6	4.8	5.0	7.1	8.3	11.5	23.5
VII	14.9	16.3	7.8	5.3	5.4	5.6	7.2	12.1	25.4
VIII	14.1	15.9	6.6	5.7	6.0	5.8	7.3	9.2	29.3
IX	14.2	12.4	5.3	5.1	6.0	6.2	7.1	9.4	34.2
X	9.0	10.1	8.4	6.9	8.1	8.0	7.5	7.7	34.3
XI	8.6	9.0	7.9	7.3	8.0	7.7	8.2	8.3	34.8
XII	8.8	8.0	8.5	8.0	6.0	7.5	9.9	8.9	34.3
Year	11.5	11.0	8.3	7.0	6.6	7.5	8.6	9.9	29.4

** Bold – the maximum values of the recurrence in each month*

In the cold period (November – February) the greatest recurrence is at winds of North, North-West and West directions (9-10%), in the warm period (March-October) the winds of the North and North-East directions (approx. 12,5%). For the year as a whole the greatest recurrence (16%) is for winds of North direction (Figure 7.3.4).

[56] Data archive at weather station Jizzakh for the period 2005 – 2019 // “Raspisanie pogody” JSC https://rp5.ru/Архив_погоды_в_Джизаке

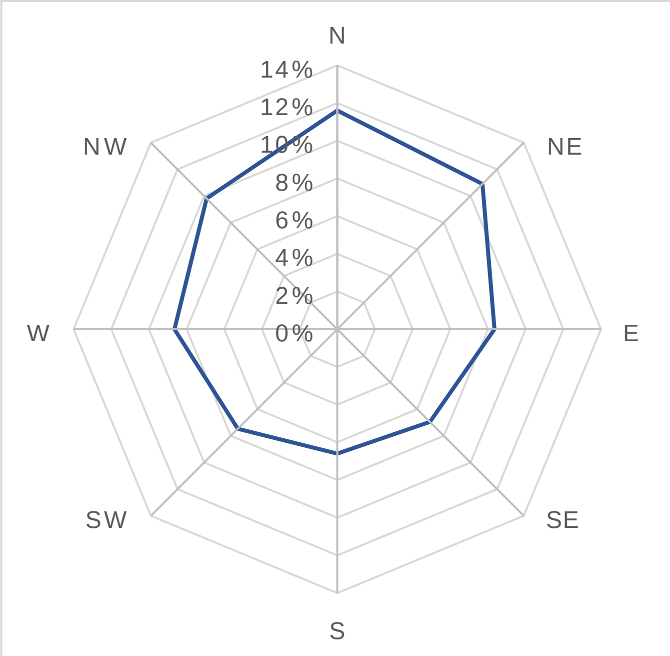

Figure 7.3.4: Average annual wind rose

Wind speed is low throughout the year, therefore, the recurrence of calm is high, ranging from 23 to 35%. Monthly average wind speed not exceeds 2 m/s, the value of the average annual speed reaches 1.4 m/s. The highest wind speeds refer to the March-June period, and in April reach the value of 1.7 m/s (Table 7.3.6, Figure 7.3.5). The minimum wind speeds are observed in winter and make up 1.2 m/s in September and October.

Table 7.3.6: Average monthly and annual average wind speed, m/s[57]

Month												Year
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
1.4	1.5	1.6	1.7	1.6	1.6	1.5	1.3	1.2	1.2	1.3	1.3	1.4

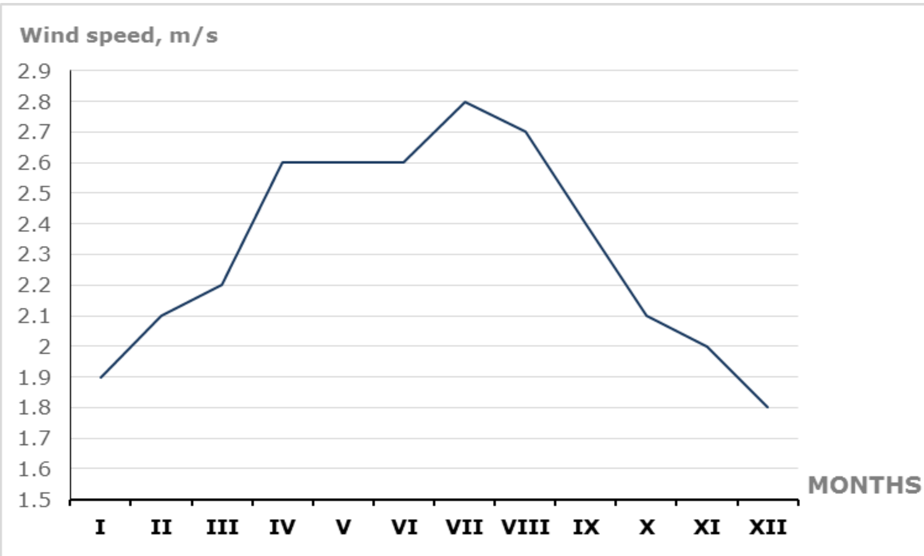

Figure 7.3.5: Annual course of wind speed

[57] Data archive at weather station Jizzakh for the period 2005 – 2019 // "Raspisanie pogody" JSC https://rp5.ru/Архив_погоды_в_Джизаке

High wind speeds (≥15m/s) are observed seldom, it is extremely rare in May-September. The highest wind speed was recorded on December 4, 2008 and amounted to 41 m/s. The probability of speeds exceeding 15 m/s is 0.7% of the total number of observations (Table 7.3.7). Strong winds throughout the year are distributed rather uniformly, with the increase of the recurrence in winter and spring.

Table 7.3.7: Recurrence of gradations of wind speed, %[58]

Month	Wind speed, m/s									
	0-1	2-3	4-5	6-7	8-9	10-11	12-13	14-15	16-17	18-20
I	52.5	18.2	12.2	8.6	4.3	1.1	1.6	0.4	0.5	0.5
II	53.3	19.4	10.2	7.8	4.2	1.0	1.9	0.5	0.9	0.8
III	52.0	20.3	11.9	7.3	3.7	0.6	1.6	0.7	0.9	0.8
IV	46.4	22.7	13.0	8.9	4.5	0.9	1.6	0.6	0.9	0.4
V	45.3	22.8	13.2	10.2	4.6	1.3	1.4	0.5	0.6	0.1
VI	50.6	23.4	12.8	7.7	3.5	0.5	0.9	0.4	0.2	0.03
VII	53.9	24.4	12.7	6.0	1.9	0.4	0.4	0.1	0.1	0.1
VIII	55.3	23.0	13.0	5.9	1.8	0.3	0.5	0.1	0.1	-
IX	55.2	21.3	10.0	8.0	3.6	0.5	1.0	0.3	0.1	-
X	53.9	18.9	10.1	8.5	6.0	0.6	1.2	0.3	0.4	0.1
XI	56.4	18.8	10.6	6.7	3.9	0.8	2.0	0.4	0.3	0.1
XII	56.0	18.7	9.2	5.0	5.0	0.7	2.3	0.8	0.4	0.4
Year	52.6	21.0	11.6	7.7	3.9	0.7	1.4	0.4	0.4	0.3

The recurrence of speed of 4-5 m/s has the maximum values in spring and summer, while in winter there are the maximum values of high speed recurrence (≥10 m/s) (Figure 7.3.6).

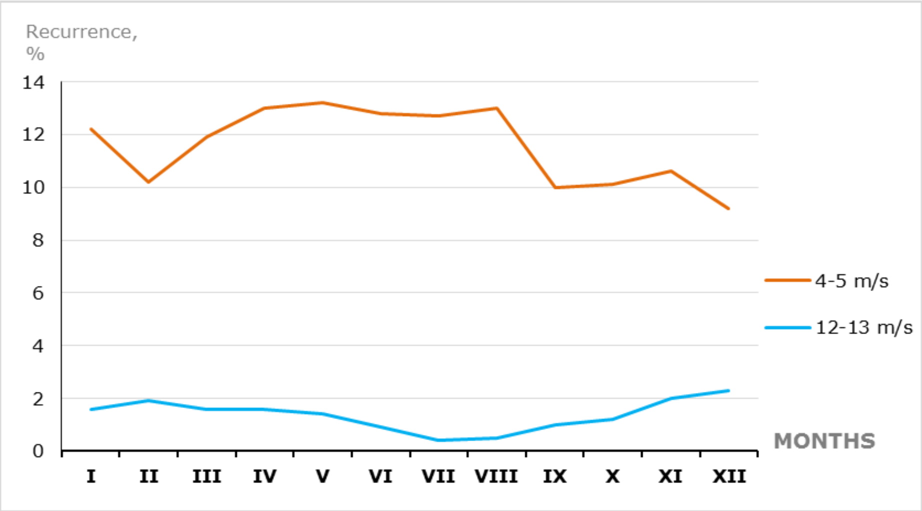

Figure 7.3.6: Annual course of recurrence of wind speeds grades 4-5 and 12-13 m/s

There is annual wind speed exceeding 15 m/s at the Project Site. During the year, strong winds with speeds above 15 m/s more often observed in spring (Table 7.3.8, Figure 7.3.7). On average, about 31 days in a year strong winds dominate.

[58] Alibekov L.A., Nishanov S.A. Natural conditions and resources of Jizzakh region. – Tashkent: "Uzbekistan", 1978. – 254 p.

Table 7.3.8: Average number of days with wind speed above 15 m/s[59]

Month												Year
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
3.0	3.9	4.5	4.2	3.6	2.2	0.7	0.8	0.8	2.0	2.0	3.2	31.0

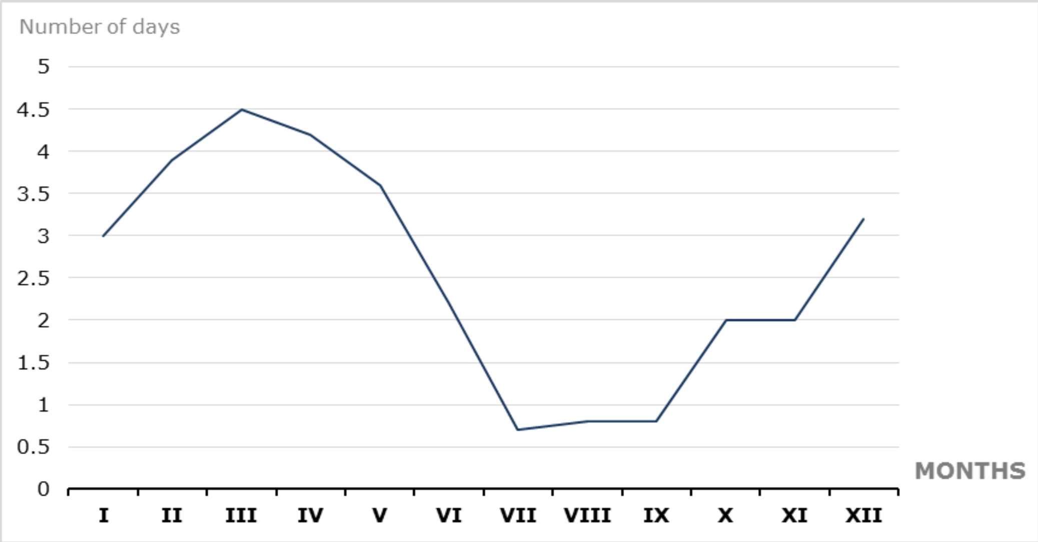

Figure 7.3.7: Annual course of the average number of days with wind speeds above 15 m/s

7.3.6 *Atmospheric pressure*

Average monthly and annual values of atmospheric pressure in the vicinity of the Jizzakh station are given in Table 7.3.9. Atmospheric pressure in average per year is equal to 975.5 mb, maximum is noted in December (983.5 mb), minimum – in summer (965.2 mb).

Table 7.3.9: Average monthly and average annual values of atmospheric pressure, mb[60]

Atmospheric pressure	Month												Year
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
Average	981.7	980.7	976.9	975.3	971.9	967.3	965.2	967.6	973.1	979.5	982.0	983.5	975.5

7.3.7 *Weather events*

7.3.7.1 Dust storms

Almost every year, from March to October, dust storms are recorded at the Jizzakh WS (Table 7.3.10). The average number of days with dust storms is 8, but there is a trend towards a decrease in annual dust storms compared to the past. However, they occur much less frequently in irrigated areas like the Project Site surroundings.

Table 7.3.10: Number of days with dust storms[61]

Month								Year
III	IV	V	VI	VII	VIII	IX	X	
0.5	1	1.3	1.3	1	0.8	0.9	1	8

[59] Data archive at weather station Jizzakh for the period 2005 – 2019 // "Raspisanie pogody" JSC https://rp5.ru/Архив_погоды_в_Джизаке
[60] Data archive at weather station Jizzakh for the period 2005 – 2019 // "Raspisanie pogody" JSC https://rp5.ru/Архив_погоды_в_Джизаке
[61] Alibekov L.A., Nishanov S.A. Natural conditions and resources of Jizzakh region. – Tashkent: "Uzbekistan", 1978. – 254 p.

7.3.7.2 Fogs

Fogs are observed in the cold season (November - April) when cyclonic processes predominate. The lack of fog in the rest of the year is due to dry air and high soil surface temperatures. The whole year 30 days with fog are observed (Table 7.3.11). The maximum number of days with fog per year is 56. More than 50% of the fogs in summer are formed in the afternoon or in the evening hours. The average duration of fog has a maximum value in December.

Table 7.3.11: Number of days with fog[62]

Month												Year
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
8	6	4	2	-	-	-	-	-	-	3	9	30

7.3.7.3 Thunderstorms

Thunderstorms are relatively common in the considered area. The annual number of days with thunderstorm is 22.5. Thunderstorms can occur in any month of the year but are most common from April to June. The maximum number of days with thunderstorm is observed in May and is 7.54 (Table 7.3.12).

Table 7.3.12: Average number of days with thunderstorm[63]

Month												Year
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
0.18	0.32	1.96	4.54	7.54	4.75	0.89	0.93	0.25	0.57	0.43	0.14	22.5

7.3.7.4 Sukhoveys (hot dry winds)

Sukhovey (hot dry wind) is a wind with high temperature and low relative humidity (less than 30%) occurring in the steppes, the semi-deserts and the deserts. The speed of sukhovey is usually moderate 8 to 20 m/s. The temperature of sukhovey is not lower than 25°C, sometimes increases to 40°C and higher. Sukhoveys are observed from May to September. The average annual number of days with sukhoveys is 16, and a half of them are in July[64].

7.3.7.5 Mudflows

There are potentially exposed to mudflow areas in the Jizzakh region[65], but the Project Site is not located within those areas. Mudflows occur in areas located southwest of the Project Site and are confined to mountainous Gallaoral and Bahmal districts.

7.3.8 Construction and climatic characteristics of the Project Site

According to the construction-climatic zoning of the CIS countries territories[66], the Project Site relates to climate district IV, subdistrict IV Г. The criteria for classification to the specified subdistrict are the average January temperatures range from -15 to 0°C and in July range from +25 to +28°C, with an average wind speed during the three winter months more than 5 m/s.

Data on climatic characteristics of conditions of dispersion of pollutants in the atmosphere in the Project Site are shown in Table 7.3.13.

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[62] Alibekov L.A., Nishanov S.A. Natural conditions and resources of Jizzakh region. – Tashkent: “Uzbekistan”, 1978. – 254 p.
[63] Data archive at weather station Jizzakh for the period 2005 – 2019 // “Raspisanie pogody” JSC https://rp5.ru/Архив_погоды_в_Джизаке
[64] Alibekov L.A., Nishanov S.A. Natural conditions and resources of Jizzakh region. – Tashkent: “Uzbekistan”, 1978. – 254 p.
[65] Environmental Atlas of Uzbekistan. – Tashkent:”Kartografiya” - 66 p.
[66] SNiP 23-01-99. Building climatology

Table 7.3.13: Climatic characteristics of the Project Site

Name	Value
Coefficient, depending on the stratification of the atmosphere, A[67]	200
Average maximum temperature (°C) of the hottest month (July)	34.9
Average minimum temperature (°C) of the coldest month (January)	-1.8
Recurrence of wind directions and calms during year, %	
North	11.5
Northeast	11
East	8.3
Southeast	7
South	6.6
Southwest	7.5
West	8.6
Northwest	9.9
Calm	29.4
Wind speed, where recurrence exceeds 5%, m/s	14.8

7.3.9 Air quality

Uzbekistan has an air quality monitoring network in major industrial cities. None of 25 stations of this network is located in the Jizzakh region, and the nearest one in Samarkand is more than 90 km away from the Project Site. The data provided by Samarkand monitoring station are marginal and none of the standard parameters such as PM_{10}, $PM_{2.5}$, CO or volatile organic compounds (VOC) were monitored. The Project Site is located within agricultural lands, therefore data of urban areas do not reflect their air quality objectively.

The main sources of air pollutants in Project Site surroundings are agriculture (grazing and irrigated crop growing), Jizzakh Cement Plant (8 km northwest, see Figure 7.3.8), railway and motor transport. The most significant of the listed sources is Jizzakh Cement Plant which was launched in 2014. The capacity of the plant makes up 350,000 tons of white cement and 760,000 tons of Portland cement a year.

Relevant to cement manufacturing indicative list of the main air-polluting substances[1] includes the oxides of nitrogen (NOx) and other nitrogen compounds, sulphur dioxide (SO_2) and other sulphur compounds, dust, total organic compounds (TOC) including volatile organic compounds (VOC), polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD and PCDF), metals and their compounds, hydrogen fluoride (HF), hydrogen chloride (HCl), carbon monoxide (CO), carbon dioxide (CO_2).

Following the Company's request, the samples of atmospheric air have been taken by Environmental Monitoring Service of the Uzbekistan Hydrometeorological Agency (UzHydroMet) on October 18th and 19th, 2019 in 5 locations of the Project area to measure the levels of three pollutants – nitrogen dioxide, sulfur dioxide and the sum of particulates (Table 7.3.14).

[67] OND 86. Method for Calculating Atmospheric Concentration of Hazardous Substances Contained in Industrial Emissions

[1] Best Available Techniques (BAT). Reference Document for the Production of Cement, Lime and Magnesium Oxide Industrial Emissions Directive 2010/75/EU Integrated Pollution Prevention and control. – 2013.

Table 7.3.14: Current level of air pollution as measured on October 2019 at the reference points of the Project area*

Reference points (Communities)	Sampling time	Pollutants		
		NO_2, mg/m^3	SO_2, mg/m^3	Particulates, mg/m^3
RP-1 (Balykly)	20 min averaged concentrations			
	14h00min	0.02	0.005	0.06
	9h15min	0.01	0.006	
	11h10min	0.01	0.005	
	24 h averaged concentrations			
	Mean	0.01	0.005	0.06
RP-2 (Karatepa / Uskanchaly)	20 min averaged concentrations			
	13h00min	0.01	0.004	0.01
	8h10min	<0.01	0.002	
	12h00min	0.01	0.005	
	24 h averaged concentrations			
	Mean	0.01	0.004	0.01
RP-3 (Pistalikent / Timiryazev)	20 min averaged concentrations			
	17h30min	0.02	0.010	0.44
	19h20min	0.02	0.012	
	14h30min	0.02	0.004	
	24 h averaged concentrations			
	Mean	0.02	0.009	0.44
RP-4 (Nuravshon / Khulkar)	20 min averaged concentrations			
	16h50min	0.02	0.003	0.50
	18h30min	0.03	0.006	
	13h20min	0.02	0.005	
	24 h averaged concentrations			
	Mean	0.02	0.005	0.50
RP-5 (ZafarAgro Keladjak Farm)	20 min averaged concentrations			
	15h00min	0.02	0.004	0.08
	16h00min	0.02	0.006	
	10h15min	0.02	0.004	
	24 h averaged concentrations			
	Mean	0.02	0.005	0.08

**Data source: Laboratory testing certificate No. 21 dd. October 22nd, 2019 issued by Environmental Monitoring Service of the Uzbekistan Hydrometeorological Agency (UzHydroMet). Location of the reference points is shown in Section 9.1*

Despite the results of this single measurement cannot be interpreted as monitoring data, all the reference points gave almost the same and environmentally safe concentrations of NO_2 (0.01-0.03 mg/m3) and SO_2 (0.002-0.012 mg/m^3), with levels of particulates being more variable and likely reflecting the local conditions. In particular, the air in two villages, Pistalikant and Nuravshon, was found containing 0.4 to 0.5 mg of dust per 1 m^3 which is 2.9 to 3.3 times higher than the maximum allowable value for such pollutants. The lab certificate contains no data on weather conditions or visual observations during the sampling, but taken into account the dates when the samples were taken, Consultant would expect even higher levels of air particulates in spring and summer time when dusting is more intensive and the presence of biogenic aerosols also reaches its maximum.

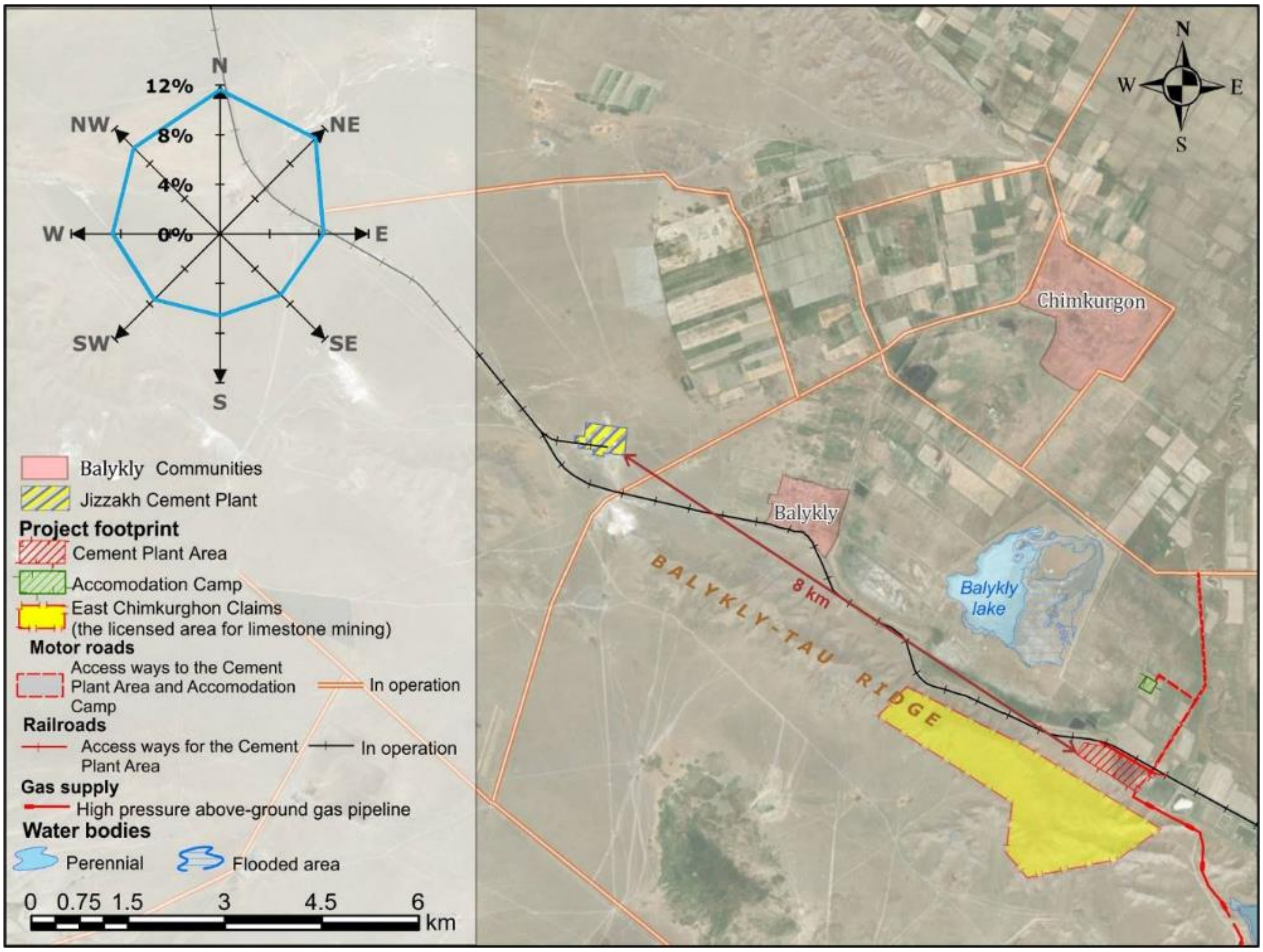


Figure 7.3.8: Location of Jizzakh Cement Plant to the Project Site

7.4 Harmful Physical Impacts

There are no permanent sources of noise in the Project zone of influence. Periodic noise exposure is associated with the operations of road and railroad transport, the intensity of which is low due to insignificant traffic.

The nearest source of noise outside the Project zone of influence is the Jizzakh cement plant, part of the Almalyk MMC holding, located 8 km to the west of the Project construction site. Limestone mining for the Jizzakh cement plant is carried out using drilling and blasting operations, so the noise from the explosions is likely to spread over a significant area. However, due to the significant distance from the Project construction site, the noise levels from explosions in the Project area will not exceed standard values, given that explosions are carried out only in the daytime and no more than two to three times a week.

There are no permanent sources of electromagnetic fields in the project area.

There are no data on the radiation background in the Project are, due to the fact that gamma-radiation and radon surveys were not carried out.

7.5 Geology

7.5.1 Terrain and Bedrock Geology

The Project Area is situated at the western periphery of Tashkent-Golodnosteppe (Mirzachul) Lowland drained by the Kly (olso named Qili or Sanzar) river and edged by a series of mountain ridges (Figure 7.5.1).

Figure 7.5.1: Main topography elements of the Project Area: 1 – Balykly-Tau Ridge; 2 – Mirzachul Lowland; and 3 – Kly (Qili) River valley (Ramboll photos)

The East Chimkurgon area of the licensed limestone mining covers a 400 ha part of the eastern section of the Balykly-Tau Ridge with smaller pieces of adjacent lowland (Figure 7.5.2). The ridge is a part of the larger mountain system called Nuratin Mountains.

The highest top of the ridge within the claims is 532 masl, with the adjacent lowland's surface ranging between 280 and 325 masl. The surface of the ridge is clearly divided into peaked summit, steep backslopes with exposed bedrock and, finally, more gentle footslopes formed by a mixture of colluvial and deluvial deposits (Figure 7.5.1, frame 1).

The River of Kly has V-shaped valley (Figure 7.5.1, frame 3) without a set of terraces and floodplains developed. It drains the surrounding lowland irrigated by a network of artificial canals (Figure 7.5.1, frame 2).

The regional geology is composed of Devonian, Mississippian and Quarternary units (Figure 7.5.3). Carbonate deposits form Balykly-Tau calciferous ridge elongated from the south-east to the north-west. Lower Devonian units are Lower Asmansayan sub-suite 30m thick; Middle Devonian units are Egerbelitauian sub-suite up to 350 m thick. Chemical composition of the limestone deposits to be used for the Project needs will be analysed later during the detailed mine exploration phase. It is known cuttently that the main macro-component ratio for this material is CaO/MgO = 54.88/0.47 %, with no data on trace admixtures.

Quarternary units in the region are well-developed; they are Tashkent and Mirzachul-Steppe unit which can be of interest as a raw material for cement production. Tashkent unit is composed of loess-like formations up to 70 m thick; Mirzachul-Steppe is sand clays, sands and rubble with various composition and up to 10 m thick.

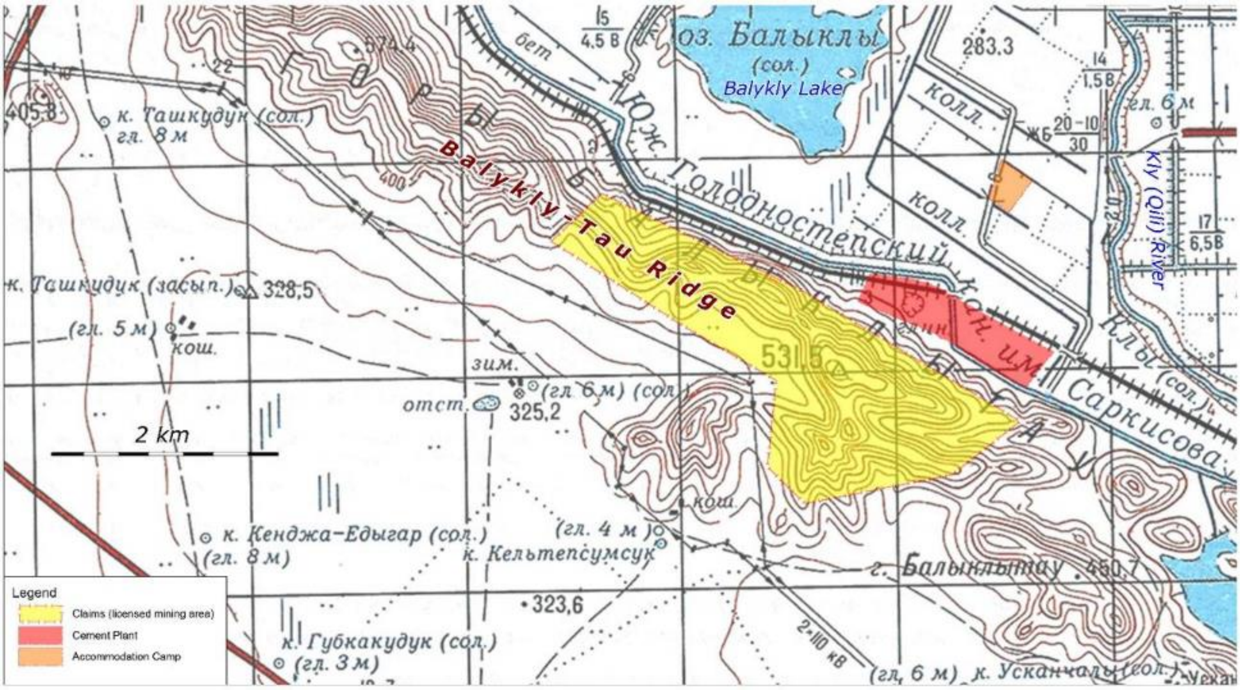


Figure 7.5.2: General topography of the Project Area

7.5.2 Surface Geology and Groundwater of the Project Site

Pre-project geological survey («O'ZGASHKLITI» DUK, 2018) included drilling boreholes to a depth of 30 m within the cement plant site located at a gently sloping area north of the Balykly-Tau Ridge (Figure 7.5.2).

It has been revealed that loess-like silty and sandy loams rich in gypsum and carbonaceous concretions form the upper horizon of the studied 30 m thick interval (Figure 7.5.4). Sandy lenses occur throughout this horizon proving its proluvial-deluvial origin. This material has been found subject to subsidence, suffosion and fissuring. Its overall thickness changes from 0.5-1 m to 5-6 meters depending on location (horizons no. 1 and 2, Figure 7.5.4, 7.5.5).

Depth to the gray-colored fissured limestone was measured as being the minimum (8 m) along the southern boundary of the Plant site, i.e. at the Balykly-Tau Ridge's footslope (Figure 7.5.4, horizon no. 5). The sedimentary rock has been found covered by 6-10 m thick weathering crust consisting of limestone debris with inclusions of loam and clay originated from weathering and internal abrasion of the limestone gravel (horizon no. 4). At the northern periphery of the site where the bedrock lies deeper than 30-35 m, the limestone debris layer has been found at 27 m (Figure 7.5.5).

A series of fine-grain and coarse water-saturated sands (horizon no. 3, Figure 7.5.5) has been found only in the northern part of the site between the loess-like loams (no. 1 and 2) and the limestone weathering crust (horizon no. 4).

Shallow groundwater table was found present at wide ranges of depths (from 2.6 to 13.8 m below surface) due to inhomogeneity of soils and nonuniform distribution of irrigation water throughout the area. According to laboratory analyses of groundwater samples, the water is aggressive to most of conventional construction materials due to increased salinity and some other properties.

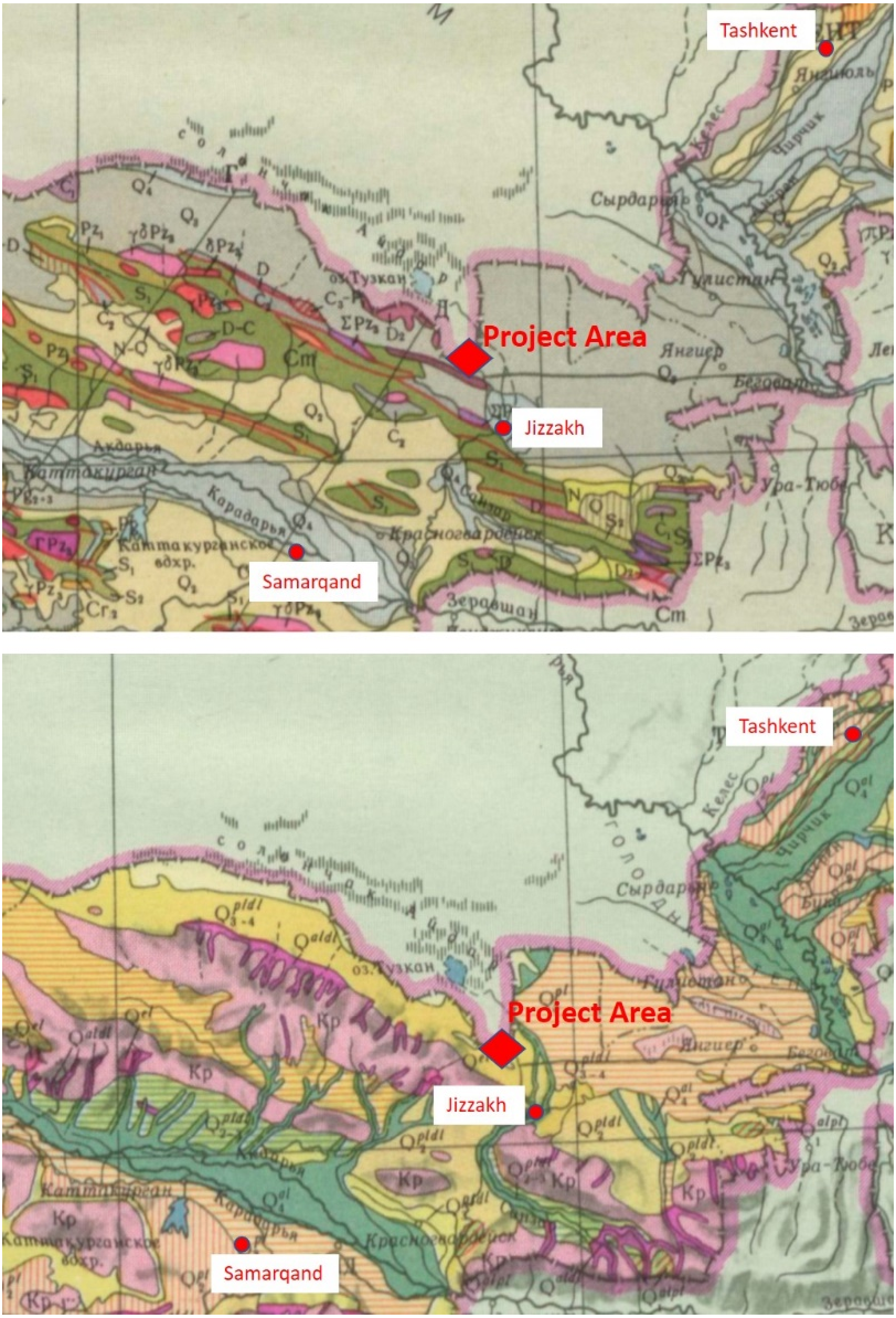


Figure 7.5.3: Project Area on Uzbekistan geological overview map (all the strata indexes are internationally recognised)

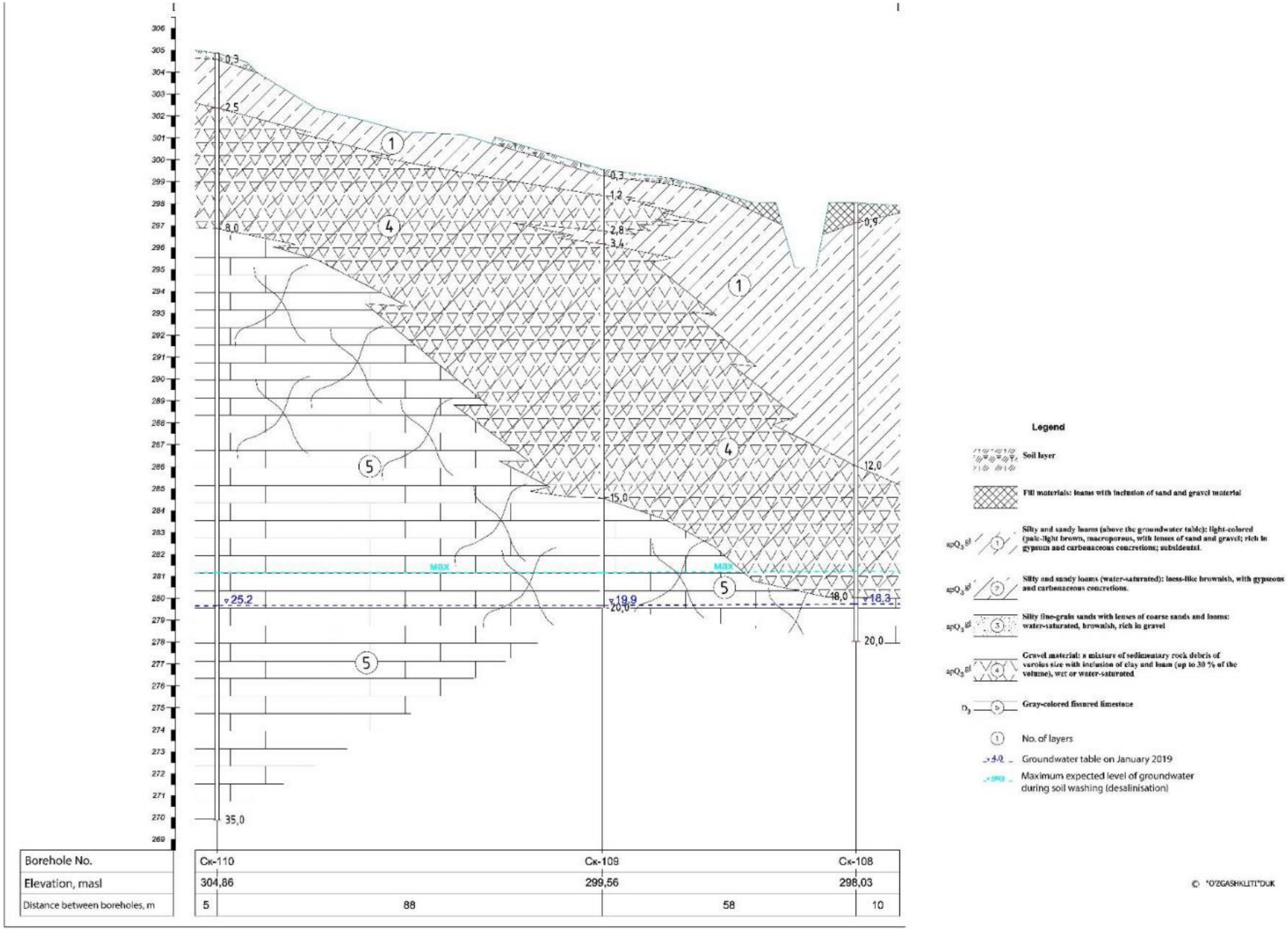
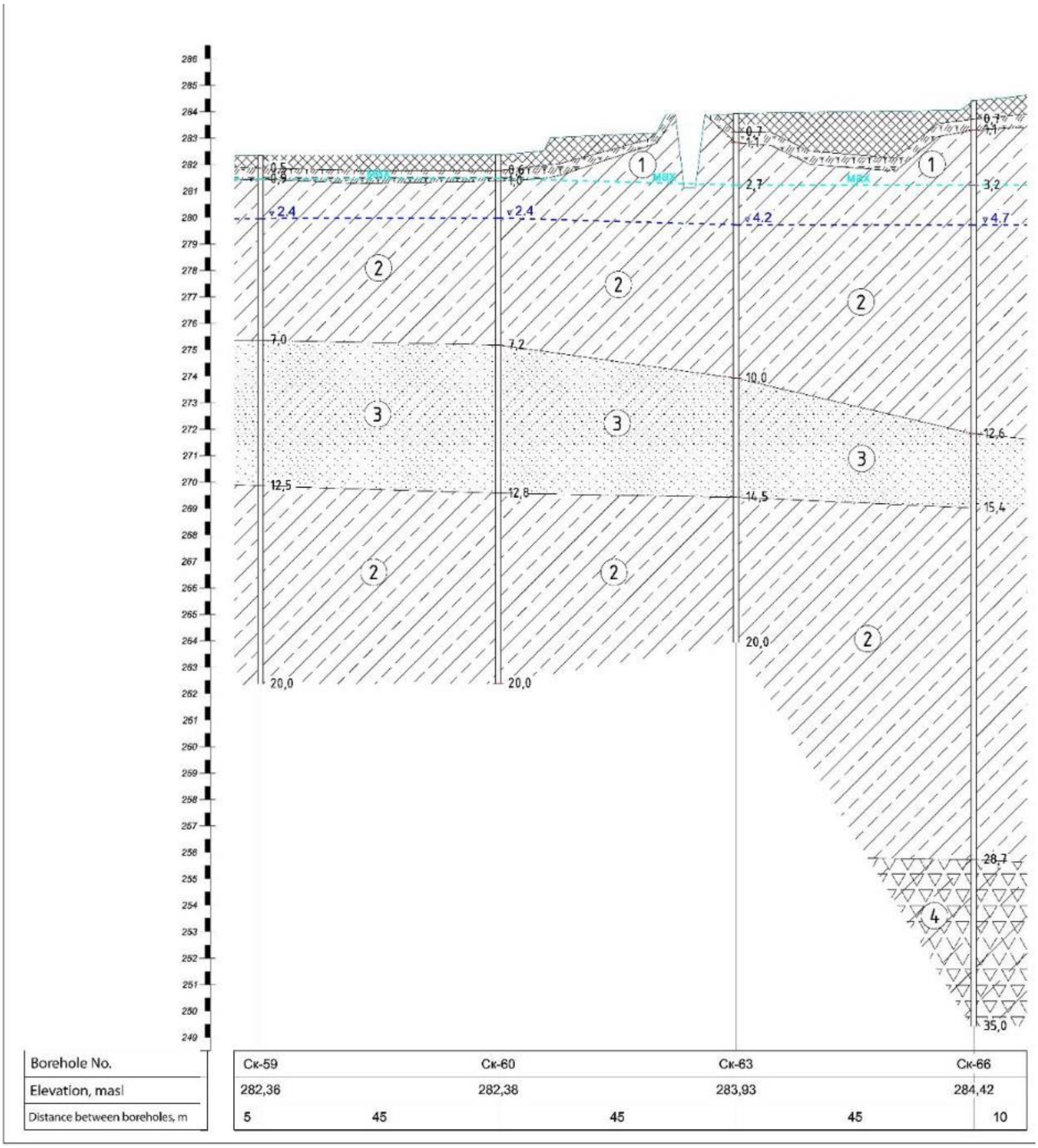


Figure 7.5.4: Geological cross-section of the Plant Site: the sloping area adjacent to Balykly-Tau Ridge

Figure 7.5.5: Geological cross-section of the Plant Site: the semi-flat area of the irrigated lowland



7.5.3 Aquifers

Most of the residential areas closest to the Project Site are supplied with groundwater of Dustlik Aquifer the southern boundary of which goes along the A.A. Sarkisov Main Water Supply Canal. The aquifer's reservoir horizons demonstrate the overall thickness of 20 to 60 m, lie within quaternary deposits and are therefore affected by infiltration of irrigation water and canal water losses. The lower (within Q1 deposits) saturated horizon of the aquifer is less prone to contamination and contains relatively low mineralised (0.7-1.5 g/l) water, with the upper layers tending to increase their salinity to as much as 5 g/l[68].

The Company plans to extract some amount of water from this aquifer for technical purposes by drilling 2 boreholes near the Plant site. No more details of this activity have been available for Consultant. The

[68] Tirkasheva M.B. et al. Structural and Geological Analysis of Groundwater Regime for Aquifers of Nuratin-Turkestan Region // Innovations in Agriculture. Proceedings of the International Research Conf. Moscow: 2015. P. 57-66. Available at https://moluch.ru/conf/agr/archive/127/7650/

overall water consumption of the Plant will be equal to 1056 m^3 a day as a maximum, so the capacity of water intake facility must be corresponding to this value.

The water taken from both groundwater intake wells generally meets Uzbek national sanitary and health-care requirements applicable to water supply systems (as summarised by the SanPin RUz 0211-06). Some minor non-compliances (e.g., for taste index, hardness, sulfate and chloride level, and TDS – see Table 7.5.1) have been revealed for the sample No. 2 only, so it is likely that the samples characterize two different aquifers or saturated horizons of the subsoil, or, alternatively, the tested aquifer is heterogeneous and demonstrates so significant variability in water chemistry (data on groundwater wells, their depths, location and subsoil conditions are not available for Ramboll). Since the Company plans to use this water for process needs rather than as potable one, the values of the Table 7.5.1 must be taken into account when planning water pre-treatment procedures like removal of excessive salts, decreasing of water hardness, etc. It's also clear from this Table that monitoring of groundwater quality is reasonable for this water intake facility to be able to reveal and respond to any trends, both current and future.

Table 7.5.1: Groundwater quality parameters as measured in samples of water taken from the Wells no. 1 and 2 (according to a laboratory certificate provided by the Company)

Components	Units	Legal requirements		Measurements	
		Required Levels	Standards (as cited by the lab certificate dd. August 5th 2019)	Well No. 1	Well No. 2
Odor index	Grade point	2 at max.	GOST 3354-74	0	0
Taste index				0	3
Color index	Degree	20 (25***) at max.		0	0
Turbidity	mg/L	1.5 (2.0**) at max.		0	0
pH	pH units	6÷9	Not specified	7.0	7.2
NH_4^+ as N	mg/L	0	GOST 18226-73	Not detected	Not detected
NO_2^-	mg/L	3 at max.		<0.001	0.075
Hardness	mg-eq./L	7 (10*) at max.	GOST 4154-72	8.5	45.0
Biochemical oxygen demand	mg O_2/L	2.0 (2.5*) at max.	Not specified	1.12	2.40
SO_4^{2-}	mg/L	400 (500*) at max.	GOST 18226-73	180	580
Cl^-	mg/L	250 (350*) at max.		45	400
TDS	mg/L	1000 (1500*) at max.		900	2700
Alkalinity	mg/L	Not specified		4.5	7.5
Fe	mg/L	0.3 (1.0*) at max.		<0.1	0.1
Cu	mg/L	1 at max.		<0.1	<0.1

*Values for water supply systems which are not equipped with water treatment facilities
**For the water supply systems equipped with water sterilizing unit
***For the water supply systems where the water is treated with Al-containing reagents

7.5.4 *Geological and geomorphic hazards*

The surveyor («O'ZGASHKLITI» DUK, 2018) recommends to remove all the fill materials that present onsite and indicates the following geomorphic processes that must be considered as hazardous when designing the Cement Plant:

- Subsidence of the loess-like loams;
- Groundwater and soil aggressivity to construction materials; and
- Suffusion.

Consultant would also make the following additions to this list:

- water and wind erosion the activity of which will be increasing especially within construction and quarrying sites and require a set of specific control measures;

- rockfalls and sloughing – for the quarrying areas only;
- waterlogging – for the Plant and Accommodation Camp areas;
- karst processes accelerated by irrigation.

It's very important to note that groundwater of the Project Area are not protected from contamination by water-tight strata.

As for the seismic conditions, the Project Area is characterized by seismicity level of 7 units, with average repeatability of earthquakes having this magnitude being assessed as once for the period of 200 years («O'ZGASHKLITI» DUK, 2018).

7.6 Soils

Soil-related investigations in Uzbekistan were started in the first half of the 20th Century in full accordance with the standards and demands accepted in the former USSR. In terms of soil classifications and maps issued in Soviet Union, the Project area belongs to a periphery of so called serozem belt - a strip of serozems[69] (also titled by FAO as Calcic Xerosols) along the piedmont of the Pamiro-Alay mountains (Figure 7.6.1).

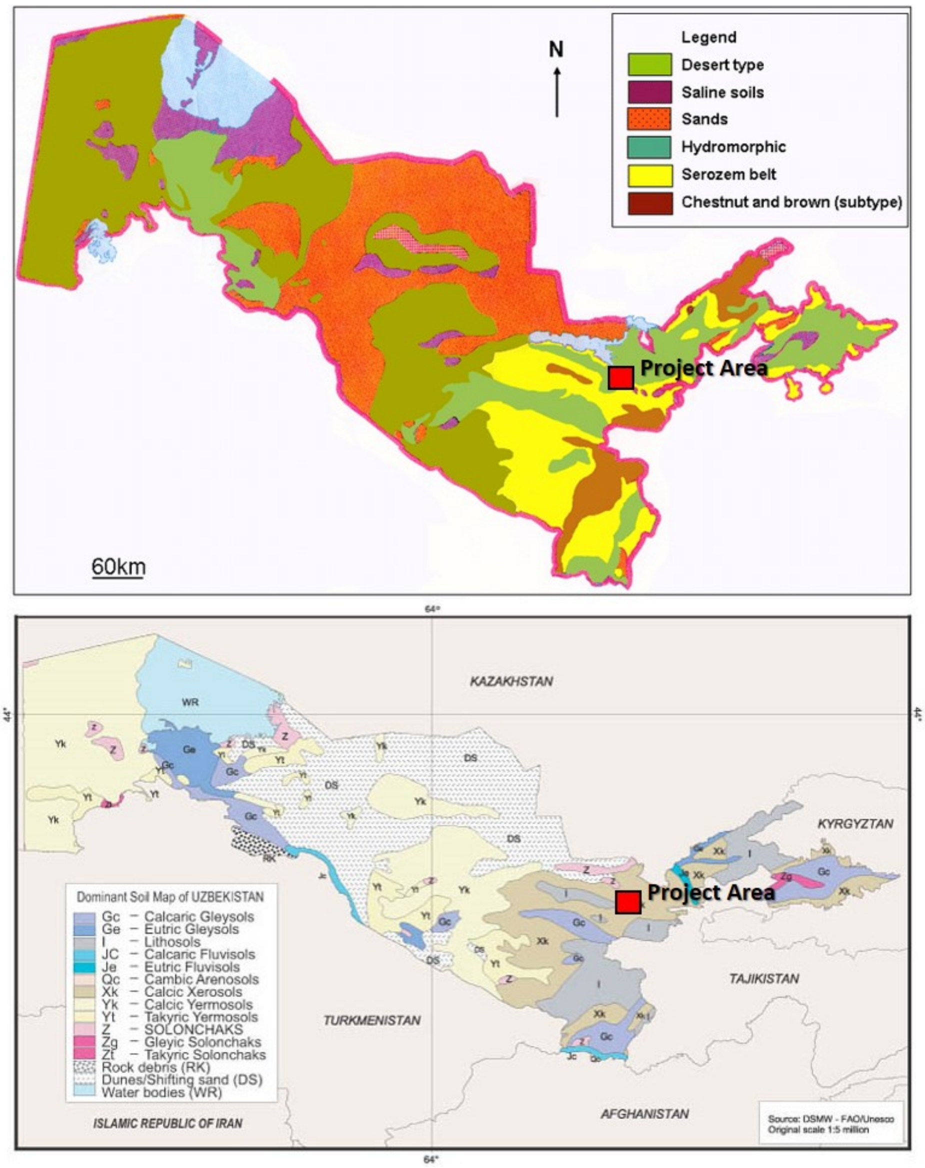


Figure 7.6.1: Project Site on general soil maps of Uzbekistan[70]

[69] Rozanov A.N. Serozems of the Middle Asia. - Moscow: Academy of Sciences of the USSR, Soil Institute im. V.V. Dokuchaev, 1961. 541 p.
[70] Fertilizer use by crop in Uzbekistan. First version. Rome: FAO, 2003.

Having been shown in larger scale (Figure 7.6.2), this area falls into a sequence of mountain, piedmont and lowland soils, with serozems keeping present mostly at the foolslopes and toeslopes of the ridges.

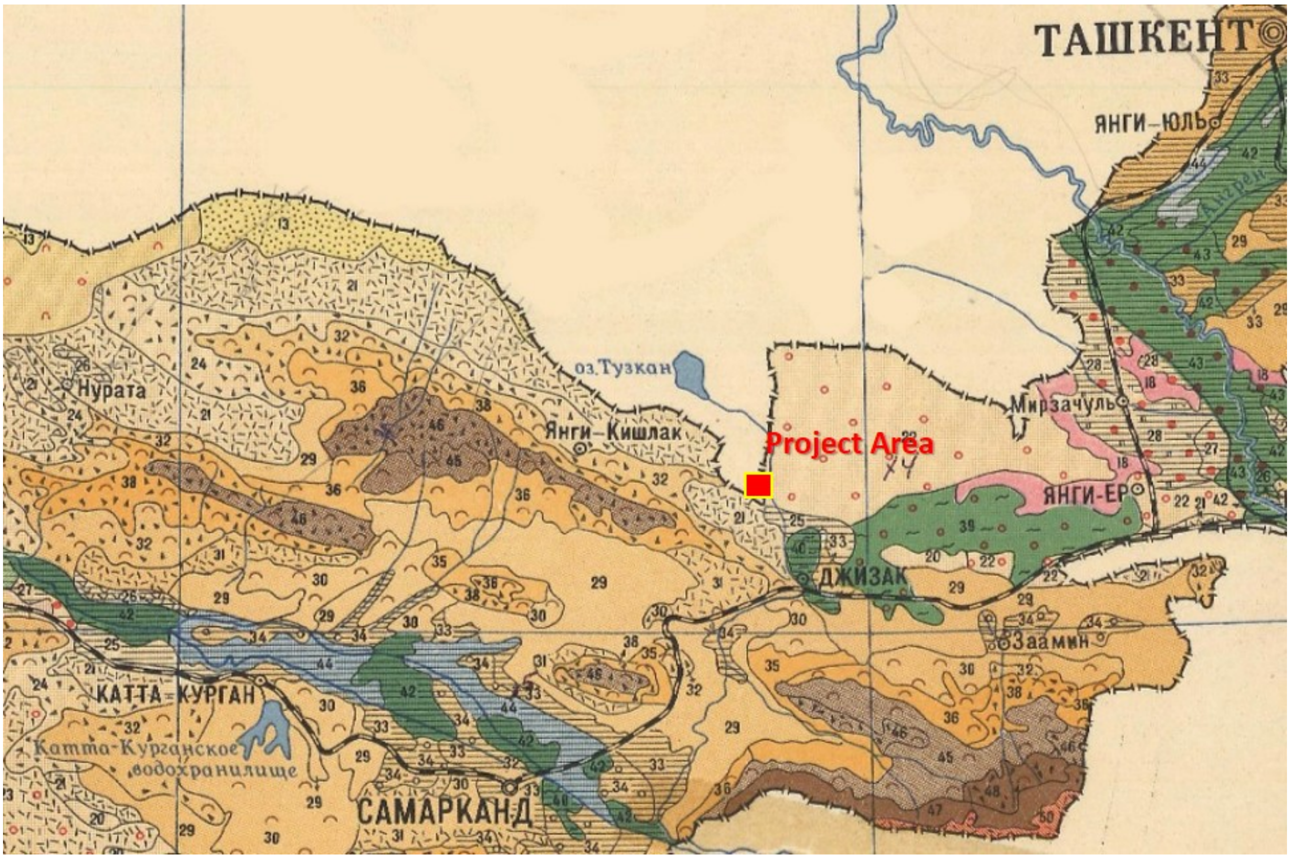


Figure 7.6.2: Project Site on the medium-scale soil map of Uzbekistan[71]

As for the Project area, it is located in the borderland between the contours No. (Figure 7.6.2):

- 32 - Eroded variants of typical loamy-gravel serozems formed on weathered calcareous material, colluvial material and proluvial stratified gravel loams, associated with exposed bedrock and shallow gravel soils;
- 21 - Light-colored loamy-gravel serozems formed on proluvial stratified gravel loams rich in rock fragments;
- 22 - Light-colored slightly saline loamy serozems formed on loess-like deposits;
- 25 - Irrigated light-colored loamy and clayey serozems formed on proluvial stratified gravel loams and loess-like loams;
- 40 - Irrigated meadow (saz or sasa) serozem-like loamy and clayey soils formed on proluvial stratified deposits underlain by gravel material.

Historically, most part of this area (with the only exclusion of steeply graded mountain slopes and peaked summits) was used for sporadic grazing. In the 19th century, under the Russian Empire's protectorate, the area took the 150 years long path of irrigated farming. Supporting irrigation and associated agricultural expansion was one of the most important issues soil scientists addressed in both historical and man-made oases of the Jizzakh Region. From 1950-s onwards, the Project's area of influence

Rakhmatullaev Sh., et. al. Sustainable Irrigated Agricultural Production of Counties in Economic Transition (a case study of Uzbekistan). - In: Agricultural Production. Editor: Felix C. Wager. Nova Science Publishers, Inc., 2010.

[71] Genusov A.Z., Gorbunov B.V., Kimberg N.V. Soil Map of Uzbekistan. Scale 1:1,500,000. - Tashkent, 1960.
Note: the boundary of Uzbekistan shown on this map is not the same as at present (Figure X.1), since the northern part of Jizzakh Region belonged to the adjacent Republic of Kazakhstan before 1956

became a part of the larger-scale irrigation zone where native soils have been deeply transformed to meet agricultural requirements.

The long term irrigation essentially changed soil formation processes. More specifically, sufficient moistening along with systematic soil tillage and fertilizers application facilitated soil biological and physical-chemical activity, increased intensity of soil processes, stimulated removal of water soluble salts and accumulation of organic carbon, and finally created relatively thicker humus horizons (as compared to non-irrigated variants). Therefore, according to many reviews[72], soils of the areas that were irrigated and cultivated for a long time must be considered in general as "gold reserves" of the Central Asia.

Period of intensive irrigation development in this area was completed by 1990 due to basins water reservoir exhaustion and a number of ecological aggravations (especially in the downstream Aral Sea area). In after years the wide scale development of irrigated lands was stopped, and this triggered or speeded up a set of secondary degradation processes. Many adverse changes of soils became apparent as originating from irrigation itself or its phasing-out in 1990s and secondary effects.

The resulting degradation of soils is becoming a combination of the following processes that are the most wide-spreading in historical oases of the Jizzakh Region[73]:

- salinization and water logging;
- water and wind erosion;
- overgrazing;
- loss of organic matter and soil fertility;
- loss of biodiversity.

Below is a brief description of the first three processes as the most important ones to be addressed.

The main proximate causes of salinization (or secondary re-salting) are excessive irrigation through poorly constructed and maintained irrigation systems. Drainage systems add to the problem as they fail to drain off the excess water and salts, due to their inappropriate construction and maintenance. In many areas including the Project one, drainage water is fed back into the rivers, increasing the salt levels in downstream water.

Soil erosion due to poor agricultural practices are estimated to be occurring in about 800,000 ha of irrigated croplands of Uzbekistan, with mean annual soil losses of up to 80 tons per ha of fertile topsoil. More than 50 per cent of farmlands in Uzbekistan are estimated to be affected, to different degrees, by wind erosion. About 19 per cent of the irrigated area of Uzbekistan proved to be affected by water erosion. Strong wind activity, ploughing of sloping lands, inappropriate irrigation and livestock grazing practices have resulted in a vast erosion of soils. Leaving open soil between rows of cotton or wheat and involving intensive tillage result in soil exposure to significant erosion. Furrow irrigation may also result in soil erosion in areas with inadequate land leveling. Conditions of the Project area are favorable for both water and wind erosion of soils the showings of which have been observed by Consultant during the site visit.

Overgrazing is noted as one of the major causes of rangeland degradation in Jizzakh Region of Uzbekistan. During the past decades, there has been an extensive reducing of pasture lands due to unsustainable use of pastures for livestock grazing, lack of maintenance of pastures and other human activities. The Project area has been found widely used for grazing the practices of which looks unregulated rather than systematic.

[72] Mirzabayev A. et al. Economics of Land Degradation in Central Asia. In: Nkonya E., Mirzabaev A., von Braun J. (eds) Economics of Land Degradation and Improvement – A Global Assessment for Sustainable Development. Springer, 2016.
Land Degradation and Desertification in Central Asia: Central Asian Countries Initiative for Land Management. - A final report for the Swiss GEF Council Member. CALCIM, 2010. Available at https://zoinet.org/wp-content/uploads/2018/02/CACILM.pdf

[73] Khasankhanova G. (UZGIP Institute, Uzbekistan). Decision Support for Mainstreaming and Scaling Out Sustainable Land Management (DS-SLM). - The World Overview of Conservation Approaches and Technologies (WOCAT). Available at: https://www.wocat.net/en/projects-and-countries/projects/ds-slm/countries/uzbekistan

Since acquisition of soils is one of the most important impacts of the Project, Consultant has prepared a large-scale soil scheme based on the aerial pictures provided by the Company (Figure 7.6.5). All the soils shown are classified in accordance with WRB-2014 as the 'mainstream' and internationally recognized soil hierarchy, with nomenclative bridges having been made to historical and local soil names (Table 7.6.1). Image interpretation has been made on the basis of available scientific publications, extrapolation of general soil maps along with Consultant's observations during the site visit. Most of the boundaries are associated with clearly identified objects like water bodies, facilities, sharp edges of slopes, vegetation cover etc.

As it follows from the soil scheme, most part of the claims area is occupied by a sequence of Calcaric Leptosols (LP-1) and Leptic Skeletic Calcisols (CL-2, CL-3; this soil name generally corresponds to serozems of the Soviet classification and Calcic Xerozems of the previous FAO classification) associated with exposed bedrock, colluvuim and proluvium (Figure 7.6.3).

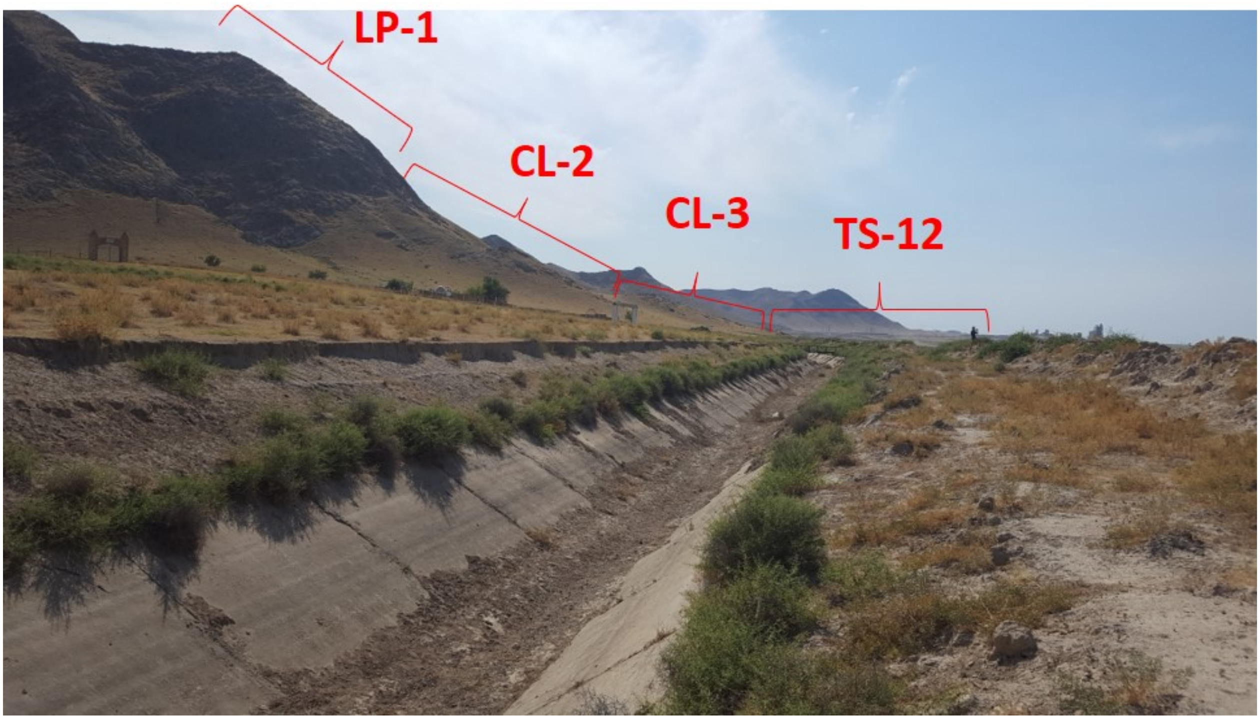


Figure 7.6.1: A sequence of the soils associated with backslopes and footslopes of the Balykly-Tau ridge within the Project Area

The picture was taken by Ramboll during the site visit on July 08th, 2019. Soil indexes are the same as in Table 7.6.1

More specifically, the Leptosols (LP-1) comprise very thin soils over continuous rock and soils that are extremely rich in coarse fragments. Parent material of this soil type is normally represented by continuous rock or unconsolidated materials with less than 20 percent (by volume) fine earth under strongly dissected topography. Leptosols have continuous rock at or very close to the surface or are extremely gravelly. Leptosols in weathered calcareous material may have a mollic horizon, but Consultant has no any data on Leptosol variants of the licensed area. The only way to use Leptosols is grazing that is limited by slope conditions and vegetation cover. Colluvial processes and erosion are the greatest threats to Leptosols of the Project site.

The group 'Calcisols' accommodate soils with substantial accumulation of secondary carbonates. Along with Leptosols, Calcisols are widespread in arid environments of Uzbekistan and generally associated with piedmont areas thanks to their additional moistening and specific loess-like conditions of the parent materials. Typical (Haplic) Calcisols have a pale brown surface horizon; substantial accumulation of secondary carbonates occurs within 100 cm of the soil surface (Figure 7.6.4); but the variants within the claims area of a limestone deposits are likely the ones transitory to the above described Leptosols and rich in coarse material (skeletic).

Figure 7.6.2: Profile of a typical (Haplic) Calcisols of the Project Area

The picture was taken by Ramboll at an excavation of the Accommodation Camp site

Many Calcisols occur together with Solonchaks that are actually salt-affected Calcisols. Within the Project site, only the footslope variants of Calcisols can be salt-affected and therefore marked in Table 7.6.1 as endosalic (CL-3). Spontaneous grazing and local development are the most typical forms of using skeletic (CL-2, CL-3) variants of these soils in the Project area, while Calcisols of the lowland adjacent to the limestone ridges were historically incorporated into agricultural and irrigation expansion and can be currently divided into a sequence of derivatives:

- Irragric Anthrosols (Calcaric, Gleyic) dominate within the area as irrigated and cultivated light-colored loamy and clayey serozems formed on proluvial stratified gravel loams and loess-like loams (AT-7);
- Irragric Anthrosols (Gleyic, Salic) are associated with the AT-7 soil variant and can be described as irrigated meadow (locally named 'saz' or 'sasa') serozem-like loamy and clayey soils formed in depressions on proluvial stratified deposits underlain by gravel material (AT-8);
- Non-cultivated (or historically cultivated) analogues of the AT-8 variant that also occupy isolated depressions (CL-6).

The Calcisols' variety shown on the Figure 7.6.4 was irrigated and cultivated for a long period of time (at least for 50 years), and therefore its profile demonstrates relatively thick and dark-colored humus layer with abrupt transition to the underlaying light-colored calcic horizon.

Other soil types of the Project area include Solonchaks (salt-affected soils), Gleysols (soils affected by groundwater), Fluvisols (soils of the Qili/Kly river valley), and Technosols (soils of fills, excavations, other disturbed locations) - see Table 7.6.1 and Figure 7.6.5 for more detail.

Table 7.6.1: Taxonomy of Soils within the Project Area

Contour ID	Soils according to the WRB-2014*			Alternative soil names**	Connotation
	Dominant	Associated	Inclusions		
LP-1	Hyperskeletic Calcaric Leptosols	Hyperskeletic Calcisols Skeletic Calcisols Exposed bedrock and associated shallow soils	Leptic Calcisols	Eroded variants of typical loamy-gravel serozems formed on weathered calcareous material, colluvial material and proluvial stratified gravel loams with locations of exposed bedrock and associated shallow gravel soils	Non-cultivated soils of the ridges' summits and backslopes
CL-2	Skeletic Leptic Calcisols	Skeletic Leptic Calcisols	Hyperskeletic Calcisols Exposed bedrock and associated shallow soils		Non-cultivated soils of the ridges' footslopes
CL-3	Skeletic Calcisols	Haplic Calcisols (Endosalic, Siltic)	Skeletic Calcisols (Transportic)	Light-colored loamy-gravel serozems formed on proluvial stratified gravel loams rich in rock fragments	Non-cultivated soils of the flat and gently sloping areas that immediately surround the ridges. Affected by spontaneous grazing and local development
CL-4	Haplic Calcisols (Endosalic)	Skeletic Calcisols (Endosalic)	Skeletic Calcisols (Transportic) Skeletic Calcisols	Light-colored slightly saline loamy serozems formed on loess-like deposits	
CL-5	Haplic Calcisols (Endosalic, Fluvic, Sodic)	Haplic Calcisols (Endosalic, Gleyic) Haplic Calcisols (Endosalic)	Leptic Technosols (Gleyic, Irragric, Salic, Transportic) Subaquatic Technosols (Gleyic) Water (irrigation and drainage canals)	Same as above, affected by irrigation of adjacent land plots, locally disturbed by roads, canals and other structures	Non-cultivated soils of the areas immediately adjacent to the irrigated fields and therefore affected by additional moistening
CL-6	Haplic Calcisols (Endosalic, Gleyic)	Haplic Calcisols (Endosalic)	Skeletic Calcisols (Endosalic)	Light-colored loamy-gravel serozems associated with meadow (saz or sasa) serozem-like loamy and clayey soils formed on proluvial stratified deposits underlain by gravel material	Non-cultivated (or historically cultivated) soils of depressions
AT-7	Irragric Anthrosols (Calcaric, Gleyic)	Irragric Anthrosols (Gleyic, Salic)	Anthraquic Epi- and Endosalic Gleysols (Salic, Sodic, Relocatic) Haplic Calcisols (Endosalic, Gleyic, Sodic)	Irrigated light-colored loamy and clayey serozems formed on proluvial stratified gravel loams and loess-like loams	Areas of long-term cultivation under irrigated conditions
AT-8	Irragric Anthrosols (Gleyic, Salic)	Anthraquic Epi- and Endosalic Gleysols (Salic, Sodic, Relocatic) Haplic Calcisols (Endosalic, Gleyic, Sodic)	Gleyic Solonchaks (Aridic, Evapocrustic, Transportic)	Irrigated meadow (saz or sasa) serozem-like loamy and clayey soils formed on proluvial stratified deposits underlain by gravel material	
GL-9	Endosalic Gleysols	Anthraquic Endosalic Gleysols (Sodic) Gleyic Solonchaks (Siltic)	Gleyic Solonchaks (Aridic, Evapocrustic / Puffic)	Meadow and meadow-boggy solonchakous soils	
SC-10	Gleyic Solonchaks (Aridic, Evapocrustic)	Gleyic Solonchaks (Aridic, Puffic) Subaquatic Solonchaks (Siltic)	Water (salt lakes, irrigation canals)	Shor Solonchaks	Non-cultivated salt-affected soils around the evaporating lakes and other areas of seasonal watering (within isolated depressions)
FL-11	Leptic Skeletic Sodic Fluvisols (Geoabruptic)	Calcaric Sodic Fluvisols Fluvisols (Transportic) Exposed bedrock and young colluvial, proluvial and alluvial deposits Subaquatic Technosols (Gleyic)	Water (the River of Qili/Kly)	Variously aged and textured variants of alluvial and associated soils associated with exposed materials and water. Disturbed locally by drainage canals	A series of soils associated with Kly (Qili) river valley (a part of this area is likely affected by spontaneous grazing). The valley is V-shape, so the soils are generally embryonic and subject to rockfalls, rockslides, marginal erosion
TS-12	Leptic Technosols (Calcic, Transportic)	Ekranic Technosols (Skeletic) Leptic Hyperskeletic Technosols (Calcic, Transportic) Leptic Technosols (Irragric, Transportic)	Technic hard material Water (main irrigation canals)	A mixture of soils formed on man-made grounds, with local replacement of soils by structures (motor and rail roads, water ways, transmission lines)	Scarcely vegetated fill materials, excavations, and water ways, including those of the areas of fishery ponds and associated canals
TS-13	Leptic Subaquatic Technosols (Gleyic, Salic)	Leptic Technosols (Gleyic, Irragric, Salic, Transportic)	Water (ponds, irrigation canals, streams of the tail-water areas)		
EX-14	Ground materials made or exposed by human activity	Leptic Technosols (Calcic, Transportic) Ekranic Technosols (Skeletic)	Technic hard material	A mixture of recent fills, excavations and other forms of exposed grounds	Construction sites without soils

World reference base for soil resources 2014. Update 2015. - Rome: FAO, 2015. Available at http://www.fao.org

**Genusov A.Z., Gorbunov B.V., Kimberg N.V. Soil Map of Uzbekistan. Scale 1:1,500,000. - Tashkent, 1960.

Fertilizer use by crop in Uzbekistan. First version. Rome: FAO, 2003.

Rakhmatullaev Sh., et. al. Sustainable Irrigated Agricultural Production of Counties in Economic Transition (a case study of Uzbekistan). - In: Agricultural Production. Editor: Felix C. Wager. Nova Science Publishers, Inc., 2010.

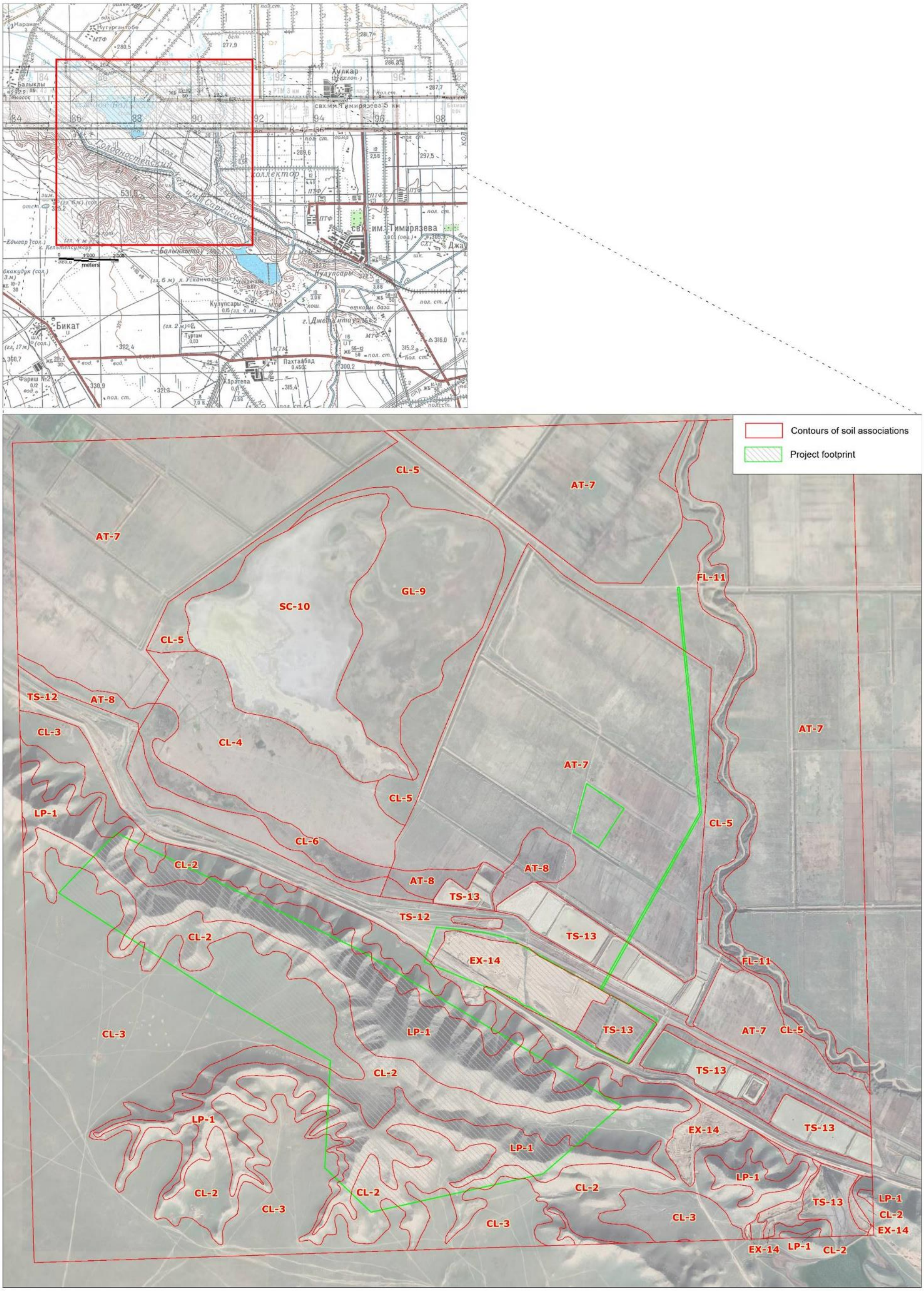


Figure 7.6.3: Major soil associations within the Project Area (the indexes are the same as in Table 7.4.1)

Taking into account the history of the Project area's development, one can expect that none of the soils listed in Table 7.6.1 are naturally/environmentally unique or specially protected by the law of Uzbekistan. It is also unlikely that soils affected by the Project serve as a natural or man-made reservoir for historically valuable artifacts or pose a specific hazard for the Project (like the one associated with natural infections, endemial diseases, radon or other gaseous appearances, UHO, etc.). At the same time, all of this cannot be fully ruled out in the absence of site surveys other than geological one.

The main function of soils of the Project area is agricultural, with the highest productivity and economic value having been historically made for the irrigated variants of serozems and associated soils (AT-7, AT-8).

Most of the soils described above can be also characterised as vulnerable to both physical (mechanical) and chemical impacts due to their physical instability and very thin humified and/or root-spread layer (Leptosols and Skeletic Calcisols of slopes), unbalanced water regime and highly fluctuating profile distribution of salts (Endosalic Gleysols, Solonchaks, Irragric Anthrosols), native exposure to wind and water erosion (Fluvisols, Technosols).

7.7 Landscapes

Project site is located in the Central Asian lowland region, in the zone of southern subtropical deserts,the South Kyzylkum province, the southeast Kyzylkum sub-province, the Farish region. (According to the scheme, developed in "Natural Conditions and Resources of the Jizzakh Region, 1978").

The territory corresponds to the pre-North Nuratau downfold in terms of tectonic. Sedimentary cover is presented by Mesozoic, Paleogene, and Caenozoic continental molasses with a thickness of over 500 m.

The project site is located on the northern macro slope of the North Nuratau ridge, which is bordered by a strip of inclined foothill plains with a general slope to the north and northwest, with absolute elevations of 480-250m. The surface is covered by proluvial and deluvial deposits - gravel, sand, arenose-sandy loamy pebble deposits, overlain by loess-like loams and sandy loams. The northern foothill plains of the Nuratau ridge are indented by a system of shallow dry canals. There are a lot of erosion forms of different types - ravines, potholes, dry drift cones. The surface of the plains near foothills of the mountains is sometimes dissected by flat depressions, which are covered by vegetation and do not reveal traces of modern erosion. This area is composed of more fine material, like gravel and sand, which gradually changes to the loams in northern direction.

The terrain of the plain is complicated by the relic paleozoic low-mountain ridges of Balyklytau, Egaberlitau, Pistalitau, Khanbanditau, extended in a northwest direction.

Project site is located at Balyklytau low mountain ridge, and its formations are a source for raw materials. The Balyklytau ridge has length of about 20 km and a width of 1.5-2 km, and the highest point is 551 m. North-eastern slope is steep and rocky, south-western is gentle and soddy. To the east, mountain ridge gradually declines. Southeast end of the ridge is cutted by canal-like valley of the Kly river. River valley is presented with a winding ravine, cutting into loesslike loams of the foothill plain.

The area is characterized by a continental desert climate. Its essential feature is the duration of the hot summer season, low cloud cover, high intensity of solar radiation, high average annual air temperatures, low relative humidity, the lowest annual rainfall and its uneven distribution over the seasons. Short winters are characterized by unstable weather and thin snow cover.

Hot, dry summer season in the low plains causes the intensive development of evaporative concentration, as a result of which the processes of the greatest salinity of groundwater and the greatest accumulation of readily soluble salts in soils, which is common for the northern foothills of the north Nuratau ridge.

Quaternary sediments are presented by eluvial-deluvial formations, which vary in thickness and composition, which are the products of weathering of limestones, sandstones and granites. In addition to the diversity of parent rock materials, frequent outcrops and screes create a significant diversity of soils. The influence of the exposure of the slopes increases towards the west. On the northern slopes of the low mountain ranges, a soil-and-vegetation cover is presented; the southern ones are mostly steep rocky outcrops, and there are essentially no soils, with the exception of primary soils.

On flat plains, extended along the foot of the northern macro slope of the North Nuratau ridge, mainly light gray soils are formed under the ephemeral and wormwood vegetation and sharply continental climate conditions. The aridity of the climate and the low amount of precipitation determines the irrigated regime of soils with gypsum-bearing and carbonate horizons at different depths. These soils are characterized by constant salinity, the presence of a large number of carbonates in the uppermost soil horizons and chloride-sulfate salts at a very shallow depth in the soil mass. At the lower part of the foothills of the island low-mountain ridges, such as Balyklytau, both on the southern and especially on the northern side, on a fine-grained piedmont deposits, underlain by clays with interlayers of sand, pebble and crushed stone, saline gray soils are common.

The vegetation of the low foothill plains is presented by wormwood shrub, locoweed-trigonella, needle grass and other formations.

The wormwood shrub formation is dominant. It is distinguished by the predominance of gray wormwood shrub, which creates a uniform gray aspect and is widespread on the light gray soils of the northern foothill plains of the Northern Nuratau ridge. The wormwood shrub formation of the low foothill plains does not form a closed cover.

The upper part of the foothill plains has gray and Turanian wormwood shrub, which do not form a closed cover, with bindweed and ephemeral plants.

The vegetation of the middle strip of foothill plains is presented by gray wormwood shrub, ephemeral plants, such as - desert sedge grass or bluegrass, as well as umbrellates, such as ferula. Needle grass formation is also widespread.

Vegetation cover of the lower, flat part of the foothill plains, is presented predominately with locoweed-trigonella formation. Various types of alkali grass - kuyanjuni, azhrek, etc, is present at saltmarshes.

There are two groups of landscapes at the territory, landscapes of relic low-mountain ridges and landscapes of northern-Nuratau foothill plains.

Desert landscapes of northern Nuratau foothill plains

- Landscapes of low part of foothill plains are presented with locoweed-trigonella formations, with alkali grasses, on grey soils, sometimes saline, on quaternary deluvial deposits (Figure 7.7.1)
- Landscapes of middle part of foothill plain are presented with gray wormwood shrub formations on grey soils on loess loams (Figure 7.7.2).

Desert landscapes of relic low mountain ridges

- Landscape of northern slopes of Balyklytau relic low mountain ridge are presented with thinned wormwood shrub formations on raw wash soils on colluvial deposits (Figure 7.7.1)
- Landscape of southern slopes of Balyklytau relic low mountain ridge are presented with wormwood shrub formations on thin grey soils on colluvial/deluvial deposits (Figure 7.7.3).

Most of the low part of foothill plains territory is used as pasture for almost the entire year.

Figure 7.7.1: Landscape of northern slopes of Balyklytau relic low mountain ridge and landscapes of low part of foothill plains

Figure 7.7.2: Landscapes of middle part of foothill plain

Figure 7.7.3: Landscape of southern slopes of Balyklytau relic low mountain

7.8 Surface Water Bodies

7.8.1 Background

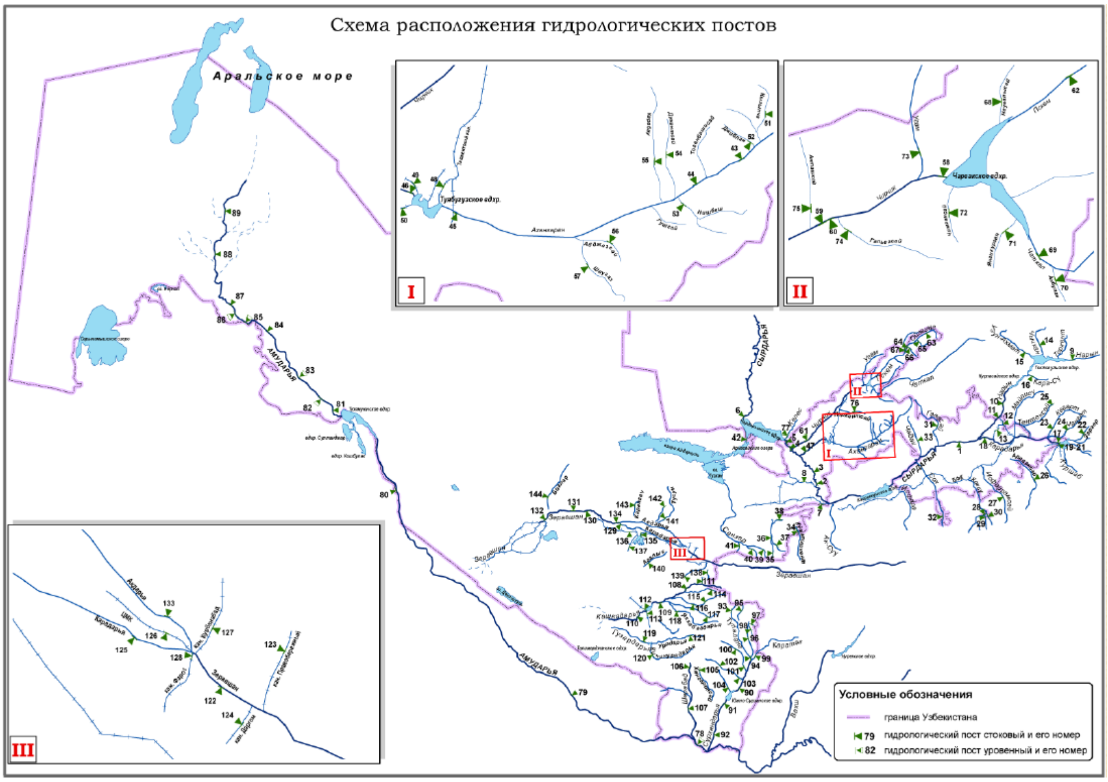
Surface water bodies are unevenly distributed over the area of Jizzakh Region. There are two main rivers: Sanzar (Kly) and Zaaminsu. Besides, there is the man-made Aydar-Arnasay system of lakes. However, these lakes are located at a considerable distance from the proposed Project, therefore the hydrological and hydrochemical characteristics given below refer to the Kly river and its tributaries, Balykly Lake and artificial water bodies (Figure 7.8.1).

Rivers of the study area belong to the inland water basin of the Aral Sea. The main features of hydrography, morphology and regime of water bodies are determined by a complex combination of climate, topography, geological structure, groundwater, rainfalls and snow melting. These features are discussed below.

The following materials were used as a baseline data source for this report: scientific literature, scientific publications, interviews with government and Hua Xin Cement Jizzakh Plant representatives, cartographic materials and other available sources.

Unfortunately, Ramboll specialists were not provided with any materials of environmental studies and hydrometeorological engineering surveys. Probably, the company did not conduct such surveys.

The hydrometeorological monitoring in the area is carried out by Centre of hydrometeorological service of the Republic of Uzbekistan (UZHYDROMET). Uzhydromet is a component of one of the UN specialized agencies – World Meteorological Organization (WMO), the main aim of which is weather and climate observation, cooperation for collection and exchange of meteorological and hydrological data and other observations of environmental conditions. The network united under Uzhydromet includes more than 400 environmental monitoring stations. Meteorological, hydrological and agrometeorological observations are carried out on the territory of the republic since 1921. Environmental monitoring of water bodies, air and soil are carried out since 1972.The nearest hydrologic station of the state monitoring network on the tributary of the Sanzar river is sited upstream the Project facilities. The station is located at a distance of 100 km from the Project site.



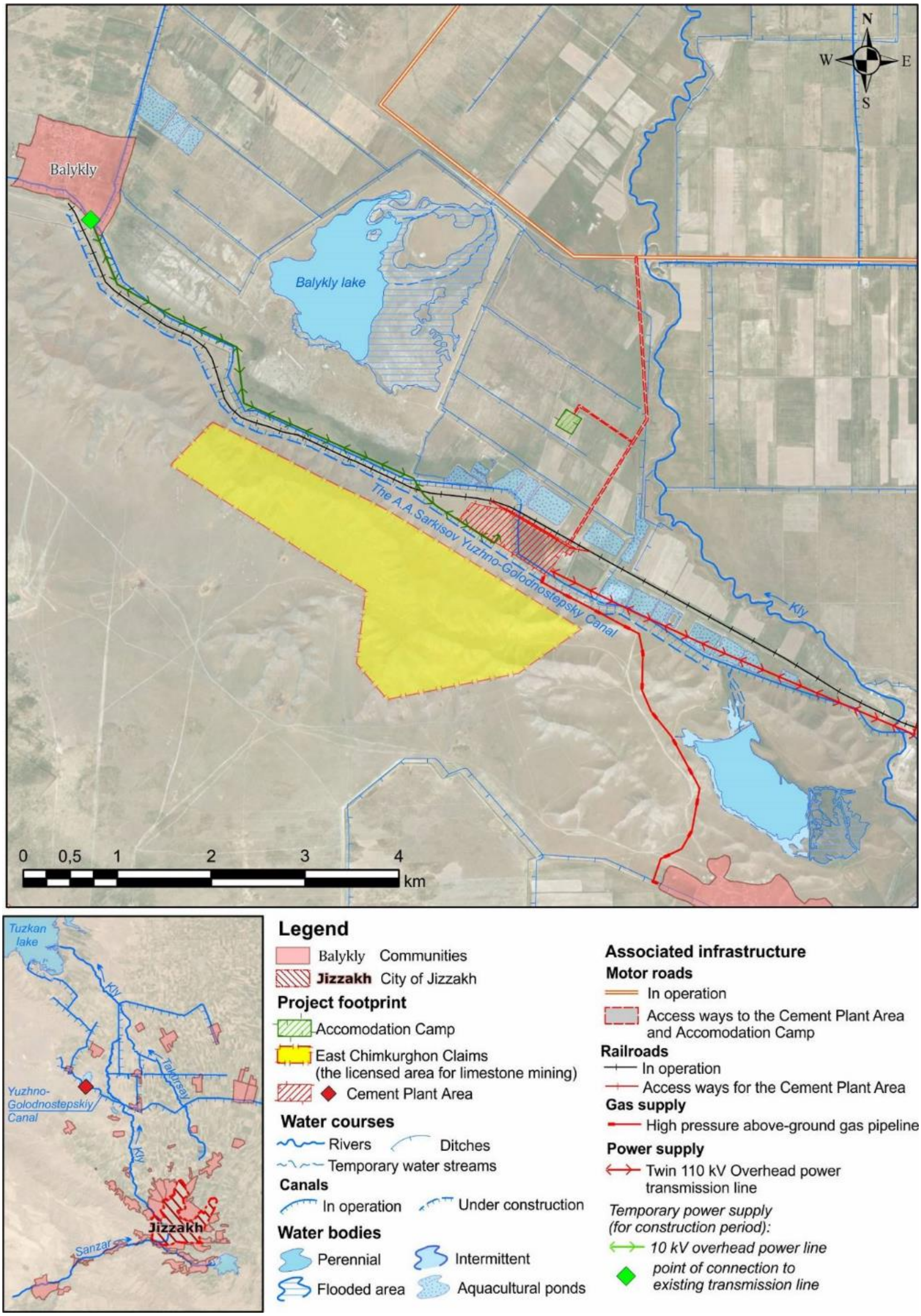


Figure 7.8.1: Watercourse basins in the area of the proposed Project

7.8.2 Rivers

The main water bodies of the Jizzakh region are the Sanzar and Zaaminsu rivers. The first is located near the proposed Project.

The Sanzar River source is located at an elevation of 3300 meters in the northern slopes of Chumkartau. The valley of the Sanzar river separates the Malguzar mountains from Nuratau mountains. Near the town of Jizzakh the name of the river has changed and it is called the Kly river (Figure 7.8.2) which flows into Tuzkan Lake.

The total length of the Sanzar river is 198 km[74]. The catchment area of the river basin is estimated at 2580 km^2. The width of the Kly river is 14 m near Lake Balykly, the depth is 1.5 m, and the bottom soil is viscous. The average annual water discharge is 6.9 m^3/s, the average annual maximum water discharge is 12.17 m^3/s, the average annual minimum water discharge is 3.00 m^3/s (Alibekov, Nishanov, 1978).

The Sanzar river recharge is mixed: snow melting accounts for approximately 45 %, rainwater runoff - for 40 % (Shultz, 1949, 1965).

Higher water discharge rates and levels are observed during rainfall and snow melting in March. The second highest water discharge rates occur in July as a result of snow melting on the northern slopes of Chumkartau. Water discharge rates are declined by September.

Water of the Kly river not is used for irrigation due to high level of salinity (2 g/l). The hydrologic regime of the creeks is extremely unstable, with periods of drying up in some years. During such a critical period, the Sanzar river does not provide enough water for the needs of irrigation, so water is supplied from the Zarafshan river through the Tutartar canal.

Figure 7.8.2: Late phase of the summer high water period at the Kly river within the Jizzakh Region

Photo: Ramboll 09.07.2019

[74] "Uzbek Soviet Encyclopedia" (in Russian). Academic. Retrieved 22 March 2015.

7.8.3 Lakes

There is the man-made Aydar-Arnasay system of lakes in Jizzakh Region. It covers an area of 4,000 km^2, which includes 3 brackish water lakes: Aydar Kul, Arnasay (water salinity – 2 ‰) and Tuzkan (< 7.4 ‰). The last one is located 20 km from the proposed Project of Hua Xin Cement Plant. The lakes were unintentionally created due to the drainage of the Syr Darya River water from Chardarya irrigation reservoir into Arnasay lowland to prevent flood. Since 1969 Lake Aidar constantly receives the waters of Syr Darya River when they overflow capacity of Chardarya Reservoir. This gradually filled up the natural cavity of Arnasai lowland to create the second largest (after Aral Sea) lake in the region. Lake Tuzkan is not completely man-made. Earlier on the place of Lake Tuzkan there was an alkaline soil with the same name filled up with water in spring and drying-up in hot season. Now Lake Tuzkan is the second in size after Lake Arnasai. Its total area is 705 km^2. The total length of the lake is 35 km and its width is 22-25 km. The maximum depth is 20 m.

However, the closest lake to the Project area is Lake Balykly (Figure 7.8.3). It is situated only at 4 km from Hua Xin Cement Plant. The total length of Lake Balykly is 2-2.5 km and the width is 1.3-1.5 km. Its total area is 705 km^2 while during dry season it reduces to 112 ha.

Balykly Lake is a regionally important area supplying medicinal mud to SPA and balneological resorts in Uzbekistan with thermal, chloride-hydrocarbonate sodium waters for both drinking and therapeutic SPA, which successfully use silt sulphide mud. Sanatoriums use this mud to treat skin and gynecological problems.

Figure 7.8.3: Lake Balykly

Photo: Ramboll, 09.07.2019

7.8.4 Artificial water bodies

The A.A. Sarkisov Yuzhno-Golodnostepsky Canal

Efforts that began as early as the end of the 19th century gradually transformed Jizzakh Region from a desert into an intensively irrigated agricultural area, today one of the major cotton and grain producing regions of Uzbekistan with around 500,000 hectares of irrigated land under cultivation[75]. Three main canals constructed in the 1950s and the 1970s bring water to kolkhozes (collective farms) and sovkhozes. The first phase was completed in 1962 and the second in 1972. These are the north-south Central and Northern Canals and the east-west South Golodnostepsky Canal (Figure 7.8.4).

The total length of the A.A. Sarkisov Yuzhno-Golodnostepsky Canal is 127 km. The width of the Canal is 1.5-3.5 m, the depth is around 2 m (Tulyaganov, 1971). The maximm capacity of the Canal near the proposed Project is 9.0 m³/s, the average flow rate of the canal is 4-5 m³/s. It brings water to 350,000 ha of irrigated lands.

Figure 7.8.4: The A.A. Sarkisov Yuzhno-Golodnostepsky Canal

Photo: Ramboll, 08.07.2019

Aquacultural ponds

There are more than 10 aquacultural ponds near the Hua Xin Cement Plant in Jizzakh Region (Figure 7.8.5). The average length of ponds is 500-800 m and the average width is 1.5-3.5 m, the depth is around 1.5 - 3.5 m. Aquacultural ponds are usually rectangular in size. Total area varies from 1 to 11.5 ha (the average is 5-6 ha).

According to the interview with the members of Khokimiyat (local administrative authority) of Zafarabad Region performed by Ramboll specialists on 09.07.2019, the fish ponds are used by local fishing organisations for farming the following species: Common carp, Carassius and Snakehead fish (see Section 7.9).

[75] Big Soviet Encyclopedia, on-line edition, in Russian

Figure 7.8.5: Aquacultural ponds

Photo: Ramboll, 08.07.2019

7.9 Biodiversity

7.9.1 Vegetation

According to the phytogeograpical zoning of Uzbekistan[76], the area of the Project implementation is located on the boundary of two geobotanical provinces: Central Asia Mountain province and Turan Plain province (Figure 7.9.1).

The southern part of the territory belongs to the Nuratau relic mountain region, which includes the low island mountains Pistalitau. The main features of the flora of the area is a considerable similarity with the Nuratau mountains distinguishing by larger variety of pigweeds (*Chenopodiaceae*).

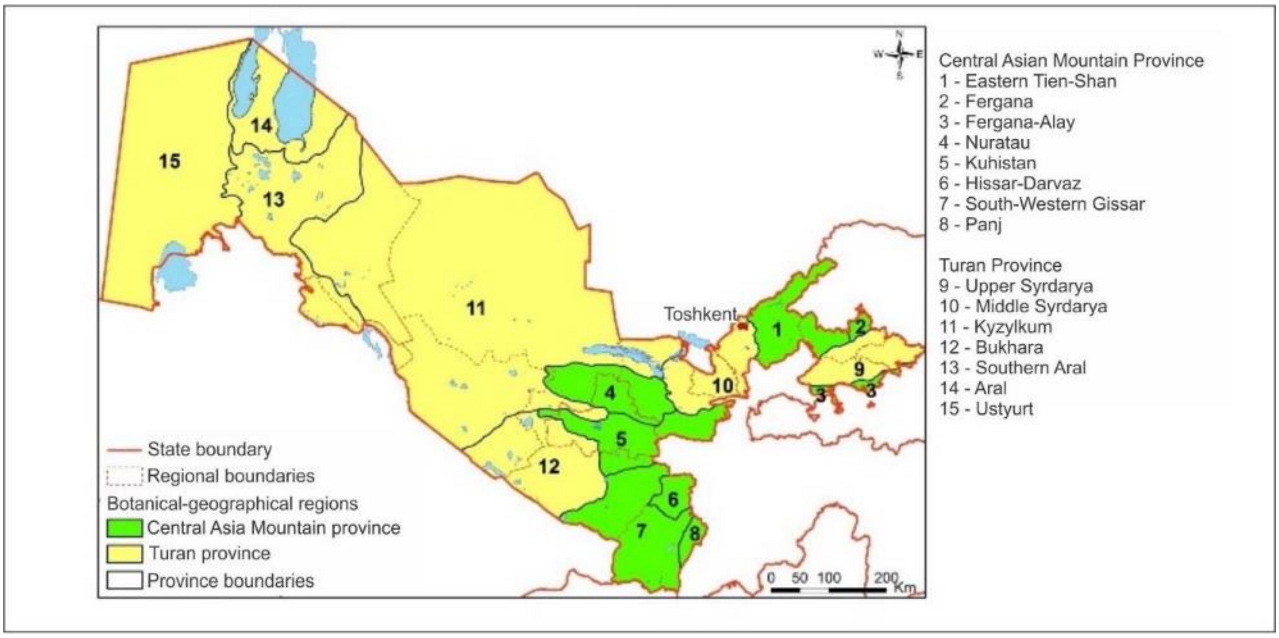


Figure 7.9.1: Phytogeographical zoning of Uzbekistan[77]

The Nuratau ridges are located on the south border of Kyzylkum desert. They represent relic low mountain ridges. The ridges belong to Nuratau floristic region of Central Asian Mountain province (according to R.V. Kamelin) and differ from all other low-hills terrain of Kyzylkum.

According to Alibekov and Nishanov[78], the vegetation of foothill plains is formed by wormwood (*Artemisia* genus), locoweed (*astragalus* genus), trigonella and needle grass (*Stipa* genus) plant formations.

Wormwood suffruticose formation is predominant on low plains but does not form closed communities and the shrubs have distance of 30-50 cm between individuals. Ephemerous herb is usual among the wormwood shrubs, and it is represented by sedge (*Carex pachystylis*) and bulbous bluegrass (*Poa bulbosa*). Rocky areas are occupied by wormwood and perennial bindweed (*Convolvulus* genus). Ephemerous wormwood phytocenoses are essential feeding grounds for karakul sheep.

[76] K.Sh. Tojibaev, N.Yu. Beshko, V.A. Popov Botanical-geographical regionalization of Uzbekistan // Botanic Magazine vol. 101, No. 10, 2016. – pp. 1105-1128.
[77] Botanical Institute of the Academy of Sciences of the Republic of Uzbekistan [Official website]. – Link: http://floruz.uz/ru/флора-узбекистана/
[78] Natural conditions and resources of Jizzax region, - "Uzbekisan", Toshkent, 1978. 255 p.

Figure 7.9.2: The lower part of the slopes. Vegetation affected with intensive sheep grazing (“sheep’s trace” microrelief)

Locoweed trigonella formation occurs on light serozems. Annual astragalus and locoweed are the main edificators of the plant formation. It is an important feeding ground for karakul sheep during spring and summer.

Figure 7.9.3: Livestock grazing on the xerophilous vegetation

Needle grass (*Stipa*) formation is common on light sandy loam and clay loam soils. The formation also includes wormwood on rank soils.

Vegetation of the peripheral parts of foothill plains is more complex due to topographic low, which causes changes in soil texture and salinity of soils. Apart from wormwood and ephemerous plants, succulents may also occur there.

Recent surveys confirm the information of the research performed in 1970s. According to Batoshov[79], vegetation of the area mostly consists of ephemerous and ephemeroid absinthic communities on fine earth and lithogenic light serozems, such as species of wormwood (*Artemisia diffusa H. Krash., A. sogdiana Bunge),* Sedge *(Carex pachystilis J. Gay.),* Bulbous bluegrass *(Poa bulbosa L.),* Barbed goatgrass *(Aegilops triuncialis L.),* Poaceae *(Taeniatherum crinitum (Schreb.) Nevski)*, usually with perennial xerophyles: Tumble-weed *(Psoralea drupacea Bunge),* Phlomis (*Phlomis thapsoides Bunge)*, and species of *Phlomoides* genus. Cleves are covered with tangle of Almond (*Amygdalus spinosissima)*, Barley (*Hordeum bulbosum L.)*, Wormood (*Artemisia diffusa, A. Sogdiana)*, ephemerous and miscellaneous herbs in herb layer. Nowadays wide areas, which were previously used for grain crops breeding, are abandoned and covered with secondary phytocenoses representing various stages of anthropogenic successions.

Figure 7.9.4: Xerophilous half-shrub cover on the tops of the mountains

[79] A.R. Batoshov, N.Yu. Beshko Characteristics of the flora and plant cover of the relic mountains of the South Kyzylkum // Aridnye Ecosystems, vol. 19, No. 3(56), 2013. – pp. 77-82.

Figure 7.9.5: Typical xerophilous plant (camel thorn or alhagi)

Predominant plant families of the Nuratau mountains are *Asteraceae* and *Poaceae* (118 and 101 species respectively). Key species constituting the flora of the area is also occupied by the following families: Beans (*Fabaceae)*, Crucifers *(Brassicaceae)*, Borage *(Boraginaceae)*, Carnations *(Caryphyllaceae)*, Umbrellifers (*Apiaceae)*, Sage *(Lamiaceae)*, Pigweeds *(Chenopodiaceae)*.

Figure 7.9.6: Typical vegetation of the Southern slope of Balyklytau ridge

One of the specific features of the Nuratau mountains is a scarcity of species *Eremurus* in the vegetation, unlike in other arid extraneous ridges of Central Asia. Despite similar natural conditions, the areal of the genus *Astragalus* mainly does not include the Nuratau ridges either. Another specific feature of the region is dominant position of the *Hordeum* genus, with wide-spread occurrence of the H. bulbosum species in phytocenoses.

Figure 7.9.7: Representative of xerophilious vegetation (Common thistle or Cirsium vulgare)

General appearance and species composition of the vegetation cover of Northern slopes of the ridges is close to the vegetation cover of Turanian wet herb steppe, typical for high submountain regions and lower belt of Western Tien-Shan and the Pamiro-Altay.

Absence of the *Campanulaceae* family is the unusual feature of the whole Nuratau region (the species is typical for neighboring districts)[80].

The first herb layer is formed with *Crambe kotschyana*, which occupies large area of the region. Similarities of flora of the Nuratau mountains and the Pamiro-Altay is underlined by the occurrence of such geophytes as Tulipa micheliana.

The Northern part of the area of interest belongs to the plain of Turan province. It is dominated by human-transformed landscapes of alluvial-proluvial plains with areas of lake plains. Heavily degraded natural halophilic, psammophile, riparian plant communities have survived only in fragments.

[80] K.Sh. Tojibaev, N.Yu. Beshko, V.A. Popov Botanical-geographical regionalization of Uzbekistan // Botanic Magazine vol. 101, No. 10, 2016. – pp. 1105-1128.

Most of the territory of Golodnaya steppe, which was previously an anhydrous clay desert with ephemeroid vegetation and fragments of saline lands, is currently occupied by agricultural landscapes: irrigated fields with a network of canals. The selvedges of the agricultural landscapes along the roads and canals are disturbed lands overgrown with weeds and adventive plants.

Figure 7.9.8: Construction site, fishery ponds, irrigated agricultural land

Figure 7.9.9: Irrigated agricultural land (cotton fields)

Figure 7.9.10: Hygrophilous vegetation along the irrigation canal

Figure 7.9.11: Disturbed vegetation as a result of the construction of roads and canals

Red List species

The following chapter describes rare and endemic species from the Red Book of Uzbekistan, which might be discovered within the Project area of influence.

Nonea calceolaris is an annual plant with dense sticked out short glandular hair with disseminated long bristles, height up to 30 cm.

It has a few stretched stems ascending from the base.

Leaves are smooth-edged or not clearly dentate; radical leaves are spatulate-lancet, withering; stems are assidenous wide- or angusti-lancet, sharp, 2,5 - 4,5 cm length, 5-10 mm of width. Inflorescences are 10-14 cm long.

Calyx is campanulate, 7-8 mm of length, almost 2 times longer than a tube of a nimbus with lancet long pointed barbs, in 2 times shorter, than a tube of a cup. Perianth yellowish, 7-8 mm of length, with a tube of 4 mm of length. Nutlets 3-4 mm lg., almost horizontal, hairy. Flowering in March-April, fruiting in April-May.

Their habitat is argillaceous deserts and foothills. In Uzbekistan Nonea calceolaris can be noticed on the area of Mirzacho'l (as well as in Surdarjo, Surkkhandarja districts). According to the Red Book of Uzbekistan, might be extinct, i.e. had not been discovered during the last research.

Climacoptera malyginii. Rare endemic species of Mirzacho'l (Golodnaya Steppe).

Climacoptera is an annual plant 30-35 cm high. Young plants are tomentous with long, thin and tangled hair, naked subsequently when grow up. Leaves are carnous and linear.

Flower leaves are longer than bracteols in a basal part, shorter in the upper part. Bracteols ovate, shorter than perianth.

Petals are lanceolate, naked with wings in the middle. Anthers 1-1,5 mm long, with utricular appendix. Pistil is longer than perianth.

Flowering and in fruiting in June-September.

Grows in salty places of Mirzacho'l region in Syr Darya river basin.

Salvia submutica is a perennial herbaceous plant 15-40 cm high. The stem is straight, densely glandular-pilose. Radical leaves are numerous, petioled, oblong-lanceolate, pinnately sected, with deeply acuminate pinnately lobed segments. Stem leaves in the lower pair is more short-petioled, with more acuminate lobes; the middle and upper highly reduced, entire, sessile.

Flowers have long (10-12 mm) pedicels in 4-flowered whorls. Calyx is broadly campanulate, slightly inflated, 22-23 mm long, indistinctly 2-lipped, all teeth obtuse. Corolla is cream-coloured. Flowering in July, fruiting in July-August.

Salvia submutica prefers to grow on mounds and granite streams in the middle belt of mountains. Distributed in Jizzakh region – could be found in solitary plants generally on the Nurutau ridge and Koitash mountains.

Probability of presence of the species listed above within the Project area of influence is relatively low due to lack of suitable habitats.

According to the Conclusion of the State Environmental Expert Review[81], no rare nor endangered species listed in the Red Book were discovered within the Project area.

[81] Conclusion of the State Environmental Expert Review, No. 03-01113-08—2428 of 16.11.2018. – 6 pp.

7.9.2 Terrestrial vertebrates

The Central Asian plains fauna is generally dominated by animals of subtropical and tropical origin, with few forest-steppe and steppe species in the river valleys. Warm conditions with sharp variations in water availability in various territories are the main contributing factors that shape the wildlife structure in the plains. The high air and soil temperatures in spring, summer and autumn boost faunal proliferation, however viability of many groups is limited due to the lack of precipitation. In deserts, fauna is composed of species resistant to the parching environment and excessive heating due to exposure to sun at daytime, whereas the sparse vegetation does not provide any shelter. Hygrophilous and mesophilous animals live near water, especially in floodplain thickets which are characterised by high temperature and fairly high humidity of air and soil, shadowiness and still air.

Environmental conditions in the Project areas including local flora and fauna has not been surveyed, therefore, description of local fauna is provided below using the available publications.

From the orographic perspective, the Project area is located in sloped piedmont plains (L.A. Alibekov, S.A. Nishanov, 1978) composed of argillaceous and loessial ephemeral deserts with roughly similar fauna compositions (Environmental conditions and natural resources of the USSR: Central Asia. Moscow, Nauka 1968). Many animals here are nocturnal and spend the hot daytime in burrow shelters to avoid exposure to the heat and dry air. They make their own burrows or use burrows still occupied or abandoned by other animals

Reptiles

In Uzbekistan, the Reptilia class is represented by 132 species including 5 tortoise, 89 lizard, and 38 snake species (of which 5 are venomous - Oxus (Central Asian) cobra, Orsini's viper, Lebetine viper, saw-scaled viper, and Siberian pit viper).

The lizard species common in the Project area are Desert Monitor (*Varanus griseus*) and geckos. Other local reptile species are Central Asia tortoise, steppe agama, sunwatcher, stepperunner, steppe ribbon snake, Tatary sand boa, Siberian pit viper, colubers, and sometimes Lebetine viper.

Red Data Reptiles

Desert Monitor (*Varanus griseus*) – Vulnerable species (Red Data Book RUz, 2009), LC: Least Concern (IUCN Red List, 2019). Active during April-October. Finds shelter in burrows of great gerbil or abandoned foxholes. Feeds on insects, reptiles, birds and bird eggs, small mammals. Limiting factors: land ploughing and irrigation, death on roads.

Amphibians

Amphibian species diversity in Uzbekistan is extremely scarce and includes only two species - green toad (*Bufotes viridis*) and lake frog (*Pelophylax ridibundus*), which, according to the published information, may be encountered in the lower terraces of the Sanjar River.

No rare or protected amphibian species registered in the Red Book of the Republic of Uzbekistan and IUCN Red Lists have been found in the Project area. No commercial species of amphibians have been identified either.

Mammals

The fauna of Uzbekistan includes 108 mammal species. Within the Project area mammals are represented by multiple rodents (Rodentia) - jerboa, gerbils, mole lemmings, yellow souslik. Desert hare (*Lepus tibetanus*) is encountered in the subject territory. Among the carnivores (Carnivora), most common are wolf, fox and badger. The vast diversity of chiropterous animals (Chiroptera) is due to abundant presence of insects.

Lynx, jackal and wild boar are encountered in floodplain thickets along irrigation ditches and rivers and around lakes.

Red Data mammals

Goitered Gazelle (*Gazella subgutturosa*) – VU:D – Vulnerable Declining (Red Data Book RUz, 2009), VU: Vulnerable (IUCN Red List, 2019). Small populations of goitered gazelle in Uzbekistan including Jizzakh Region represent the subspecies that was very common in Central Asia in the past. At present, geographic range of this mammal is fragmented into few small populations. Limiting factors: Economic development of habitats, poaching, glaze ice and thick snow cover.

Birds

About 500 bird species are encountered in the territory of Uzbekistan. Besides providing habitats for local species, Central Asia also serves as wintering area for various birds that breed further north. Major seasonal migration routes pass through the country's plains, such as Black Sea / Mediterranean, West-Asian / East-African, and Central-Asian / South-Asian routes. The main transit routes follow the river streams, Caspian shores, and vernal ponds, however, a few bird species migrate over the xeriochore Turan plain.

Larks (Alaudidae) are abundant in argillaceous and loessial deserts where they are represented by several different species - crested lark, lesser short-toed lark, greater short-toed lark; Pallas's sandgrouse is also common (*Syrrhaptes paradoxus*). Abundant insect resources support proliferation of insectivorous birds – bee-eater (Meropidae), Coraciiformes, rosy starling (*Sturnus roseus*) whose main feed is acridoids.

To the north-west of the Project area, at a distance of some 20 km, there is the Tuzkan Lake being a part of the Arnasoy system of artificial drainless lakes (also includes the Aydarkul Lake and the East-Arnasoy Lakes). Unlike other lakes of the Arnasoy system which are fully fed by overflow from the Shardara Reservoir, Tuzkan has ancient natural origin, even though it has been significantly transformed by human activities.

According to the ornithological studies (Ye.A. Filatova, 2012[82]), 78 bird species were present on the Tuzkan Lake in summer 2006, including 59 nesting species. The registered species belong to 14 different orders. The greatest species diversity is reported for shore birds (Charadriiformes) – 22 species, perching birds (Passeriformes) – 19 species, and Anseriformes – 11 species. Other orders are represented by fewer species. Desert around the lake is inhabited by long-legged buzzard (*Buteo rufinus*), Short-toed Snake-eagle (*Circaetus gallicus*) and kestrel (*Falco tinnunculus*) which visit the lakes for feeding. Summary list of summer ornithofauna of the Tuzkan Lake with details of the species' presence is provided in Annex 1. In 2008 the government of Uzbekistan has added the Aydar Arnasay Lakes System (AALS) to the Ramsar List.

Red Data Avifauna species

Conservation importance was determined at a National level based on the National Red Data Book of Republic of Uzbekistan (2009); and an International level based on the IUCN's Red List of Threatened Species (IUCN, 2019).

Of the 78 bird species expected to occur in the Project area the following species are listed in the national and international Red Data books (Table 7.9.1).

Table 7.9.1: Rare and protected bird species expected to be present in the AALS Ramsar site and the adjacent areas

Species	Status	Protection category	
		Red Book of RUz	IUCN Red List*
Great White Pelican (*Pelecanus onocrotalus*)	Seasonal migrations, wintering. Previously (1998) was observed in the lakes area. Was not met during the survey in year 2006	VU:D - Vulnerable Declining	VU Vulnerable

[82] Ye.A. Filatova. Tuzkan Lake ornithofauna development over 100 years. International conference proceedings. Terrestrial vertebrates. Aridic ecosistems wildlife. Tashkent, Uzbekistan, 24-27 October 2012

Species	Status	Protection category	
		Red Book of RUz	IUCN Red List*
Dalmatian Pelican (*Pelecanus crispus*)	Seasonal migrations and wintering in the Lakes area	VU Vulnerable	LC Least concern
Red-breasted Goose (*Rutibrenta ruficollis*)	Wintering in Tuzkan Lake area. Was not met during the survey in year 2006	VU:R Vulnerable: Naturally Rare	VU Vulnerable
Lesser White-fronted Goose (*Anser erythropus*)	Seasonal migrations and wintering in the Lakes area	VU:R Vulnerable: Naturally Rare	VU Vulnerable
Mute Swan (*Cygnus olor*)	Breeding in the Amu-Darya basin, migrating, wintering in Kyzylkum desert	NT Near Threatened	LC Least concern
White-headed Duck *(Oxyura leucocephala)*	Breeding and wintering in the area	EN: Endangered	EN Endangered
Sociable Lapwing (*Chettusia gregaria)*	Seasonal migrations and stopovers	VU:R Vulnerable: Naturally Rare	CR Critically endangered
Pin-tailed sandgrouse (*Pterocles alchata*)	Breeding in Kyzylkum Desert	VU:D Vulnerable: Declining	LC
Marbled Teal (*Marmaronetta angustirostris*)	Breeding, wintering in the area. Was not met during the 2006 survey	EN	VU Vulnerable
Pallas Sea-eagle *(Haliaeetus leucoryphus)*	Migrations through Kyzylkum desert	EN Endangered	EN Endangered
White-tailed (Gray Sea) Eagle (Haliaeetus albicilla)	Migrations through Kyzylkum desert	VU: R Endangered: Naturally Rare	LC Least concern
Short-toed Snake-eagle *(Circaetus gallicus)*	Breeding in the area, nesting on trees and rocks	VU:D Vulnerable: Declining	LC Least concern
African Houbara *(Chlamydotis undulata)*	Breeding in Kyzylkum Desert, spring-autumn migrations	VU:D Vulnerable: Declining	VU

Invertebrates

Termites (Isoptera) and acridoid (Acrididae) insects are very abundant in argillaceous and loessial deserts. The most common are locusts (*Sphingonotus*) and bryodemella (*Briodema*), darkling beetles (Tenebrionidae) and geotrupidae (Geotrupidae), cicadae, Dyscia conspersaria, various Vespula and Phlebotominae.

Carnivorous and parasitic arthopods are also abundant, e.g. scorpions, spiders, solifuges, sanguivorous ticks. Woodlice (Oniscidea) are represented by multiple species.

Species of economic value

Potential game species (included in the List of game animals permitted for sport and amateur hunting as per Rules of Hunting and Fishing in the territory of the Republic of Uzbekistan)[83] in the Project area include 15 species: wild boar (*Sus scrofa*), hare (Lepus), porcupine (*Hystrix cristata*), nutria (*Myocastor coypus*), gophers (Spermophilus), fox (*Vulpes Vulpes*), corsac fox (*Vulpes corsac*), wolf (*Canis lupus*), jackal (*Canis aureus*), steppe cat (*Felis silvestris lybica*), reed cat (*Felis chaus*), badger (*Meles meles*), stone marten (*Martes foina*), mink (*Mustela lutreola*), steppe polecat (*Mustela eversmanni*).

[83] Annex to the Hunting and Fishing Rules of the Republic of Uzbekistan, approved by the State Committee for Nature Protection of the Republic of Uzbekistan, Order of 22.03.2006 No.27)

Bird game species include geese (Anser), ducks (Anatinae), coot (Fulica atra), water hen (*Gallinula chloropus*), common cormorant (*Phalacrocorax carbo*), dikkop (Burhinus), snowcock (*Tetraogallus*), chukar (*Alectoris chukar*), quail (*Coturnix coturnix*), partridge (Perdix), wild doves (*Columba livia*), all species of turtle dove (Streptopelia), all species of waders (Charadrii), all species of starlings (Sturnus), pheasants (Phasianus) excluding Zarafshan Ring-nacked Pheasant.

Dangerous species

Venomous spiders and snakes are present in the Project area which may represent hazard to human health and livestock.

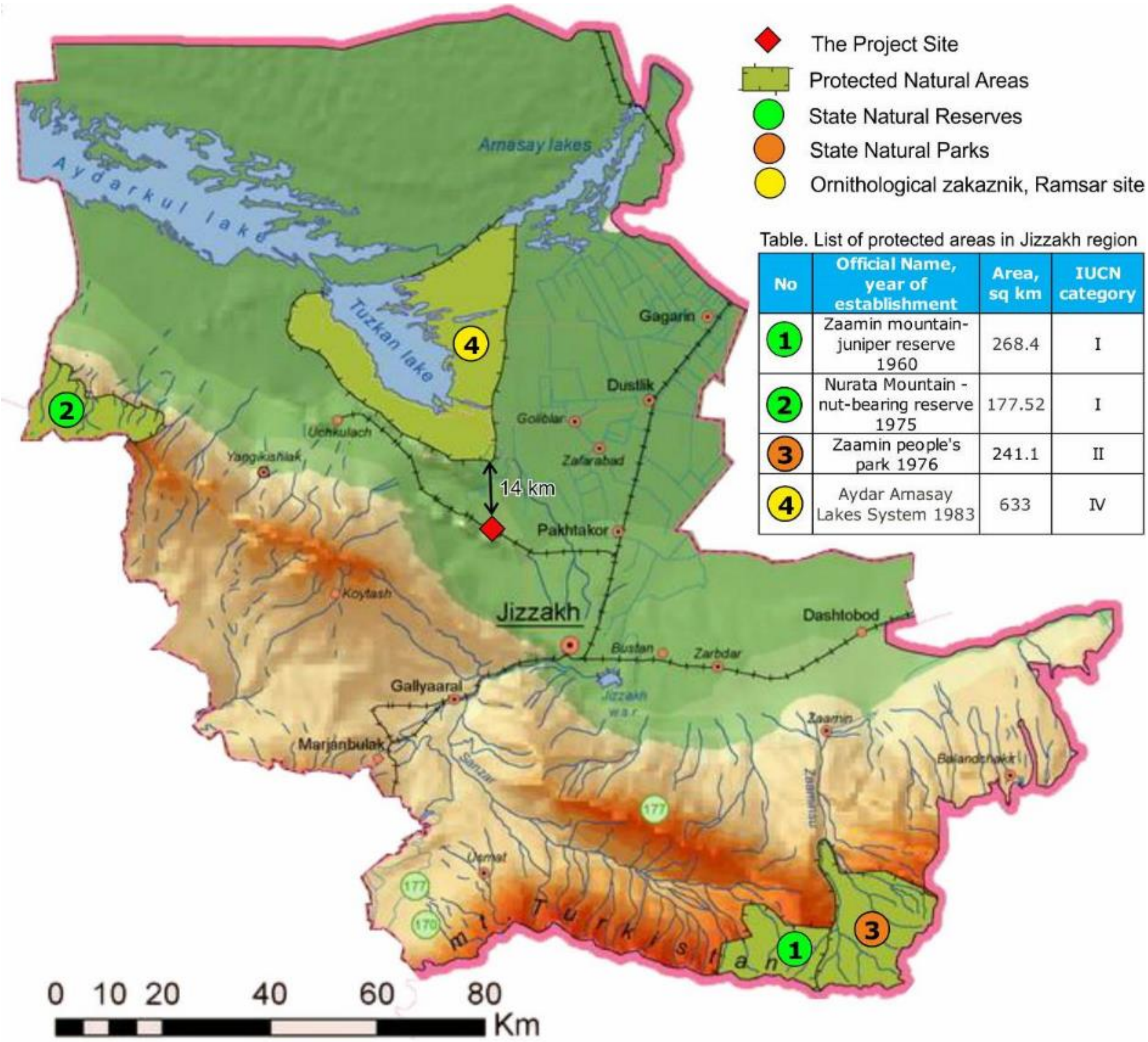
- Karakurt (*Latrodectus tredecimguttatus*) - Main habitats: wasteland areas, banks of irrigation ditches, ravine slopes. Does not attack people or animals if not disturbed. Poison is quick-acting, fatal bites of people and livestock (hoses, camels) are reported. Urgent medical attention shall be sought in case of bite.
- Tarantula (Lycosa) – Carnivorous spider, active at night, spends daytime in burrow. Poison does not represent hazard to human life but may be dangerous in case of allergic reaction.
- Lebetine viper (*Macrovipera lebetina*) is the largest of Viperidae family snakes encountered in the territory of the former Soviet Union. May grow to the total body length of almost 2 m and weight up to 3 kg. Common in dry piedmont areas and mountain slopes overgrown with shrubs, in stony canyons with creeks and springs. The highest density of snake populations is reported on banks of rivers and irrigation canals. Daily activity patterns of Lebetine viper vary between seasons: in spring and autumn it is active during daytime, during warm season the pattern is more complex (short active periods in morning and evening, and also at twilight and during first half of night). In terms of toxicity, poison of Lebetine viper is second to only cobra's poison. Urgent medical assistance is needed in case of a bite.

Habitats

Natural habitats in the Project area have been significantly transformed by long-term economic activities (irrigation farming and livestock grazing). The survey performed in year 2018 during the environmental impact assessment in Zafarobod District of Jizzakh Region did not find any rare or endangered flora and fauna species listed in the Red Data Book of the Republic of Uzbekistan[84]. Habitats that may be categorized as critical in the context of IFC PS6 are most probably associated with designated conservation areas (DCA).

DCAs within Jizzakh Region include two national reserves - Zaamin Mountain Juniper Reserve and Nurata Reserve, as well as Zaamin National Park and a Ramsar Site - Aydar Arnasay Lakes System (Figure 7.9.12).

[84] Opinion of the State Environmental Expert Evaluation Committee dated 16.11.2018



No	Official Name, year of establishment	Area, sq km	IUCN category
1	Zaamin mountain-juniper reserve 1960	268.4	I
2	Nurata Mountain - nut-bearing reserve 1975	177.52	I
3	Zaamin people's park 1976	241.1	II
4	Aydar Amasay Lakes System 1983	633	IV

Figure 7.9.12: Designated Conservation Areas in Jizzakh Region

Sources: Environmental Atlas of Uzbekistan. – Tashkent:"Kartografiya". - 2008 - 66 p.

Fifth national report of the Republic of Uzbekistan on conservation of biodiversity. – UNDP, 2015.

Nurata Reserve

The reserve occupies the area of 17752 ha in the central part of the Nuratau ridge. The DCA was established in 1975 for conservation of rare endemic subspecies of argali maintain sheep (*Ovis ammon severtzovi*), the IUCN Red List and the Red Data Book of Uzbekistan. 34 species of mammals are present within the reserve territory including 3 insectivores, 8 bat species, 1 duplicidentate, 13 rodent, 7 carnivore and 2 even-hoofed species. Reptiles encounter 21 species including Desert Monitor (*Varanus griseus*), Northern (Schaw's) Wolf Snake (*Lycodon striatus)* and Oxus (Central Asian) Cobra (*Naja oxiana*) that are listed in the Red Data Book of Uzbekistan (2009).

One bird migration route passes through the Nurata Reserve. The number of bird species observed in the reserve is 196, including 103 species that breed within the reserve territory. Nine of the species that are reportedly present in the reserve are registered in the Red Data List of Uzbekistan: black stork, black vulture, griffon vulture, saker falcon, golden eagle, short-toed snake eagle, booted eagle, bearded vulture, houbara bustard.

Vegetation is composed of 814 vascular plant species. 29 species are recorded in the Red Data Book of Uzbekistan, including 3 Eremurus, 3 Alliaceae, 5 tulips, 5 Astragalus species, etc. The main functions of the reserve also include conservation of genetic variety of walnut and other cultivated fruit trees, as this area is a recognized centre of origin of Central Asian cultivated plants.

Zaamin Mountain Juniper Reserve was established in 1960 for conservation of unique natural juniper forests with their inherent flora and fauna. The reserve occupies 26.8 ha in the medium- and high-altitude area of Turkestan ridge, within the altitude range of 1760 to 3500 m above sea level. Fauna within the reserve belongs to the Eastern Bukhara zoogeographical area. Protected species: lynx, wild boar, Himalayan brown bear, long-tailed marmot, beaded vulture, rock partridge, Himalayan snowcock, black stork.

Zaamin National Park was established in 1976 for conservation and recreational development of the unique mountain juniper ecosystems in the total area of 24 ha. The Park is located on the northerm slopes of Turkestan ridge in Zaamin District of Jizzakh Region of Uzbekistan, 25 km from the centre of Zaamin town and 55 km from Jizzakh city. Its territory and fauna are strongly associated with Zaamin Reserve. Its fauna consists of mover a hundred species of mammals, birds, amphibians and fish. Animals registered in the Red Data Book of Uzbekistan and IUCN Red List are encountered in the Park area: Turkestan Lynx (*Lynx lynx*), Tien-Shan Brown Bear (*Ursus arctos*), Bearded Vulture (*Gypaetus barbatus*), Golden Eagle (*Aquila chrysaetos*), Saker Falcon (*Falco cherrug*).

Ramsar Site - Aydar Arnasay Lakes System: This ornithological protected area is the largest reservoir of Uzbekistan, consisting of freshwater lakes situated in the middle stream of the Syrdarya river and on the irrigated massif of Golodnaya steppe and Kyzyllum desert. The Aydar Arnasay Lakes System (AALS) includes 3 brackish water lakes (Aydar Kul, Arnasay and Tuzkan) located in the saline depressions of the south-eastern Kyzylkum and covers the area of 527,100 hectares. The site is located at the crossroads of the Afro-Eurasian and Central Asian flyways and provides habitat for migrating and wintering waterbirds, with more than 100 species noted. It provides habitat to threatened species like White-headed Duck Savka (*Oxyura leucocephala*), Sociable Lapwing (*Chettusia gregaria*), Dalmatian Pelican (*Pelecanus crispus*), Red-breasted Goose (*Rufibrenta ruficollis*), Lesser White-fronted Goose (*Anser erytropus*), and Pallas Sea-eagle (*Haliaetus leucoryphus*) and provides an important source of food and a spawning ground for various species of fish.

Conclusions

- Natural habitats in the Project area are significantly modified over a number of years by irrigation agriculture and cattle grazing. Habitats that may be considered of critical importance (as defined by the IFC PS6) are most probably assigned to designated conservation areas (DCAs).
- The Project area of influence matches the criteria of modified habitats as it was used for irrigation agriculture and cattle grazing over decades of years.
- No DCAs are located in the closest proximity of the Project site; however, Aydar Arnasay Lakes System now recognized as a Ramsar Site is at a distance of 20 km and therefore protected and rare bird species can be met in the Project area during their migrations.
- According to literature data, vulnerable species: Goitered Gazelle and Desert Monitor can be met in the Project area; the Company needs to develop and implement mitigation measures to reduce the potential impact to possible minimum.
- The Project area is inhabited by a number of species (snakes and spiders) that can be dangerous for people. The Company needs to provide safety induction to workers regarding safety behavior in case of coming across the species and emergency actions required in case of a bite.

ANNEX 1: List of species and status of presence of birds on Tuzkan lake in summer period

Species	Status	Conservation category	
		Red Data Book of RUz	IUCN Red List
Grebe *Podicipediformes*			
Little grebe, dabchick *Podiceps ruficollis Pall., 1764*	breeding	-	NE
Great crested grebe *Podiceps cristatus L., 1758*	breeding	-	LC
Totipalmate birds *Pelecaniformes*			
Great white pelican, eastern white pelican, rosy pelican *Pelecanus onocrotalus L., 1758*	Seasonal migrations, wintering. Previously (1998) was observed in the AALS area. Was not met during the survey in year 2006	VU:D	LC
Great cormorant *Phalacrocorax carbo L, 1758*	breeding	-	NE
Pygmy comorant *Phalacrocorax pygmaeus Pall. 1773*	Seasonal migrations	VU:D	LC
Stork *Ciconiiformes*			
Common little bittern *Ixobrychus minutus L., 1766*	breeding	-	LC
Little egret *Egretta garzetta L. 1766*	Occasionally met in the area	VU:R	LC
Grey heron *Ardea cinerea L., 1758*	breeding	-	LC
Purple heron *Ardea purpurea L., 1766*	breeding	-	LC
Great egret, Large egret *Egretta alba L., 1758*	breeding	-	LC
Black-crowned night heron *Nycticorax nycticorax L., 1758*	breeding	-	LC
Eurasian spoonbill *Platalea leucorodia L,1758*	Very rare	VU:D	LC
Anseriformes *Anseriformes*			
Grey goose, Anser *Anser anser L., 1758*	breeding	-	LC
Mute swan *Cygnus olor Gm., 1789*	breeding	NT	LC
Ruddy shelduck *Tadorna ferruginea Pall., 1764*	breeding	-	LC
Common shelduck *Tadorna tadorna L., 1758*	breeding	-	LC
Mallard *Anas platyrhynchos L., 1758*	breeding	-	-
Eurasian (common) teal *Anas crecca L., 1758*	breeding	-	LC
Gadwall *Anas strepera L., 1758*	breeding	-	LC
Northern shoveler *Anas clypeata L., 1758*	breeding	-	LC
Red-crested pochard *Netta rufina Pall., 1773*	breeding	-	LC
Ferruginous duck, Common white-eye *Aythya nyroca Guld., 1770*	Breeding, seasonal migrations, wintering	NT	NT

Species	Status	Conservation category	
		Red Data Book of RUz	IUCN Red List
Falconidae *Falconiformes*			
Osprey *Pandion hailaetus L., 1758*	Seasonal migrations	VU:R	LC
Western marsh harrier *Circus aeruginosus L., 1758*	breeding	-	LC
Eurasian (northern) sparrowhawk *Accipiter nisus L., 1758*	breeding	-	LC
Long-legged buzzard *Buteo rufinus Kretzschmar, 1827*	breeding	-	LC
Short-toed snake eagle - *Circaetus gallicus Gmel., 1788*	Breeding in the area, nesting on trees and rocks	VU:D	LC
European (common) kestrel *Falco tinnunculus L., 1758*	breeding	-	LC
Gruiformes *Gruiformes*			
Common moorhen, waterhen, common gallinule *Gallinula chloropus L.,1758*	breeding	-	LC
Eurasian (common) coot *Fulica atra L., 1758*		-	LC
Charadriiformes *Charadriiformes*			
Eurasian stone curlew, *Burhinus oedicnemus L., 1758*		-	LC
Common ringed plover *Charadrius hiaticula L., 1758*		-	LC
Little ringe plover *Charadrius dubius Scop, 1786*		-	LC
Greater sand plover *Charadrius leschenaultii Lesson, 1826*		-	LC
Kentish plover *Charadrius alexandrinus L., 1758*		-	LC
Northern lapwing, peewit, green plover *Vanellus vanellus L., 1758*		-	NT
White-tailed lapwing, *Vanellochettusia leucura Licht., 1825*		-	NE
Ruddy turnstone *Arenaria interpres L., 1758*		-	LC
Black-winged stilt *Himantopus himantopus L., 1758*		-	LC
Pied avocet *Recurvirostra avosseta L., 1758*		-	NE
Eurasian oystercatcher *Haematopus ostralegus L., 1758*		-	NT
Green sandpiper *Tringa ochropus L., 1758*		-	LC
Common greenshank *Tringa nebularia Gunnerus., 1767*		-	LC
Common redshank *Tringa totanus L., 1758*		-	LC
Spotted redshank *Tringa erythropus Pall., 1764*		-	LC
Marsh sandpiper *Tringa stagnatilis Bechst., 1803*		-	LC
Eurasian curlew *Numenius arquata L., 1758*		-	NT

Species	Status	Conservation category	
		Red Data Book of RUz	IUCN Red List
Black-tailed godwit *Limosa limosa L., 1758*		-	NT
Asian dowitcher *Limnodromus semipalmatus Blyth., 1848*		VU	NT
Collared pratincole *Glareola pratincola L., 1766*	breeding	-	LC
Black-winged pratincole *Glareola nordmanni Nordmann, 1842*	Probably breeding	VU	NT
Caspian gull *Larus cachinnans Pall., 1811*	breeding	-	LC
Black-headed gull *Larus ridibundus L., 1766*	breeding	-	LC
Slender-billed gull *Larus genei Breme, 1840*	breeding	-	LC
Black tern *Chlidonias niger L., 1758*		-	LC
Gull-billed tern *Gelochelidon nilotica Gm., 1789*	breeding	-	LC
Caspian tern *- Hydroprogne caspia Pall., 1770*	breeding	-	LC
Common tern *Sterna hirundo L., 1758*	breeding	-	LC
Little tern *Sterna albifrons Pall., 1764*	breeding	-	LC
Pigeons, Doves *Columbiformes*			
Black-bellied sandgrouse *Pterocles orientalis L., 1758*		-	LC
Pin-tailed sandgrouse *Pterocles alchata L., 1776*	breeding	VU:D	LC
Rock dove, Common pigeon *Columba livia Gm., 1789*	breeding	-	LC
Cockoos, Cuculidae *Cuculiformes*			
Common cuckoo *Cuculus canorus L., 1758*	breeding	-	LC
Owls, Strigoformes *Strigiformes*			
Eurasian eagle-owl *Bubo bubo L., 1758*	breeding	-	LC
Little owl *Athene noctua Scop., 1769*	breeding	-	LC
Galliformes *Galliforme*			
Common pheasant *Phasianus colchicus turcestanicus Lorenz, 1896*	breeding	-	-
Apodiformes *Apodiformes*			
Common swift *Apus apus L., 1758*		-	LC
Kingfishers *Coraciiformes*			
European roller *Coracias garrulus L., 1758*	breeding	-	LC
European bee-eater *Merops apiaster L., 1758*	breeding	-	LC
Olive bee-eater *Merops superciliosus L.,1773*	breeding	-	LC

Species	Status	Conservation category	
		Red Data Book of RUz	IUCN Red List
Eurasian hoopoe *Upupa epops L., 1758*n	breeding	-	LC
Passerine *Passeriformes*			
Crested lark *Galerida cristata L., 1758*	breeding	-	LC
Calandra lark *Melanocorypha calandra L., 1766*	breeding	-	LC
Eurasian skylark *Alauda arvensis L., 1758*		-	LC
Pale martin *Riparia diluta Sharpe et Wyatt, 1893*	breeding	-	LC
Barn swallow *Hirundo rustica L., 1758*	breeding	-	LC
Western yellow wagtail *Motacilla feldegg Michahelles, 1830*	breeding	-	LC
White wagtail *Motacilla personata Gould., 1861*	breeding	-	NE
Common starling, *Sturnus vulgaris L., 1758*		-	LC
Common myna, Indian myna *Acridotheres tristis L., 1766*	breeding	-	LC
Eurasian magpie *Pica pica L., 1758*	breeding	-	LC
Carrion crow *Corvus corone L., 1758*	breeding	-	LC
Paddyfield warbler *Acrocephalus agricola Jerd., 1845*	breeding	-	LC
Clamorous reed warbler *Acrocephalus stentoreus Hempr.et Ehr.,1833*	breeding	-	LC
Sykes's warbler *Hippolais rama Sykes, 1832*	breeding	-	LC
Pied wheatear *Oenante pleshanka Lepechin, 1770*	breeding	-	LC
Common nightingale, *Luscinia megarhynchos C.L. Brehm,1831*		-	LC
Bearded Reedling *Panurus biarmicus L., 1758*	breeding	-	LC
Great tit *Parus bocharensis Lichtenstein, 1823*		-	-
Indian sparrow *Passer indicus Jardine et Selby, 1831*	breeding	-	-
Red-headed bunting *Emberiza bruniceps Brandt., 1841*	breeding	-	LC

7.9.3 *Hydrobiota*

Hydrobiont communities of Jizzakh Region are associated with small-area water bodies (rivers, canals, lakes and ponds) conditions of which are generally limiting for habitats (due to unfavorable hydrology or increased water salinity), and therefore the species diversity of organisms is not large and has been found decreasing in recent decades.

Water availability and quality are among the major environmental and social issues of Uzbekistan and in Jizzakh Region as well.

According to the data of 1990-2000[85], total amount of return water varies from 28 to 33 km^3 per year. Return water from irrigation is the important component of local water resources (about half of such waters are returned into the rivers), but it is also a threat to the ecosystems because of water quality.

Habitats of the area can be divided into natural and confined to artificial water bodies. According to this classification, natural habitats are represented by the river Kly (Sanzar) and its creeks, and brackish lake Balykly. The hydrologic regime of the creeks is extremely unstable, with periods of drying up in some years.

Habitats confined to artificial water bodies are represented by Yuzhno-Golodnostepsky Canal , aquacultural ponds and the lake Tuzkan. The biggest artificial water body of the region is the A.A. Sarkisov Yuzhno-Golodnostepsky Canal used for irrigation. The mineralization of water in the Canal is relatively high (more than 1 g/l) . There are also more than 10 aquacultural fish ponds in the close proximity to the Cement plant. The average area of every pond is about 5-6 ha. Their water is most probably saline, but there is no information in the open sources, and the Consultant got no information about water characteristics during the interview with the members of Khokimiyat. Another water body is the lake Tuzkan, into which the Kly river flows. It is located 20 km from the Project area. Tuzkan is a part of Aydar-Arnasay System of lakes and its salinity is 7.4 ‰ .

Water bodies of Uzbekistan are the habitat for 73 species of fish, 35 of which are commercial. Most common species for commercial fishery in Jizzakh region are European carp, Grass carp and Bighead carp.

Aquaculture is an important and fast-growing sector of fisheries[86] accounting for 52–60 percent of the total fish production in the period of 2011–2014. Finfish are the only cultivated fishery product in Uzbekistan. The pond culture of cyprinids is by far the most developed aquaculture system in the country and there are a few well established, full-cycle fish pond farms, country-wide.

Pure water from rivers was has been traditionally used for fish farming, but farms have to use saline and sewage water, that may decrease the diversity of fish species and amounts of fish production.

The main technology that was introduced was the polyculture of cyprinids in earth ponds in semi-intensive conditions. The cultured species were: common carp (*Cyprinus carpio*), silver carp (*Hypophthalmichthys molitrix*), bighead carp (*Hypophthalmichthys nobilis*) and grass carp (*Ctenopharyngodon idellus*). According to the State Committee on Statistics of Uzbekistan[87], Jizzakh region produced 1,805 tonnes of fish from January to March 2019.

Grass carp (*Ctenopharyngodon idella*) is a large herbivorous species of fish, which is widely cultivated for food. Natural habitats of the species are lakes, ponds, pools, and backwaters of large rivers with tranquil flow or standing water bodies with vegetation, located in East Asia. Grass carp spawn at 17-27ºC in fast-moving rivers and the turbulence keeps the eggs in suspension while they drift downstream. Hatching occurs at the temperature of 20ºC and the larvae migrate to the shallow waters and riparian zone.

During the summer period, it is mainly in the appendage system, in the winter it goes into the river bed and rests on the pits. Grass carp is an important commercial species, but it is also used for an and effective weed control for undesirable aquatic vegetation.

Common carp or European carp (*Cyprinus carpio*) is a widespread fish of eutrophic waters and large rivers in Europe and Asia. The species had been introduced into environments throughout the world and survives the salinity up to 5 ‰ . Common carp is tolerant to most conditions but prefer large water bodies with slow or standing water and soft, vegetative sediments. The species is omnivorous, with a high tendency towards the consumption of animal food, such as water insects, larvae of insects, worms,

[85] Issues of the conservation of inland water ecosystems of Central Asia and Southern Caucasus. – Almaty, Regional Ecological centre of Central Asia; Toshkent, Global Water Partnership of Central Asia and Caucasus, 2006.
[86] Food and Agriculture Organization of the United Nations, Fisheries and Aquaculture Department. [Official Website]. – Link: http://www.fao.org/fishery/countrysector/naso_uzbekistan/en
[87] State Committee on Statistic of Uzbekistan report. Agriculture and Fishery. January-March 2019. – 22 pp.

mollusks, and zooplankton.[88]. Spawns at the temperature of 18-20°C in fresh and brackish water in the coastal vegetation zone with the depth of 40-50 cm.

Often considered a destructive invasive species and included in the list of *World's 100 worst invasive species*. It is also considered vulnerable to extinction by the International Union for Conservation of Nature (IUCN)[89].

Hypophthalmichthys is a genus of large cyprinid fish. The most common species are Bighead carp and Silver carp. They were introduced to Uzbekistan in 1960's. Young fish feed on zooplankton, imago mostly on phytoplankton, detritus.

Bighead carp (*Hypophthalmichthys nobilis*) is a freshwater species, one of the most intensively exploited species in aquaculture. Spawns during summer low water at the temperature of 18-20°C in spring and early summer.

This species is basically a zooplankton feeder throughout its life under natural conditions. In culture, bighead carp will also accept artificial feed, such as the by-products from grain processing and organic detritus, in addition to natural food[90].

Silver carp (*Hypophthalmichthys molitrix*) are primarily filter feeders – due to their mouth apparatus they filter water bloom and muddy water. In the wild spawns at the temperature of 25°C in June-July in large rivers with swift water. Young fish hatch in the floodplain zone. Requires standing or slow-flowing conditions such as in impoundments or the backwaters of large rivers. Feeds on phytoplankton[91].

They can be used for controlling water quality (for example, of noxious blue-green algae). Some of the algae (*Microcystis*) produce more toxins in the presence of silver carp. These carp have natural resistance to their toxins but can accumulate them in their systems. The species is considered near threatened in the the IUCN Red List[92].

According to Alibekov and Nishanov[93], presence of the genus *Schizothorax* was also discovered on the territory of Jizzakh region: in the river Sanzar and its tributaries. This is a genus of cyprinid fish is mostly carnivorous, dwells in mountain fast moving rivers. Spawns from April-May in plain regions until August in mountain rivers, in relatively cold water with the temperature about 13-14°C. Certain species of the genus on the area of interest were not identified.

In the natural water bodies and in A.A. Sarkisov Yuzhno-Golodnostepsky canal, there were also discovered populations of Common carp, *Carassius* and *Snakehead fish* (most possibly, the Northern snakehead, *Channa argus*).

Carassius, commonly known as *crucian carps* (*Carassius carassius*), inhabit a wide variety of still water bodies and lowland rivers, usually associated with submerged vegetation or regular flooding. Can strongly tolerate low oxygen concentrations and pollution[94]. Originally a European species, crucian carp was introduced throughout the world.

Feeding larvae and juveniles usually occur in high-complexity habitats as reed belts. Feeds on plankton, benthic invertebrates, plant material and detritus. Spawns in shallow, warm shores on submerged vegetation when the temperatures reach 17-20°C[95]. Considered as least concern by IUCN List[96].

Another species of carassius genus that could be met in the water bodies in Jizzakh region is the goldfish (*Carassius auratus*), which is widely distributed throughout Central Asia and introduced in many

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[88] Food and Agriculture Organization of the United Nations, Fisheries and Aquaculture Department. [Official Website]. – Link: http://www.fao.org/fishery/culturedspecies/Cyprinus_carpio/en
[89] IUCN Red List. [Official Website]. – Link: https://www.iucnredlist.org/species/6181/12559362
[90] Food and Agriculture Organization of the United Nations, Fisheries and Aquaculture Department. [Official Website]. – Link: http://www.fao.org/fishery/culturedspecies/Hypophthalmichthys_nobilis/en
[91] Food and Agriculture Organization of the United Nations, Fisheries and Aquaculture Department. [Official Website]. – Link: http://www.fao.org/fishery/species/2967/en
[92] IUCN Red List. [Official Website]. – Link: https://www.iucnredlist.org/species/166081/6168056
[93] Natural conditions and resources of Jizzakh region, - "Uzbekisan", Toshkent, 1978. 255 p.
[94] Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.
[95] Carassius carassius (crucian carp). Centre for Agriculture and Bioscience international [Official Website]. – Link: https://www.cabi.org/isc/datasheet/90564
[96] IUCN Red List. [Official Website]. – Link: https://www.iucnredlist.org/species/3849/10117321

countries. It is unpretentious to the environmental conditions, in the wild goldfish inhabits deep floodplain ponds with developed vegetation and clean stretches, avoiding plant-filled waters.

Spawns on low waters from late April until mid-August at the temperature of 23-25ºC.

Northern snakehead is a species of snakehead fish native to Japan, Eastern China, North Korea and South Korea. It has been introduced to other regions where it is now considered invasive. It inhabits shallow, marshy ponds and wetlands, swamps with mud substrate and aquatic vegetation. Due to the tolerance to a wide range of environmental conditions they can be found in freshwater waterbodies with temperature range from 0º to 30ºC, they can also survive out of water for up to 4 days by breathing oxygen from the atmosphere[97].

The northern snakehead predates upon a wide range of aquatic fauna: zooplankton, crustaceans, insects, even small reptiles, frogs and mammals. Spawning typically occurs in June-July at the temperature higher than 25ºC. Hatching occurs at the temperature of 25-30ºC. Juveniles usually consume phytoplankton.

According to the interview with the members of khokimiyat (local administrative authority) of Zafarabod region dated 09.07.2019 performed by Ramboll specialists, the fish ponds near the Project area are used by local fish farmers for Grass carp, European carp, Bighead carp, Silver carp.

It is noted[98] [99] that there are 111 species of *zooplankton* dwelling in fish ponds of Uzbekistan. Species composition of 21 water reservoirs of Uzbekistan (Charvak, Akhangaran, Tuyabuguz, Kattakurgan, Tuyamuyun and the reservoirs of Syrdarya, Surkhandarya, Kashkadarya, Zarafshan basins) mostly consists of *rotifers*, *daphnids*, and *copepods*.

No research data on zooplankton in Jizzakh region is available in free access.

Phytoplankton in Uzbekistan is represented by diatoms and cyanophyta, 22 genus and 55 species in total[100]. This species composition is relevant to the lake Tuzkan located 20 km North-East from the area of Project and which is fed by the river Kly, flowing in Jizzakh region. Phytoplankton of other water bodies of Jizzakh region was not surveyed.

[97] *Channa argus argus* (northern snakehead). Centre for Agriculture and Bioscience international [Official Website]. – Link: https://www.cabi.org/isc/datasheet/89026
[98] Kuzmetov A.R. Zooplankton of the fish ponds of Uzbekistan. Candidate thesis. Institute of Zoology of the Academy of Sciences of Uzbekistan, 1998
[99] Kuzmetov A.R. Fauna, ecology and practical significance of zooplankton of reservoirs of Uzbekistan. Dissertation abstract for the DSc of Biological Sciences. – Tashkent, National University of Uzbekistan, 2019.
[100] Chembarisov E.I., Shamisiev F.K. Complex method of water bodies state assessment, based on generalization of environmental indicators. – Institute of water issues of Uzbekistan. – 7 pp.

8. SOCIAL AND ECONOMIC BASELINE CONDITIONS

8.1 Introduction

This section describes baseline socio-economic characteristics of the Project social area of influence. The information presented in this section has been obtained from a wide range of sources including secondary sources (e.g. statistical data, governmental data) and primary sources (e.g. new data collected via interviews and field observations). Collection of data was undertaken in June-July 2019, whereas the field trip was performed in July 8-10, 2019.

The main sources of information are listed below.

National and regional levels:

- o Official website of the Republic of Uzbekistan Open Data Source (https://data.gov.uz/ru);
- o Official website of the Statistics Department of Jizzakh Region (http://jizzaxstat.uz/ru);
- o Official website of the Investment Promotion Agency of the Republic of Uzbekistan (http://invest.gov.uz);
- o Information provided by Investment Department and International Trade of Jizzakh Region under request.

District and local levels:

- o Information provided by hokimiyat (administration) of Zafarobod district under request;
- o Information bulleting on Socio-economic Characteristics of Zafarobod District in 2016-2018 issued by the Statistics Department of Jizzakh Region;
- o Information bulletin on Macro-economic Indicators of Zafarobod District in January-December 2018;
- o Socio-economic Passport of Nurafshon Rural Settlement (no information on the date of document's issue is available – presumably, 2019);
- o Socio-economic Passport of Chimkurgon Rural Settlement, 2019.

References to the above and other sources of information are provided throughout the text.

Information was also collected during interviews with the Project stakeholders, which were performed on July 6-7, 2019 as part of the site visit. The list of meetings when interviews were conducted is provided in the Table 8.1 below:

Table 8.1: Stakeholder meetings held as part of the ESIA preparation

Stakeholder	Date	Issues discussed
Representative of agricultural organisation Zafaragro Keladjakh	06.07.2019	Profile and operations area of the agricultural organisation. Issues related to interaction with the Project workers
Hokimiyat of Zafarobod district	07.07.2019	Main socio-economic characteristics of Zafarobod district, including the area of Project implementation. Administrative settings of the Project area. Local land use issues. Potential investment projects in the district
Hokimiyat of Chimkurgon rural settlement	07.07.2019	Main socio-economic characteristics of Chimkurgon and Balykly, including those related to demographics, employment, local land use, utilities, social infrastructure, etc.
Hokimiyat of Pistalikent rural settlement	07.07.2019	Main socio-economic characteristics of Pistalikent, including those related to demographics, employment, local land use, utilities, social infrastructure, etc.

Stakeholder	Date	Issues discussed
Hokimiyat of Nuravshon rural settlement	07.07.2019	Main socio-economic characteristics of Pistalikent, including those related to demographics, employment, utilities, social infrastructure, etc.

8.1.1 *Data limitations*

The analysis carried out for the ESIA has revealed the following limitations and/or data gaps with respect to the social baseline information on the Project social area of influence:

- The routes of the designed twin 110kV overhead power line and the high pressure above-ground gas pipeline (including relevant Yangi-Hayet Gas Distribution Station and Sary-Bazar Power Substation) have not been observed/ visited as part of the site visit;
- No information on Forish district, Sharof Rashidov district and Gallaorol district and their communities was available at the time of this report preparation;
- Community health information was not available at the time of reporting;
- Information on the crime level in the communities was not available.

8.2 Project Country Baseline Information

Uzbekistan, officially the Republic of Uzbekistan, is a doubly landlocked country in Central Asia and also a former Soviet Republic. The sovereign state is a secular, unitary constitutional republic, comprising 12 provinces, one autonomous republic, and a capital city. Uzbekistan is bordered by five landlocked countries. Along with Liechtenstein, it is one of the world's only two doubly landlocked countries.

Most of the country’s population is concentrated in urban areas. In rural areas in 2012, agriculture employed approximately 27% of Uzbekistan's labour force and contributed 17.4% of its GDP. Cultivable land is 4.4 million hectares, or about 10% of Uzbekistan's total area. While official unemployment is very low, underemployment – especially in rural areas – is estimated to be at least 20%[101]. The population of Uzbekistan is very young: 34.1% of its people are younger than 14 (2008 estimate).

The Uzbek economy is in a gradual transition to the market economy. Since its independence in September 1991, the government has largely maintained its Soviet-style command economy with subsidies and tight controls on production and prices[102]. Uzbekistan's growth has been driven primarily by state-led investments, and export of natural gas, gold, and cotton provides a significant share of foreign exchange earnings.

The country’s Gross Domestic Product (GDP) accounted for $223 billion in 2017 or $6,900 per capita. The key economic sectors of Uzbekistan include industry (33.7% GDP), agriculture (17.9% GDP) and services sector (48.5% GDP).

Uzbekistan has a high literacy rate, with about 99.3% of adults above the age of 15 being able to read and write.

The land in Uzbekistan is owned by the state. Land users can only lease land plots. The land use in the country’s rural areas is mostly presented by the agricultural sector. The agriculture products include cotton, vegetables, fruits, grain and livestock. Despite the country is making efforts to diversify crops, the country’s agriculture is largely centered on cotton[103].

The Autonomous Republic of Karakalpakstan occupies 37% of the country’s territory and ethnic Karakalpaks represent about a third of the Karakalpakstan’s population, and a minor proportion of the country’s total population (2.2%).

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[101] "Demographic situation in the Republic of Uzbekistan". The State Committee of the Republic of Uzbekistan on statistics..

[102] US Central Intelligence Agency. The World Factbook.

[103] Ibid.

The largest ethnic group in Uzbekistan are Uzbeks. The last census was conducted in 1989, but according to official estimates updated in 2017, the ethnic Uzbek majority totalled just over 26.9 million (83.8% of the population) while ethnic Tajiks made up 1,544,700 (4.8%). Other ethnic groups include Russians 2%, Kazakhs 3%, Karakalpaks 2.5% and Tatars 1.5% (1996 estimates).

Minorities Rights Group who gained consultative status with the United Nations in 1974, does not recognise as indigenous peoples any of ethnic minorities living in Uzbekistan, including Karakalpaks majority of which live in the Autonomous Republic of Karakalpakstan.

As such, the issues regarding Indigenous Peoples have been scoped out of further analysis in this ESIA.

8.3 Project Region and Districts

Development of the Project and associated facilities will be performed in Jizzakh region of the Republic of Uzbekistan. The cement plant will be located in Zafarobod district, whereas the licensed area for limestone mining lies at the junction of three administrative districts: Zafarobod district, Forish district and Sharof-Rashidov district (former Jizzakh district). Location of the Project site is shown in the Figure 8.1 below:

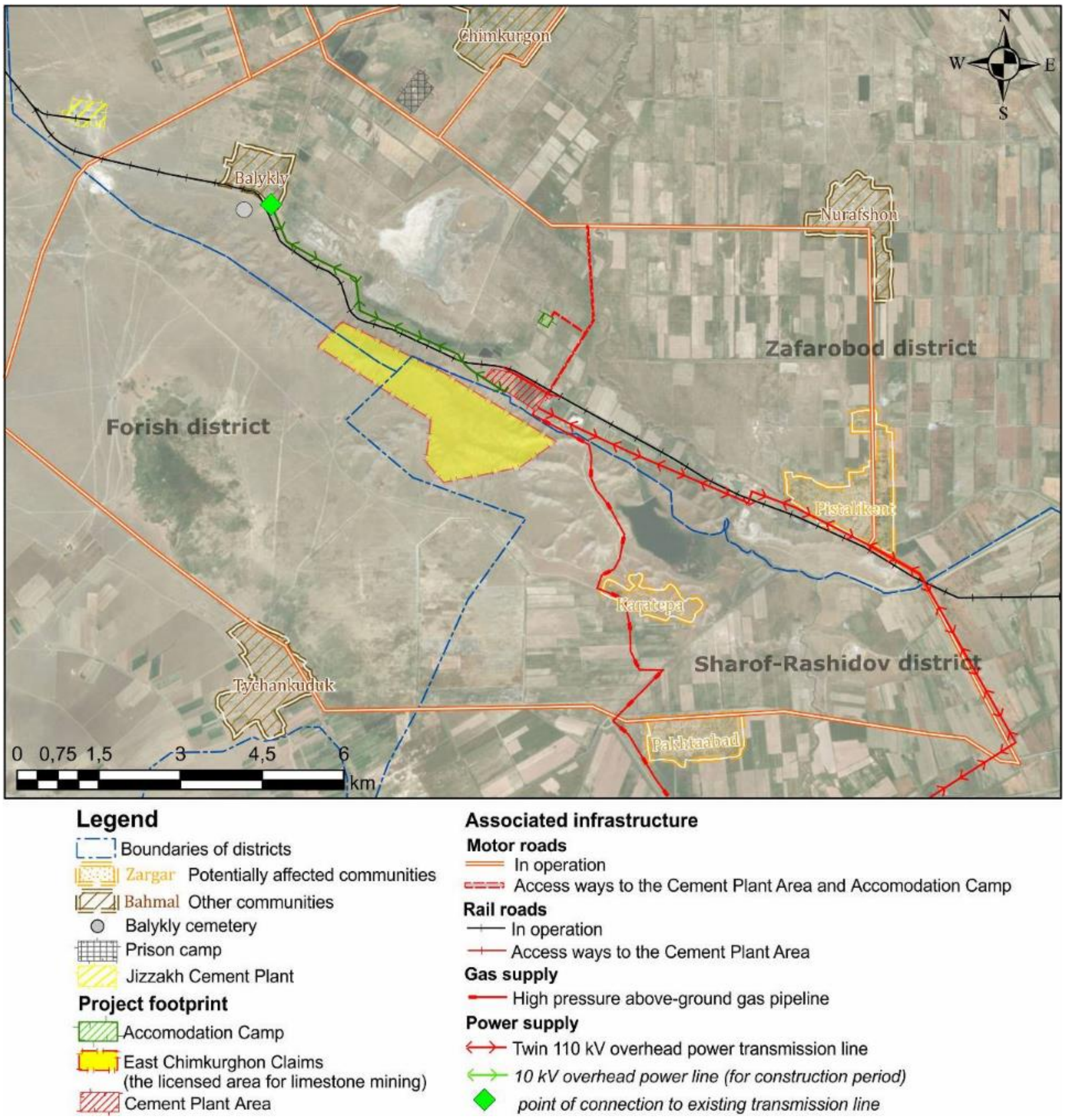

Figure 8.1: Project site and adjacent associated facilities

8.3.1 Jizzakh region

Jizzakh region is located in the center/east of the country. It borders with Tajikistan to the south and south-east, Samarqand region to the west, Navoiy region to the north-west, Kazakhstan to the north, and Sirdaryo region to the east. It covers an area of 2,117 thou ha[104]. The population is estimated to be around 910,500 people, with some 80% living in rural areas.

The region is divided into 12 districts (tumans) with a total of 95 rural villages.

The Gross Regional Product of Jizzakh region accounts for 5,761 billion Uzbekistan Som in 2017 (595 million Euro)[105]. The region's GRP was growing over the last decade. The economy of Jizzakh region is primarily based on agriculture. Agriculture, forestry and fishery are the key economic drivers of the region comprising 61% of the GRP share. The share of livestock farming in the agriculture, forestry and fishery sector accounts for 59%, whereas of crop production – 37%.[106] Cotton and wheat are the main crops, and extensive irrigation is used. Industry and service sectors account for 14% and 25% of the region's GRP accordingly.

To support development of Jizzakh region, free economic zone "Jizzakh" has been established, providing tax and customs privileges for investors.[107] This zone is located compises the area of 164 ha and is located in the city of Jizzakh[108]. The current key projects include JizzakhCement plant, Jizzakh battery plant, Jizzakh spinning and knitting production, complex for reprocessing oil products, etc.

8.3.2 Zafarobod district, Forish district and Sharof-Rashidov district

This subsection provides key characteristics of Zaforobod, Forish and Sharof-Rashidov districts, with a focus on Zaforobod district which accommodates the Plant.

The population of Zaforobod district shows a steady increase due to positive natural growth and accounts for 48.8 thou people. Age profiles of Zafarobod district and the affected communities within the district are identical. Children and teenagers make 31%, people of working age – 60%, whereas those above working age – 9%. The gender ratio of Zafarobod district is as almost equal: the share of men and women is approximately 50%[109]. Uzbeks form the majority of the district or 80% of its population. The two other largest ethnic groups are Tadjiks and Kazakhs (8% each). There are no indigenous peoples in Zafarobod district[110].

The key employement sectors of Zaforobod district include agriculture and forestry (47% of the employed population), health care (26%), industry (9%) and education (5%). All other sectors account for less than 5%[111]. The unemployment rate accounted for 10% in 2019 and doubled since 2017. The average monthly salary in the district accounted for 1,245,600 Som (130 Euro).

The industrial output of Zafarobod district accounted for 94.4 million Som in 2018 (9.5 thou Euro). The key industrial enterprise in the district is Zafarobod Cotton Processing Plant located in Buston and employing 320 people. A cement producing plant of JizzakhCement also operates in the district and is located at approximately 8 km from the Project site. The limestone mining area of Jizzakh Cement is located at the North-Eastern part of Balykly-Tau Ridge.

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[104] http://invest.gov.uz/ru/regional-map/dzhizakskaya-oblast/. Accessed 11 October 2019.

[105] According to information provided on the official website of the Investment Promotion Agency of the Republic of Uzbekistan. Accessed at: https://invest.gov.uz/regional-map/dzhizakskaya-oblast/. Accessed on 06.08.2019.

[106] According to information provided on the official website of the Jizzakh Stat. Accessed at: http://www.jizzaxstat.uz/uploads/press-reliz/2018/dekabr/selxoz%20ru.pdf. Accessed on 06.08.2019.

[107] According to the presentation "Investment opportunities for foreign companies to implement hight-tech projects in Jizzakh region of Uzbekistan.

[108] Accroding to presentation "Investment opportunities for foreign companies to implement hight-tech projects in Jizzakh region of Uzbekistan".

[109] Ibid.

[110] According to information provided by representatives of hokimiyats of Zafarobod district, Chimkurgon, Pistalikent and Nurafshon rural settlements during interviews in July 2019.

[111] According to information provided by the hokimiyat of Zafarobod district in 2019 under request.

Agriculture plays major role in Zafarobod district's economy. The sector's output accounted for 652 million Som (65.7 thou Euro). Most of the district's agricultural output is produced as part of subsidiary (households) farming. The share of the agricultural output in the district is as follows:

- Subsidiary farming – 65%;
- Farms – 34% (including individual enterpreneurs);
- Agricultural organisations – 1%.

The output of the agricultural sector of Zafarobod district includes production of grain crops, potatoes, vegetables, melons and gourds, fruit and berries, as well as grapes. 41 tonnes of cotton were also produced in the district. Seasonal jobs in the agricultural sector is an important source of employment in Zafarobod district. Approximately 12,500 people are involved in seasonal cotton-picking works, including approximately 4,000 people from Forish district and 8,500 from the other districts[112].

In 2018, the livestock production of Zafarobod district included 10.3 thou tonnes of meat, 28.3 thou tonnes of milk and 6.4 million of eggs. In the beginning of 2019, there were 36.5 thou cattle heads (including 10.9 cows), 116 thou head of sheep and goats, as well as 246 thou poultry stock.[113]

The population of Sharof Rashidov district is approximately 151 thou people. The area of the district is 1,320 square kilometres. Sharof Rashidov district includes 46 communities[114]. Along with the other districts considered in this subsection, Sharof Rashidov district is largely agricultural.

The area of Forish district includes 9,530 square kilometres. The district has a population of approximately 81 thou people, with the majority population living in the rural area. The district's nationalities include Uzbeks (77%), Kazakhs (11%), Tadjiks (11%) and others. Forish district also has deposits of lead, zinc, basalt, limestone, as well of marbled black limestone. Some of these deposits are being developed (including open pit mining). Along with other districts described, Forish district is largely agricultural, including livestock farming and crop production. Agricultural activities include production of vegetables, melons and gourds, grapes.

8.4 Project Area Overview

Location of the Project site is shown in the Figure 8.1 above. The licensed area for limestone mining is located at Balykly-Tau Ridge, whereas the surrounding area is largely rural, includes agricultural fields crossed by irrigation canals, fish farming ponds and several rural communities spread at some distance from the Project site (Table 8.2). There are five communities within 2-5 km distance to the licenced area/ cement plant site that is currently under construciton.

Table 8.2: Communities that close to the Project site and adjacent associated facilities

Community	Approximate distance to the Project site, km	Approximate distance to the closest associated facility, km	Population number	Administrative district / Town
Balykly (part of Chimkurgon rural settlement)	2.3	0 (temporary power line) 5 (access railroad)	341	Zafarobod district
Chimkurgon	5.5	3.2 (access motor road)	2,232	Zafarobod district
Nurafshon	5.5	4.2 (twin 110 kV power line)	4,736	Zafarobod district
Pistalikent	4.2	0 (twin 110 kV power line)	4,448	Zafarobod district
Karatepa	2.6	0	20 households	Sharof-Rashidov district

The Project associated facilities are described in Section 5.15.

[112] According to information obtained during interview with representative of hokimiyat of Zafarobod district on 7 July 2019.

[113] According to information provided on the official website of the Jizzakh Stat. Accessed at: http://www.jizzaxstat.uz/uploads/press-reliz/2018/dekabr/selxoz%20ru.pdf. Accessed on 06.08.2019.

[114] http://jizzax.uz/_jizzaxt.php. Accessed 11 October 2019.

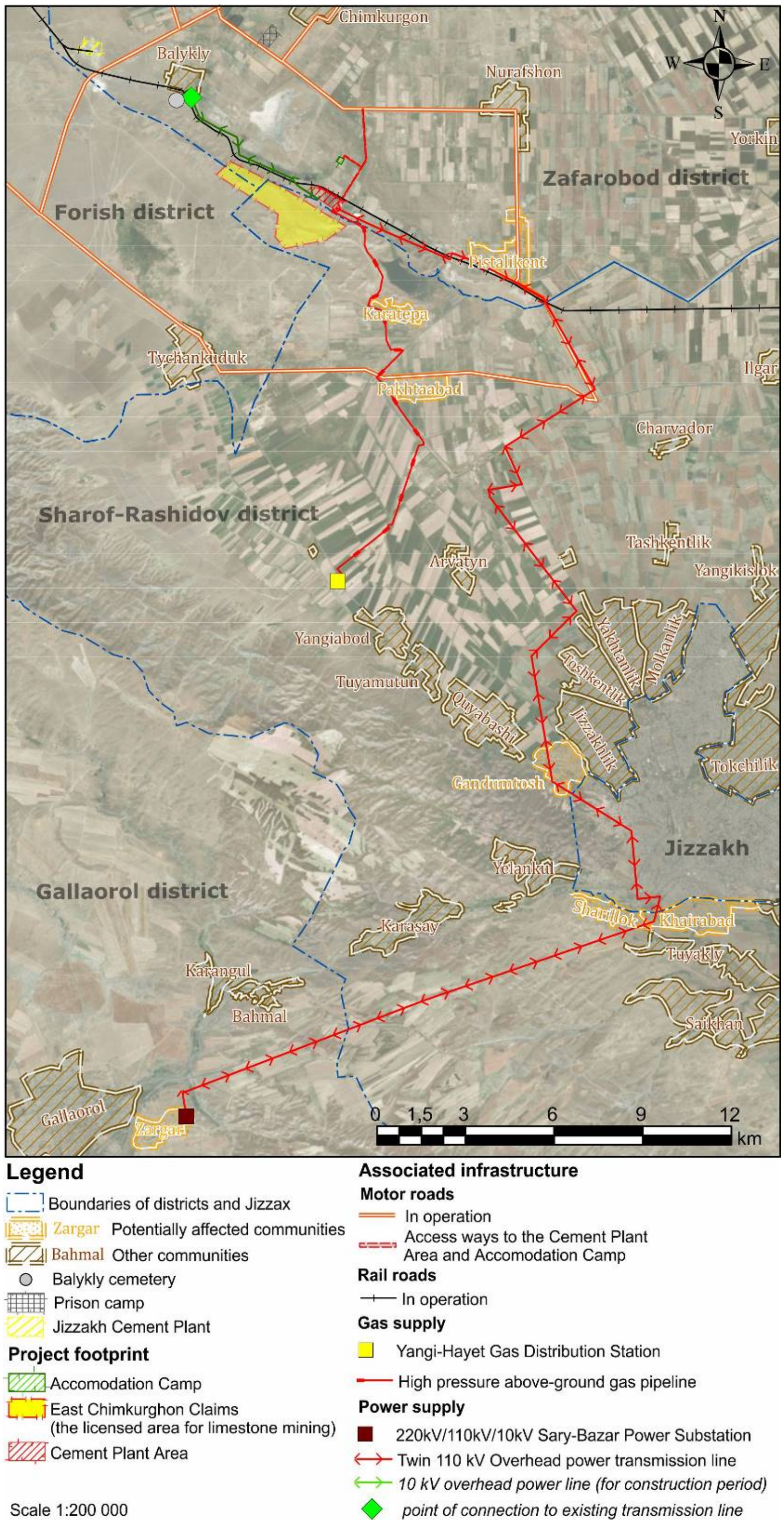


Figure 8.2: Communities closest to the Project associated facilities

The Project-associated motor road will be located at the territory adjacent to the Project site and will connect it to the public R-37 road (this road connects R-37b road with Nurafshon, Pakhtakor and other communities) – see Figure 8.2. The overhead 10 kV power line will lie from the Plant along the existing rail road and main watercourse of the A.A. Sarkisov Yuzhno-Golodnostepskiy Canal for approximately 6 km.

Major parts of the twin 110 kV overhead power transmission line and of the above-ground gas pipeline will lie at the territory of Sharof-Rashidov district (Figures 8.2 and 8.3). The territory along the named linear objects is also largely rural and is used for agricultural purposes.

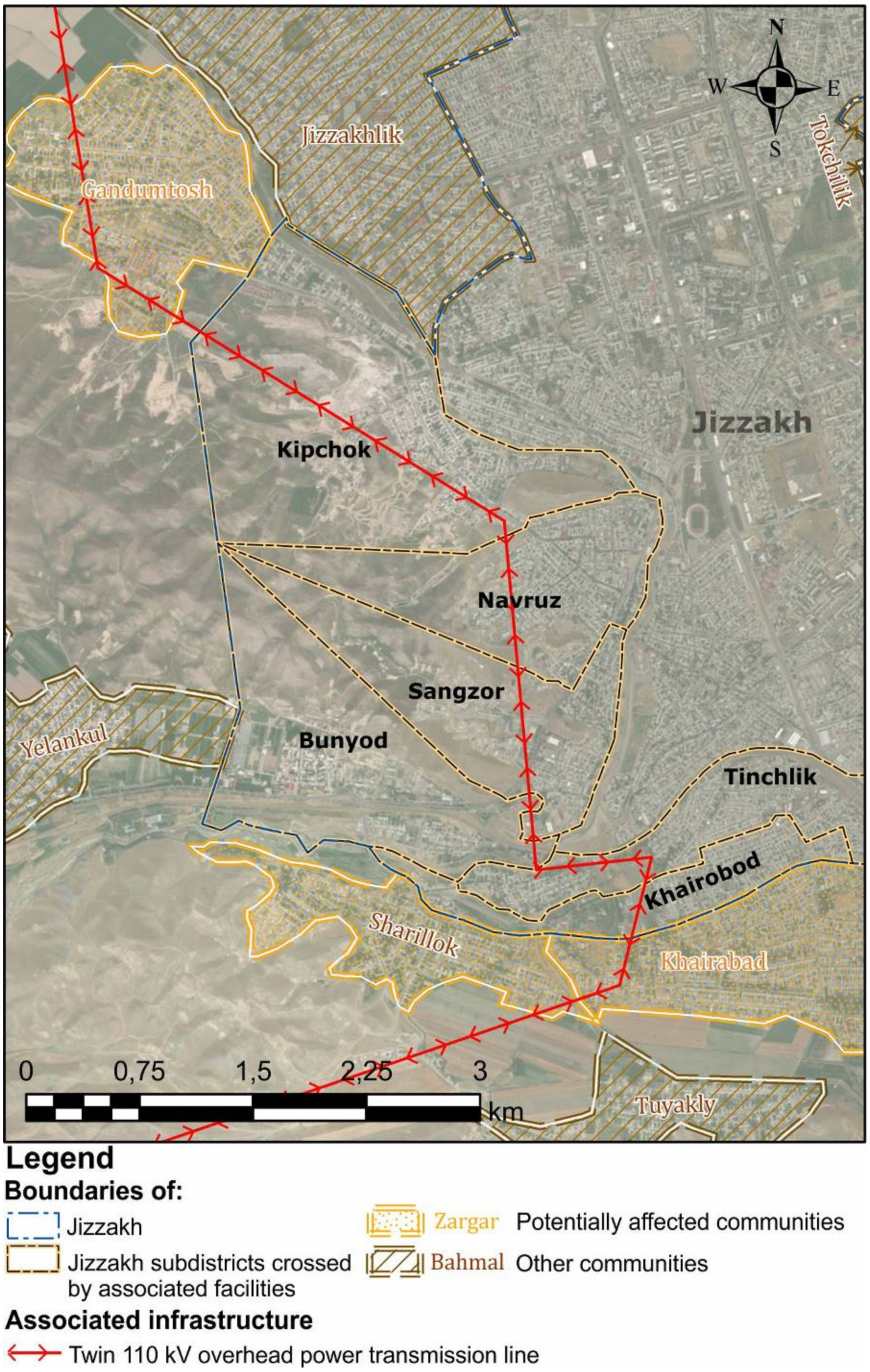


Figure 8.3: Communities close to the twin 110 kV overhead power transmission line near Jizzakh

Information on communities located in proximity or crossed by the associated facilities is provided below. Table 8.3 shows communities close to the above-ground gas pipeline, whereas Table 8.4 – communities close to the twin 110 kV power line.

Table 8.3: Communities close to the above-ground gas pipeline (associated facility)

Community	Approximate Distance to the Project Site, km	Approximate Distance to the Closest Associated Facility, km	Population Number	Administrative district / Town
Karatepa	2.6	0	20 households	Sharof-Rashidov district
Pakhtaabad	5.1	0	400-500 households	Sharof-Rashidov district

Yangiabod and a small community to its North-West are located at over 1 km to the gas pipeline (and over 10 km from the Project site) and are therefore not considered further in this report.

Table 8.4: Communities close to the twin 110 kV overhead power transmission line (associated facility)

Community	Approximate Distance to the Project Site, km	Approximate Distance to the Closest Associated Facility, km	Population Number / Households
Zafarobod district			
Pistalikent	4.2	0	4,448
Sharof-Rashidov district			
Toshkentlik	15	0.15	1,450 households
Gandumtosh	18	0	900 households
Khairabad	25	0	1,400 households
Sharillok	23	0	600 households
Town of Jizzakh			
Kipchok	20	0	200 households
Navruz	22	0	220 households
Sangzor	22	0	240 households
Bounyed	22	0	170 households
Khayrobod	24	0	75 households
Tinchlik	24	0	130 households
Gallaorol district			
Zargar	29	0	700 households

Since construction of the power transmission line will be short-term and not associated with significant environmental impacts (no significant impacts are also associated with its operation), communities located at a distance of 300 m and over form the designed power line are scoped out of the further assessment process. These include the following communities of Sharof-Rashidov district: Arvatyn, Yakhtalik (and a small community 1 km to its North), Jizzakhlik, Quyabashi; communities of Gallaorol district: Bakhmal and Gallaorol.

The district center Zafarobod (approximately 4,000 people) lies at 12 km to the North-East from the Project site.

The regional center Jizzakh (160,300 people) is located at a considerable distance of approximately 19 km to the South from the Project site. However, as mentioned above the twin 110 kV overhead transmittion line will cross its outskirts.

8.5 Community Profiling

This section provides information on community profiling, including:

- Information on communities in the vicinity of the Project site in Zafarobod district;
- Information on communities along the Project associated facilities in other districts.

8.5.1 Communities that in the vicinity of the Project site and associated facilities in Zafarobod district

The 4 closest communities to the Project site in Zafarobod district are Balykly, Chimkurgon, Nuravshon and Pistalikent. Each of them is described below.

Balykly

Balykly (341 people) is a small rural community lying at the bottom of Balykly-Tau Ridge and surrounded by agricultural lands. It is located approximately 2 km to the Project Plant site on the opposite side of the railroad, 5.1 km to the accommodation camp. The temporary 10 kV overhead power line to be used during Project construction also runs to the point of connection to the existing transmission line located in Balykly.

Figure 8.4: Balykly overview and water channel in the foreground (approximately 200 meters from Balykly)

Administraively Balykly is part of Chimkurgon. It comprises 154 families residing in 101 households. The families reside in private detached houses. The key economic activity in the community is agriculture (crop production and cattle preeding).

A prison camp is located between Balykly and Chimkurgon (Figure 8.1). The prisoners are also engaged in the agricultural sector. It is located in the agricultural area at some distance form Balykly and Chimkurgon at approximately 150 m from the local public road.

Figure 8.5: Residential houses and streets of Balykly

Balykly has a school and a kindergarten. A local cemetery is also located on the other side of the railroad at the bottom of the ridge at over 5 km from the Plant.

Chimkurgon

Chimkurgon rural settlement administratively includes two communities – Chimkurgon and Balykly. Chimkurgon (2,232 people) is a community located at 5.5 km from the Project site and 4.9 km from the accommodation camp. It has 355 families residing in 320 households. The housing in the community includes only private detached structures. Chimkurgon is surrounded by agricultural lands crossed by water canals. During Soviet times it used to accommodate a large state farm. However, agriculture remains to be the key economic activity in the community. Local residents are also employed in construction of Huaxin Cement plant and in the other cement producing plant (JizzakhCement).

Figure 8.6: Residential houses in Chimkurgon

The community has a school and a kindergarten. Chimkurgon also has a café. A local police officer is also based in this community.

Nuravshon

Nuravshon rural settlement includes only one community – Nuravshon. This community is relatively large comprising 4,736 residents. It is located at 5.5 km distance from the Project site and 5.2 km from the accommodation camp. The housing in the community includes one and two-storey detached structures.

Agriculture is the key economic activity in Nurafshon. However, some locals are also employed in a poultry farm outside the rural settlement.

Figure 8.7: Residential houses and street in Nurafshon

Nurafshon has two health care clinics and a pharmacy. It also has a vocational college, two schools and 2 kindergartens. As a relatively large rural community, Nurafshon has a barbershop, a bakery and a sewing shop. A local police officer is also based in Nurafshon.

One of the potential Project traffic routes will cross Nurafshon (Section 8.8).

Pistalikent

Pistalikent rural settlement (former Sovkhoz Timiryuazeva) also includes only one community – Pistalikent. It lies at 4.2 km distance from the Project site, as well as 5.3 km from the workers accommodation camp. The twin 110 kV power transmission line (associated facility) also goes along this community. Pistalikent has 4,448 residents[115] living in one apartment house and private detached houses.

[115] According to information provided by hokimiyat of Zafarobod district in July 2019 under request.

Pistalikent used to accommodate a large state farm. Along with involvement in the agricultural sector, Pistalikent residents are currently employed in the state-owned Zafarobod Chemistry organisation, distributing mineral fertilisers among local farmers. Two open mines of Bekabad Cement organisation are also located at the territory of the rural settlement at the bottom of Balykly-Tau Ridge, also providing jobs to local residents (the cement producing plant of this organisation is located at a distance of over 100 km). In addition, some locals also work in a granary facility in Pistalikent. Several fish farming ponds are also located at the territory of this rural settlement.

Figure 8.8: Residential houses and streets in Pistalikent

Pistalikent has two schools and a kindergarten. An outpatient clinic (including ambulance) is also operating in the community. A police officer is also based in Pistalikent.

8.5.2 *Communities along the Project associated facilities in other districts*

This subsection described communities located along the high pressure above-ground gas pipeline and the twin 110 kV power transmission line.

8.5.2.1 Communities along the above-ground gas pipeline

Communities located along the high pressure above-ground pipeline include Karatepa, Pakhtaabad, Yangiabod and a small community to its North-West (see Table 8.3). All of them are located in Sharof-Rashidov district.

Karatepa

Karatepa is a very small rural community lying at the bottom of Balykly-Tau Ridge. It is located at 2.6 km from the Project licensed area for limestone mining on the opposite side of the ridge from the Plant. However, the above-ground gas pipeline will go along this community (Figure 8.1).

Figure 8.9: Resindential houses in Karatepa (Balykly-Tau Ridge in the background)

Karatepa comprises around 20 households. Presumably, the key economic activity in the community is livestock farming. No social infrastructure facilities are there in Karatepa.

Pakhtaabad

Pakhtaabad is a rural community located at approximately 5 km from the Project site. However, the gas pipeline will also go along this community. It has approximately 400-500 households. Presumably, certain social amenities are also there in Pakhtaabad.

Figure 8.10: Resindential houses and local road in Pakhtaabad

Yangiabod and a small community to its North-West are located at over 1 km to the gas pipeline (and over 10 km from the Project site) and are therefore not considered further in this report.

8.5.2.2 Communities along the twin 110 kV overhead power transmission line

The 36km twin 110 kV overhead power transmission line (Project associated facility) will lie along 12 communities (see Table 8.4, Figures 8.2 and 8.3), including:

- One community in Zafarobod district (Pistalikent – described in Section 8.3.1 above);
- Four communities in Sharof-Rashidov district;
- Six communities within the town of Jizzakh;
- One community in Gallaorol district.

The four communities of Sharof-Rashidov district – Toshkentlik (1,450 houses), Gandumtosh (900 households), Sharillok (600 households) and Khairabad (1,400 households) – are communities-sattellites of the town of Jizzakh. The project associated power transmission line will lie at 150 m from Toshkentlik and will cross the other three named communities.

The power transmission line will also cross the nearby communities that are administravely part of the town of Jizzakh. These include Kipchok, Navruz, Sangzor, Bunyod, Tinchlik and Khairobod (only the outskirts of Bunyod will be affected).

Finally, the power transmission line will be connected to the existing Sary-Bazar power substation, located at the outskirts of Zargar community (approximately 700 households) in Gallaorol district.

8.5.3 Social Area of Influence

The social area of influence of the Project and its associated facilities is defined as part of the ESIA process. It includes territories, communities and land users that might experience adverse and positive impacts of the intended activity. The Project Social area of influence includes the following:

- Balykly, which is the key affected community for the Project. It is located 2 km from the Project site and 5 km from the workers accommodation camp. The 10 kV owerhead power line to be used during Project construction will also connect to the existing transmission line in this community. Residents of this community might be also affected by visual impacts associated with the Project development and operation;
- Chimkurgon, Nurafshon and Pistalikent, which are the three other nearest communities to the Project site and the workers accommodation camp in Zafarobod district. The Project construction and operation works might be visible for the residents of these communities. Nurafshon might be also affected by the Project traffic. Residents of these communities might be also employed for the Project. In addition, the Project mining operations at Balykly-Tau Ridge will be also visible for these communities;
- Communities along the Project traffic routes, including:
    - The Western route: Tychankuduk, Yangiobod, Tuyamoyin, Quyovboshi, Gandumtosh, etc.;
    - The Eastern route: Nurafshon, Yorqin, Pakhtakor, etc.

  These communities might be affected by the Project traffic and associated community safety and roads deterioration issues.
- Communities along the Project associated facilities in other districts, including:
    - Karatepa, Pakhtaabad, Toshkentlik, Gandumtosh, Sharillok and Khairabad in Sharof-Rashidov district;
    - Kipchok, Navruz, Sangzor, Bunyod, Tinchlik and Khairobod in the town of Jizzakh;
    - Zargar in Gallaorol district.

  The named communities might be affected during construction of the high pressure above-ground gas pipeline or the twim 110 kV overhead power transmission line as these two Project associated facilities will either cross or lie in the vicinity of these communities.

Karatepa might be also potentially affected by noise impacts associated with the mining activities.

- Local land users, including:
    - Zafaragro Keladjak;
    - Ismail Anora;
    - Land users near Karatepa;
    - Other local land users to be potentially affected by development of the Project and associated facilities in Zafarobod district, Sharof-Rashidov district, the town of Jizzakh and Gallaorol district, including those performing agricultural activities.

  The agricultural areas of Zafaragro Keladjak and Ismail Anora will be crossed by the Project access road. The workers accommodation camp will be also located in the vicinity of the pasture areas used by these two organisations. Land users near Karatepa might be affected by the project mining operations and associated constraints on land use in the surrounding areas.

- Local fish farming organisations, including:
    - o Beliy Amur;
    - o Mir Asrar Babo;
    - o Chimkurgon Sara Gelos;
    - o Forestry Authority of Jizzakh.

The other communities of Sharof-Rashidov and Gallaorol districts have been scoped out of the ESIA process since these are located at a considerable distance of 300 m (and over) from the Project associated facilities. These include the following communities of Sharof-Rashidov district: Yangiabod (and a small community to its North-West), Arvatyn, Yakhtalik (and a small community 1 km to its North), Jizzakhlik, Quyabashi; communities of Gallaorol district: Bakhmal and Gallaorol. It is presumed that construction of the power transmission line and the gas pipeline will be short-term and not associated with significant environmental impacts (no significant impacts are also associated with operation of these facilities).

8.6 Vulnerable Groups

Vulnerable groups are those individuals or groups who may be *"directly and differentially or disproportionately affected by the Project because of their disadvantaged or vulnerable status"*[116].

This status may stem from ethnicity, property, level of income, economic situation, gender, language, religion, national or social origin, age, culture, literacy, physical or mental disability, and dependence on unique natural resources.

Based on the above definition, the following groups within the Project social area of influence are considered vulnerable:

- Children and elderly;
- Low-income individuals and families;
- Disabled or chronically ill.

Description of each of the vulnerable groups is provided in subsections below.

8.6.1 Children and elderly

Children and elderly may be particularly vulnerable with respect to changes in environmental conditions and the effects on health arising from air pollution. In rural areas, children often walk through the communities unaccompanied by adults. This makes them more vulnerable to any impacts associated with traffic, especially in those communities that do not have sidewalks along the access roads.

[116] IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts, paragraph 12.

The elderly may have less ability to adjust to any significant changes to their lives, particularly those who are housebound. They may be less able to participate in stakeholder engagement and decision-making processes than those of younger generations. This might be as a result of difficulty in accessing consultation venues (given the distances between the rural communities) or because of their lower level of computer literacy which would help them find out about Project information and participate online.

Children and teenagers form a quite large group within the Project affected communities in Zafarobod district, accounting for approximately 30% of their population. The share of elderly is approximately 9%.

8.6.2 Low income individuals and families

Low income individuals and families may not have sufficient financial resources to cover basic needs, and their wellbeing may heavily depend on provision of the public social support. This makes them more vulnerable to environmental and economic change and can limit their ability to protect their rights and interests. They can also have limited transportation options that, in turn, limit their ability to get involved in stakeholder engagement and decision-making processes.

According to the Passport of Chimkurgon Rural Settlement, it has 19 low income families. No information on the other affected communities is available.

8.6.3 Disabled or chronically ill

People with disabilities or chronic diseases can be vulnerable, as their ability to gain employment and generate income is often lower. They may also find it challenging to participate in stakeholder engagement activities and decision-making processes. The physically disabled are likely to be particularly vulnerable members of the community as they tend to need more support and often rely on family care.

There are 21 persons in Chimkurgon rural settlement that receive social payments due to their disabled status. No information on disabled or chronically ill people in the other affected communities is available.

8.7 Land Use

8.7.1 Land use at the Project site, accommodation camp and access motor road

The land in Uzbekistan is owned by the state. Land users can only lease land plots.

The following areas have already been acquired for the Project and associated facilities (approximately 525 ha), including:

- Plant area – 71 ha;
- Limestone mining area – 440 ha;
- Workers accommodation camp – 10 ha;
- Access motor road (excluding the access way from this road to the accommodation camp) – 4.6 ha.

The named areas are show on Figure 5.3. As described in Section 5, these areas were allocated according to the Governmental Decree No. 81 as of Ferbruaty 1, 2019, which launched a government-managed process of land acquisition. Additional land plots are still required to locate facilities like the crushing station, conveyor belts and other communication corridors between the quarrying area and the Cement Plant site. These objects/ facilities will be located in the vicinity of the Project site.

In addition, a short section of the access way to the accommodation camp will still require land acquisition.

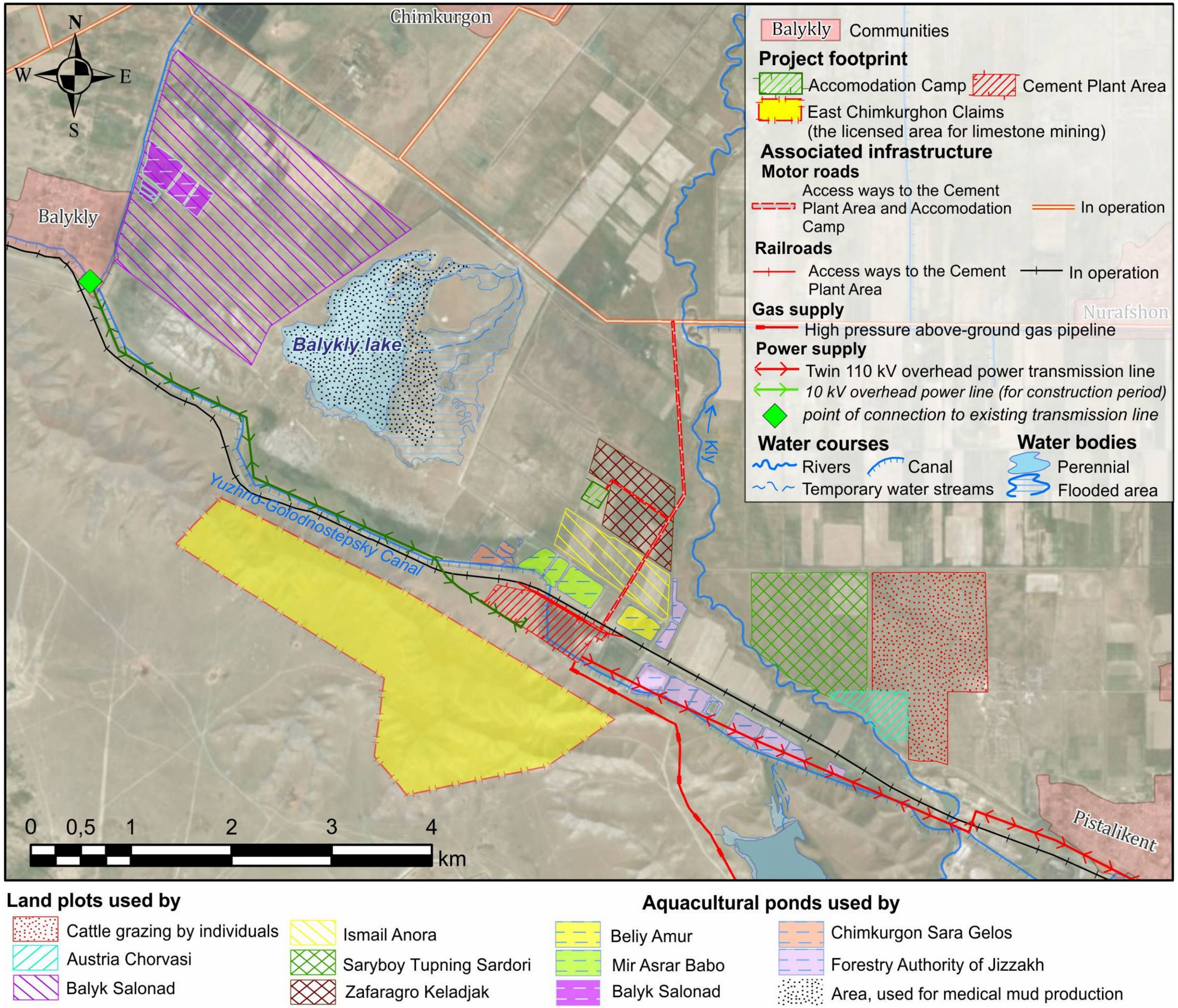


Figure 8.11: Land use at the Project area

8.7.2 Land use in the vicinity of the Project site

The area for limestone mining is located at Balykly-Tau Ridge, whereas the Plant – at the bottom of the ridge. The surrounding area is rural and is primarily used for agriculture (including livestock farming and crop production) and fish farming (Figure 8.11). Several rural communities are also located nearby (see Sections 8.2 and 8.3). The subsections below describe these economic activities in more detail.

8.7.2.1 Agriculture

The actual land users in the vicinity of the Project area are shown in Table 8.7:

Table 8.5: Land use at the Project area

Land User	Approximate land use area, ha	Type of activities
Zafaragro Keladjak	61	Livestock farming (cows)
Ismail Anora	50	Livestock farming (cows and sheep)
Sariboy Tupning Sardory	124	Livestock farming (sheep)
Avstriya Torvasi	23	Livestock farming (cows)
Balyk Salonad	463	Crop production for fish farming
3-4 individual land users (local residents)	163	Livestock grazing (sheep)

Sources: Information provided by hokimiyat of Zafarobod district and confirmed by hokimiyats of Chimkurgon and Pistalikent rural settlements

Land plots used by Zafaragro Keladjak and Ismail Anora will be crossed by the Project access road. The workers accommodation camp is located in the vicinity of the land plots used by these organisations. Non-official land use is also present in the vicinity of the Project site. These activities are described in more detail below.

Zafaragro Keladjak

Zafaragro Keladjak is an agricultural organisation that leases three land plots in the vicinity of the workers accommodation camp, which was under construction during the site visit in July 2019. The territory of this agricultural organisation is also crossed by the Project access motor road (see Figure 8.11). The described land plots of Zafaragro Keladjak are used for grazing of 71 cows. Two herders work for Zafaragro Keladjak at this area. One of them lives with his family (wife and two kids) in a building/ house located at one of these land plots close to the workers accommodation camp. A cowshed is also locaded nearby. However, the named herder also has a house in Chimkurgon[117].

Figure 8.12: Residential building, cowshed and cows at Zafaragro Keladjak territory

Reportedly, Zafaragro Keladjak has also some other land plots used for agricultural purposes outside the Project area[118].

[117] According to information provided by representative of Zafaragro Keladjak on July 2019.
[118] According to information provided by deputy head of hokimiyat of Zafarobod district in July 2019.

Ismail Anora

Ismail Anora is an agricultural organisation leasing land plots in the vicinity of the Project site and the workers accommodation camp (see Figure 8.11). Its territory will be also crossed by the Project access road dividing it into two parts. Ismail Anora is a family business run by a couple, and therefore employing only two people. However, they might also engage one or two workers if required. Reportedly, a barn is also located at its territory[119].

Ismail Anora performs livestock farming activities (cows, sheep) and therefore uses its territory as pasture lands. This organisation has 62 cows and 23 sheep.

Figure 8.13: Cattle grazing at Ismoil Anora territory

Illegal land use in the vicinity of the Project site

The area in immediate proximity to the Project site is used for cattle grazing activities by some local organisation. Reportedly, this organisation has approximately 300-400 sheep. The activities performed by this organisation near the Project site are illegal as only private herders might use public areas for cattle grazing; organisations need to conclude agreement with the district hokimiyat to perform cattle grazing activities at a certain territory.

Figure 8.14: Illegal cattle grazing activities in the vicinity of the Project site

Reportedly, this organisation has land plots where it performs cattle grazing activities on legal basis somewhere closer to Pistalikent.

The site visit in July 2019 also identified illegal fishing activities in Yuzhno-Golodnostepsky Canal (fishing rod, fishnet).

[119] Ibid.

Non-official land use

Public/ non-allocated areas might be used by individuals for cattle grazing. Such activities are performed by 3-4 individuals at the territory of Pistalikent rural settlement (see Figure 8.11). In addition, local residents might also use public areas for capers picking. These activities were reported in Pistalikent rural settlement[120].

No hunting or berries-picking activities were reported by the heads of local hokimiyats within the Project area of influence in Zafarobod district.

Land use near Karatepa

As discussed above, Karatepa is a small rural community located on the opposite side of Balykly-Tau Ridge at the territory of Sharof-Rashidov district. The nearby areas are extensively used for cattle grazing by local land users (not identified). The areas in the vicinity and at the bottom of the ridge are also used as pasture lands. The cattle sheds of local land users are spread along the ridge.

Figure 8.15: Land use near Karatepa on the opposite side of Balykly-Tau Ridge

8.7.2.2 Fish Farming

The area in the vicinity of the Project site is actively used for fish farming activities. Fish farming ponds of the following organisations are located nearby:

- Beliy Amur (8.5 ha);
- Mir Asrar Babo (19.5 ha);
- Chimkurgon Sara Gelos (6.4 ha);
- Forestry Authority of Jizzakh (43.4 ha);
- Balyk Salonad (23.6 ha).

Reportedly, the Forestry Authority of Jizzakh leases its ponds to private fishermen (3-4 persons). The cultivated fish species include European Carp, Grass Carp and Silver Carp. The fish is sold in Jisakh and Tashkent. The workers involved in fish farming are reportedly non-local (from Jizzakh, etc.).

[120] According to information provided by hokimiyat of Pistalikent rural settlement in July 2019.

Figure 8.16: The Project site, existing railroad and fish farming ponds in the background

In April 2019, the Company acquired the area (fish farming pond) from the local farm Polovkhon Tura for construction of the Project-associated access motor road. The area covered 6 ha and included one fish farming pond (the only pond this farm had in this area). This pond was not used for fish farming purposes at the time of its acquisition[121]. The Company acquired this area through amicable settlement – “willing seller and willing buyer” – with provision of adequate compensation in accordance with local standards (126.6 million Som or 13 thou Euro). An independent company was engaged for valuation of the area and for the loss calculation. The settlement was negotiated by hokimiyat of Zafarobod district[122].

8.7.2.3 Other

Balykly lake located at approximately 1.5 km from the Plant and 1 km from the limestone mining area is used for extraction of therapeutic mud. The mud is used by the health resort Gagarin (located in Mirzachulsky district of Jizzakh region), as well as by other organisations in Uzbekistan[123].

8.7.3 Land use associated with the Project associated facilities

No information on land acquisition associated with development of the Project associated faciltities was available during preparation of this report (except of land acquisition related to the access motor road described in subsection 8.8.1 above). The associated infrastructure including gas pipeline, power lines, Project site rail and motor roads are under construction by companies engaged by the government; Huaxin Cement Jizzakh does not take part in these activities.

The overhead 10 kV power line will lie from the Plant along the existing rail road and main watercourse of the A.A. Sarkisov Yuzhno-Golodnostepskiy Canal for approximately 6 km (see Figure 8.2). According to information available, there are no private land users along the power line route. However, there is no information whether the power line will cross any local households near the point of its connection to the existing transmission line.

Major parts of the twin 110 kV overhead power transmission line and of the above-ground gas pipeline will lie at the territory of Sharof-Rashidov district (Figures 8.2 and 8.3). The territory along the named linear objects is largely rural and is used for agricultural purposes. Residential areas will be also over-head crossed by the power transmission line.

[121] This was confirmed by the Company and by the hokimiyat of Zafarobod district in July 2019.
[122] According to Minutes of meeting on the compensation payment to be provided to the farm Pavlohkon Tura by Huaxin Cement Jizzakh as of March 28, 2019.
[123] According to information provided by hokimiyat of Zafarobod district in July 2019.

8.8 Transport

The Project site will be served by an access road connecting it with the public R-37 road (this road connects R-37b road with Nurafshon, Pakhtakor and other communities). Reaching the R-37 road, the Project traffic will go East direction via R-37b and R-36 roads to Jizzakh to distribute cement products further throughout Uzbekistan. However, as a secondary route the Project traffic may also go West direction by R-37b road via Nurafshon, Yorqin, Pakhtakor, and then via the chosen road network to Tashkent. The potential traffic routes are shown on the figure below:

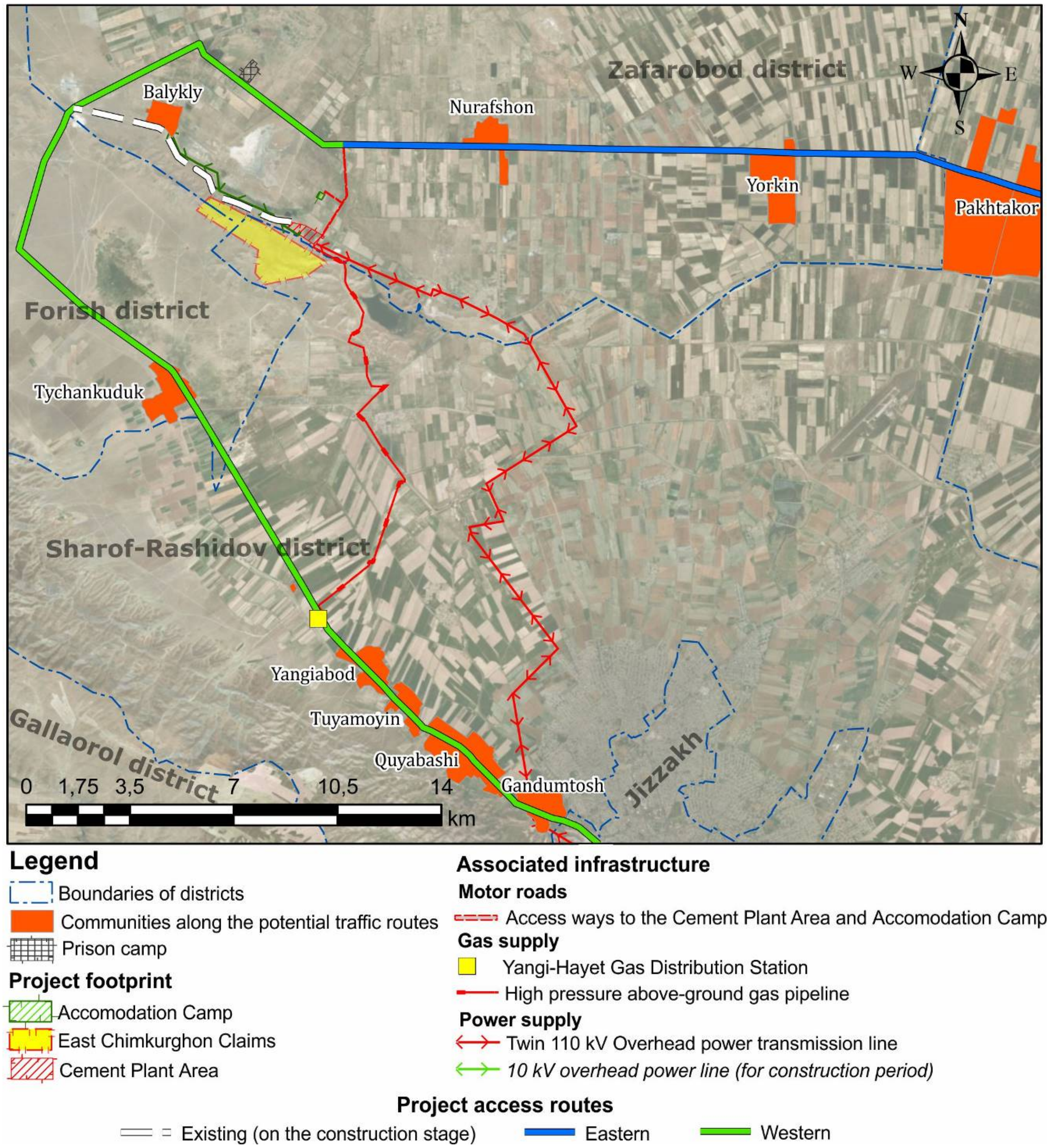


Figure 8.17: Project potential traffic routes

The following residential communities are located along the potential traffic routes:

- The Western route: Tychankuduk, Yangiobod, Tuyamoyin, Quyovboshi, Gandumtosh, etc.

(the prison camp in Chimkurgon rural settlement is located at over 150 m from the Project traffic route);

- The Eastern route: Nurafshon, Yorqin, Pakhtakor, etc.

The current road along Balykly-Tau Ridge used by the Company (until the access road will be constructed) is also shown on the above figure.

The Project site will be also connected to the existing Boytog-Chimkurgon one-gauge rail way by a rail spur.

8.9 Cultural Heritage

8.9.1 Tangible cultural heritage

No specific archeological/ cultural heritage surveys were performed for the Project.

According to the web portal Meros Cultural Heritage, the following cultural heritage sites are present in Jizzakh region[124]:

- Qizlartepa – archaeological object;
- Kurgantepa (Urdatepe) – archaeological object;
- Xonbandi dam;
- Tamerlan gates – mountain passage;
- Saad Ibn Abu Vaccas – holy spring.

According to UNESCO, there is also a cultural heritage site Abdulkhan Bandi dam, which is a complex of hydro engineering installation[125].

All the named above cultural heritage sites are shown on the map below:

[124] According to web portal Meros Cultural Heritage. Accessed at: Qizlartepa, Kurgantepa and Xonbandi dam - https://meros.uz/en/objects/archaeological?ObjectSearch%5Bprovince_id%5D=9&ObjectSearch%5Bperiod%5D=&ObjectSearch%5Bcontent%5D=, Tamerlan gates - https://meros.uz/en/object/%D1%82%D0%B0%D0%BC%D0%B5%D1%80%D0%BB%D0%B0%D0%BD%D0%BE%D0%B2%D1%8B-%D0%B2%D0%BE%D1%80%D0%BE%D1%82%D0%B0, Saad Ibn Abu Vaccas - https://meros.uz/ru/object/sad-ibn-abu-vaqqos-ziyoratgohi. Accessed on: 12.08.2019.

[125] UNESCO. World Heritage Centre. Accessed at: http://whc.unesco.org/en/tentativelists/5288/. Accessed on: 12.08.2019.

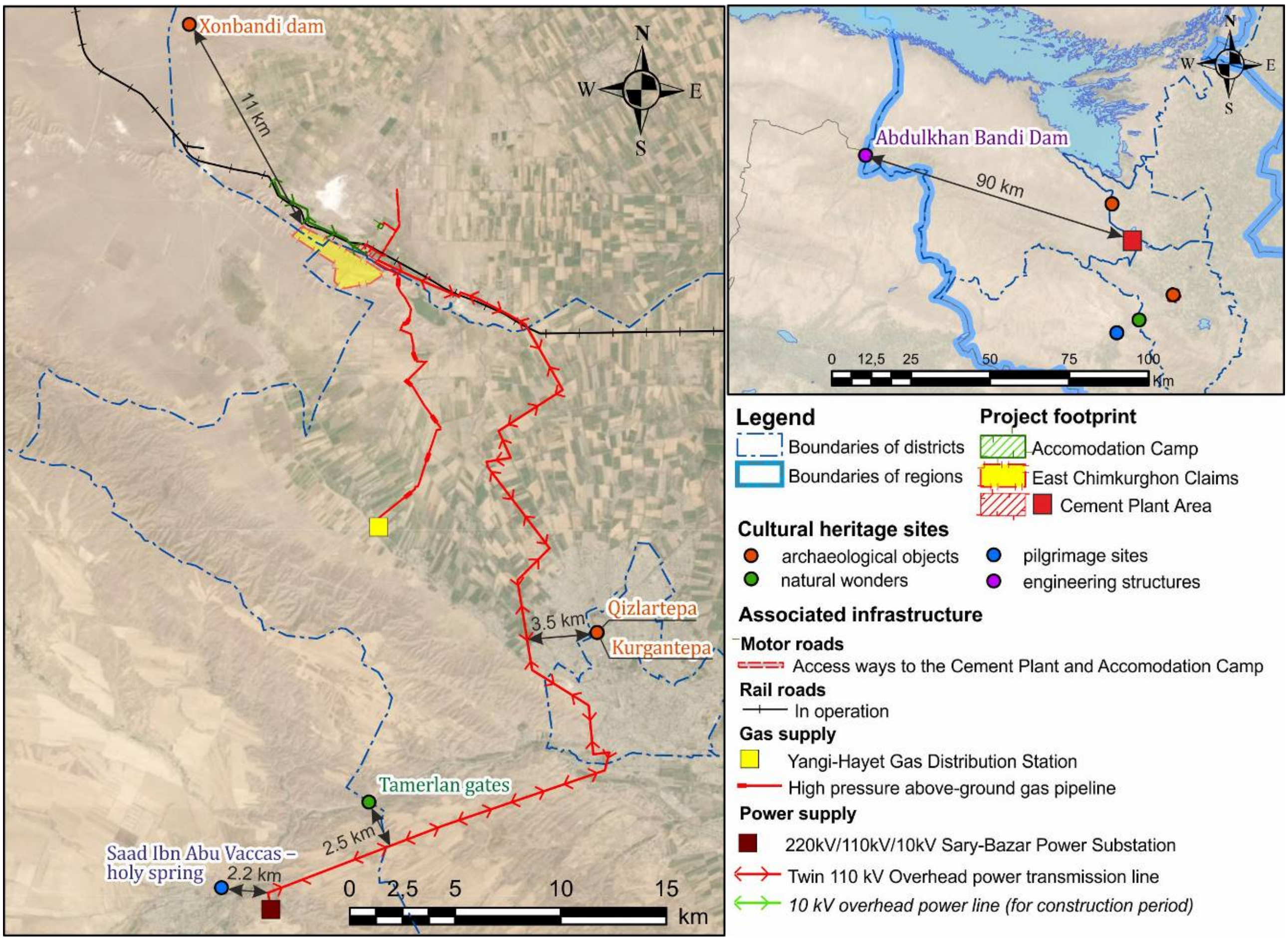


Figure 8.18: Cultural heritage sites and the Project and associated facilities' layout

As shown on the Figure 8.18, certain cultural heritage sites are located close to the twin 110 kV overhead power transmission line.

A certain survey also confirms the presence of cultural heritage sites in Jizzakh and Zaamin[126].

According to information provided by hokimiyat of Zafarobod district, there are no cultural heritage sites at the Project site or in the surrounding areas. As reported by hokimiyats of Chimkurgon (includes Balykly), Pistalikent and Nurafshon rural settlements, there are no cultural heritage sites within the areas of these rural settlements (only one monument to Uzbek poet Khamid Alimdjan was identified in Nurafshon).

8.9.2 Intangible cultural heritage

In accordance with requirements of the International Finance Corporation, intangible cultural heritage includes cultural knowledge, innovations, and practices of communities embodying traditional lifestyles.[127]

As discussed in Section 8.4.2, the key ethnic groups of Zafarobod district include Uzbeks, Tadjiks and Kazakhs. There are no indigenous peoples or specific ethnic groups within the Project social area of influence in Zafarobod district.

The main language within the Project social area of influence is Uzbek. However, most of the people understand or speak Russian.

[126] Pardaev M. 2019. Design and Development of Cultural Civilization in Dzhizak (Jizax and Zomin). ISJ Theoretical & Applied Science, 01 (69), 36-40.
[127] IFC. 2012. Performance Standards on Environmental and Social Sustainability. Performance Standard 8. Cultural Heritage, i. 3.

Figure 8.19: Muslim structure at Balykly cemetery

There are no data on religious affiliation of the communities within the Project social area of influence. However, vast majority of the Uzbek population in general (88%) are Muslim (Sunni)[128]. Presumably, Islam is also the main religion within the Project social area of influence. There is a Muslim cemetery not far from Balykly (Figure 8.19).

8.10 Crime and Security

No information on the crime level within the Project social area of influence was available during this report preparation. Accroding to information obtained during the field trip in July 2019, the police officers are based in Chimkurgon, Nurafshon and Pistalikent.[129]

[128] CIA, 2018. The World Factbook. Accessed at: https://www.cia.gov/library/publications/download/download-2018. Accessed on 12.08.2019.
[129] According to information provided by hokimiyats of Chimkurgon, Nurafshon and Pistalikent rural settlements during interviews in July 2019.

9. ENVIRONMENTAL IMPACT ASSESSMENT

9.1 Air Quality Impact Assessment

This section provides a preliminary generalized assessment of possible impact from the operation of the proposed Cement Plant on the level of chemical pollution of the near-ground atmosphere within the Project Site.

When evaluating the air impact in the vicinity of the Cement Plant it is also necessary to consider pollutant emissions from the Jizzakh Cement Plant located 8 km northwest. The potential air quality impact from this Plant and baseline conditions are considered in Section 7.1.9.

9.1.1 Basic requirements for assessing the impact on air quality.

Huaxin Cement Plant includes two main production facilities: limestone quarry and Cement plant. Both facilities are classified as a hazard class II enterprise with the corresponding SPZ sized 500 m according to SanPiN No. 0350-17[130].

The size of the sanitary protection zone should be chosen to prevent the maximum permissible concentrations (MPCs) for air pollutants in residential areas and the maximum permissible levels (MALs) for physical air impact from being exceeded at its boundary or beyond. At the same time, for groups of industrial or production facilities and for an industrial hub, sanitary norms require the establishment of a common sanitary protection zone, both estimated and final, taking into account the totality of air emissions and physical impact from sources at industrial and production facilities included in that common zone.

The assessment considers four hazardous classes which are adopted by the sanitary standards for classification of polluting substances in terms of impact on human organism. The Uzbekistan Ministry of Health has identified and approved permissible concentrations of specific polluting substances in air of residential areas: MPC_{20min}- short-term exposure limit (during 20 minutes), MPC_{aa} – annual average or TSEL - tentative safe exposure level), as well as permissible concentrations in working zone (MPC_{wz}).

9.1.2 Impact on air quality during construction

Emissions of air pollutants from the Project's construction phase are mainly associated with transportation i.e. vehicle movement and site preparing activities. The primary sources include:

- Exhaust emissions from running engines (carbon monoxide, nitrogen oxides, sulfur dioxide, hydrocarbons);
- Earthworks, loading/unloading operations, transportation to and from the plant and quarry sites (dust);
- Fugitive emissions from loading/unloading operations of raw construction materials and process equipment (dust);
- Emissions from welding (welding aerosol components (iron oxide, manganese and its compounds, etc.), nitrogen oxides, carbon oxide);
- Painting works (volatile components of varnishes and paints, such as xylene, toluene, butyl acetate).

Besides emissions from the above sources, there will be other contributing sources of air pollution, e.g. diesel generator units of the portable welding stations, dust from stockpiles and dust-generating materials storage and hydrocarbons from machinery fueling operations.

Composition and quantities of emissions from the above sources will depend on type of activities and number of simultaneously operating vehicles. A technical regulation[131] has been introduced in Uzbekistan,

[130] SanPiN No. 0350-17. Sanitary rules and norms of air quality protection in residential areas of The Republic of Uzbekistan.
[131] Technical regulations on requirements for motor and aviation gasoline, diesel, marine and jet engine fuel, and masut (approved by the Cabinet of Ministers of Uzbekistan, Order No. 931 of 21.11.2017)

which determines the quality of gasoline and diesel fuel. It distinguishes 4 classes of fuel quality, depending on the content of pollutants (K2, K3, K4, K5). The regulation does not provide for the transition or abandonment of low-ecological-class fuel, and therefore the estimate of the mass of pollutants can vary widely, especially for sulfur dioxide emissions. Requirements for sulphur content in different classes of fuel are given in Table 9.1.1.

Table 9.1.1: Requirements for sulphur content in fuel, mg/kg (not above)

Fuel	Ecological class			
	K2	K3	K4	K5
Diesel	500	350	50	10

It is expected that major pollutants at the construction phase will include nitrogen oxides, sulphur dioxide, carbon oxide, and dust. Due to significant distance to nearest communities, the impact on their inhabitants can be assessed as low. Impact on workers close to air pollution sources is assessed as low.

9.1.3 Air impact during the operation phase

Sources of pollutant emissions

Emissions of air pollutants from the project's operation phase are mainly associated with the industrial process emissions released from cement manufacturing. Additional sources of atmospheric and fugitive emissions comprise of vehicular transportation of raw materials, finished product and quarrying operations.

A significant source of air pollution is explosion works in the limestone quarry. The explosions will be carried out by the method of borehole charges. It is not known whether they will be carried out with stemming - this method allows you to simultaneously increase the efficiency of loosening and reduce the diameter of the expansion of dust and blast fragments. According to the safety rules for explosion works[132], the radius of the danger zone around such explosions should be at least 200 m.

All stationary sources of pollution (limestone crusher, rotary kiln, precalciner & preheater system, clinker cooler) are accomplished by air pollution control equipment with a working efficiency of at least 99.9%. Rotary kiln nozzle design reduces NO_x emissions.

Pollutant emissions regulation based on pollutant dispersion

In order to regulate emissions of pollutants based on the dispersion of pollutants in near-ground air, maximum permissible emissions should be determined for each source and for the enterprise as a whole in such a way to make sure that the MPC_{20min} values for air in populated areas at the SPZ boundary or at the borders of residential areas are not exceeded.

As regards the Cement Plant and limestone quarry, the calculation of dispersion should be carried out taking into account:

- the location of the Balyklytau mountain ridge 300 m southwest to the Cement Plant;
- low wind speeds are prevailed, which complicates the self-cleaning of the atmosphere;
- regular (twice a week) explosions in the Balyklytau mountains and these height decreasing as a result of limestone mining.

Dispersion of Pollutants: A Preliminary Assessment

Preliminary modelling of pollutants dispersion has been performed by Ramboll on the basis of the MRR-2017 imitation computer model (previously named as OND-86) that is in official use within Uzbekistan. The supporting software is issued by 'Integral' Company (St.-Petersburg, Russia) under the trade mark of

[132] Unified Safety Regulations for Explosion Works. Approved by the Gosgortechnadzor of the Republic of Uzbekistan 24.04.92

'Ecolog' (version 4.60.1). The model simulates the worst-case meteorological conditions under which dispersion of pollutants is least effective, and their above-ground levels are therefore the highest.

The data needed for pollutants dispersion modelling include: i) parameters of emission sources (like their location and height, flow rates, the list of pollutants, etc.), ii) background levels of emitted compounds in the impacted atmosphere, iii) data on local environmental conditions that govern dispersion of pollutants (climate and meteorological conditions, topography, vegetation cover, development, etc.), and iv) location and status of potential recipients.

The data on main emission sources have been provided by the Company (like the ones for the three plant's chimneys – see Table 9.1.2 for more detail).

Table 9.1.2: Air emissions of Huaxin Cement Jizzakh plant - chimneys (the data provided by the Company)

Emission sources			Pollutants						
ID	Title	Category	Height, m	Outflow diameter, m	Temrepature, ^0C	Gas flow, m/s	Gas flow rate, м^3/с	Pollutants	Emission rate, g/s
1	*Kiln tail chimney*	*Point source*	*100*	*3,35*	*80*	*21.36*	*188*	*Ca-PM**	*7,89*
								SO2	*52,6*
								NO2	*84,16*
								NO	*13,68*
2	*Kiln head chimney*	*Point source*	*35*	*3,35*	*120*	*17.6*	*155*	*Si-PM***	*0,464*
3	*Cement mill ventilation chimney*	*Point source*	*37*	*3,35*	*65*	*15.1*	*133*	*Si-PM*	*0,648*

The ventilation data and other fugitive emissions are taken from a number of sector-specific guidelines, reference books, or other cement industries (Table 9.1.3). Location of emission sources has been coordinated with the plant's master plan, with some other parameters of them (like the height, for example) improvised with some assumptions.

Location of emission sources (Figure 9.1.1) has been identified in accordance with the cement plant's master plan. Each source is provided with relevant data of gas/particulates flow, temperature, etc. (the indexes are the same as in Table 9.1.3). Surrounding area is illustrated by Figure 9.1.2 where a set of reference points are specified, each being associated with residential areas closest to the plant and the quarry as well.

The law of Uzbekistan requires establishing a sanitary protection buffer zone (SPZ) around each cement plant or limestone quarry, with the statutory width of this area being equal to 500 m. As the cement plant is adjacent to the mining area, there will be an integrated SPZ around both areas, the boundaries of which are currently unclear because there is no information on which part of the claims will be quarried at first (and of what size). That is why the SPZ area shown by the Figure 9.1.2 is tentative and must be further detailed.

Four main pollutants that have a potential to travel long distances from emission sources and create the highest above-ground concentrations, were selected for the modelling: nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and two categories of particulate material – carbonaceous dust containing 0 to 20 per cent of Si (indexed as Ca-PM) and silicate dust (Si-PM) containing 20 to 70 per cent of Si. Ramboll expects the modelling of their dispersion provides representative data on overall distribution of the plant-related pollution in the atmosphere.

The Project Area is located very far from the closest stations of air quality monitoring. Since no environmental surveys have been also performed onsite, Ramboll has taken values recommended by Russian authorities for remote lowly populated areas the air of which is supposed to contain 0.055 mg of NO_2, 0.038 mg of NO and 0.018 mg of SO_2 per 1 cubic meter. A single air quality measurement carried out in October 2019 (see Table 7.3.14 in Chapter 7) confirms general applicability of these values to the

Project area, since the 20min and 24h levels of NO_2 and SO_2 at the RP-1...RP-5 are falling within the ranges of 0.01-0.03 and 0.002-0.012 mg/m^3, respectively.

The reference levels of particulates cannot be taken from any sources, because the Project Area is subject to wind erosion and some other processes that induce dusting. This means that estimated levels of particulates are Project-based only, and it remains unclear to which extent the total amounts of particulates will grow in the presence of Project's quarry and cement plant. This is generally supported by results of the October 2019 air sampling (see Table 7.3.14): two sampling locations stand out sharply with 0.4-0.5 mg/m^3 of dust, with the 3 others showing as low as 0.01-0.08 mg/m^3.

In the absence of digital terrain data, it has been assumed that the surface of the area is flat. Since no reference data on meteorological conditions and background concentrations of pollutants are also available for the Project Area, Consultant has operated climate characteristics summarized by the geotechnical survey report (O'ZGASHLITI DUK, 2018), with some gaps having been filled with publicly available data on the climate of Uzbekistan. The value of atmosphere stratification index has been set equal to 200 (according to the MRR-2017 air dispersion modelling methodology).

Table 9.1.3: Air emission sources of the Project

Emission sources			Emission parameters						Pollutants	
ID	Title	Category	Height, m	Outflow diameter, m	Temrepature, ^0C	Gas flow, m/s	Gas flow rate, $м^3/c$	Size (for fugitive sources), m	Pollutants	Emission rate, g/s
C1	*Kiln tail chimney*	*Point source*	*100*	*3,35*	*80*	*21.36*	*188*	–	*Ca-PM**	*7,89*
									SO2	*52,6*
									NO2	*84,16*
									NO	*13,68*
C2	*Kiln head chimney*	*Point source*	*35*	*3,35*	*120*	*17.6*	*155*	–	*Si-PM***	*0,464*
C3	*Cement mill ventilation chimney*	*Point source*	*37*	*3,35*	*65*	*15.1*	*133*	–	*Si-PM*	*0,648*
V1	*Ventilation system of the crushing facility*	*Point source*	*10*	*1,28*	*18,2*	*12,82*	*16,5*	–	*Si-PM*	*0,47766*
V2	*Ventilation system of the limestone storage*	*Point source*	*10*	*0,7*	*18,5*	*6,3*	*2,4*	–	*Si-PM*	*0,063132*
V3	*Ventilation system of the raw material (clay) and additive storage*	*Point source*	*9*	*0,5*	*18,4*	*9,65*	*1,9*	–	*Si-PM*	*0,0514587*
V4	*Ventilation system of the raw mix and additive proportioning station*	*Point source*	*10*	*0,5*	*17,96*	*3,52*	*0,196*	–	*Ca-PM*	*0,022416*
V5	*Ventilation system of the limestone proportioning station*	*Point source*	*10*	*0,5*	*72,6*	*9,65*	*1,9*	–	*Si-PM*	*0,0611*
V6	*Ventilation system of the limestone milling unit*	*Point source*	*10*	*1,28*	*18,2*	*12,82*	*16,5*	–	*Si-PM*	*0,47766*
V7	*Ventilation system of the*	*Point source*	*10*	*1,28*	*18,2*	*12,82*	*16,5*	–	*Si-PM*	*0,0756*

Emission sources			Emission parameters						Pollutants	
ID	Title	Category	Height, m	Outflow diameter, m	Temrepature, ^{0}C	Gas flow, m/s	Gas flow rate, м^{3}/с	Size (for fugitive sources), m	Pollutants	Emission rate, g/s
	corrective crusher & transport facility									
V8	*Ventilation system of the raw mill homogenising silo & kiln feeding facility*	*Point source*	*10*	*0,5*	*76,5*	*14,7*	*2,9*	*–*	*Ca-PM*	*0,068633*
V9	*Ventilation system of the clinker cooler*	*Point source*	*10*	*0,56*	*107,2*	*11,6*	*2,9*	*–*	*Si-PM*	*0,61085*
V10	*Ventilation system of the clinker storage*	*Point source*	*10*	*0,95*	*109,4*	*8,06*	*5,7*	*–*	*Si-PM*	*0,121476*
V11	*Ventilation system of the cement grinding facility*	*Point source*	*37*	*1,8*	*75*	*16,37*	*41,6*	*–*	*Si-PM*	*0,04539*
V12	*Ventilation system of the cement storage*	*Point source*	*10*	*0,7*	*75,2*	*7,4*	*2, 9*	*–*	*Si-PM*	*0,0461083*
V14	*Ventilation system of the cement bulk loading unit (rail road)*	*Point source*	*10*	*0,5*	*20,5*	*14,3*	*2,8*	*–*	*Si-PM*	*0,054236*
D1	*Simultaneous quarrying*		*5*	*–*	*–*	*–*	*–*	*200x400*	*Ca-PM*	*9,57*
D2	*Limestone crushing facility*		*2*	*–*	*–*	*–*	*–*	*100x140*	*NO2*	*0,10648*
									NO	*0,0173*
									SO2	*0,01309*
									CO	*0,2656*
									Petroleum hydrocarbons	*0,03492*
									Si-PM	*0,056*
D3	*In-Plant Rail*		*5*	*–*	*–*	*–*	*–*	*30x600*	*NO2*	*1,2512*

Emission sources			Emission parameters						Pollutants	
ID	Title	Category	Height, m	Outflow diameter, m	Temrepature, ^0C	Gas flow, m/s	Gas flow rate, $м^3/c$	Size (for fugitive sources), m	Pollutants	Emission rate, g/s
	Operations area								*NO*	*0,20336*
									SO2	*0,09792*
									CO	*0,3104*
									Petroleum hydrocarbons	*0,44416*
D4	*Access rail road area*		*5*	–	–	–	–	*10x1000*	*NO2*	*0,1564*
									NO	*0,02542*
									SO2	*0,01224*
									CO	*0,0388*
									Petroleum hydrocarbons	*0,05522*
D5	*Access rail road area*		*5*	–	–	–	–	*10x250*	*NO2*	*0,1564*
									NO	*0,02542*
									SO2	*0,01224*
									CO	*0,0388*
									Petroleum hydrocarbons	*0,05552*
D6	*Access motor road*		*5*	–	–	–	–	*15x1600*	*NO2*	*0,00277*
									NO	*0,00045*
									SO2	*0,00076*
									CO	*0,0064*
									Petroleum hydrocarbons	*0,00089*
D7	*Access motor road*		*5*	–	–	–	–	*15x1700*	*NO2*	*0,00156*
									NO	*0,00025*
									SO2	*0,00043*
									CO	*0,0036*
									Petroleum hydrocarbons	*0,0005*
D8	*In-plant motor ways*		*5*	–	–	–	–	*115x180*	*NO2*	*0,00173*
									NO	*0,00028*
									SO2	*0,00048*
									CO	*0,004*
									Petroleum hydrocarbons	*0,00056*
D9	*In-plant motor ways*		*5*	–	–	–	–	*15x160*	*NO2*	*0,00156*
									NO	*0,00025*
									SO2	*0,00043*
									CO	*0,0036*

Emission sources			Emission parameters						Pollutants	
ID	Title	Category	Height, m	Outflow diameter, m	Temrepature, ^{0}C	Gas flow, m/s	Gas flow rate, м^{3}/с	Size (for fugitive sources), m	Pollutants	Emission rate, g/s
									Petroleum hydrocarbons	*0,0005*

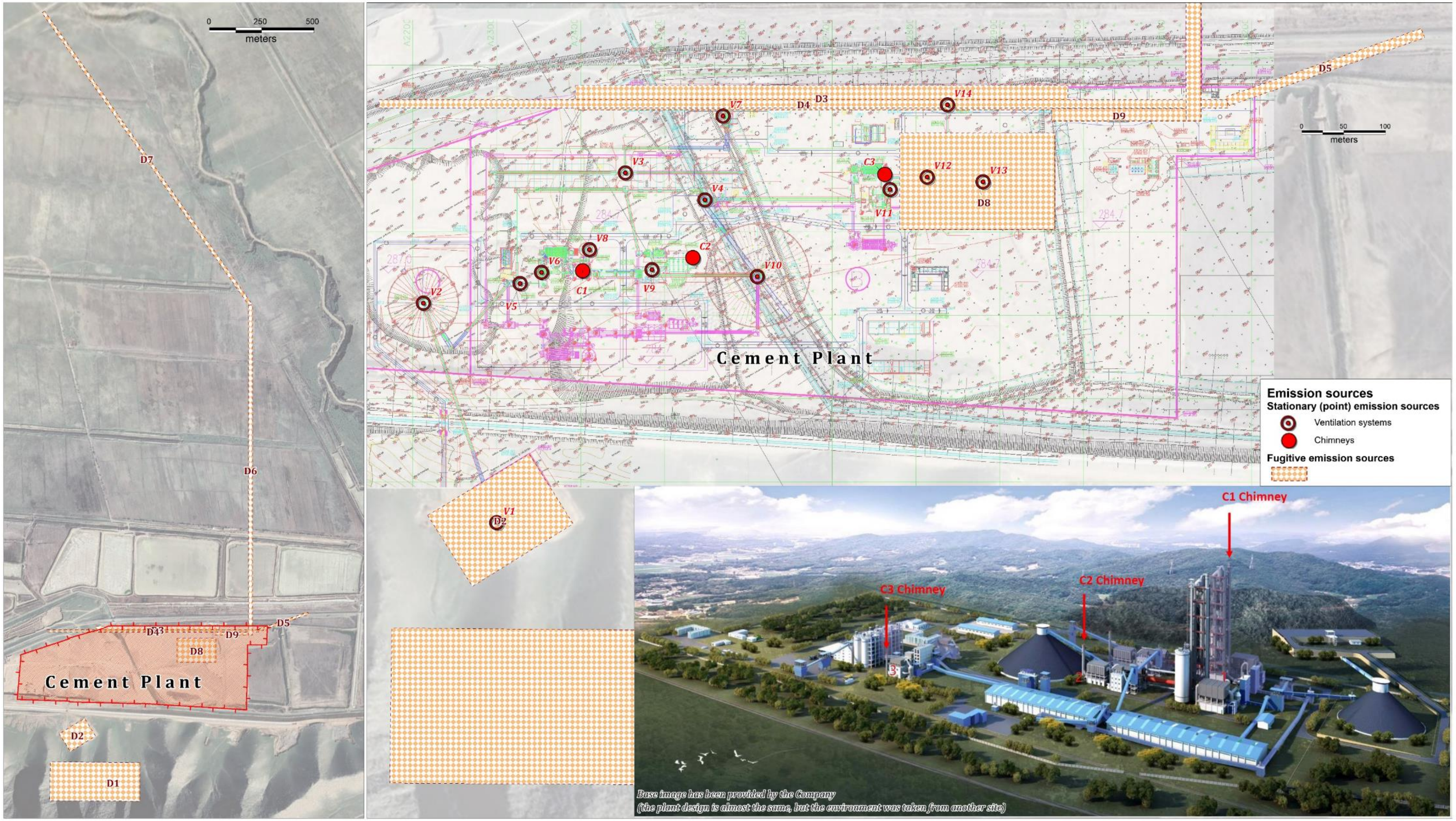
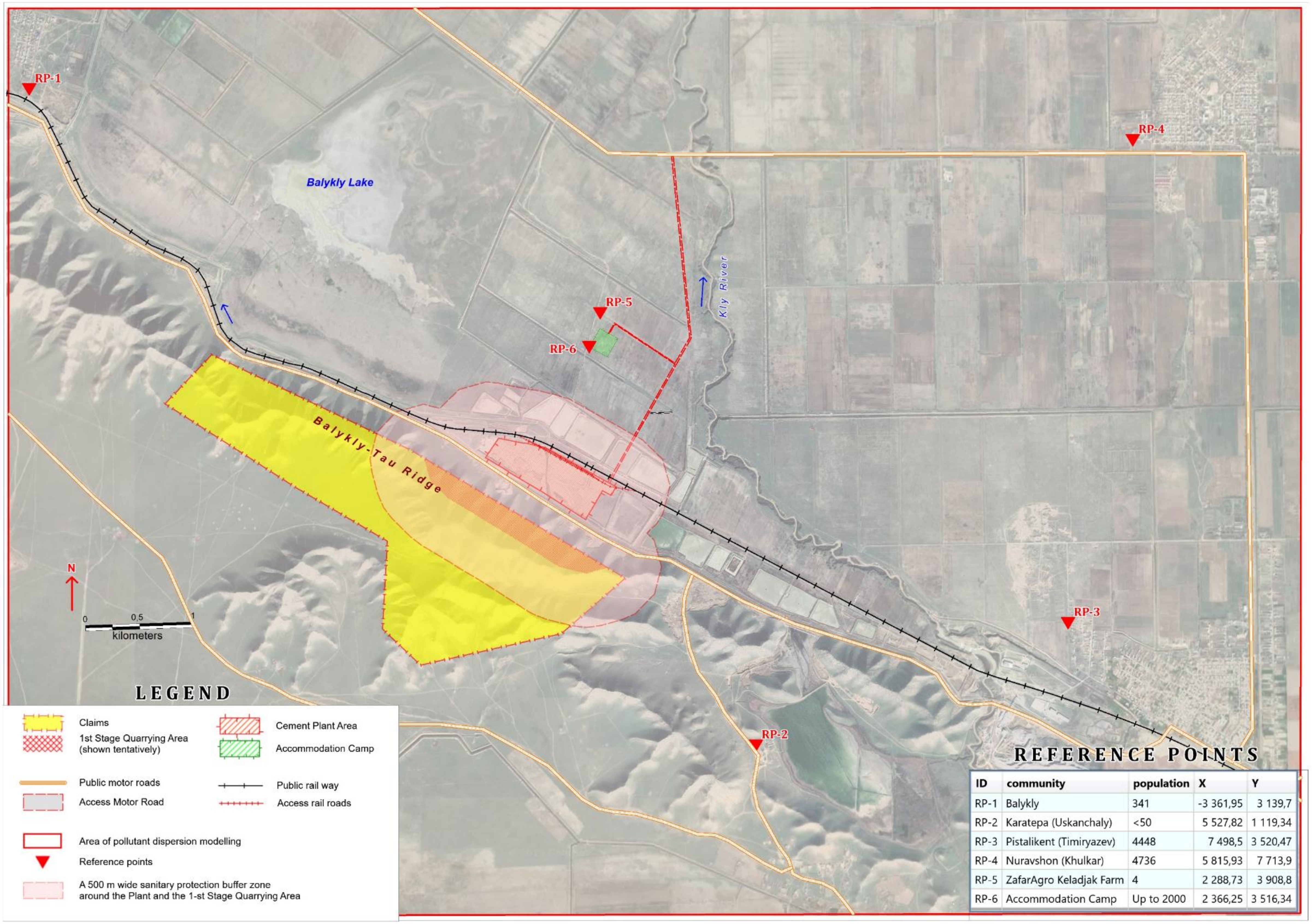


Figure 9.1.1: Emission sources



ID	community	population	X	Y
RP-1	Balykly	341	-3 361,95	3 139,7
RP-2	Karatepa (Uskanchaly)	<50	5 527,82	1 119,34
RP-3	Pistalikent (Timiryazev)	4448	7 498,5	3 520,47
RP-4	Nuravshon (Khulkar)	4736	5 815,93	7 713,9
RP-5	ZafarAgro Keladjak Farm	4	2 288,73	3 908,8
RP-6	Accommodation Camp	Up to 2000	2 366,25	3 516,34

Figure 9.1.2: Reference points and the area of pollutants dispersion modelling

Dispersion charts have been plotted for 4 pollutants : nitrogen dioxide (NO_2), two categories of particulate material (indexed as Ca-PM and Si-PM), and sulfur dioxide (SO_2). The following findings can be formulated on the basis of resulting dispersion maps (Figures 9.1.3 and 9.1.4):

- the Project will unlikely have significant impact on air quality of the closest residential areas (Table 9.1.4 summarizes the estimated maximum concentrations of pollutants at the reference points, with none of them being over the national 20-min MPCs[133]);
- the ground-level concentrations of pollutants within the Company's Accommodation Camp and the immediately neighboring Keladjak farm have been found as maximum for the surrounding regulated areas, with the highest levels of nitrogen and sulfur dioxides being 0.08 and 0.04 mg/m^3, respectively, and the levels of carbonaceous dust being up to 0.3 mg/m^3 under conditions of poor dispersion;
- the Balykly village located northwestwards of the cement plant (RP-1 reference point, 341 inhabitants) will face some increment of pollutants, but to a very slight degree, e.g. within 17% of NO_2, 4% of SO_2, 9% of Ca-particulates and some 1% of Si-particulates of MPCs; since this village is located about a half-way between two cement plants, the existing Almalyk plant and the constructing Huaxin's plant, it has been important to confirm that its air quality conditions will unlikely degrade significantly to above-limit concentrations of cumulative pollutants like N/S dioxides or Ca/Si dust, so the addition of the Project effects to the existing ones won't require emission control measures other than already provided by the Project;
- as for the communities of Karatepa (RP-2 reference point), Pistalikent (RP-3) and Nuravshon (RP-4), their air quality conditions will also keep safe from the Project-induced pollution, but relatively more exposed to emissions from the quarrying areas;
- it's reasonable to suppose that Project-induced concentrations of some pollutants (including NO_2 and Ca-PM) will unlikely exceed the corresponding MPCs over some areas beyond the 500 m wide Project's SPZ; since the estimation is based on preliminary data, Ramboll recommends to update the dispersion findings on the basis of detailed information on the Project's emissions, when available, and rectify the integrated SPZ boundaries taking into account the confirmed contour of quarrying area; more attention must be also paid to the quarrying methods (blasting, excavations, etc.), operation of haul roads, and some other impacts that cannot be considered here due to the lack of appropriate data.

Table 9.1.4: Maximum estimated ground-level concentrations of main pollutants at the closest residential areas (reference points, RP)

ID	Community	Population	Estimated Maximum Above-Ground Concentrations, in share of MPC value for resdential areas (in mg/m^3)				
			NO_2	NO	SO_2	*Ca-PM*	*Si-PM*
			20 min MPCs				
			0.2	*0.6*	*0.5*	*0.5*	*0.3*
			Reference background concentrations				
			0.055	*0.038*	*0.018*	*None*	*None*
RP-1	Balykly	341	0,17 (0,035)	0,009 (0,0057)	0,04 (0,018)	0,09 (0,043)	0,01 (0,0044)
RP-2	Karatepa (Uskanchaly)	<50	0,28 (0,056)	0,02 (0,0092)	0,06 (0,029)	0,18 (0,091)	0,03 (0,0098)
RP-3	Pistalikent (Timiryazev)	4,448	0,20 (0,041)	0,01 (0,0066)	0,04 (0,021)	0,10 (0,048)	0,02 (0,0051)

133 The only exclusion is the MPC value of 0.085 mg/m3 that was established for NO2 by the SanPin RUz 0293-11. Ramboll takes into consideration that adjacent countries (Kazakhstan, Russia) as well as the European Union operate the value of 0.2 mg/m3 as maximum permissible for this substance, with the value of 0.085 looking fully inapplicable to environmental conditions of the Republic of Uzbekistan

RP-4	Nuravshon (Khulkar)	4,736	0,16 (0,032)	0,009 (0,0053)	0,03 (0,017)	0,07 (0,037)	0,01 (0,0038)
RP-5	ZafarAgro Keladjak Farm	4	0,40 (0,079)	0,02 (0,013)	0,08 (0,039)	0,34 (0,170)	0,08 (0,023)
RP-6	Accommodation Camp	Up to 400*	0,41 (0,081)	0,02 (0,013)	0,07 (0,036)	0,46 (0,290)	0,10 (0,030)

**According to the Company, the maximum number of rotation workers present in Camp at one time is 400*

In addition, it shall be noted that during upset conditions, such as shut-down of the plant for emergency or other reasons (either routine maintenance or power outages, during which the kiln will discontinue operation and cool down), re-starting of the plant and kiln will result in higher concentrations of gas emissions being temporarily released. Under certain ambient conditions, particularly when the wind will direct emissions from the plant towards receptors. As this impact will be temporary (limited to the start-up time for the kiln) and the frequency of occurrence of upset conditions requiring re-starting of the kiln cannot be determined, the significance of this impact has not been rated. It could however result in acute health impacts (primarily respiratory-related problems) on local residents and possibly chronic impacts should this situation occur frequently.

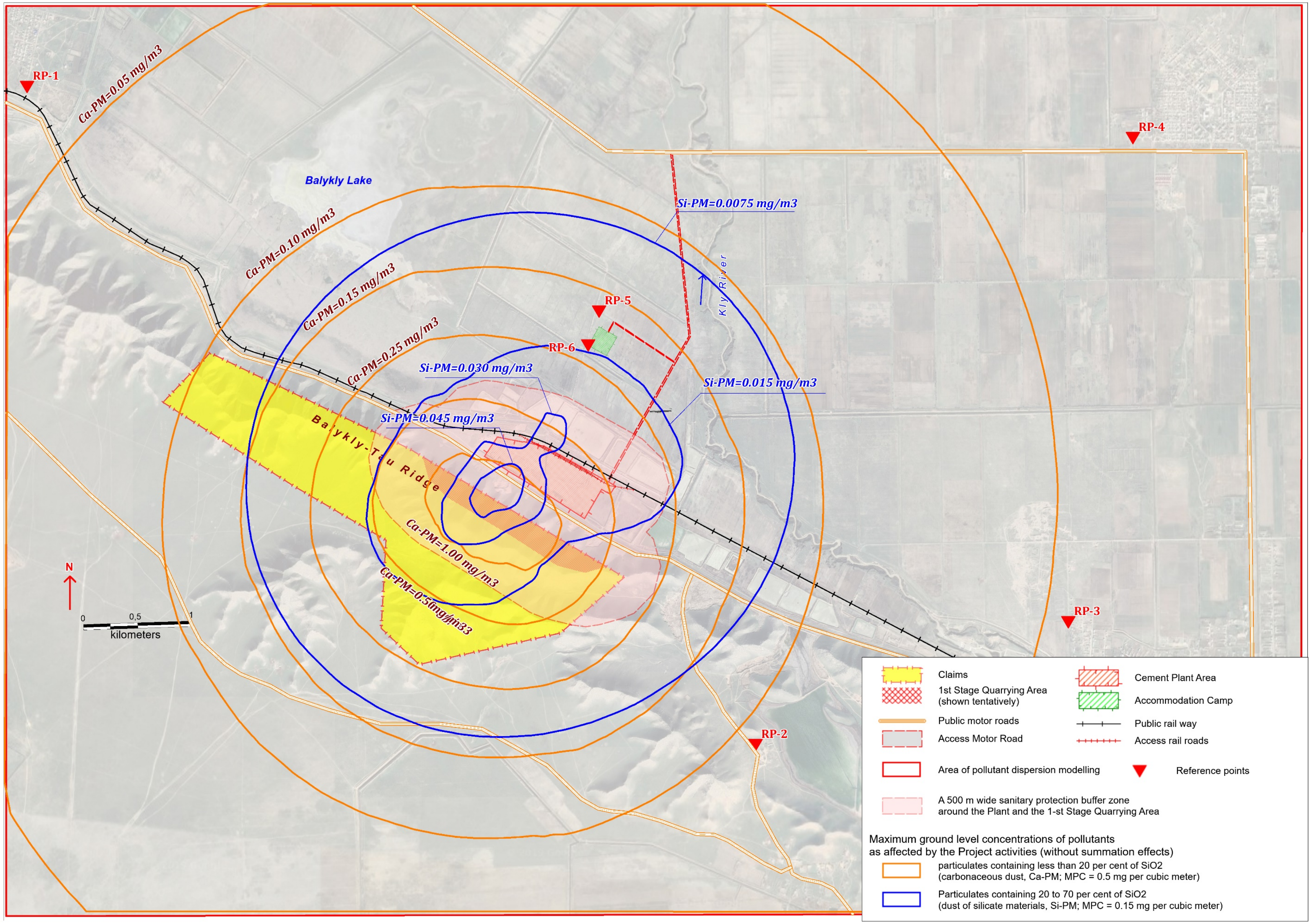


Figure 9.1.3: Dispersion of particulates

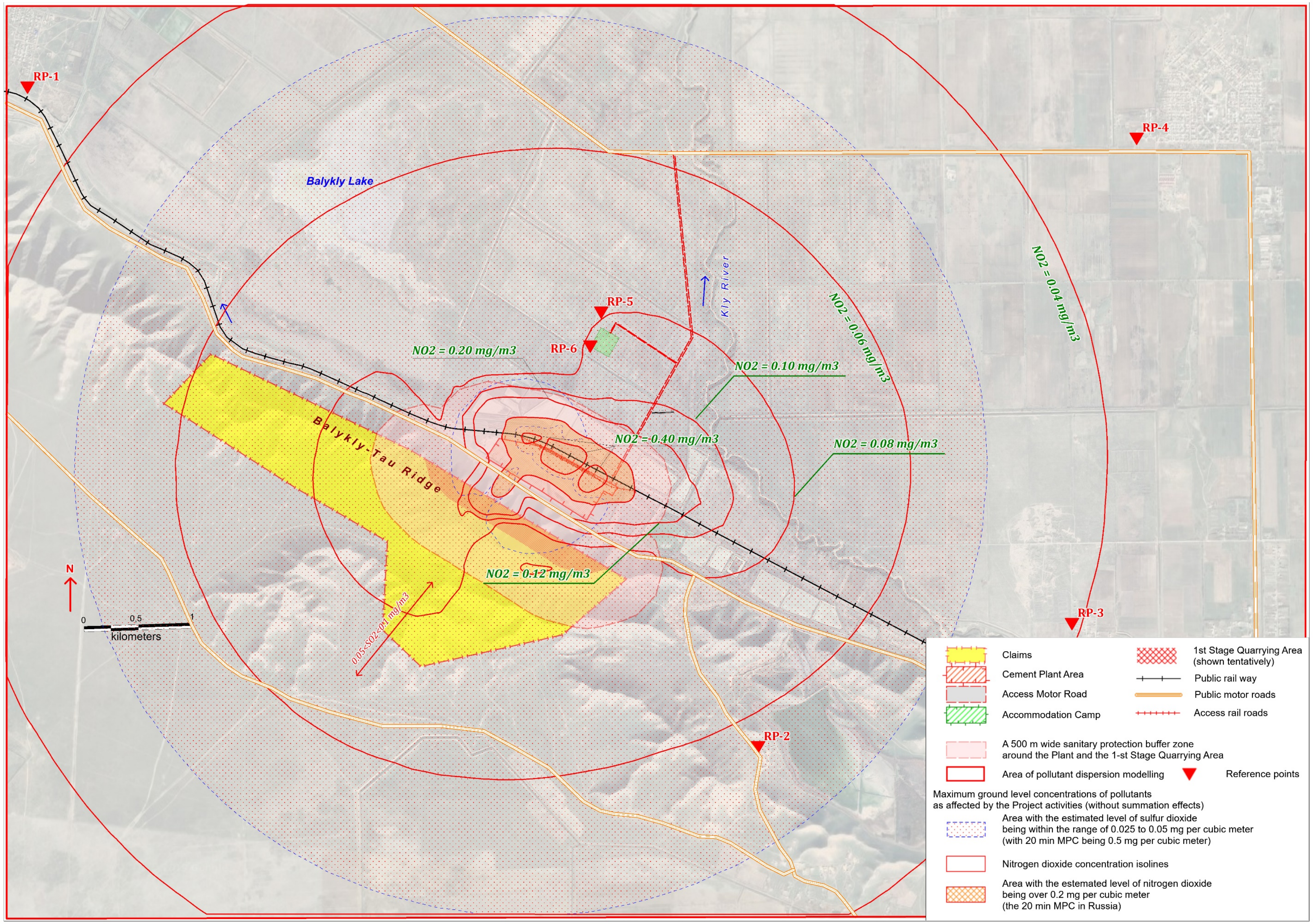


Figure 9.1.4: Dispersion of nitrogen dioxide and sulfur dioxide

Dust suppression

Dust that will be generated in significant quantities at all stages of limestone quarrying and cement production is one of the most significant factors of the project impact. The Project will apply adequate design solutions to minimize generation and spread of dust from cement processing and dusty materials handling activities.

Air pollution control equipment will be used for dust control of kiln gases. High efficiency bag filters (99.9%) will be used for the control of dust for all point sources and transfer points. Dust concentration in enterprise emissions does not exceed 50 mg/Nm^3. The PM_{10} and $PM_{2.5}$ are 60% of total particulate matter in the raw gases before treatment. Reduction efficiency of bag filters is 99.51% for PM_{10}, and 99% for $PM_{2.5}$.

Emission of mercury and other heavy metals

If mercury or heavy metals exist in limestone, they will be released in the chimney emissions. Mercury and other heavy metals normally exist in igneous rock or metamorphic rock. Limestone is chemical sedimentary rock and there is no mercury or heavy metals in it. However, when chemical sedimentary rock coexists with igneous rock or metamorphic rock for longtime, mercury or other heavy metals may be detected in the sedimentary rock.

No igneous rock or metamorphic rock is identified at Huaxia Jizzakh's limestone quarry. There is little chance to find mercury or other heavy metals in the limestone to be extracted; therefore, the chance of elevated levels of mercury or other heavy metal emissions is very little.

The detailed chemical compositions of the limestone will be analyzed during the detailed mine exploration phase. In case mercury and other heavy metals are identified in the analysis, Huaxin Jizzakh will monitor mercury and heavy metals in the emissions. If necessary, activated carbon adsorption will be installed to ensure the emission compliances with the applicable WBG EHS Guideline limits.

Impact of pollutant emissions on air quality

The Cement Plant is located at a considerable distance (4-8 km) from the nearest residential areas. If the cement plant is operated with proper emission controls, at such distance from the sources, the near-ground concentrations of pollutants will not exceed the air quality values prescribed for residential areas.

Both the general character of the Cement Plant's pollutant emissions and the above preliminary estimation of pollutants' dispersion enable it possible to assume that the near-ground concentrations of priority pollutants (NO_x and dust) are highly unlikely to exceed the MPC_{20min} values for the closest populated areas, because:

- The main fuel used is natural gas with the addition of coal, which leads to less dust and soot;
- In areas of increased dust formation, highly effective air pollution control equipment are used;
- The construction features of the rotary kiln and the relatively low combustion temperature cause a lower level of NOx formation due to a decrease in thermal NO_x.

Although a detailed view on air emissions of the Plant and Quarry has been recommended above to address the current uncertainties associated with the lack of appropriate data on Project's emissions, the overall impact of the Project on the air quality of the surrounding area can be generally assessed as low.

Prevention and mitigation measures

The Project shall adopt a systematic approach to prevention and mitigation of air impacts, and implement environmental measures at the management and engineering level.

At the management level, the following measures can be taken to prevent and mitigate the air impact of construction activities:

- Manage the works in compliance with the environmental requirements of Uzbekistan laws and regulations and the Company's corporate regulations and standards; keep the construction activities within the boundaries of allocated land;

- Adher to standard rules and instructions for construction activities and specific processes, to prevent emergency and unplanned emissions;
- Provision of backup and auxiliary equipment as appropriate to ensure compliance with the construction programme and prompt response in case of accidents;
- Keep vehicles traffic strictly within specified routes, minimize the idle running of machinery, and shut down when not in use;
- Control the technical conditions of construction machinery and vehicle engines;
- Designer's supervision of implementation of the design decisions in course of construction;
- Monitoring of construction, installation and commissioning works for compliance with the applicable process requirements.

At the engineering level, technology, equipment, facilities location shall be selected so that generation and emissions of polluting substances at the operation stage are kept to a minimum. In this regard, the following solutions are adopted for the Project:

- Most effective modern technologies and equipment to ensure reasonable use of fuel and materials;
- Materials and product transportation conveyors are designed as covered;
- High-efficiency dust-trapping equipment for dusty processes (where possible).

The above solutions at the operation phase shall be supplemented by the following management measures:

- Optimal selection of sources and transportation routes for materials and products;
- Reasonable planning of transportation activities;
- Provision of timely preventive maintenance of the main and auxiliary equipment;
- Control of technical conditions of equipment, machinery and automobile engines;
- Operational control and monitoring.

Techniques for minimizing and preventing fugitive dust emissions during the loading/unloading activities and vehicle operation can be accomplished through dust suppression measures. The main dust control measures include the following:

- Water suppression should be used on unpaved roads and work areas in dry and windy conditions;
- Storage of dusty materials (i.e. stockpiles) should be enclosed or operated with efficient dust suppression measures;
- Maintaining stockpiles at minimum heights and forming long-term stockpiles into the optimum shape (i.e. stabilization) to reduce wind erosion;
- Drop heights during loading and transfer of materials should be minimized and shielded against the wind;
- During the transportation and storage of dusty materials these should be covered by dust-tight material or sprinkled by water.
- Efficient scheduling of deliveries;
- Maintaining handling areas in a dust free state as far as practicable;
- Establishing and enforcing appropriate speed limits over all unpaved surfaces;
- Movement on existing and paved tracks wherever possible.

Operational monitoring and control, including monitoring of emissions and changes in the environmental conditions, is an imperative to be addressed to ensure control of the impacts and develop further mitigations and measures for reduction of SPZ dimensions, as appropriate.

9.1.4 Conclusions

Analysis of the project documentation provided by Huaxin, pollutant emission data from analogous projects, and regulatory requirements for process emissions suggests that during the construction and operation of the Cement Plant the quality of atmospheric air within the enterprise's zone of influence will be in accordance with the hygienic standards.

The most significant air impact is caused by emissions of nitrogen dioxide, dust and sulfur dioxide.

For these pollutants, the modeling indicates the air quality at the residential areas could meet Uzbek regulatory standards for ambient air qualities.

9.2 Harmful Physical Impacts

9.2.1 Introduction

The study Area is predominantly rural in nature and not generally exposed to high levels of noise or vibration levels. Any excessive noise will have a detrimental effect on peoples' health and may increase annoyance and raise complaints.

The construction and operation of the proposed Project will likely generate noise and vibration levels that could potentially elevate the baseline condition possibly causing disturbance or damage to nearby surrounding communities.

This section addresses the potential noise and vibration impacts during both phases through identification of sensitive receptors, determining primary sources of noise and vibration generation, assessment of the potential impacts and their significance and finally proposing mitigation measures following Best Available Techniques (BAT).

The Uzbekistan ambient noise quality standards (on dBA) are presented below (Table 9.2.1).

Table 9.2.1: Ambient noise quality standards (dBA)

Type of Area	Day	Night
Residential area	55	45
General work area	80	

National limits states that instant noise level must not exceed 125 dB(A). Similarly, noise level exposure during an 8 hr working shift must not exceed 80 dB(A). In case noise level exceeds the 80 dB(A), the exposure duration must be reduced.

Explosives will be used during quarrying activity (for fragmentation of rocks) but only a part of the explosive energy is used in doing the useful work, the rest is dissipated as ground vibrations and noise.

Jizzakh cement plant is located 8 km west of the Huaxin cement plant. Due to the fact that Jizzakh cement plant is using drilling and blasting operations, the noise from the explosions spreads over a significant distant. Given the fact that the explosions are carried out only in the daytime and no more than two to three times a week, there are no excess noise levels on daytime and night near the Project area.

There are no permanent noise sources in the zone of influence of the Project implementation. Periodic noise is associated with moving road and rail transport, the intensity of which is low due to insignificant traffic.

9.2.2 Potential Sensitive Receptors

Development of the Project and associated facilities will be performed in Jizzakh district of the Republic of Uzbekistan. The cement plant will be located in Zafarobod district, whereas the licensed area for limestone mining lies at the junction of three administrative districts: Zafarobod district, Farish district and Sharof-Rashidov district (former Djisakh district).

The licensed area for limestone mining is located at Balykly-Tau Ridge, whereas the surrounding area is largely rural, includes agricultural fields crossed by irrigation canals, fish farming ponds and several rural communities spread at some distance from the Project site (Table 9.2.2).

Table 9.2.2: Distances to the nearest settlements

Community	Approximate Distance to the Project Site, km
Balykly (part of Chimkurgon rural settlement)	2.3

Community	Approximate Distance to the Project Site, km
Chimkurgan	5.5
Nurafshon	5.5
Pistalikent	4.2

9.2.3 *Inventory of Primary Sources of Noise Emissions*

Noise emissions will be generated from a number of activities that will take place, including:

- Construction activities at the cement plant site;
- Mining activities at the limestone quarry sites;
- Cement plant operation; and
- Traffic flow for transportation of raw material and final product.

Construction Activities

The planned construction program of the Huaxin Cement plant will take place during daytime two years. Noise levels from different activities can vary between 50 -100 dB(A) based on the typical noise levels of machinery:

The primary sources of noise generation during construction include:

- Land clearance, compaction and excavation works;
- Construction of above ground reinforced concrete structures including slabs, foundations and walls;
- General movement of heavy vehicles such as delivery trucks, dozers, concrete delivery vehicles, cranes, front end loader, excavators, pumps, and mechanical dumpers; and
- Handheld and table tools such as saws, grinders, etc.

Mining Activities

The mining activity proposed at the Huaxin Cement Plant quarries involves the use of both blasting and mechanical excavation works. The blasting is planned to take place once or twice per week and restricted to day time only. A single crusher unit will be employed at at the limestone quarry. Primary sources of noise generation associated with quarry activities include noise from:

- Blasting activities,
- Mechanical excavation activities involving the use of various equipments like pressure drills, excavators, compressors, loaders and dumpers;
- Crusher;
- Onsite traffic (including Backing-up alarm signal of wheel loaders and dumpers).

High noise levels are inherent to blasting operations (100-120 dB(A) near the source. Machinery and equipments generally employed for mining activity generate noise levels typically of about 90 to 95 dB(A) (measured at 1-2 meters from source). The process of raw material crushing also generates high levels of noise (95 - 100 dB(A)).

Cement Manufacturing

Cement manufacturing includes raw material grinding, mixing and storage; intermediate and final product handling and transportation; and operation of exhaust fans. Noise levels from primary noise sources at the cement plant will be in the range of 73 -100 dB(A) as presented in Table 9.2.3 below.

Table 9.2.3: Principle sources of noise and associated noise levels at cement plant

Operation	Sound Level dBA
Vertical mills	95-100
Kilns	80-85
Cement mills	95-100
Ventilation fans	85

Operation	Sound Level dBA
Pumps	70-75
Compressor	85-95
Cooler	80-85

In order to control the noise, the project is designed to:

- Select low noise equipment;
- Install mufflers at air inlets and outlets of the fans and air compressors;
- Install sound insulation cover (room) for equipment with higher noise;
- Place noisier sources farther away from sensitive receptors in the overall design;
- Build sealed or semi-sealed workshops for noisier production processes.

Offsite Traffic

Offsite noise impacts are most likely to occur along the road networks that will be used for the transportation of construction material, machinery, raw material, manpower and final product to end users.

The significance of the impact is related to the anticipated high traffic volume (hundreds of round trips) and nature of vehicles (mostly heavy trucks) entering and existing the cement plant site during the project lifetime.

Vibration from Blasting Activity

Vibration will mainly result from blasting during mining activity at Limestone quarries. Blasting induces both ground vibration and air blast overpressure in the form of noise wave. Geological condition, atmospheric conditions, the terrain and the vegetation affect the wave propagation from the blast.

9.2.4 Harmful physical impact assessment

Noise Impact during Construction Activities

Based on the noise assessment of the projects similar to the Huaxin Cement Plant noise levels at the majority of the sensitive receivers surrounding the cement plant construction site complies with the stringent night time criteria of 45 dB(A).

Construction noise emissions are generally intermittent and not expected to be continuously operational during the entire construction period. Overall, construction noise impacts have a high likelihood of occurrence yet are considered to be of minor of temporary and reversible nature as they cease to exist once the construction activities are terminated.

Additional noise mitigation measures at the source include:

- Selecting adequate equipment (fit with noise mufflers) and minimizing machinery or equipment idling conditions;
- Maintaining an active community consultation and positive relations with local residents will assist in alleviating concerns and resolve any potential noise complaints.

Noise Impact from Quarry Operation

Based on the noise assessment of the projects similar to the Huaxin Cement Plant, the noise levels at all sensitive receptors surrounding the Limestone quarry site will comply with permissible noise limits. As show results of the noise modeling, the calculated noise levels are less that 45 dBA at the distant on 2 km from the quarry.

Hence, noise impacts from the quarry operation, as it progresses further from the boundary, will have a low likelihood of occurrence and are expected to be reduced to even minor during day time.

Noise Impact from Cement Plant Operation

Based on the noise assessment of the projects similar to the Huaxin Cement Plant, the noise levels at all sensitive receptors surrounding the cement plant site will comply with noise limits for daytime and night time period. Hence no noise impact during operational stage is expected.

As the highest predicted noise levels at night are less than 45 dB(A) at the distant of 1.7 km from the site, the noise impacts are expected to be tolerable by the residents of the nearby communities.

Mitigation measures could be adopted to reduce noise limits to permissible noise levels including:

- Use of properly tuned engines, proper mountings and muffling of equipment and equipment fitted with silencers;
- Providing permanent enclosures around the heavy noise producing equipment;
- Ensuring good maintenance and repair of the heavy equipment;
- All equipment shall be switched off when not in use.
- Equipment and trucks used shall use the best available noise control techniques (e.g., improved mufflers; equipment redesign; use of intake silencers, ducts, engine enclosures and/or acousticallyattenuating shields or shrouds) wherever feasible and necessary.
- Stationary noise sources shall be located as far from sensitive receptors as possible. If they must be located near sensitive receptors, they shall be muffled to the extent feasible and enclosed within temporary shed.

Offsite Traffic Noise Impact

Offsite noise impacts may arise from transport of raw material along the road crossing nearby communities. Typical noise levels from trucks could range between 80 nd 95 dB(A) based on vehicle condition and speed. The flow of large volume of trucks at close proximity from communities will be a major source of noise pollution in addition to high safety risk to pedestrians and motorists.

Huaxin Cement Plant shall properly plan the transportation routes to optimize the distance covered and enhance traffic flow and speed; all which will contribute to reduction of noise pollution. Huaxin Cement Plant shall also develop a detailed traffic management plan for organizing truck movement inside the plant, traffic flow, parking spaces, warning signs, timing, directions, measures to prevent traffic related accidents or injuries to workers and motorist driving along the highway and at the facility main entrance/exit gate.

Occupational Impacts

Noise impacts are likely to be a matter of concern from an occupational health and safety point of view for both construction crew workers and quarry and cement staff. As indicated, some of the machinery and equipment will generate noise levels exceeding permissible exposure noise limits of 80 dB(A) for an 8 hr working shift.

In order to mitigate such impacts on the occupational health, Huaxin Cement Plant and its contractors shall:

- Provide adequate Personnel Protective Equipment (PPE) to construction workers at all noisy activities/locations that exceed permissible occupation noise level limits set in the Uzbekistan Permissible threshold Occupational noise level standards in different work areas.
- Install high noise warning boards which will be displayed in areas of noise levels and mandate ear protection the identified high risk area.
- Noise level monitoring should be conducted regularly to ensure that noise levels during all times are within national noise exposure standards.

Vibration Impact from Mining Activity

Blasting is certainly an issue of concern for local residents. Exceeding vibration limits for both human comfort and structural damage will result in significant public opposition. The limit values for ground vibration applied to European quarries range from 2 to 50 mm/s, with an average of around 15-20 mm/s, and 90-140 dBL[134] for the air overpressure. For ground vibration, these limits are adapted to the frequency of the vibration and to the type of nearby building. However, public complaints are not always

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[134] dBL = decibels, linear (different from noise)

the result of actual structural damage but could be due to adverse human responses and fears of structural damage from blasting activities.

In general, vibration (as well as noise) level decreases with the increase of distance of measurement and it is proportional to the quantity of explosives detonated. Air over pressure, noise and vibration can be effectively contained within limits by adopting Huaxin Cement Plant’s proposed techniques in addition to those stated below:

- The frequency of blasting shall be determined and amount of explosives used per round of blasting shall be properly calculated;
- Blasting needs to be restricted to a limited part of the day;
- Covering the detonating fuse with at least 150 mm thick cover of sand or drill cuttings;
- Supervision of drilling and blasting operations to ensure the designed blast geometry;
- Avoid blasting when strong winds are blowing towards the residence;
- Further based on the safe blasting limits it is recommended that the peak particle velocity (ppv) should be kept at 10 mm/sec.

By adopting the above listed measures, vibration impacts due to blasting operations would be reduced to acceptable levels.

9.2.5 Conclusions

The noise generated at some locations and near certain equipment within the cement plant could be in excess of noise exposure limits. Noise level in mining area, though high especially during blasting, will be only for short duration. High noise warning signs shall be displayed in areas of noise levels and ear protection will be made mandatory in those areas.

Majority of the sensitive receptors surrounding the cement plant during construction will comply with daytime night time criteria of 45 dB(A). Adoption of proposed noise mitigation measures shall set noise to permissible levels.

Noise levels from operation at the Limestone quarry site will comply with noise limits having potential low impacts of long-term nature. Prohibiting mining activity at night time, securing an adequate horizontal buffer zone will minimize the noise level at receptors. Noise modelling results validates the predicted reduction at targeted receptors with the noise impacts assessed to have Minor significance to no impacts.

Noise levels at all sensitive receptors surrounding the cement plant site during operation will comply with noise limits. Hence no noise impact during daytime is expected.

The flow of large volume of trucks at close proximity from communities will be a major source of noise pollution in addition to high safety risk to pedestrians and motorists. Proper route planning, traffic planning and compliance with regulations will reduce the impacts from offsite noise pollution to acceptable level.

Exceeding vibration limits for both human comfort and structural damage will result in significant public opposition. The adoption of good blasting practices, potential vibration impacts will be reduced to acceptable levels.

9.3 Impacts on Soils and Subsoil

The section describes and assesses the soil and subsoil impacts that are likely to occur during the construction and operation phases as a result of the proposed Project. The findings here are based on a desktop review undertaken by Consultant along with 2 days long site visit. Since the pre-project baseline surveys have been focused on geotechnical and geological issues for the Plant site only, the assessment of the Project impacts on soils and subsoil shall be prefaced with the following assumptions:

i) no impacts on loss of ecological function of soils, subsoil and groundwater were considered due to the absence of a site- and Project-specific biodiversity study;

ii) it is assumed that there are no unique or specially protected soils, geological features or groundwater appearances present within the Project Area;

iii) it is assumed that in the majority of the area to be impacted, there is only limited agricultural activity, with sporadic grazing, local irrigated farming and fish farming being likely the main forms of it, and there're no plans to enlarge the cultivated area within the Project's zone of influence in coming years;

iv) no data are available on the areas affected by loam and other raw materials quarrying as well as on the right-of-way spaces for infrastructure facilities including 16 km long gas pipeline and 55 km long power line;

v) no cultural layers and soils containing artefacts are present onsite;

vi) no soils that were historically used for burial purposes (i.e. as landfill, cemetery, repository, cattle mortuary, Beccari pit) are present onsite;

vii) the soils of the Project Area do not serve as hot spots/natural focuses of endemic or any other virus and bacterial diseases (like plague) to the extent that would require special attention and appropriate provisions; and

viii) the assessment was based on a desktop review of regional soils information, and thus any specific anomalies on the Project Area will not have been considered in this impact prediction.

9.3.1 Construction Phase Impacts on Soils

The aspects of the quarrying, limestone processing and associated activities will definitely change soil baseline conditions at a local scale. The following items specifies how these changes are likely to occur.

9.3.1.1 The loss of soil resources

The construction of the Plant, limestone quarry and associated infrastructure will lead to a loss of soil resources and land capability due to permanent allocation of land, topsoil stripping and covering with fill materials and structures. During construction, soils under the Plant, overburden spoil piles, linear infrastructure, and areas cleared for the quarry etc., will be lost from the landscape. The loss of this resource will result in a change in land availability from sporadic agriculture (grazing) and irrigated croplands to unavailable for supporting agriculture (Figure 9.3.1). In this assessment the aspect is split into two different impacts as discussed below.

a. The loss of soil resources limited to the period of construction, after which rehabilitation will be undertaken. This includes offices, soil stockpiles, workshops and the Plant that are likely to be demolished or removed at the end of the operation. Following the completion of the activity, the soil resource can be made available to the environment and agriculture through the implementation of remediation activities.

The areas to be temporary used during the construction phase include right-of-way strips of the overhead power line and gas pipeline, presumably (to be further specified by the Company at the following stages of the project design), some parcels intended for soil dumping, ground storages, temporary access roads and gravel pits. Now it is not clear how large will be the area of these sites, but Consultant expects this value being much lesser than the permanent Project's footprint (71 ha for the Plant itself plus 440 ha of the claims, 10 ha for the Accommodation Camp, 4.63 ha for the access road and about 5 more ha for additional facilities like crusher, conveyor lines, access road to the Camp, etc.).

The pre-management magnitude of this impact could be preliminary assessed as minor to moderate depending on recipients: the soil resources of Zafarobod, Forish and Sharof Rashidov rural municipalities won't be affected significantly, while a number of agricultural land users will share their land plots with the Company or operators of associated infrastructure facilities on a temporary basis and therefore be facing the need of additional land management and restrictions (to be further clarified when all the Project-related land allocation plans will become documented).

Figure 9.3.1: Acquisition of agricultural lands (some 65 ha in total) induced by the Project

Taking into account that the impact will be short- or medium-term and local, and the recipients are preliminary considered as having low sensitivity, the overall significance of the impact can be classified as minor. A set of measures to manage this issue includes:

i) minimizing the disturbed footprint of the activity as far as practically possible along with preventing any violations of the agreed land parcel borders (as it is shown by the Figure 9.3.2, the Company has sited the Plant with maximum possible use of the non-cultivated piedmont area, and it is Consultant's understanding that it wasn't possible to prevent acquisition of some part of adjacent farmlands the overall area of which is about 65 ha);

ii) ensuring that quarry, plant and any support vehicles and human movement are limited to dedicated access ways, with off road travel authorized when required for critical operations only;

iii) developing and implementing a soil management plan that will be Project-specific and give provisions for dealing with quarry's overburden material (if any), stripped topsoil, any other importing or exporting ground materials (excavations, stockpiling, stripping, backfilling, etc.);

iv) developing and implementing livelihood restoration and compensation measures specific for the areas where livelihood is impacted by temporary loss of agricultural lands[135]; and

v) developing and implementing the Project-specific soil monitoring program that covers all the aspects of activities as well as the whole area of their influence (this provision is applied to all the soil-related impacts and shall not be mentioned elsewhere below).

[135] By the current date, monetary compensations have been budgeted in favor of the land users impacted by construction of the Project's assess road. Other Project related compensatory measures are to be specified as land allocation process will be completed

Figure 9.3.2: Aerial view of the periphery of irrigated agricultural area before and after starting the Project (GoogleEarth, 2015, 2019)

Given the management of the impact is successful, its final significance has a potential to be reduced from minor to negligible category.

b. The long-term (construction, operation, decommissioning, demolition and remediation phases of the Project) and permanent loss of soil resources associated with the Project including the infrastructure that will remain after closure of both Plant and the Quarry. This must be further specified by the Company and may include road embankments, open pits, overburden spoil piles that will probably remain as permanent features of the landscape, irrespective of any soil placement that may occur at closure. As announced by the Company, the limestone deposits to be excavated have almost no overburden material, so there's no need to develop any specific plan to deal with it. Consultant expects the mining project that is now under development will specify in more detail whether the overburden occurs within the claims area, in which volumes, and what are the most effective and environmentally safe options to deal with it. In Ramboll's opinion, such a material could be used for filling in the historical limestone and gravel pits located nearby or in road construction activity within the region. At the same time, the overall soil & rock material balance of the Project Area will definitely be negative, and Consultant expects a permanent change in local topography that will further decrease agricultural capability of this land as well as land use potential of the impacted area at the local scale.

This impact is very similar to that described above (the 'a' item); however, as some of the activity will be permanent even following closure, the impact will endure permanently with regards the quarry, overburden spoil piles (if any) and all the other facilities/structures that won't be demolished after the Project's closure.

Although there are no opportunities to remove the infrastructure and/or completely replace soils onto the original or historical (abandoned pits) footprint of the quarrying area, two eco-friendly options can be implemented to minimize the impact, with one being the use of new quarry's overburden for backfilling of abandoned pits and the other to use the surplus of stripped soils as cover material for overburden spoil piles and remediating areas to provide a growth medium (to be further analyze with properties of local soils and soil mass balance of the Project taken into account).

However, irrespective of the depths of pits, unless the slopes covered are the same as those that existed prior to quarrying, land capability – which considers slope – will be irreversibly lost to some extent. Finally, it is undesirable to allow the community to utilize the rehabilitated pits and overburden spoil piles for agricultural activities as this may result in post closure impacts becoming manifest as the rehabilitation is disturbed.

To manage the impact, the following routine measures appear applicable to the Project (with some other more specific ones to be developed later in the light of baseline surveys and project design details):

i) containing the soil disturbance to as small a footprint as practically achievable for the activity;

ii) preserving topsoil material of the former irrigated croplands for further rehabilitation works by its stripping in areas where buildings or structures are located, then stockpiling in conditions that save its mass and fertility to the maximum extent possible;

iii) minimizing the sediment load originated from the Quarry and construction sites of the Projects to the canals, the valley of Kly (Qili) river and associated ravines by stabilizing the surfaces of stockpiles and soil dumps, slopes and exposed grounds; and

iv) developing and implementing the Project-specific soil remediation plan that specifies, inter alia:

- all the locations the topsoil needs to be stripped (at least all the former irrigated agricultural plots);
- requirements for the storage of topsoil material;
- requirements for both technical (earthworks) and biological remediation of soils disturbed by the Project activity;
- requirements for reporting remediation works and further monitoring of reclaimed areas.

Since the Project is going to be land-intensive (with mining only taking up to 50-100 ha of the 440 ha sized licensed claims area) and will leave some part of the allocated land permanently unavailable for agriculture, the magnitude of this impact is considered to be qualified as moderate (unlike the minor effects of the short-term land acquisition). Offset activities like refilling historical pits with overburden material would enable to minimize stockpiling of soil and will expectedly retard mass movement processes along the pits' brinks and subsequent degradation of adjacent agricultural lands. The overall significance of the 'b'-item impact with all the management measures taken into account is assessed as medium, although the Project configuration has not been finalized, and distribution of soils within the Project Area cannot be assessed at a sufficiently fine scale.

9.3.1.2 Soil contamination by spillage of chemicals and seepage from waste

Construction activities may lead to the contamination of soils, particularly where there is the uncontrolled (accidental) spillage of technical liquids (incl. hydrocarbons), wastewater, contaminated snowmelt or storm water in areas where they are not contained and/or managed. There is the potential that during construction, spillage of chemicals such as hydrocarbons could affect the soils over a wider footprint than that disturbed by the actual activity. Where this occurs, phytotoxins could potentially accumulate in soils resulting in these soils no longer having the potential to support plant growth. There are a number of activities which could result in this occurring as described briefly below:

- spills of the various hydrocarbons used for power, mining and lubrication requirements;
- inadequate methods of storage and disposal of hazardous waste resulting in seepage of effluent or discharge of contaminated runoff;
- breakdown of mobile equipment away from a workshop requiring the equipment to be repaired in areas where there may not be adequate protection from hydrocarbon spills;
- leaks or spills of process or sanitary wastewater; and
- spills of groundwater piped away from both historical and new limestone pits (this can induce additional salinity and structural degradation of the soils impacted).

The pre-management significance of the impact can be assessed as moderate, with proposed measures including:

- providing appropriate conditions for the sites where hydrocarbons, solvents, lubricants, any other potentially hazardous materials are stored or reloaded (more specifically, this could imply impermeable pavement, secondary containment, storm water and runoff catchment, spillage traps, bunds, sheds or site-specific combinations of such preventive measures);
- developing and implementing a site-specific action plans for spills and other incidents/emergencies associated with leaks or spillage of liquids off the site to the adjacent environments; and

- preparing procedures to ensure that spillage during mobile equipment maintenance is minimized.

Both action plans and procedures should be updated as necessary to ensure that they contain appropriate management and remediation strategies to limit the potential impacts associated with accidents and incidents associated with the spills of material which could impact on soil quality.

Implementation of the measures will reduce the impact's magnitude to minor, with its overall significance having been assessed as low thanks to the likely absence of highly sensitive or cultivated soils that could be directly affected by spills or effluents.

9.3.1.3 Increase of soil erosion and deposition rates

Both quarrying (preceded by blasting operations) and construction of Plant and associated infrastructure may lead to increased erosion resulting in a loss of soil resources by the Site and subsequent accumulation of transported materials in downslope positions of the landscape, including the valley of Kly (Qili, Sanzar) river.

Given the snow and runoff management measures are not implemented, there is a potential that the soils disturbed by earthworks may be exposed to greater water and wind velocities than would occur if covered by snow and/or vegetation (depending on the season) (Figure 9.3.3). This increase in soil mobility could lead to erosion potentially followed by sedimentation in the downstream areas the most vulnerable of which is the Kly valley. The potential for wind erosion will be the highest during the dry season of the construction period, when soils are cleared of vegetation (Figure 9.3.4).

There is also the potential that poorly constructed topsoil or overburden stockpiles, which are not vegetated and protected from erosion losses, will result in an increase in both water and wind erosion rate. Increased erosion could lead to a loss of a soil resource in the area of erosion and possibly an increase in the sediment load where the eroded soils are deposited. This impact is likely to occur at the pre-construction phase as land is stripped of vegetation and the soil structures disturbed, and persist until closure.

Some of the measures listed above for preventing and mitigating the adverse impacts on soils contribute to control soil translocation also. Being associated with implementing provisions to control drainage, storm and snowmelt water around the Plant site and the Quarry as well, this enables to assess preliminary the final magnitude of the considered impact as minor and the significance as low, with the same uncertainty that originated from the absence of baseline survey reports, and with the understanding that potentially impacted soils demonstrate low sensitivity and some of them were already impacted by long-term overgrazing and other agricultural practices. The particular measures to reduce water velocity and therefore to mitigate downslope soil erosion can be selected on the basis of soil survey findings overlapped with detailed site development plan.

Figure 9.3.3: Rill-washing erosion of fill material at the Project Area (Ramboll Photos on July 08th, 2019)

9.3.2 Operation Phase Impacts on Soils

9.3.2.1 Soil contamination with air-borne pollutants originated from the Project's emissions

The quarrying and the hauling of raw material are likely to be the main sources of dust, during the operational phase. Dust will be emitted as a result of excavation, blasting, materials handling and vehicle movement in and out of the Quarry. Periodic earth moving to remove and stockpile the overburden of soil will also result in dust emissions. Dust from these sources tends to be of a larger particle size, so the major amount of it will be falling out locally within the surrounding area on soil or snow surface depending on the season.

To the contrary, all particulate and gaseous emission sources of the cement plant will be provided with dust, gas and vapor control measures, so the emission of regulated pollutants will be within internationally accepted standards, and the plumes will contain only the permitted remains of finely-dispersed particles, gases and vapors that have a potential to travel by large distances from the sources and therefore dissipate among the particles of similar size fractions originated from other sources.

Therefore, the proposed Plant as a new stationary point source of air emissions is unlikely to contribute significantly to soil contamination in any way including acid rains, fall-out of particulates, penetration of toxic gases and vapors into the soil, etc. One can resume now on the base of available research materials that Serozems and associated soils of the Project Area demonstrate very high level of buffer capacity related to acids. At the same time, the soils' potential to accumulate contaminants like trace metals and polycyclic aromatic hydrocarbons in upper horizons is much higher than their ability to translocate these elements and compounds to the subsoil or downslope positions of the landscape.

Figure 9.3.4: Dust emissions originated from quarrying and motor traffic on unpaved roads

(Ramboll photos: 1 – the limestone quarry operated for Jizzakh cement plant; 2 – one of the gravel roads of the Project Area; 3 – an access road to the limestone quarry of the Project)

The effects of soil contamination associated with air emissions of the Project will be the most significant immediately around the sources, and the legislation of Uzbekistan required to organize a 500 m wide sanitary protection buffer zone (SPZ) within which the near-surface air levels of regulated contaminants can be above the established limits. The use of soils will also be restricted within SPZ, since they can share toxic compounds of the plowed layer with harvest. In this context, cultivated soils can be considered as having moderate sensitivity to this impact.

As it follows from the Figure 9.3.5, in addition to the Project-related closure of about 50 ha of fishery ponds, 65 ha more of the remaining ponds will be located within the statutory SPZ along with 28 ha of irrigated croplands and also several dozens ha of areas that are used for irregulated grazing. In Consultant's opinion, properties of the soils and bottom sediments of these impacted areas must be monitored to trace the levels of target contaminants the list of which is to be derived from the Project's emissions profile (currently unknown).

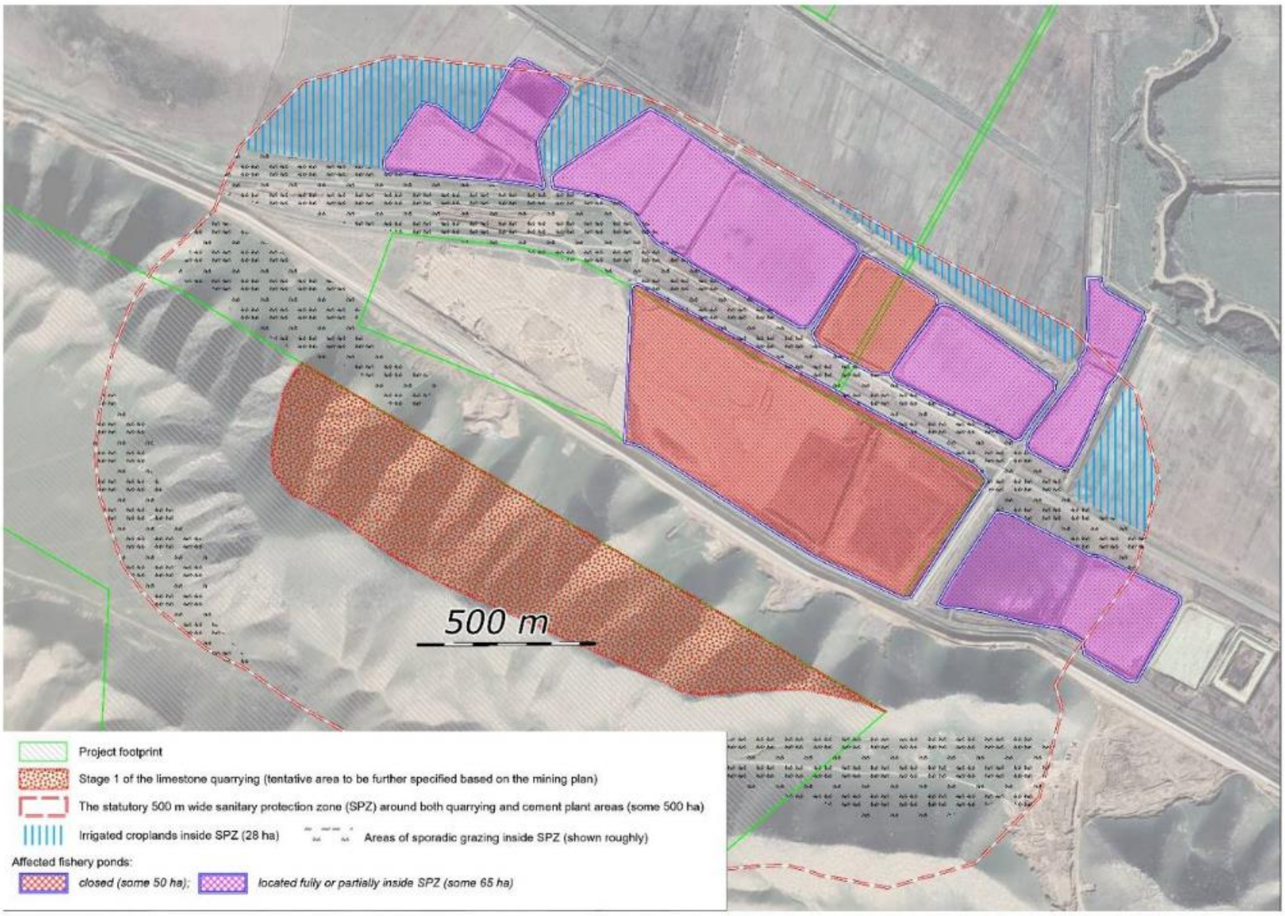

Figure 9.3.5: Soils and associated land uses of the statutory sanitary protection buffer zone

There's no need to develop any special measures to prevent soil contamination with air borne pollutants other than those already planned for emissions control:

- using of fabric and electrostatic filters for kilns, mills and separators (already provided by the Project);
- applying of dust suppressants to unpaved motor roads (especially the sections used routinely by Project vehicles that pass through or close to residential areas or agricultural fields);
- designing road alignments to minimize travel distances and eliminate unnecessary traffic;
- locating stockpiles within the Site boundaries considering the location of potential sensitive receptors and the predominant wind direction;
- setting speed limits for road traffic to minimize creation of fugitive dust;
- removing grass vegetation and topsoil together (mixed) so that plant matter will help to hold the soil material;
- where practical, rehabilitation of disturbed lands should be progressive, i.e. implemented as soon as quarry section is worked out or the land plot is abandoned after short-term (construction related) use; and

- stimulating grass and shrub vegetation within SPZ that plays important role in minimizing dust emissions by reducing surface wind speeds and trapping a lot of dust (an option could be to plant shrub or even forest lines around the Quarry and Plant as well as to perform runoff management in a way that gives additional water to the areas the vegetation cover of which is desirable).

The 'after-management' magnitude of the impact can be assessed as moderate for the area of SPZ and minor for the rest zone of Project's influence. Overall significance of the impact keeps medium for the sections of cultivated soils falling within SPZ and low for the uncultivated soil variants, both inside and outside SPZ.

9.3.2.2 Chemical or wastewater spills and release of contact water resulting in permanent loss of soil, and change in soil characteristics

There is the potential that during Plant and Quarry operations, spillage of chemicals such as hydrocarbons or contaminated wastewater could affect the soils over a wider footprint than that disturbed by the actual activity. There may also be the potential that runoff of contact water from the overburden spoil pile (if any), coal yard and spillage of any process water may affect soils in the flow path of this water. Where this occurs, phytotoxins could be accumulated in soil mass resulting in these soils no longer having the potential to support plant growth.

There are a number of activities which could result in this occurring as described briefly below:

- spills of contaminants including the various hydrocarbons used for power, mining and lubrication needs as well as any reagents used in the processing activities;
- breakdown of mobile equipment away from a workshop requiring the equipment to be repaired in areas where there may not be adequate protection from hydrocarbon spills;
- runoff of contact water from the overburden spoil pile or waste dumps (if any);
- release of acidity, heavy metals and salinity from contact water generated at the coal yard; and
- spillage of process water in the mining and limestone manufacturing area.

Having moderate magnitude without any control measures, the impact can be easily reduced to the minor one by the following routine procedures:

- developing and implementing procedures to ensure that spillage during mobile equipment off-site maintenance is minimized;
- providing appropriate secondary containment in areas where hydrocarbons, solvents and other potentially hazardous materials are stored or reloaded;
- providing appropriate water containment facilities at outdoor coal stockyard to contain and manage contact water generated during rainfall or snowmelt events;
- providing snow management in a way that implies transporting of contaminated snow to the special area equipped with meltwater catchment and treatment facilities;
- implementing emergency preparedness and response measures plans (see the section dedicated to soil construction impacts for more detail).

The confidence level of this impact is low as the geochemical characteristics of the overburden and the coal has not been determined yet. Based on the available geology data it is unlikely that acidity will be released from the overburden, however, this material may release some alkalinity and salinity which may impact on the soils. It is likely that the coal stockpiles in the coal yard will be transient as material is continually deposited and then utilized. As this material is transient, there may not be sufficient time for acidity to generate in significant amounts, however, secondary precipitates in the coal may be solubilized during rainfall events and washout of the coal stockpiles.

Taking into account the likely absence of highly sensitive or cultivated soils that could be directly affected by spills or effluents from the Project sites, Consultant considers the overall significance of the discussed impact as low.

9.3.2.3 Increased soil erosion triggered by operational activities

Unmanaged operational activities have the potential to increase soil erosion, particularly from the quarrying and the presence of infrastructure where runoff from disturbed areas is likely to be higher than would occur under natural conditions. For such locations, the increased water velocity at runoff during rainfall events may result in the erosion of soils on the periphery of the infrastructure and quarrying area followed by permanent loss of soil resource and change in soil properties.

If this was to occur, it could lead to a loss of a soil resource in the area of the erosion and possibly an increase in the sediment load where the eroded soils are deposited. This impact is likely to occur around the limestone quarry, the Plant Area, Accommodation Camp and other hard standing and from the slopes of the overburden spoil piles (if any).

Preliminary qualified as minor in magnitude and having low significance, this impact will be kept under appropriate control by many of the above-listed measures like:

- minimizing the area of physical disturbance;
- implementing storm and snowmelt water control provisions around infrastructure;
- providing appropriate management of soil stockpiles.

9.3.3 Construction and Operation Phase Impacts on Subsoil and Groundwater

The effects on the subsoil and groundwater conditions of the Project Area cannot be linked to separated lifecycle phases of the Project, since most of them will expectedly be long-term or permanent, inevitable, heavy managing, complimentary to the above described soil effects, but having on-site or local extent for the most cases.

9.3.3.1 Increasing the thickness of the vadose zone as affected by quarrying activity

It is very unlikely that the effect of lowering groundwater table that is typical for open mining areas will be manifested within the Project Site, since the limestone deposits to be developed by the Company is a positive landform, and no deep excavations are planned[136]. As for the Plant's site, it is expected some increase of the vadose zone thickness below the structures and local changes of groundwater distribution and level along their boundaries. As of today, the magnitude of such an impact will likely be low, with the scale being local, sensitivity of recipients - low and the overall significance of the impact - also low.

9.3.3.2 Non-recoverable loss of subsoil material and extracted groundwater as commercial products or by-products in parallel with depletion of the operated mineral deposit and aquifer

Since the limestone deposits and aquifers were discovered and investigated here with the purpose of future extraction, and the Project Site has no prospective uses other than limestone mining, such an effect is considered as having no need to be assessed in both environmental and social contexts. It is also very unlikely that the effect of lowering groundwater table that will result from water extraction and reduction of irrigated acreage, will create any trouble for the local communities.

9.3.3.3 Increase of the mass movement rates as affected by quarrying activity

As it has been previously described (construction impact on soils), the Project will expectedly launch or speed up a variety of mass movement processes which have already become apparent or remain latent with a potential to be triggered by human activity. Some of these processes will likely be local and associated with earthen and subsurface structures, quarrying spaces and other areas of disturbed vegetation and soils (sloughing, slips and other gravitation-driven processes, karst, suffusion), with the others being able to go off the Project's footprint and spill over to adjacent areas (wind and water erosion, changes of groundwater conditions). Having qualified above the significance of construction

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136 This must be further specified based on the mining project that is now under development

impacts on soils as low, Consultant has no grounds to assign any other rating to the considered impact also. It's important to note here that some external hazards that are consider being very unlikely or having rare occurrence (like high-magnitude earthquakes, catastrophic rainfall flooding, breaking of upstream hydraulic facilities, etc.) can serve as triggers for movement of soil and subsoil material the stability of which has been undermined by quarrying and other Project-related activities.

9.3.3.4 Importation or mobilization of pollutants already present within the materials or grounds to be used for filling and site levelling operations

Since construction of the Plant, its utilities and quarrying activities are associated with earthworks and other machinery activities, there will be a potential of mobilizing some portion of residual contaminants (if any) through dust emissions, surface runoff, vertical transfer towards water-saturated horizons, exporting a surplus soil for remote locations, some other minor ways like tracking of contaminated soil by personnel and equipment or with exported wastes. Taking into account that the site never was chemically intensive, one can suppose the presence of pesticides and other agricultural chemicals in soils, subsoil and groundwater of the Project Area, mobilization of which could be originating from the Project-related activities. Consultant expect such effects being short-term, generally local and of minor amplitude, so their overall significance is assessed here as low.

9.3.3.5 Static and dynamic deformations of the subsoil by buildings and structures, earthworks, blasting, pile works, vehicle and railroad traffic

According to the data of geological survey («O'ZGASHKLITI» DUK, 2018), the Project Site's terrain is formed by subsiding loams having medium to high potential of water-induced budging. The underlaying sands and weathered limestone do also not provide very stable foundation due to their fracture porosity and high potential to induce karst and suffusion events under water-saturated conditions. Therefore, the grounds of the Plant Site can be characterized as generally unstable in wet conditions which predominate here thanks to the irrigation-induced supplying the local groundwater.

As it has been also indicated by geologists, the presence of water-soluble salts contributes significantly to the subsoil's corrosiveness to concrete and metal structures along with a potential of dissolution and leaching chlorides, sulfates and hydro-carbonates by groundwater following by volume deformations of the layer.

The highest amplitude of both static and dynamic deformations of soil is expected for the areas of historical waterlogging, irrigation, water canaling and ponding the conditions of which are significantly changing by increasing loads of Plant's and Camp's structures, fill materials, transportation.

All of this requires careful site-specific management of drainage, process, storm and snowmelt water in a way that minimizes its contact with subsoil material as well as the extent of subsoil influence zones associated with Project-related loads, both static (construction sites, building and structures) and dynamic (motor and rail roads, construction sites, blasting locations, etc.).

Most of the measures listed above for preventing or mitigating construction and operational impacts on soils will help to provide the subsoil stability within the Project sites. Geotechnical monitoring and groundwater observations will provide necessary data on the status of impacted subsoil.

Consultant expects the overall impact of static and dynamic deformations will be limited on-site and immediate adjacencies and won't involve any sensitive areas or subsoil features. Indeed, most part of the Project-related traffic will be based on existing ways, so the associated dynamic loads will be put on the subsoil that was impacted for a long time by similar loads. Considering this, the overall significance of the impact can be preliminary qualified as medium to low on the understanding that local deformations induced by blasting events, excavations, pile works and static loads within previously undeveloped areas can be measured by much higher values as compared with subsoil already settled by existing or historical structures.

Table 9.3.1: Monitoring Recommendations

Impact	Receptor	Stage	Monitoring Recommendations
The loss of soil resources	Soil resources of the impacted communities	C, Cm, O, DCm	Regular visual observations of soils immediately adjacent to the Project footprint is recommended to verify their conditions unchanged by the Project-related activities
	Soil resources of Zafarobod District		
	Soil resources of the Jizzakh Region		
Soil contamination with air-borne pollutants originated from the Project's emissions	Agricultural (irrigated, cultivated) soils within the Project's SPZ	C, Cm, O, DCm	Visual monitoring of dust suppression efficiency Regular sampling and analysing agricultural and other vegetated soils as well as fishery ponds' bottom sediments for Project- and site-specific contaminants, with sampling locations being chosen both within and beyond the SPZ
	Other soils within the Project's SPZ		
	Soils of the Project's zone of influence (other than those within the SPZ)		
Soil contamination by spillage of chemicals and seepage from waste	Soils within the Project's footprint	C, Cm, O, DCm	Regular inspection of the Project sites for any spills or improper waste handling
Subsoil and groundwater contamination	Soils and groundwater within the Project's SPZ	C, Cm, O, DCm	Regular sampling and analysing the extracting groundwater for Project- and site-specific contaminants[137]
Mobilization of pollutants already present in soils or subsoil of the Project sites	Subsoil and groundwater within the Project's footprint and SPZ	C	Regular sampling and analysing soils as well as groundwater and drainage water downstream the Project sites for site-specific contaminants
Non-recoverable loss of subsoil material (limestone, loess, sand, Fe-containing and other raw materials) and extracted groundwater as commercial products or by-products along with depletion of the operated mineral deposit and aquifer	Limestone and other mineral resources of Uzbekistan	O	Recording groundwater withdrawal and extraction of mineral resources
	Dustlik Aquifer	O	
Increasing the thickness of the vadose zone as affected by quarrying activity	Shallow groundwater	O	Regular visual inspection of the quarrying and adjacent areas regarding groundwater appearances (unlikely)
Increase of the mass movement rates as affected by construction and quarrying activity	Soils, subsoil and development of the Project footprint area	C, Cm, O, DCm	Regular visual inspection of structures, their basements and surrounding soil surfaces with a focus on their physical stability and the absence of geological, geomorphic or hydrological hazards
	Soils, subsoil and development of the area adjacent to the Project footprint	C, Cm, O, DCm	
	Soils, subsoil and structures of the developed areas closest to the Project footprint	C, Cm, O, DCm	
Static and dynamic deformations of the subsoil by buildings and structures, earthworks, blasting, pile works, vehicle and railroad traffic	Subsoil of the Project footprint area	C, Cm, O, DCm	
	Subsoil of the area adjacent to the Project footprint	C, Cm, O, DCm	
	Subsoil of the developed areas closest to the Project footprint	C, Cm, O, DCm	

[137] Consultant would also recommend to identify the closest groundwater extraction facilities (wells, pits, etc.) that are used by local communities and located downstream of the Project Area to involve them into the Project's environmental monitoring program along with canals that drain the Project sites and transfer drainage water to the river of Kly

9.4 Impacts on Surface Water Bodies

9.4.1 Introduction

Water bodies in the area of the proposed cement plant include the Kly River and its tributaries, Lake Balykly, the A.A. Sarkisov Yuzhno-Golodnostepsky Canal and aquacultural ponds. The Project area does not feature any bogs.

Potential impacts of the Project construction and operation on surface water bodies include:

- Depletion of natural or artificial water resources, due to abstraction for water supply needs;
- Change in surface water quality under the influence of uncontrolled surface runoff from the industrial sites, operation of special machinery, etc.;
- Contamination of water by lubricants and oil/diesel spills, (emergency) discharge of untreated or inadequately treated wastewater to water bodies or to ground.

The above impacts are considered in this section below, and appropriate measures are proposed for their minimization.

9.4.2 Water supply

Construction

The main components of water demand at the construction stage are:

- Household needs and drinking water;
- Showers;
- Fire water supply;
- Dust control.

Water for dust supression, operation of showers and household needs at the construction stage will be transported to the site. Drinking water will be supplied in bottles.

Special tanks will be provided for on-site storage of water, placed in dedicated indoor premises or on a hard-paved plot under a shed. The water storage tanks shall be made from materials approved for such application in the Republic of Uzbekistan.

At the beginning of the construction phase the Project will take water from adjacent canal. The company has the permit for such purposes. At the final construction stages, it is expected that water will be supplied from two artesian wells which will be drilled by a local geological company. Underground distribution pipelines will be constructed to supply water to consumers. Water treatment system will be provided as appropriate. Upon pumping, the water will be accumulated in raw water tanks. The collected water is expected to undergo a chemical treatment process consisting of a “primary demineralization and mixed bed” system. The purpose of the chemical water treatment process is to reduce the levels of electrical conductivity, hardness and silica (SiO2) as required of the water quality feeding the boiler.

Operation

At the operation stage, the following water uses are expected:

- Household needs and drinking on-site;
- Domestic needs at the shift camp;
- Fire water supply;
- Operational needs (dust control in the area of shift camp and along the route of heavy machinery traffic in the open pit mine).

The water for operational stage comes from the adjacent canal via a flexible hose and electric pump. The company has the permit for water abstraction from the canal.

The site-specific construction activities include re-development of the Project-affected waterway of The A.A. Sarkisov Yuzhno-Golodnostepskiy Canal (both previous and new locations of this canal are shown on the map, Figure 5.4).

Drinking water will be delivered by third parties in bottles. The Company announces that there're no plans to use the water from canals and natural water bodies of the Project area during operation phase of the Plant.

Water abstraction from surface water bodies (Kly River and its tributaries) is not planned for construction and operation stages. Therefore, water supply for the Project construction and operation will course no negative impact on surface waters.

9.4.3 *Water balance*

At the construction stage the technical water comes from the nearby canal via a flexible hose and electric pump. The use of this public water source was approved by The Water Supply Canals Authority of the Republic of Uzbekistan (in Uzbek - Ushbu Shartnoma Uchtom Irrigatsyia Tizimi) and is regulated by the Agreement No. 5 dated April 1st 2019 according to which the Project can take 768 000 m^3 of water monthly from April to December of the year 2019 at a rate of 889 m^3/h.

It is expected that water abstraction from groundwaters will not have a significant impact on it. It is considered to be low, short-term and local.

The estimated water demand for the operation is 1056 m^3 a day as a maximum. This number includes 655 m^3 of the make-up process water, 131 m^3 as a reserve process water (calculated as 20 per cent of the 655 m^3 regular volume) and additionally 270 m^3 for supplying fire control systems of the Plant. For the second stage of the Plant, the water demand will increase up to 1500 m^3 as a maximum.

The project consumes approximately 200,000-ton water per annum, or 0.01 m^3/s (less than 1% of the average flow rate of the canal). The water will be drawn from the adjacent canal. The average flow rate of the canal is 4-5 m^3/s. Jizzakh Oblast Water Resource Bureau confirms that water consumption from Huaxin Jizzakh project will not impact the current water demand from this canal, which is mainly for irrigation and sanitary purposes. In case more industries are established in the future, the upstream source can supply up to 10 m^3/s water through the canal according to the Water Bureau's master plan. To further mitigate water risk, a 100,000 m^3 water storage pond will be built onsite to store water for consumption in the summer, which is the peak water consumption season.

The 1.57 mn tons of cement per year plant will consume approximately 200,000 ton water, with efficiency at 127 l/t, which is well below Lafarge's averages at 239 l/t in water stressed regions or 299 l/t of Group average.

Water abstraction will be limited to the technological process needs which is considered to be low therefore impact on groundwaters and artificial canal is likely to be low, long-term and local.

9.4.4 *Wastewater disposal*

Process wastewater, sanitary wastewater, and first 5-cm contaminated rainwater will be treated at the onsite wastewater treatment unit through physical/chemical/biological treatments. The treated wastewater will be stored at an onsite treated wastewater accumulation pond with the capacity of 57,600 m^3. The treated wastewater will be partly recycled back to the processes, with the rest portion of it to be used for greenbelt and process dust control. The large accumulation pond will also work as an evaporation pond; therefore, there will be no wastewater discharge from the Site. The accommodation camp will be equipped with its own wastewater treatment facility.

During the operation phase, the impact of storm/melt water from the Project facilities and sites on surface water may occur mainly during intensive snow-melting and heavy rainstorms. Considering the distance to the Kly River from the Project area, it is unlikely that any negative impact on the river will be caused. On the other hand, considering the proximity of the artificial canal, it is likely that some negative impact will be caused to the canal. It is expected to be law, local and short-term, however regularly recurring.

After the proposed management and engineering measures against pollution of surface and ground water, residual impact of wastewater discharge during the Project operation on surface water quality can be assessed as low.

9.4.5 Water protection zone

In order to prevent pollution, contamination and siltation of surface water bodies and depletion of water resources, as well as preserve habitats of aquatic biological resources and other wildlife and flora resources, water protection zones are established along water body boundaries of rivers, canals, lakes, water reservoirs in conformity with Ministerial Decree No. 174[138]. Special rules and conditions are applied to any commercial and other types of activities within water protection zones.

According to the national requirements, industrial operations may be conducted in water protection zones and on condition that the facilities are provided with adequate systems for protection of water bodies against contamination, littering and water depletion.

In accordance with Ministerial Decree No. 174[139], it is highly likely that the width of water protection zone of the Kly River is 50-100 m from water edge, on the right and left bank of the river. None of the components of the Cement Plant facilities are located within the water protection zone.

It is considered that impact on Kly River to be negligible.

On the other hand, Huaxin Cement Jizzakh Plant is located near the irrigation canals, which may have protection regime along their waterside. Ramboll was not provided with such information. However, in accordance with Ministerial Decree No. 174 additional limitations to any commercial and other types of activities are established within the water protection zones and protection belts along rivers and irrigation canals relating to ensure protection of the water bodies against pollution, contamination, development of erosion processes along the riversides etc. Besides, water intake can be carried out under agreements with water management organizations.

On condition that the required protection measures are implemented, it is anticipated that impact on the canal will be low / moderate, mid-term and local.

The impact mitigation summary is presented in Summary Table.

9.5 Impacts on Biodiversity

9.5.1 Vegetation

The planned activities will produce physical, chemical and other impacts on vegetation during construction and operation of the Project and associated facilities. Herewith, most of the expected impacts will be felt throughout the Project life cycle.

Since the Project area is located in the region with ephemerous and xerophilous vegetation with low probability of finding rare and endangered species, it could be assumed that the area is characterized by the absence of sensitive ecosystems requiring protection.

Destruction of the existing vegetation within the area of the planned development. This impact is inevitable, due to the area requirements of the Project facilities, hard-paved and other surfaces, and access roads. Total area of allocated for the Project is 400 ha for the limestone claims, 71 ha for the cement plant, 10 ha for the accommodation camp and 4.63 ha for the access motor road (Figure 5.1).

Land disturbance occurring during construction and operation stages and leads to vegetation habitat loss. All vegetation cover on the Project area is destroyed during construction activities.

The impact, although inevitable, can be minimized by adopting adequate management arrangements, e.g. optimization of land use within the boundaries of allocated land plots, ensuring that such boundaries

[138] Decree of the Cabinet of Ministers of the Republic Uzbekistan No. 174 of 7 April 1992 validating the Regulation on water protection zones of water reservoirs and other waterbodies, rivers, main canals, manifolds, and also of supply sources of potable water for residential use, sources of medicinal and recreational water uses

[139] Decree of the Cabinet of Ministers of the Republic Uzbekistan No. 174 of 7 April 1992 validating the Regulation on water protection zones of water reservoirs and other waterbodies, rivers, main canals, manifolds, and also of supply sources of potable water for residential use, sources of medicinal and recreational water uses

are respected by contractors; restoration of natural vegetation in some areas as part of the planned landscaping activities, etc.

Overall intensity of the impact can be tentatively assessed as minor or moderate, receptor sensitivity - as low, and resultant significance of the impact - as low. Spatially the impact is limited only to the area of the Project and associated facilities; it is long-term, i.e. occurs during the Project lifetime.

Fragmentation of vegetation cover by linear facilities. The Project requires such linear facilities as access motor roads and access ways for railroads, above-ground gas pipelines, power transmission lines and watercourses to be built.

Access roads to the Cement Plant Area and to Accommodation camp will originate from the operational motor road from the North-East from the Plant. Local railroad access ways will be constructed on the area of the Plant and connected to the operational railroad, which crosses the Project area from South-East to North-West. The watercourse (part of the A.A. Sarkisov Yuzhno-Golodnostepsky Canal), flowing on the planned Cement Plant Area at the present day is planned to be rebuilt to pass the Plant area around from North-East. It will probably cross the existing railroad and allocated access motor road.

Construction of *linear facilities* is performed by contractors within the framework of contracts with state institutions responsible for construction and operation of the infrastructure facilities. The Project has no levers of influence on the activities of contractors, which creates additional risks of impact on vegetation during construction works.

Based on the above description, the impact intensity as minor or moderate, receptor sensitivity - as low, and resultant impact significance - as low. Similarly to the impact discussed above, this impact can be reduced by mitigation measures, mainly at the management level.

Pyrogenic impact of vegetation cover due to fires. Occurrence of fire hazard is unlikely in the conditions of dry steppe/semi-desert with thinned vegetation cover. The most probable cause of fire is emergency vehicles fuel spillage. Mitigation measures may include Oil Spills Response Plan for fuel leakages on the whole Project area.

Impact of air pollutants. The planned activities are expected to produce significant emissions of Nitrogen oxides from natural gas combustion and Sulphur oxide, powdered particles of carbonaceous and associated rock from coal combustion.

Generally, vegetation cover of the area is adapted to arid steppe conditions whereby the plants are regularly exposed to the dust and sandstorms. Dust emissions from fuels combustion are expected to be relatively low compared to the natural total suspended solids concentration.

At quarries, drilling, blasting, primary crushing at tips, screening and tipping onto stockpiles are the major sources of airborne dust. Operation of heavy equipment such as loaders, shovels, dozers, draglines and haul trucks also produces dust. Dust on roadways and around stockpiles and loading operations is often a problem. This type of impact is of a high likelihood and has long-term effect. Mitigation measures, such as implementation of modern de-dusting equipment, planting of trees around the plant and access ways as an additional barrier for dust particles or and using water- and foam-based suppression method at the quarry can reduce the impact of dust.

Carbonaceous rock dust has alkalization effect, while ash may induce acidification; both effects entail changes in soil quality and fertility. Due to the neutralizing effect of their interaction, the substances will not cause acid precipitation. Hazard of the acid precipitation is dangerous only for irrigated agricultural land (cotton fields). The impact can be minimized by the implementing of the ground air monitoring system and adopting of corrective measures in the case of negative impact on agricultural plants.

Impact of contaminated surface runoff and contamination of soil substrate. Impacts of this category are determined by reaction of plants to contamination of surface or subsurface runoff, or of soil on which the plants grow. Contamination of surface runoff is caused by air-borne pollutants from air emissions. Except for the low-intensity gradual accumulation of polluting substances in soil and vegetation within the sanitary protection zone which is barely likely to cause any notable intoxication of plants, such impacts are only possible in case of accidents with emergency spills of process liquids, wastewater or contaminated surface runoff. Therefore, the impact is tentatively assessed as being of *low* significance and preventable by a system of non-specific measures to manage petroleum, oil, lubricants and other hazardous substances, wastewater (including drainage water).

9.5.2 Terrestrial Fauna

Analysis of the baseline status of the wildlife, vegetation and biodiversity within the Project area is presented in Chapter 7. This Section includes the assessment of the Project's impact on the wildlife and vegetation and on economically significant ecosystems, as well as recommendations for the impact mitigation measures and monitoring of their implementation within the Project.

The significance of impacts has been determined based on the relationships between factors of the potential magnitude of the impact and the vulnerability of receptors exposed to the impact during the Project construction and operation. The significance of impacts has been considered for each aspect before and after the prevention / mitigation measures (residual impact).

9.5.2.1 Classification of habitats within the Project's area of influence

The IFC Performance Standard 6 - Biodiversity conservation and sustainable management of living natural resources (IFC PS6) defines the habitat as a terrestrial, freshwater, or marine geographical unit or airway that supports assemblages of living organisms and their interactions with the non-living environment. Habitats are divided into modified, natural, and critical (the latter being a subset of modified or natural habitats).

Modified habitats are areas that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition. Habitats that do not match the above description are classified as natural.

Critical habitats are areas that meet at least one of the criteria set by IFC PS6:

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

The following conclusions are based on review of the scientific publications relating to the Project area (to be updated when results of the environmental surveys are available):

- the critical habitats nearest to the design boundaries can be tentatively identified with reference to the existing designated conservation areas (DCAs) at the local and regional level;
- major part of the area affected by the Project matches the transformed habitats criteria as it was used for irrigation agriculture and cattle grazing over decades of years.

9.5.2.2 Sensitivity of Receptors

Special attention has been paid to environmental receptors having either high value or sensitivity:

- areas with a designated conservation status;
- critical habitats identified using the above criteria of IFC PS6;
- natural habitats identified using the above criteria of IFC PS6;
- Endangered species according to the IUCN Red List and the Red Data Book of the Republic of Uzbekistan;
- habitats or species of significant value in terms of their economic function (e.g. for fishing and hunting).

The criteria of receptors' vulnerability are presented in Table 9.5.1.

Table 9.5.1: Criteria for assessing the environmental value

Value / sensitivity	Criteria relating to species	Criteria relating to habitats or territories
Very high	Critically endangered and endangered species (according to IUCN classification)	Nature reserves of international significance (or of similar status). Highly threatened habitats of significant environmental importance at the international level.
High	Vulnerable species (according to IUCN classification). Species protected at the national level, of significant population size and importance.	Nature reserves of national significance (or of similar status). Highly threatened natural habitats of significant environmental importance at the national level, as well as natural habitats of significant environmental importance and/or high degree of biological diversity, with a limited replacement potential.
Moderate	Near threatened species (according to IUCN classification). Rare or endangered at the national level, of insignificant population size and not of national significance.	Natural habitats of regional significance. Modified habitats with high degree of biological diversity or nearing extinction within the boundaries of a region.
Low	Species of least concern (according to IUCN classification). Species of local significance.	Unprotected territories and habitats having a certain degree of biological diversity and cultural value. Modified habitats of limited environmental value. Other territories with certain degree of biological diversity and cultural value on a local, but not national scale. Modified habitats having biological diversity of limited value.
Insignificant	Species of least concern (according to IUCN classification). Species having no local significance.	Highly modified habitats, with biological diversity of no environmental significance.

9.5.2.3 Impacts on critical habitats

The endangered or rare species are not identified at or near Project area There are no habitats within the land areas allocated for the Project or in the immediate vicinity, which can be classified as 'critical habitats' in the context of the IFC PS6. It is unlikely that such areas may be identified during the environmental survey for the Project, as modified habitats of various types prevail in the affected area.

9.5.2.4 Impacts on designated conservation areas

There are no designated conservation sites or areas within the area allocated for the Project or near it. The nearest conservation areas are (see also Chapter 7):

- Zaamin State Reserve,
- Nuratin State Reserve,
- Zaamin National Park, and
- Aydar Arnasay Lakes System Ramsar Site – the nearest designated area, located at a distance of about 15 rm from the Project site.

9.5.2.5 Impacts on natural and modified habitats

Several industrial sites have been allocated for the Project including the cement plant site, limestone quarry and a number of infrastructure facilities (water wells, roads, power transmission lines, high pressure gas pipeline). Information relating to the Project composition has been presented in Chapter 5.

The following direct and indirect impacts (but not limited to) on the vegetation and wildlife will be possible during the construction phase of the Project:

- noise and light impacts on birds, mammals, amphibia and reptiles associated with the construction activities and disturbance factor;
- elevated level of risk of localized contamination of the nearest habitats (exposure to dust);
- localized changes in the atmospheric air quality as a result of construction activities and intensive traffic of transport vehicles within the subject area;
- occasional introduction and spreading of invasive plant species during the construction period;
- physical destruction of plants and animals.

All these types of impact can cause deterioration of the status or complete destruction of habitats. The Project area of influence matches the criteria of modified habitats as it was used for irrigation agriculture and cattle grazing over decades of years

9.5.2.6 Impacts on terrestrial vertebrates

Birds

According to the preliminary information, it is potentially possible that bird species listed in the Uzbekistan Red Data Book and IUCN Red List, including nesting birds, can be found in the Project area (see Table 7.9.1). Few species are encountered in the area only on transit during seasonal migrations, i.e. their presence is limited in time and associated with specific seasons. Migration routes of various bird species, such as Afro-Eurasian and Central Asian flyways, pass through the Project area.

The negative impact of construction of the Plant and associated facilities on the bird fauna is mostly related to immediate destruction of habitats in the land plots allocated for the Project facilities. In the neighbor areas, the impact is related to changes in the living environment, more specifically:

- nuisance due to increased level of noise from the construction activities and running machinery;
- nuisance due to presence of people and equipment in the immediate vicinity of nesting sites;
- disorientation of migrating birds by lighting at the construction sites;
- deaths on the power transmission lines
- poaching.

The habitats that may be destroyed by the construction include ground-based nesting and feeding areas. With consideration that the Project is located in the area that was highly transformed by the previous economic activities lasting for decades, the decrease of nesting birds' population in the respective habitats and the absolute intensity of this impact is assessed as moderate (population size of nesting birds is to be clarified). Detailed description of the mitigation measures is provided in Summary Table. Their implementation will reduce the residual impact to low.

Mammals and reptiles

Development of areas creates adverse impacts virtually on all wildlife species due to the deteriorating conditions of their habitats, decrease in the population size and risk of death of animals. In the course of the field survey (2018) in the Project area, no protected species of terrestrial animals have been found. However, review of the pertinent literature suggests that both protected species (Goitered Gazelle and Desert Monitor) and commercial species (wild boar, hare, porcupine, nutria, gophers, fox, corsac fox, wolf, jackal, stone marten, etc.) can be found within the subject area.

The main sources of impact on mammals and reptiles are associated with construction activities, operation of machinery and equipment, transport vehicles and construction personnel. The impacts can be divided into three groups:

- Physical transformation of habitats: direct impact on animals, and indirect - changes in feed and habitat;
- Noise: direct impact - high levels of noise with immediate effect, and low noise with depressing effect; indirect impact - behavioural reactions disorders;
- Chemical contamination: direct impact - immediate death of animals in case of accidents; indirect - reduction of food resource, deterioration of forage organisms quality.

The following impact types are especially significant:

- Decrease in the habitat ranges as a result of allocation of land areas for construction, where the bio-topes will be completely destroyed;
- Transformation of habitats in areas adjacent to the construction sites;
- Contamination of the natural environment (soil and vegetation cover, atmospheric air and water bodies) entailing certain modifications of conditions for existence of baseline, commercial, rare and endangered species;

- Disturbance factor within the construction zone forcing animals to leave their usual biotopes;
- Death of animals as a result of poaching, operation of industrial facilities, chemical intoxication affecting the biodiversity level in the vicinity of construction sites;
- Death of animals on the roads;
- Impact on traditional natural routes and directions of animal migrations.

Earth works

Construction-related activities (excavation and handling of soil, filling of road foundation, construction ramps, crossings, etc.) will result in destruction of habitats of amphibians and reptiles, ground-based birds' nests, shelters of mammals above and underground, and may also cause immediate loss of animals. Animals living in areas adjacent to the construction sites will be displaced to remoter habitats which are not exposed to the adverse impacts.

The least negative effect of this factor is expected in winter when site activities will only affect dormant or other animals staying in underground shelters.

During the operation phase these impacts will be limited to the quarry mining.

Attractive effect of roads as an element of habitat

Construction of asphalt-paved roads with higher driving speed will increase the risk that animals may be killed as a result of run-over by vehicle. Intensity of this factor will be greater during the animals migration period, particularly at the time of breaking-up of brood of birds and mammals, when unwatchful and inexperienced young appear on the roads. 46 killed species of Desert Monitor were detected on the roads in Kyzyl-Kum Desert (Red Data Book of RUz, 2009).

The roads may attract animals in the following ways:

- Reptilians (*Reptilia*), particularly snakes, use road pavement for warming-up in the morning and evening hours;
- Small birds use road surfaces for picking insects (*Insecta*) and wind-borne seeds, big birds stop on high road embankments for rest and eating their prey;
- Mammals (mostly rodents – *Rodentia*, insectivores - *Insectivora* and carnivores - *Carnivora*) visit roads, particularly at night time, for feeding with invertebrates and vertebrates that are normally present there or are killed by vehicles and machinery;
- Animals also may use roads for quick movement or simply cross roads on their way.

The above factors will have a maximum effect on fauna during warm season (particularly during the periods of migration of birds and bats). During cold time of the year the impact will be smaller.

Presence of people

Physical presence of people is the main factor of nuisance for all vertebrates, except for a very small group of synanthropic species, and produces overall deterring effect. The effect of presence of people is greater for big animals and less significant for smaller species. If, during an extended period, people working on and around the site systematically refrain from following local reptiles, birds and mammals, most species get accustomed to their presence and stop reacting. For many bird and mammal species, presence of people means a chance of getting food in the form of human food remains, therefore, this factor often has an attractive function.

New activities and presence of people is likely to induce growth of population sizes of synanthropic animals (dogs, house mice, grey rats, etc.). During the construction phase, stray dogs will appear in the vicinity of construction sites, resulting in a decrease in the population size of ground-nesting birds (e.g. Houbara), as well as many animal species due to virtually complete extermination of young animals by dogs.

Impact of noise

At the construction phase the main source of noise is vehicles and construction machinery, as well as operation of various equipment and tools. Noise impact affects the most sensitive species, particularly larger mammals and most bird species, but its deterring effect will cease with time. Many bird species, particularly nonmigratory, as well as small mammals adapt to continuous, low and monotonous noise and stop reacting to it. Birds and mammals are more sensitive to night-time noise impacts than to the same level of noise at day-time.

During operation the main source of noise will be quarry mining that will include blasting. If even birds and mammals get accustomed to low-level noise generated by the process equipment, the new sounds will cause additional nuisance.

Impact of light

Impact of light may have both adverse and beneficial impact on local fauna and seasonal migrants. During migration periods in spring and autumn, night-time illumination on the Plant site and infrastructure facilities will attract flying birds, which may result in their death in case of collision with windows, various structures and power transmission lines, as in most cases they migrate at night and at low altitude.

Night-time lighting will have a deterring effect on majority of fauna species. Mammals and birds with negative reaction on night-time illumination leave the affected area.

Due to the fact that all Project facilities are located in the area transformed to a significant degree by human activities, and no critical habitats are located in the Project area, no irreversible adverse effects on fauna are expected to arise due to the Project.

On condition that proposed mitigation measures are implemented the impact of the Project construction and operation on terrestrial vertebrates will be low.

9.5.3 *Aquatic Ecosystems*

Hydrobiont communities of Jizzakh Region are associated with small-area water bodies (rivers, canals, lakes and ponds) conditions of which are generally limiting for habitats (due to unfavorable hydrology or increased water salinity), and therefore the species diversity of organisms is not large and has been found decreasing in recent decades. Water availability and quality are among the major environmental and social issues of Uzbekistan and in Jizzakh Region as well.

According to the data of 1990-2000[140], total amount of return water varies from 28 to 33 km^3 per year. Return water from irrigation is the important component of local water resources (about half of such waters are returned into the rivers), but it is also a threat to the ecosystems because of water quality.

Habitats of the area can be divided into *natural* and *confined to artificial water bodies*. According to this classification, natural habitats are represented by the river Kly (Sanzar) and its creeks, and drainless brackish lake Balykly. The hydrologic regime of the creeks is extremely unstable, with periods of drying up in some years. The Lake Balykly is the closest to the Project Area – it is located at 4 km from Huaxin Cement Plant. Its total area is 705 km^2 while during dry season it reduces to 112 ha.

The Lake Tuzkan is a natural water body modified by anthropogenic activities. It is located 20 km from the Project area and flows into the Kly river. Tuzkan is a part of Aydar-Arnasay System of lakes, its salinity is 7.4 ‰.

Habitats confined to artificial water bodies are represented by the A.A. Sarkisov Yuzhno-Golodnostepsky Canal and aquacultural ponds. The Canal, the biggest artificial water body of the region, is used for irrigation. The mineralization of water in the Canal is relatively high (as in other artificial canals of Uzbekistan it can reach 1 g/l and even more)[141]. There are also more than 10 aquacultural fish ponds in the close proximity to the Cement plant. The average area of every pond is about 5-6 ha. There is no

[140] Issues of the conservation of inland water ecosystems of Central Asia and Southern Caucasus. – Almaty, Regional Ecological centre of Central Asia; Toshkent, Global Water Partnership of Central Asia and Caucasus, 2006.

[141] Yakubov Kh.E., Yakubov M.A., Yakubov Sh.Kh. Collector and drainage drain of Central Asia and assessment of its usage for irrigation. - Scientific-Information Center of the Interstate Coordination Water Commission of the Central Asia, Toshkent, 2011. – 279 pp.

information in the open sources, and the Consultant got no information about water characteristics during the interview with the members of Khokimiyat.

The Canal, its ditches as well as lakes of the Project Area have high recreation potential. The Canal is used for recreational fishing, and agricultural ponds are used for commercial fishing. No hydrological surveys have been carried out in this area, so the main data sources on hydrobionts are the interviews with local authorities and open sources on water resources of Uzbekistan, such as scientific articles and national reports.

Water bodies of Uzbekistan are inhabited with 84 species of fish, 35 of which are commercial, 18 included in Red Book of the Republic of Uzbekistan, 18 included in IUCN list and 4 CITES species[142]. Most common species for commercial fishery in Jizzakh region are European carp, Grass carp and Bighead carp[143].

Aquaculture is an important and fast-growing sector of fisheries[144] accounting for 52–60 percent of the total fish production in the period of 2011–2014. Finfish are the only cultivated fishery product in Uzbekistan. The pond culture of cyprinids is by far the most developed aquaculture system in the country and there are a few well established, full-cycle fish pond farms, country-wide.

Pure water from rivers has been traditionally used for fish farming, but farms have to use saline and sewage water, that may decrease the diversity of fish species and amounts of fish production.

The main introduced technology was the polyculture of cyprinids in earth ponds in semi-intensive conditions. The cultured species were: common carp (*Cyprinus carpio*), silver carp (*Hypophthalmichthys molitrix*), bighead carp (*Hypophthalmichthys nobilis*) and grass carp (*Ctenopharyngodon idellus*). According to the State Committee on Statistics of Uzbekistan[145], Jizzakh region produced 1,805 tons of fish from January to March 2019.

Grass carp (*Ctenopharyngodon idella*) is a large herbivorous species of fish, which is widely cultivated for food. Natural habitats of the species are lakes, ponds, pools, and backwaters of large rivers with tranquil flow or standing water bodies with vegetation, located in East Asia. Grass carp spawn at 17-27°C in fast-moving rivers and the turbulence keeps the eggs in suspension while they drift downstream. Hatching occurs at the temperature of 20°C and the larvae migrate to the shallow waters and riparian zone.

During the summer period, it is mainly in the appendage system, in the winter it goes into the river bed and rests on the pits. Grass carp is an important commercial species, but it is also used for an and effective weed control for undesirable aquatic vegetation.

Common carp or European carp (*Cyprinus carpio*) is a widespread fish of eutrophic waters and large rivers in Europe and Asia. The species had been introduced into environments throughout the world and survives the salinity up to 5 ‰ . Common carp is tolerant to most conditions but prefer large water bodies with slow or standing water and soft, vegetative sediments. The species is omnivorous, with a high tendency towards the consumption of animal food, such as water insects, larvae of insects, worms, mollusks, and zooplankton.[146]. Spawns at the temperature of 18-20°C in fresh and brackish water in the coastal vegetation zone with the depth of 40-50 cm.

[142] Fifth National Report of the Republic of Uzbekistan on conservation of biodiversity. – State Committee for Nature Protection of the Republic of Uzbekistan, 2015. 62 pp.

[143] Karimov B.K., Kamilov B.G., Maroti Upare, Raymon Van Anrooy, Pedro Bueno and D.R. Shohimardonov Aquaculture and inland fisheries in Uzbekistan: review of the current status and conception of development. – FAO, Toshkent, 2008. – 148 pp.

[144] Food and Agriculture Organization of the United Nations, Fisheries and Aquaculture Department. [Official Website]. – Link: http://www.fao.org/fishery/countrysector/naso_uzbekistan/en

[145] State Committee on Statistic of Uzbekistan report. Agriculture and Fishery. January-March 2019. – 22 pp.

[146] Food and Agriculture Organization of the United Nations, Fisheries and Aquaculture Department. [Official Website]. – Link: http://www.fao.org/fishery/culturedspecies/Cyprinus_carpio/en

European carp is often considered a destructive invasive species and included in the list of the *World's 100 worst invasive species*. It is also considered vulnerable to extinction by the International Union for Conservation of Nature (IUCN)[147].

Hypophthalmichthys is a genus of large cyprinid fish. The most common species are Bighead carp and Silver carp. They were introduced to Uzbekistan in 1960's. Young fish feed on zooplankton, imago mostly on phytoplankton, detritus.

Bighead carp (*Hypophthalmichthys nobilis*) is a freshwater species, one of the most intensively exploited in aquaculture. Spawns during summer low water at the temperature of 18-20ºC in spring and early summer.

This species is basically a zooplankton feeder throughout its life under natural conditions. In culture, bighead carp will also accept artificial feed, such as the by-products from grain processing and organic detritus, in addition to natural food[148].

Silver carp (*Hypophthalmichthys molitrix*) are primarily filter feeders – due to their mouth apparatus they filter water bloom and muddy water. In the wild spawns at the temperature of 25ºC in June-July in large rivers with swift water. Young fish hatch in the floodplain zone. Requires standing or slow-flowing conditions such as in impoundments or the backwaters of large rivers. Feeds on phytoplankton[149].

They can be used for controlling water quality (for example, of noxious blue-green algae). Some of the algae (*Microcystis*) produce more toxins in the presence of silver carp. These carp have natural resistance to their toxins but can accumulate them in their systems. The species is considered near threatened in the the IUCN Red List[150].

According to Alibekov and Nishanov[151], presence of the genus *Schizothorax* was also discovered on the territory of Jizzakh region: in the river Sanzar and its tributaries. This is a genus of cyprinid fish is mostly carnivorous, dwells in mountain fast moving rivers. Spawns from April-May in plain regions until August in mountain rivers, in relatively cold water with the temperature about 13-14ºC. Certain species of the genus on the area of interest were not identified.

In the natural water bodies and in A.A. Sarkisov Yuzhno-Golodnostepsky Canal, there were also discovered populations of Common carp, *Carassius* and *Snakehead fish* (most possibly, the Northern snakehead, *Channa argus*).

Carassius, commonly known as *crucian carps* (*Carassius carassius*), inhabit a wide variety of still water bodies and lowland rivers, usually associated with submerged vegetation or regular flooding. Can strongly tolerate low oxygen concentrations and pollution[152]. Originally a European species, crucian carp was introduced throughout the world.

Feeding larvae and juveniles usually occur in high-complexity habitats as reed belts. Feeds on plankton, benthic invertebrates, plant material and detritus. Spawns in shallow, warm shores on submerged vegetation when the temperatures reach 17-20ºC[153]. *Carassius carassius* is considered as least concern by IUCN List[154].

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[147] IUCN Red List. [Official Website]. – Link: https://www.iucnredlist.org/species/6181/12559362

[148] Food and Agriculture Organization of the United Nations, Fisheries and Aquaculture Department. [Official Website]. – Link: http://www.fao.org/fishery/culturedspecies/Hypophthalmichthys_nobilis/en

[149] Food and Agriculture Organization of the United Nations, Fisheries and Aquaculture Department. [Official Website]. – Link: http://www.fao.org/fishery/species/2967/en

[150] IUCN Red List. [Official Website]. – Link: https://www.iucnredlist.org/species/166081/6168056

[151] Natural conditions and resources of Jizzakh region, - "Uzbekisan", Toshkent, 1978. 255 p.

[152] Kottelat, M. and J. Freyhof, 2007. Handbook of European freshwater fishes. Publications Kottelat, Cornol and Freyhof, Berlin. 646 pp.

[153] Carassius carassius (crucian carp). Centre for Agriculture and Bioscience international [Official Website]. – Link: https://www.cabi.org/isc/datasheet/90564

[154] IUCN Red List. [Official Website]. – Link: https://www.iucnredlist.org/species/3849/10117321

Another species of carassius genus that could be met in the water bodies in Jizzakh region is the goldfish (*Carassius auratus*), which is widely distributed throughout Central Asia and introduced in many countries. It is unpretentious to the environmental conditions, in the wild goldfish inhabits deep floodplain ponds with developed vegetation and clean stretches, avoiding plant-filled waters.

Spawns on low waters from late April until mid-August at the temperature of 23-25ºC.

Northern snakehead is a species of snakehead fish native to Japan, Eastern China, North Korea and South Korea. It has been introduced to other regions where it is now considered invasive. It inhabits shallow, marshy ponds and wetlands, swamps with mud substrate and aquatic vegetation. Due to the tolerance to a wide range of environmental conditions they can be found in freshwater waterbodies with temperature range from 0º to 30ºC, they can also survive out of water for up to 4 days by breathing oxygen from the atmosphere[155].

The northern snakehead predates upon a wide range of aquatic fauna: zooplankton, crustaceans, insects, even small reptiles, frogs and mammals. Spawning typically occurs in June-July at the temperature higher than 25ºC. Hatching occurs at the temperature of 25-30ºC. Juveniles usually consume phytoplankton.

According to the interview with the members of khokimiyat (local administrative authority) of Zafarabod region dated 09.07.2019 performed by Ramboll specialists, the fish ponds near the Project area are used by local fish farmers for Grass carp, European carp, Bighead carp, Silver carp farming.

It is noted[156] [157] that there are 111 species of *zooplankton* dwelling in fish ponds of Uzbekistan. Species composition of 21 water reservoirs of Uzbekistan (Charvak, Akhangaran, Tuyabuguz, Kattakurgan, Tuyamuyun and the reservoirs of Syrdarya, Surkhandarya, Kashkadarya, Zarafshan basins) mostly consists of *rotifers*, *daphnids*, and *copepods*.

No research data on zooplankton in Jizzakh region are available in free access.

Phytoplankton in Uzbekistan is represented by diatoms and cyanophyta, 22 genus and 55 species in total[158]. This species composition is relevant to the lake Tuzkan located 20 km North-East from the area of Project and which is fed by the river Kly, flowing in Jizzakh region. Phytoplankton of other water bodies of Jizzakh region was not surveyed.

9.5.4 Conclusions

Lack of endangered species and critical habitats in the Project AoI allows to assess the receptor sensitivity as Low and, after implementing mitigation measures, residual impacts will be Low to Negligible.

9.6 Impacts on Landscapes

9.6.1 Potential impacts during construction phase

Loss of Grazing Land at Quarry and Plant Sites

Livestock are the most important source of income for poor households and a second source of income to most other households. Small and medium sized herders are unable to buy fodder and concentrate feed for their animals and rely on the natural grazing to feed their flocks. Although the 485,6 ha of grazing

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[155] Channa argus argus (northern snakehead). Centre for Agriculture and Bioscience international [Official Website]. – Link: https://www.cabi.org/isc/datasheet/89026

[156] Kuzmetov A.R. Zooplankton of the fish ponds of Uzbekistan. Candidate thesis. Institute of Zoology of the Academy of Sciences of Uzbekistan, 1998

[157] Kuzmetov A.R. Fauna, ecology and practical significance of zooplankton of reservoirs of Uzbekistan. Dissertation abstract for the DSc of Biological Sciences. – Tashkent, National University of Uzbekistan, 2019.

[158] Chembarisov E.I., Shamisiev F.K. Complex method of water bodies state assessment, based on generalization of environmental indicators. – Institute of water issues of Uzbekistan. – 7 pp.

land lost is not very significant in for the area, it does impact on the households close to the quarries who will continue to use the grazing land around the quarry or travel greater distances to find suitable grazing. The grazing of livestock around the quarry will increase the risk of injury to livestock and herders. The loss of 485.6 ha of grazing land for the quarry sites will be of a Moderate Effect as it represents a safety risk to livestock and herders as well as a loss of grazing land for which herders will need to travel further to replace. This impact is of a high likelihood, and will have a limited impact on the livelihoods of local inhabitants. Accordingly, with no mitigation measures in place, this activity is likely to have a Moderate Impact on livelihoods of villagers close to the quarry sites. The following mitigation measure can be implemented to limit the impact of the quarries on grazing resources:

- Containing the quarry operations to the quarry sites this will ensure that the area effected is limited to the quarry and does not spill over onto adjoining grazing lands.
- Quarries need to be fenced to ensure that local herders and their livestock do not enter the quarry site and run the risk of injury.

The implementation of the above mentioned mitigation measures are likely to reduce the effect of the quarry operations to Low on the overall grazing land within the project area.

9.6.2 Potential impacts during operation phase

Impact of Dust on Agricultural and Grazing Land

Dust from the plant and quarry sites have the potential to impact on the vegetation adjacent and downwind of the plant and quarry sites. In general, plants show a decrease in plant growth due to dust as a result of stomatal clogging, reduced photosynthesis, and changes in soil pH. Dust on grazing lands makes the fodder unpalatable for livestock. Without mitigation measures dust particles are expected to drift in a predominately northern and north-eastern direction.

Dust emissions from cement kilns have been reduced dramatically over the last two to three decades due to regular improvements in design and operation, including increased use of modern de-dusting equipment. Near-ground fugitive releases of dust originating from grinding operations, truck traffic, wind, and other natural sources are difficult to measure and impact mainly on the local environment.

At quarries, drilling, blasting, primary crushing at tips, screening and tipping onto stockpiles are the major sources of airborne dust. Operation of heavy equipment such as loaders, shovels, dozers, draglines and haul trucks also produces dust. Dust on roadways and around stockpiles and loading operations is often a problem. The loss of grazing land surrounding the plant and quarry sites as a result of dust will be of a Moderate Effect as it represents a long-term, continuous impact resulting in adverse change to key economic drivers in the area. This impact is of a high likelihood, and will have an impact on the livelihoods f local inhabitants. Accordingly, with no mitigation measures in place, this activity is likely to have a Significant Impact on the livelihoods of villagers surrounding the plant and quarry sites.

The following mitigation measure can be implemented to limit the impact of dust at the quarries and plant site:

- Implementation of modern de-dusting equipment in the plant;
- Tarring of heavily used roads;
- Wetting (fog or mist) of gravel roads and other surfaces which release dust;
- Planting of trees around the plant and quarry sites to act as a net for dust particles;
- Use of water and foam-based suppression methods at the quarries.

The implementation of the abovementioned mitigation measures are likely to reduce the effect of the dust at the plant and quarry operations to Low on the overall grazing land within the project area.

9.6.3 Visual impact of plant and quarry site

The plant and quarry site will have a negative influence on the visual environment; both are visible from the surrounding villages and roads, at the northern slope of the Balyklytau ridge, due to the flat topography of the area. The lack of vegetation on the sites leaves them visually exposed. The negative influence on the visual environment will have a Moderate Effect as it represents a long-term, continuous impact resulting in adverse change outside the range of natural variation. This impact is of a high likelihood. Accordingly, with no mitigation measures in place, this activity is likely to have a Moderate Impact on the visual environment.

It will be difficult to mitigate the visual impact on site, due to the elevation and extent of the impact. Planting of vegetation will need to be close to the impacted community/road to maximize the angle at which the vegetation obscures the sites.

The following mitigation measures can be implemented to limit the impact:

- Planting of tall and dense vegetation at the borders of the site;
- A variation of color on the plant structures so as to blend into the environment (green and grey hues);
- Consultation with villages to address their particular impacts.

Possible interventions include the planting of tall and dense vegetation around the villages. The implementation of the above mentioned mitigation measures are likely to reduce the negative visual impact to a Low rating.

9.6.4 Conclusions

The development of the plant site and associated quarry has significant impact on current land usage and infrastructure in the project area if mitigation measures are not implemented. The most important from a land-use perspective is the impact of dust on the surrounding grazing lands, however with suitable mitigation measures this impact is reduce to a minor impact which is only expected to occur in exceptional circumstances.

9.7 Waste Management

9.7.1 Background

It is expected that during the Project implementation a sizeable amount of waste will be generated, resulting in a negative impact on the environment. Therefore, it is necessary to define the appropriate measures for waste management and waste disposal/recycling.

Domestic and industrial waste management of the Project should be based on the principle of minimization of environmental impacts through reduction of waste generation volumes, recycling of certain categories of waste, and keeping landfill disposal to the minimum. Waste shall be collected, stored, utilized and disposed in line with the environmental standards, occupational health and fire safety regulations in order to avoid accidents, fires, environmental damage and harm to human health. For this purpose, adequate facilities should be provided at the production sites for segregate collection and storage of various types of waste.

All waste management procedures shall meet both Uzbekistan regulatory requirements and IFC standards for waste management. In particular, design solutions should be focused on prevention of waste generation as far as possible, and if this is not possible - on recycling, treatment, utilization. Landfilling may be accepted only as a last resort.

Wastes generated during the Project construction and operation phases are characterized by their volumes, physical state and hazard classes specified taking into account chemicals, physical, toxicological characteristics of the waste. In Uzbekistan the classification of waste hazard is slightly different from that applied in other countries, such as the Member States of the European Union, where the most common classification divides waste into three groups: hazardous, non-hazardous and inert[159]. In accordance with the Law of the Republic of Uzbekistan dated April 5, 2002 №362-II "On wastes", all waste is classified as extremely hazardous (1st hazard class), highly hazardous (2nd class), moderately hazardous

[159] Definition of inert waste used in the EU is extremely rigid and excludes any reactive waste, including that of ferrous materials, wood, etc. Therefore, in accordance with the EU definition, only a very small amount of waste from the Project construction will be categorized as inert.

(3rd class), low- hazardous (4th class) and non-hazardous. The hazard class of waste is determined based on the waste properties that may pose hazard to the environment, human health and assists (toxicity, pathogenicity, explosiveness, fire hazard, high reactivity, ability to form persistent organic pollutants during neutralization) and other hazardous waste properties. The national waste classification is established by on the Resolution “On adoption of national waste classification catalogue of the Republic of Uzbekistan ID-1739” dated 07/01/2019. All wastes are classified taking into account their origin (raw material and attribution to the industry and technological process), chemical and/ or component composition and physical state. Brief characteristic of hazard classes used in Uzbekistan versus extended typical “international” classification of waste is given in Table 9.7.1.

Table 9.7.1: Hazard classes of waste in Uzbekistan

Hazard class in Uzbekistan	Definition of hazard	Examples of waste	Equivalent per typical international classification
I	extremely hazardous	Luminescent mercury-containing lamps, activated carbon contaminated with mercury sulphide.	hazardous waste
II	very hazardous	Concentrated acids, alkalis, halogenated solvents, lead-acid batteries, dry batteries, etc.	
III	medium hazard	Used lubricating oil, oily sludge, oily rags, used oil filter, non-halogenated solvents, waste paint, etc.	
IV	low hazard	Domestic waste, non-ferrous scrap, certain chemicals, certain construction waste, wastewater treatment sludge, treated medical waste, water-based drilling fluid, kitchen waste, etc.	non-hazardous

Non-hazardous inert wastes include plastic, cardboard, paper, ferrous scrap, inert construction waste, non-treated wood waste etc.

The Project will generate solid and liquid waste; hazardous and non-hazardous wastes of different classes and inert waste. The following hazardous wastes are likely to be generated during the cnstruction and operation phases: waste overburden rocks, spent oils, lubricants and solvents, paintwork waste, oily rags, contaminated polyethylene and polypropylene packaging, contaminated soil (owing to possible leaks and spills), waste fluorescent lamps, domestic waste, sweepings, wastewater treatment sludge, coal ash, etc.

Waste generated by the Project may cause major impacts to environment, such as:

- environmental pollution, in particular, pollution of surface water bodies, ground water and soils, resulting from improper management or storage (spills, infiltration, dumping, scattering, etc.);
- uncontrolled emissions, e.g. dust or gas, while handling and storage of some waste types;
- overexploitation of limited capacity of landfills;
- land allocation for overburden rocks and undersized materials rejects disposal;
- impact on health of personnel and community due to attraction of vermin and pests (rodents, birds, insects), and development of pathogenic micro-organisms;
- fire and explosion risks posed by highly reactive, flammable and explosive materials;
- visual impact due to inadequate waste storage arrangements.

Management of such hazardous waste requires particular caution especially as regards the selection of options for its recycling, treatment/neutralization or disposal.

Situation with waste management in Jizzakh Region

It should be noted that the current situation with waste management in Jizzakh Region of Uzbekistan, where the Project is implemented, is problematic. There are 10 waste landfills accepting domestic and production wastes in the Region; 4 landfills are under re-construction. According to the UN ECE report in 2015, most of solid waste landfills in Uzbekistan fail to meet the regulatory standards, including the designed sanitary and operational requirements[160]. By the UN ECE estimation, not more than 20% of landfills are provided with water supply, electricity - 25%, access roads - no more than 50%, administrative buildings - only each sixth. The wastes are not separated at the landfills. Due to the lack of special hazardous waste disposal facilities, toxic, medical, biological waste is illegally disposed of at the municipal solid waste landfills, threatening the epidemiological and environmental situation.

Figure 9.7.1: Waste landfill in Jizzakh Region

Source: http://ekobarqaror.muloqot.uz/; Nargis Qosimova, July 2017

About 80 tons of solid domestic wastes are generated in the city of Jizzakh daily and removed to the local municipal waste landfill located in 24 km from the city. The landfill is characterised by the frequent ignitions, smoldering, smoke and odours from wastes.

All chemical waste from industrial sites is transported by Zhizakhagrokimyo JSC to a specialised hazardous waste landfill, a 5-hectare facility located in the rural area 6 kilometres from the Egizbulak Village, Forish District. This waste disposal facility is currently under reconstruction. One local enterprise, Jizzakh Avantage Plus LLC, produces coal briquettes from coal powder.

Overall waste management infrastructure in the residential areas and industrial sites of the Region, including the number of waste-carrying vehicles, organized temporary accumulation areas and waste containers is not sufficient for proper management of generated waste. Untimely collection of domestic waste has led to occurrence of unauthorized waste dumps in the cities and rural areas of the Jizzakh Region.

In order to address the waste management problem in Uzbekistan, in 2017 the President of the Republic of Uzbekistan has issued a Decree No. 2916 “On measures of cardinal improvement and development of the waste management system for the years from 2017 to 2021”, and the all-country State Unitary Enterprise “Tosa Hoodood” was organized to manage the removal of municipal solid waste to landfills. The available equipment and machinery were transferred to this entity (see Table 9.X.2. for details; districts where the Project’s and associated facilities are located are highlighted).

Table 9.7.2: The list of equipment and machinery for waste handling transferred from the municipal administrations (khokimiyats) of the Jizzakh Region to the SUE “Tosa Hoodood” in 2017

Areas	Items of machinery	including						Waste collection areas	Containers
		Waste collection trucks	fuelled by	Bull-dozers	Loaders	Dump trucks	Weigh bridges		

			diesel	methane						
Jizzakh Region	75	37		37	7	7	12	12	234	359
including districts:										
Jizzakh City	3	-	-	-	1	-	1	1	34	-
Zafarabad	5	2	-	2	-	1	1	1	10	6
Forish	4	2	-	2	-	-	1	1	4	14
Gallyaaral	7	4	-	4	-	-	1	1	62	-
Sharof Rashidov	7	7	-	7	-	-	-	-	35	50
Arnasay	5	2	-	2	-	1	1	1	10	12
Bakhmal	6	3	-	3	-	1	1	1	13	68
Dustlik	7	3	-	3	1	1	1	1	5	56
Zaamin	8	5	-	5	1	-	1	1	34	20
Zarbdar	6	3	-	3	1	-	1	1	5	63
Mirzachul	6	2	-	2	1	1	1	1	10	67
Pakhtakor	6	3	-	3	-	1	1	1	12	-
Yangyobod	5	1	-	1	1	1	1	1	-	3

Source: Decree №PP-2916 dated 21.04.2017 "On measures of cardinal improvement and development of the waste management system for the years from 2017 to 2021"

In 2017 the region had a total of 293 waste collection areas and 554 waste containers, but for the Jizzakh region with the population over 1300 thousand people and relatively developed industrial sector, these are very few. According to the Jizzakh regional department of the State Center for Sanitary and Epidemiological Supervision, the region lacks 2,255 additional waste collection areas and 889 containers.

In addition to the SUE "Tosa Hoodood", 5 local-scale municipal solid waste processing enterprises were registered in Jizzakh Region, but none of them is currently operated. There are no waste paper recycling contractors in the region, and the waste paper and cardboard are transported to Tashkent for recycling. There are no facilities for the processing of solid household waste and electronic waste. The administration (khokim) of the Jizzakh Region has adopted a Resolution N. 227 on May 6, 2017 to organize the construction of a waste sorting and recycling facility. The project of a facility which will process 70 thousand tons of municipal solid waste per year was assigned to Temurbek Elegant LLC. It is also planned to purchase 49 pieces of machinery for the removal and disposal of waste and 170 waste containers. Still, the timeframe of the project implementation is not clear.

In February 2018 the President has ordered to organize up-to-date waste management clusters in 9 cities of Uzbekistan, including Jizzakh, and to develop a roadmap of collaboration with investors, preparation of documentation and financing of the waste treatment and recycling projects in the Jizzakh Region. The cluster in Jizzakh is operated by "ECO HOUSE" LLC. The current status of these activities is unknown.

The Project should take into account the existing situation with the waste management in the Region and ensure that the waste handling is well controlled, and that the final destination of wastes generated during the project activities is known and meets the applicable legal and international financial

[160] Country Profile on Housing and Land Management: Uzbekistan. UN ECE, 2015.

organizations requirements. Potential impacts on existing landfill capacities and on environment due to improper landfilling should be mitigated within all Project phases.

Details of the planned types of waste and generation volumes are currently not available for each specific Project phase; however, based on review of similar projects, future waste generation, including hazardous waste, during the Plant and quarries construction and operation is estimated as moderate.

Due to the lack of information, the methods and approaches have been identified to provide for adequate treatment, transportation, temporary storage, recycling, neutralization, and disposal of waste in line with the regulatory requirements and best applicable practice.

This chapter is focused on the proposed methods of handling/storage and disposal of wastes that can be generated during the construction and operation phases of the Project, as well as on the potential environmental impact of waste management and the respective mitigation measures. The issues related to the environmental impact of the waste generation and disposal during the decommissioning phase of the Project are discussed in Chapter 10 of this report.

9.7.2 Construction Phase

The section provides characteristics of waste that can be generated by the Project construction, considering the materials used for the activity. It should be noted that the construction phase will also include geological exploratory works at the limestone quarry.

Materials to be used in construction include components of the Project equipment, as well as materials for the site development, such as steel bars for piling and erection of buildings, concrete for foundations, road paving asphalt and concrete, as well as auxiliary structures, steelwork, elements of the construction site development, finishing materials.

9.7.2.1 Waste generation

It is expected that construction activities for all Project facilities will produce similar waste streams; therefore, a common tentative list of waste types can be applied for the whole construction phase. Waste generation is attributed to the following operations: exploration of quarries, earth works, road works, erection of building structures and installation of equipment, finishing works, commissioning, unpacking of materials, operation of vehicles and machinery. An accommodation camp will be operated during the construction phase, consisting 2 dormitory buildings with total capacity of 400 persons, a canteen and a wastewater treatment facility.

During the exploration activities the Project will generate 10.08 t/year of waste comprising: mud residues which will be used in reclamation, oily rags and domestic waste which will be disposed of at a solid waste landfill.

The wastes anticipated from the construction phase include:

- Construction waste (off-specification construction materials, packaging, spoiled items);
- Hazardous waste from plant construction and maintenance operations (spent batteries, spent fluorescent mercury-containing lamps, waste oils, solvents and paintwork waste, oily rags, oil-contaminated soil, etc.);
- Ferrous and non-ferrous scrap
- Domestic waste from the construction accommodation camp (capacity 400 workers);
- Wastewater sludge from the construction accommodation camp;
- Food / organic waste from the construction accommodation camp; and
- Overburden rocks from the quarries.

Wastes generated during the construction phase have the potential could cause adverse impacts to the environment if handled or disposed incorrectly.

Handling, transport and disposal of non-hazardous and hazardous waste at the construction site should be carried out to industry standards internationally to prevent impacts from incidents such as wind-blown litter, loss of containment, spillage during transportation, fly tipping.

If the handling, storage and transportation of wastes is not executed properly impacts there is potential for releases to the surrounding environment as well as impacting the health and safety of workers and the surrounding community. Loss of containment can lead to the contamination of surface and ground water. Poor chain of custody of wastes can result in the reuse of containers in application to which they are unsuited (e.g. waste chemical containers being used to store drinking water). Use of unauthorised waste shippers may lead to waste dumping in inappropriate locations, leaks and littering during transportation, as well as impact on personnel health.

9.7.2.2 Impact assessment

Generation of waste is a negative impact from the Project. The impact is direct on the environment, personnel and community health and the waste infrastructure available to the Project. Depending on the availability of waste treatment facilities and / or recyclers the impact extent will be either local or regional.

Depending on the choice of waste management solution, the impact duration could vary. Landfilling would incur permanent impact as landfill capacity is a finite resource. Recycling / waste to energy solutions are temporary as the capacity, although capped, is in theory infinite. Still at the current stage the anticipated technology does not provide for any waste-to-energy solutions.

Waste will be generated daily throughout the construction phase. Disposal of this waste will be at regular intervals as required by the project design documentation for the construction phase.

Given the limited amount, duration and low hazard class of major part of wastes generated during the Project construction the impact magnitude is expected to be low.

There are 10 known waste disposal facilities in the Jizzakh Region which are the primitive landfill sites suitable for low-hazardous (solid domestic waste) and inert waste. The only known hazardous waste disposal facility located in Egizbulak Village, Forish District, in more that 60 km from the Project site, and it is reportedly under re-construction. Other waste disposal and treatment options are unknown therefore the receptor sensitivity is considered to be high.

There are no known in place controls to manage construction waste at the cement plant and quarries as the Project is in the planning stage. The impact magnitude is considered to be low and the receptor sensitivity is considered to be high. As such the impact significance associated with wastes generated during construction are considered to be moderate without further mitigation.

9.7.3 Operation Phase

The section provides characteristics of waste that can be generated by the Project operation, considering the materials used for the activities of the cement plant, operated limestone and loess quarries and the worker accommodation camp. The Project is not chemically intensive, with most of the materials used onsite being inert and non-hazardous. Some amounts of liquid fuels, lubricants and some other chemicals will be used onsite for the maintenance of the Plant’s equipment and machinery resulting in generation of the insignificant amount of waste.

9.7.3.1 Waste generation

Waste streams generated are expected to include:

- General wastes from the operation of the cement plant (different types of packaging for consumables, sweepings, domestic waste, office waste etc.);
- Hazardous wastes such as waste oil, oily rags, lubricants and laboratory chemicals;
- Waste tyres;

- Domestic waste from the worker accommodation camp;
- Organic/ food waste from workers accommodation camp and canteens;
- Wastewater sludge;
- Spoil and overburden from the limestone and loess quarries; and
- Lime dust and alkali or chloride / fluoride containing dust build-up from the kiln
- Coal ash from the burning process.

There are currently limited in place controls for handling Project's waste and there is no waste management plan.

Overburden and excess rock associated with the quarrying operations (if any[161]) will be stockpiled for later use as reclamation materials within the quarry. Undersized materials or material rejects removed from the lime process prior to thermal treatment will also be stockpiled for later use in reclamation activities within the quarry

The lime collected from dust collection and partially calcined limestone minerals from the lime manufacturing process and emission control systems will be re-introduced into the manufacturing process or sold where possible; where no other use can be found for the lime kiln dust, it may be disposed of in an authorized non-hazardous landfill.

The ash from coal used as a process fuel serves as a correction additive for the clinker, which also allows saving the raw materials consumption.

The anticipated technology does not provide for the use of waste to energy solutions in the production process, so the Project should consider other options for waste treatment, recycling or disposal. The Project as well does not envisage construction of its own waste treatment or disposal infrastructure, e.g. thermal treatment units, waste separation facilities and landfills.

The authorized waste management operators should be contracted for waste removal and transportation to the adequately equipped waste treatment and disposal facilities. The existing capacities and equipment of such facilities in the region are unlikely to meet the needs of the Project and to comply with the sanitary, environmental and operational requirements. The use of more distant waste disposal facilities which might meet the applicable requirements and have sufficient capacities, will significantly increase transportation costs and associated air emissions and impact of road infrastructure. The Project should also ensure that the waste is transported to the authorized waste disposal facilities and is not dumped in the unauthorized locations.

9.7.3.2 Impact assessment

Generation of waste is a negative impact from the Project. Waste generated during the operation at the cement plant and quarries may have a direct impact on the surrounding environment and waste management infrastructure, and secondary effects on the environment, workers and the community if not managed appropriately.

Impacts from off-site landfilling of waste are essentially permanent. Impacts arising from waste management are likely to be from local to regional in nature depending on the selected options for waste disposal.

Waste will be generated daily throughout the operational phase.

Given the sizeable amount and low hazard class of major part of wastes generated during the Plant operation the impact magnitude is expected to be medium.

The receptors include the environment around temporary accumulation areas before offsite disposal as well as rock and overburden storage areas at the quarries, the local and regional waste handling infrastructure and roads, personnel and community health. The receptor sensitivity is considered to be moderate.

[161] According to the Company representatives and IFC Notes, the quarrying area has no soils and the limestone is exposed for mining. Nevertheless, Consultant expects some amounts of the waste soil and rock will appear in the course of the mining

The impact magnitude is considered to be medium and the receptor sensitivity is considered to be moderate. As such the impact significance associated with wastes generated during Project operation is considered to be moderate without further mitigation.

9.7.4 Mitigation

A waste management plan (WMP) for the Project should be developed that sets out plans and actions for the construction phase as follows:

- Good housekeeping practices for waste storage and handling referencing good international industry practice;
- The WMP should include a waste inventory developed in the planning stage, in discussion with the engineers, to establish the types of wastes expected from the construction and to identify appropriate disposal routes;
- Construction materials will be managed in a way to avoid over-ordering, poor storage and maintenance, mishandling as well as improper operation procedures;
- Construction wastes will be separated into reusable items and materials to be disposed of or recycled whenever possible;
- Waste suitable for reuse will be stored on site and reintroduced to the construction process as and when required;
- The WMP will identify disposal routes (including transport options and disposal sites) for all wastes generated during the construction phase;
- A hazardous waste management system covering waste classification, separation, collection, storage, transfer and disposal should be set up and operated. All necessary permits should be in place. The waste management system will comply with applicable regulation of the government, if any, or in its absence, GIIP;
- Hazardous waste will be stored in such a way as to prevent and control accidental release to the environment (e.g. secondary containment, sealed containers, weather protection sheds and covers);
- Waste will be collected regularly by the reputable waste collectors;
- Recyclables such as scrap steel, metals, plastics, and paper items will be collected for recycling wherever possible;
- Disposal of construction waste in or off the construction site should be prohibited;
- The Project should ensure waste is transported to the authorized waste disposal facilities and is not dumped in the unauthorized locations. Chain of custody documents should be used for construction waste to monitor disposal;
- Waste segregation should be practiced at the workers camps with an emphasis placed on reducing, reusing and recycling of waste streams as appropriate; and
- Portable toilets should be provided at the construction sites with regular removal of septic sludge using specialized vehicles to the wastewater treatment facility.

At the construction phase, the Project will arrange special areas for temporary waste accumulation prior to their removal to waste disposal facilities. Some of the equipped areas can be later used at the operation phase with the following applicable requirements:

- separate areas for hazardous and non-hazardous wastes;
- separate containers for each waste stream to ensure segregated collection and maximize reuse and recycling;
- provision of all containers with proper covers (to prevent blowing off of light materials or wetting with precipitation);
- collection of liquid waste in tanks or drums on areas with bunding capacity equal to 110% of the total waste storage capacity;
- provision of spill response kits at liquid waste collection areas;
- hazardous waste accumulation areas shall be located at a distance from sensitive receptors, e.g. existing production facilities, hazardous facilities, accommodation areas;
- prevention of theft and vandalisms risks;
- easy and safe access; and

– sufficient ventilation.

A waste management plan (WMP) for the Project operation phase should be developed that shall include the following, as a minimum:

- A waste inventory should be created to establish the types of wastes;
- Identify disposal routes (including transport options and disposal sites) for all wastes generated;
- Segregate wastes and recycle wherever possible;
- Hazardous wastes should be segregated and disposed separately from non-hazardous wastes using an authorized waste management operator;
- Hazardous wastes shall be labelled and stored in sealed containers that are stored on bunded hardstand. Hazardous wastes that are unsuitable for disposal in the cement kiln (such as waste oil drums) shall be returned to the manufacturer or trucked to appropriate hazardous waste disposal facility;
- Waste oil should be used for kiln start-up;
- The local landfills are not suitable for disposal of any hazardous waste and should be only used for inert and non-hazardous waste only;
- Timely removal of waste from the site should be ensured:
  - Time limit for temporary waste accumulation shall be determined for each type of waste in accordance with its properties, but in any case, shall not exceed 11 months;
  - Permitted duration of food waste storage in containers at 0ºC or lower temperatures is three days, maximum; at temperature above zero - not more than one day;
  - Medical wastes shall be removed by special vehicles 2 times per week during warm season and on a weekly basis during cold season;
- Removal of food waste as a source of food for vermin (insects, birds and rodents): collection of food waste in secured containers at dedicated areas and regular removal by licensed operators;
- Continuous record-keeping and monitoring of generation, temporary accumulation conditions, transportation of waste, monitoring of observance of environmental and occupational safety rules during waste handling operations;
- Training for workers and management personnel with responsibility for managing hazardous waste;
- The volume of waste may be reduced by using mini waste treatment units for mechanical and manual pre-sorting of waste to separate valuable recyclable fractions (paper, wood, metal) from non-marketable material. Separated waste streams are to be compacted and removed for disposal at the landfill or transferred to a recycling operator, if any identified in the region; and
- Organic/ food waste may be supplied to local communities for composting and use as fertilizer.

9.7.5 Residual Impact Significance

By preparing a suitable WMP and ensuring its implementation throughout the construction and operation phases the impact significance from waste generated during Project implementation can be generally reduced from moderate to low. For less expressed impacts the residual impact will be characterised as negligible, and for the most significant impact - on waste management facilities capacities – as moderate.

Summary of waste management activities and mitigation of their environmental impacts at the Project construction and operation phases is provided in Summary Table. The requirements for monitoring of impacts of waste generation are summarized in Table 9.7.3.

Table 9.7.3: Summary requirements for waste generation impact monitoring

Aspect	Phase	Location	Parameter	Regularity
Industrial and domestic wastes	Throughout the entire Project	Temporary waste storage (accumulation) areas	Verification of compliance of waste collection, accumulation and storage conditions with environmental, sanitary and epidemiological, occupational H&S and fire safety requirements;	Progressively as waste is generated and accumulated but no less

Aspect	Phase	Location	Parameter	Regularity
			Keeping records of waste volumes by types and hazard classes; Keeping records of presence or absence of any waste outside the temporary accumulation areas and their volumes; Keeping waste shipment and disposal documentation.	than once a month.

9.8 Climate Change Risk Assessment

9.8.1 Risk assessment approach

In 2017, extreme weather events for the first time appeared at the top of the global risks list presented at the World Economic Forum (WEF)[162], following a decade of steady growth of the weather and climate risks significance rating. In the WEF Report 2019, the top two lines in the list were already presented by risks of “extreme weather events” and “failure of climate-change mitigation and adaptation”[163].

So far, none of the Central Asia countries incorporates climate change into its national security strategy or considers it as a multiplier of threats to security. At the regional level, the Climate Adaptation and Mitigation Program for the Aral Sea basin (CAMP4ASB), designed with support of the World Bank, funded by the international climate funds, and executed through the International Fund for Saving the Aral Sea (IFAS) with the Regional Environmental Centre, is expected to become the main regional climate co-operation and policy co-ordination platform in Central Asia, starting from 2016.

Uzbekistan is the region’s leader in Clean Development Mechanism (CDM) projects, and foreign investments in emission reductions and solar energy development. The governmental authority for natural resources protection and the national hydrometeorological service are dealing with the climate change issues and collaborates on climate policy initiatives and projects with other authorities, in respect of elaborating a low-carbon development strategy. Major investments are planned to solar energy development and improving energy efficiency in the residential sector.

The global climate changes and their manifestation in the Republic of Uzbekistan is documented and expressed in the form of long-term trends of change in climate conditions and extreme weather events.[164] The related risks and opportunities need to be identified and managed in appropriate way to avoid loss and damage to the Project facilities, its infrastructure and associated facilities, and potential harm to workforce or local communities. Therefore, the Project planning and implementation shall be managed with allowance for the climate changes in the Jizzakh Region and potential extreme events, to ensure long-term climate resilience and minimisation of risks during the construction and operation phases.

This section identifies the relevant existing variations to climate conditions that should be accounted for as Project risks. The climate baseline and trends have been considered using the key climate variables in the region, as well as available research publications and reports with analysis of long-term existing and predicted climate trends.

As a baseline, the observational climate data were considered for the medium- and long-term periods of time for the Jizzakh weather station (refer to Section 7.1.2, Figure 7.1.1), using the information from international data bases[165] [166] [167] for the time period of 1973(1995)-2018. Location of the weather station Jizzakh is shown in Figure 7.1.1.

[162] http://reports.weforum.org/global-risks-2017/
[163] http://www3.weforum.org/docs/WEF_Global_Risks_Report_2019.pdf
[164] Climate change and security in Central Asia. Regional Assessment Report. ENVSEC, 2016 (ENVSEC Report)
[165] Berkeley Earth (http://www.berkeleyearth.org)
[166166] Data archive at weather station Jizzakh for the period 2005 – 2019 // “Raspisanie pogody” LLC https://rp5.ru/Архив_погоды_в_Джизаке
[167] Data archive at weather station Jizzakh for the period 1993 - 2018 // https://en.tutiempo.net/climate/ws-385790.html

The following limitations must be taken into account when using the results of this review:

- The baseline information and observation records have been reviewed using the medium- and long-term data on air temperature (annual average and extreme minimum and maximum), precipitation and wind velocity, extreme weather events at the selected weather station during the selected time period. The long-term trend analysis is based on the findings of the regional assessment report “Climate change and security in Central Asia” prepared by ENVSEC in 2016 and available research publications. In this way, overall trends of climate changes have been identified.
- The future projections review considered also the Climate change and security in Central Asia Report and recent research publications, as well as results of run simulations of future climate based on likely economic development scenarios and assumptions using the climate models. Therefore, the model outputs should be treated as projection options rather than factual values. They are generated as series of internally consistent probability-based climate characteristics which can be achieved in response to a range of potential forcing scenarios.
- Climate change risks minimization: Considering the fairly high uncertainty of the climate projections, the Consultant prepared recommendations for the Project risks minimization and adaptation measures with reference to average predicted values and where possible to potential climate change trends at the regional and local level. Accordingly, any further research, data analysis or decision-making should take account of the probability-based nature of the climate projections and should consider the available up-to-date observations data, research materials and additional studies.

9.8.2 Climate change overview

9.8.2.1 Temperature

The climate warming (both at the average annual level and during specific seasons) has been reported in CIS countries over the past decades, with few exceptions in winter in certain regions in the southern part of the West Siberia of Russia and neighbouring regions in Kazakhstan. The most rapid growth of the average annual temperature in the Central Asia occurs near the Caspian Sea and inland areas.

Assessment of the average temperature development rate is based on the linear trend coefficient over the observation period of 1976-2018. Year 1976 was selected as the starting point for recent warming measurement against the global temperature curve. In general, the warming trend in Uzbekistan is obvious but a bit slowing since 2005.

According to the consolidated annual report on climate change in the territories of the CIS member states for 2018, since the mid-1970s the regional temperatures have increased on 0,41 per each 10 years. The linear trend of annual average global temperatures for 1976-2018 demonstrates an increase of 0.34°C/10 years for Uzbekistan[168] (NEACC Report), which is two times higher than the increase in global temperatures: 0.17-0.18°C / 10 years, and faster than average warming rate of ground level air temperature in the terrestrial parts of the globe: 0.28-0.29°C / 10 years (estimations based on data from the Hadley Centre and the East Anglia University: Had – CRU UEA; NOAA).[169]

The warming process continues throughout Uzbekistan at the average annual level and during all seasons, and currently the fastest growth is reported in spring (0.58ºC / 10 years). Average annual temperatures are increasing in all physiographic regions of Uzbekistan.

According to the monitoring data of the Jizzakh WS for the period of 1973-2018, average annual temperature varied within the range from 12.9°C in 1984 to 16.9°C in 2013 (Figure 9.8.1).

The reported annual average maximum temperatures varied from 20.2°C in 1984 to 22.7°C in 2016, annual average minimum temperatures – from 7.3°C in 2014 to 9.8°C in 2014 (Figures 9.8.2 and 9.8.3).

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168 Institute of the global climate and ecology under the Russian Federal Service on Hydrometeorology and Environmental Monitoring and Russian Academy of Sciences. WMO's North Eurasia Climate Centre (NEACC). 2013. Annual Summary Report on Climate Features and Change in 2012 for the Territory of the Commonwealth of Independent States. (NEACC Report) http://seakc.meteoinfo.ru/climatemonitoring.

169 Report on climate conditions in the Russian Federation in 2018, Roshydromet

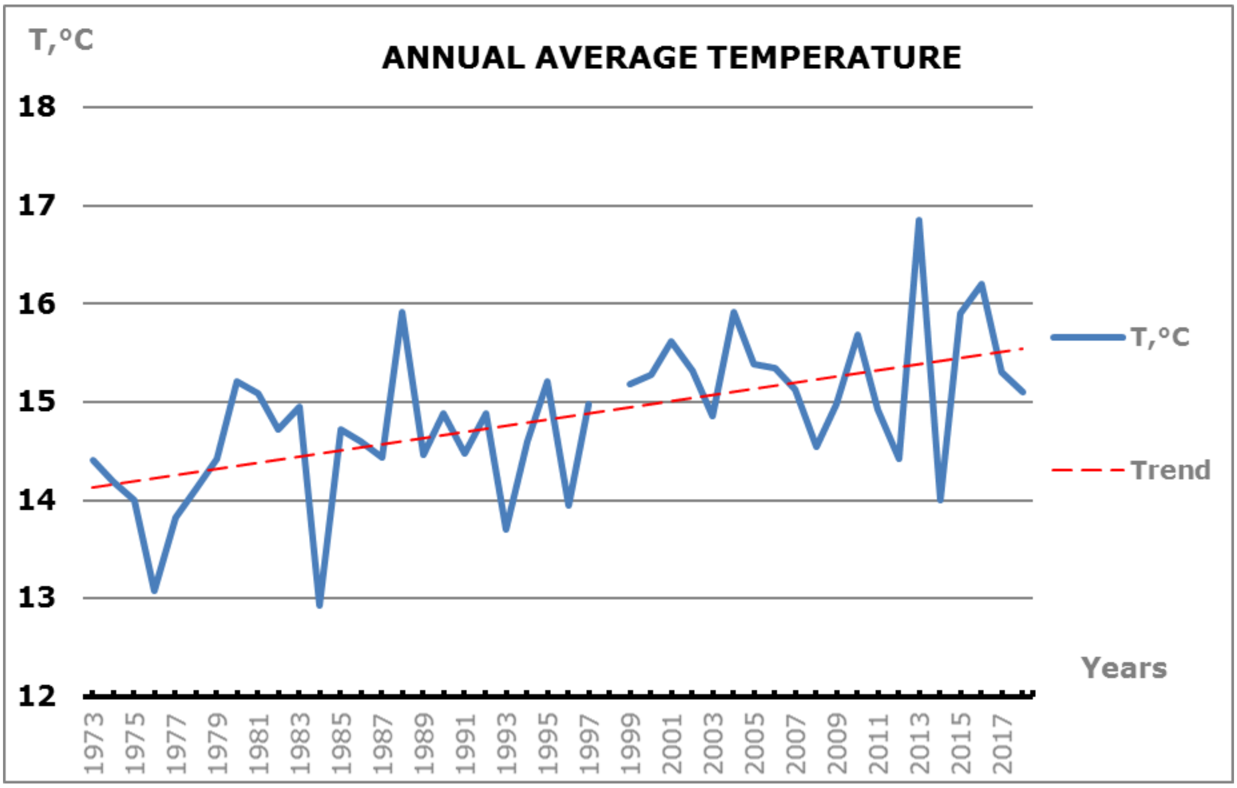

Figure 9.8.1: Average annual temperatures in 1973-2018, Jizzakh Weather Station

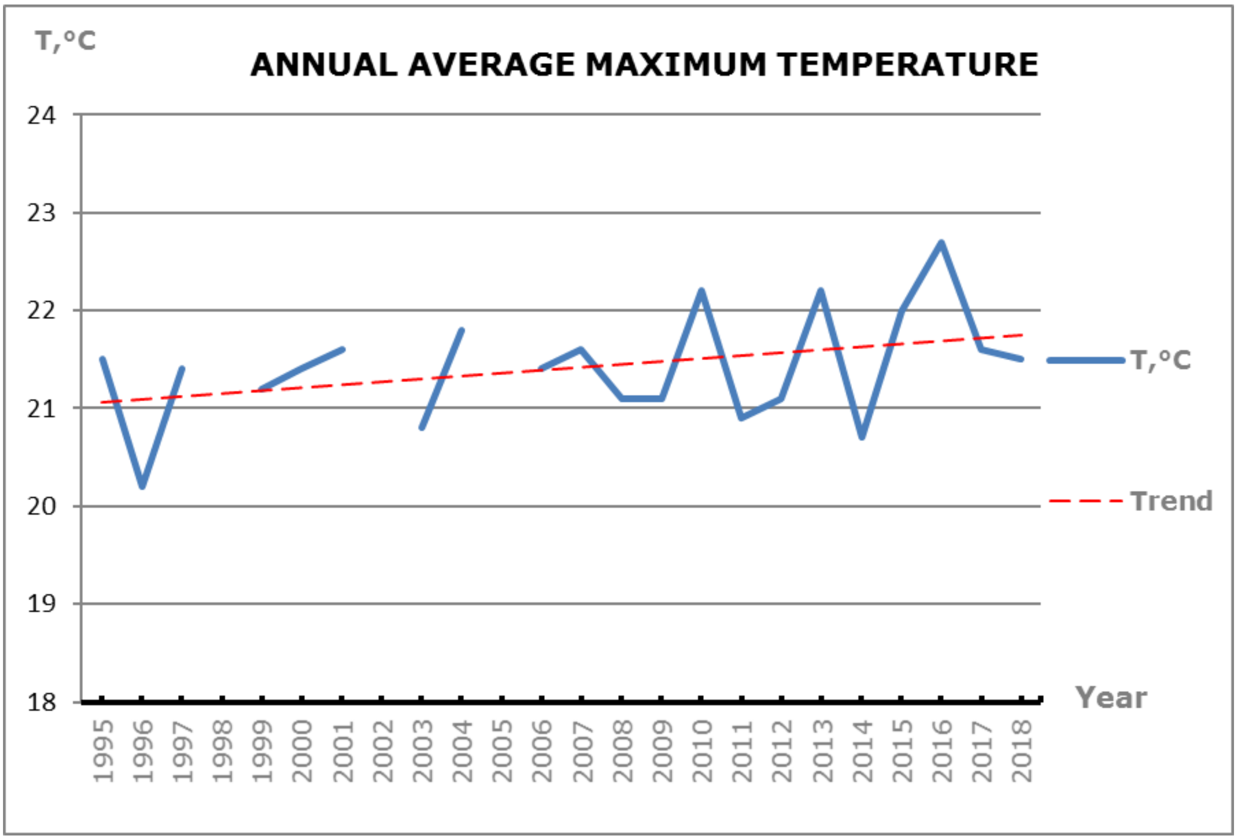

Figure 9.8.2: Annual average maximum temperature for years of 1995-2018

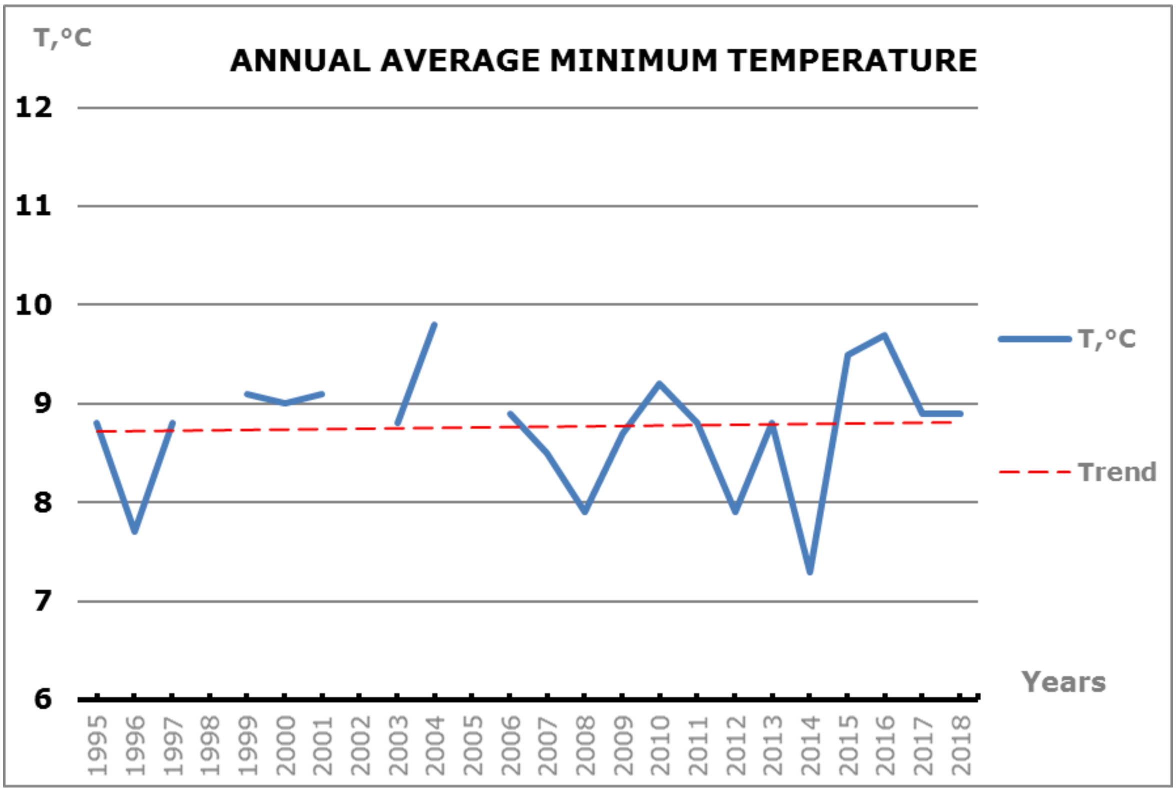

Figure 9.8.3: Annual average minimum temperatures for years of 1995-2018

The extreme maximum temperatures reported at the Jizzakh weather station during 2005-2018 varied from 38.6°C in 2006 and 42.1°C in 2005, the extreme minimum temperatures – from -5.8°C in 2005 to -19.7°C in 2008 (Figures 9.8.4 and 9.8.5).

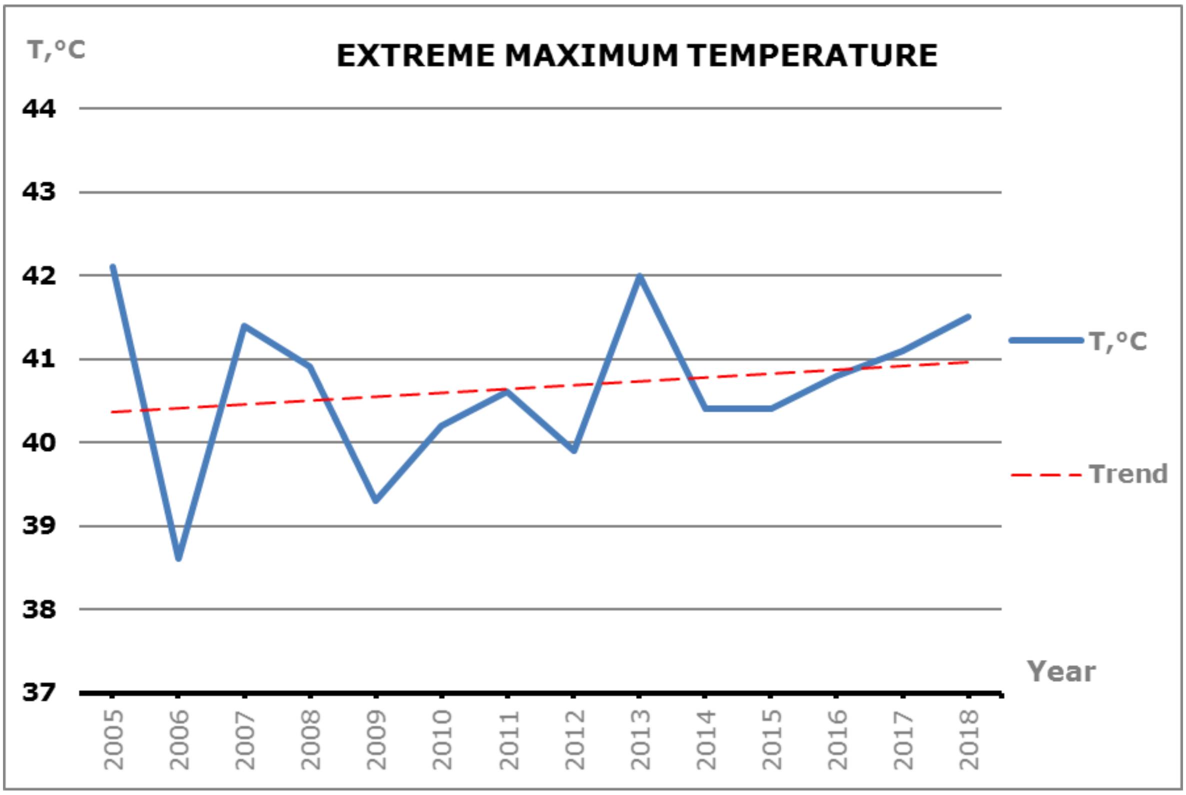

Figure 9.8.4: Extreme maximum temperatures reported in 2005-2018

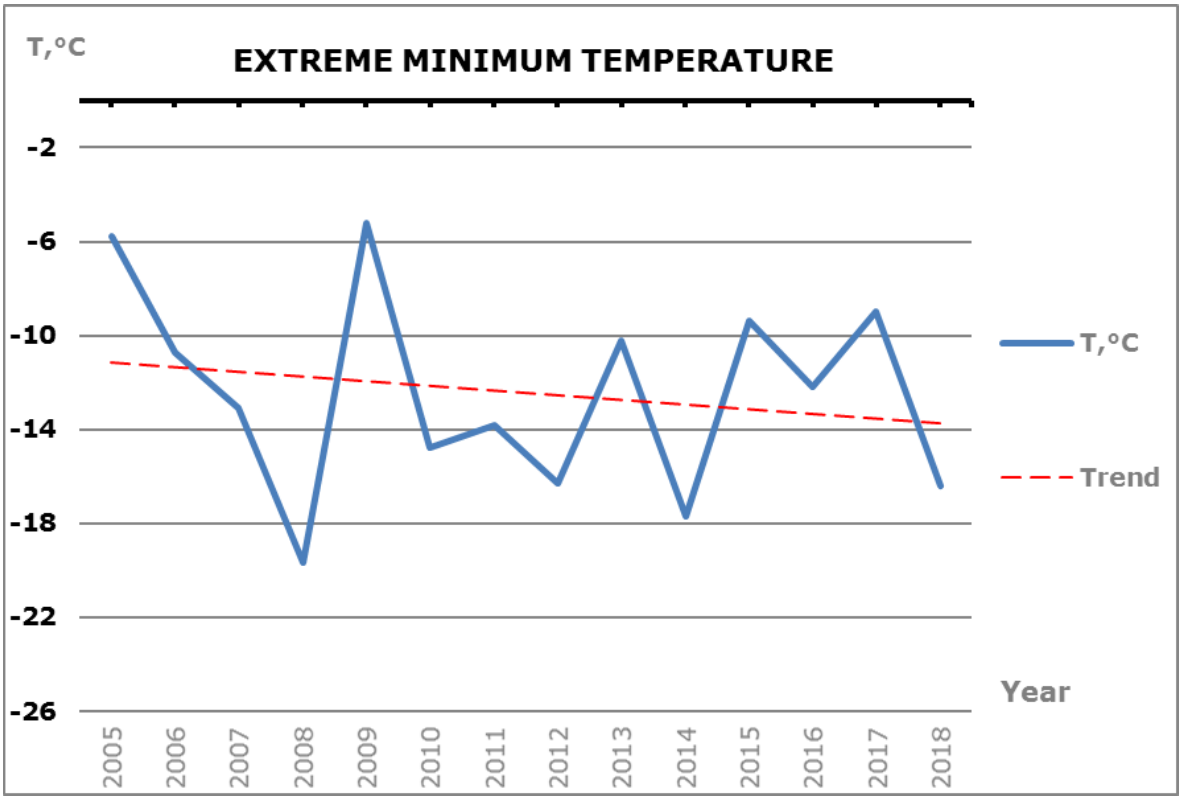

Figure 9.8.5: Extreme minimum temperatures reported in 2005-2018

During the past almost half-century (1973-2018) an overall trend towards meaningful growth of average annual temperatures is demonstrated in the Project area, at a slightly slower rate than the average one in Uzbekistan (~0.31°C *vs* / 10 years), with the linear growth trend of annual average maximum temperatures (~0.34°C / 10 years) and almost no change in average minimum temperature. There is a significant rise of extremality of maximum and minimum temperatures, by ~1-3°C over the recent years.

9.8.2.2 Precipitation

The changes also affected annual precipitation. At the country level, the annual and seasonal precipitation does not have any certain trends in changes. The overall change during the period 1976–2018 is -0.1 mm/month or -0.3% of the normal quantity per 10 years.

Analysis of the linear trends of seasonal and annual precipitation in various regions of Uzbekistan over the period 1976-2018 indicates a minor but statistically significant long-term both growing and declining trends at the average rate of -5-10% and +0-5% in 10 years (with a peak of differences in spring and summer). The significant declining trend is obvious in the central part of Uzbekistan (-5-10% in 10 years), especially in spring. In autumn, the precipitation growth trend is prevailing, more meaningful at the south-east of Uzbekistan.

According to the monitoring data from the Jizzakh weather station over the period 1995-2018, annual precipitation varied from 136.4 mm (1995) to 526 mm (1997) (Figure 9.8.6), with significant variations between years. If the value of 1995 is excluded as an extreme one, the local precipitation trend repeats the country level trend (though being statistically non-credible).

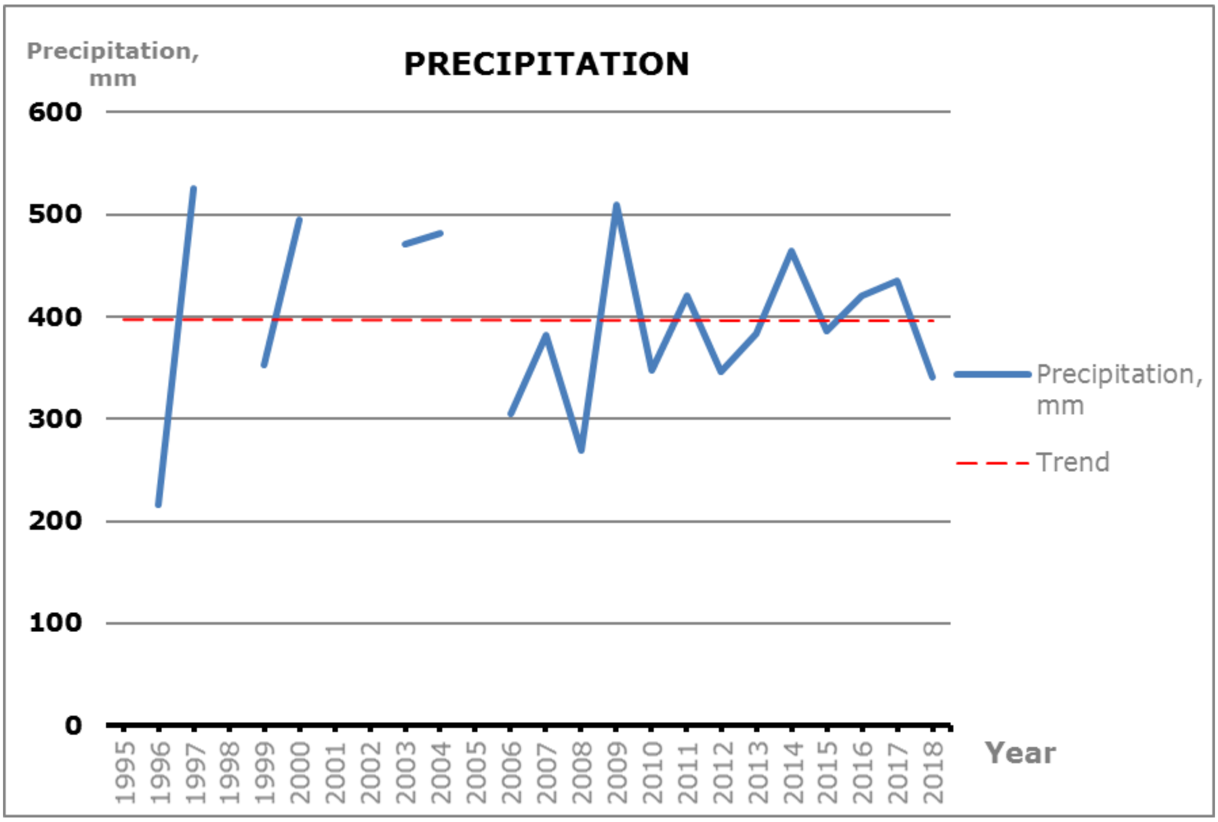

Figure 9.8.6: Annual precipitation in 1995-2018

According to the data from the Jizzakh weather station over the period of 1993-2018, the medium-term average number of days with rain is 62-63 (Figure 9.8.7; the data series is statistically non-credible). The long-term average number of days with snow cover reported by the same weather station is 36.

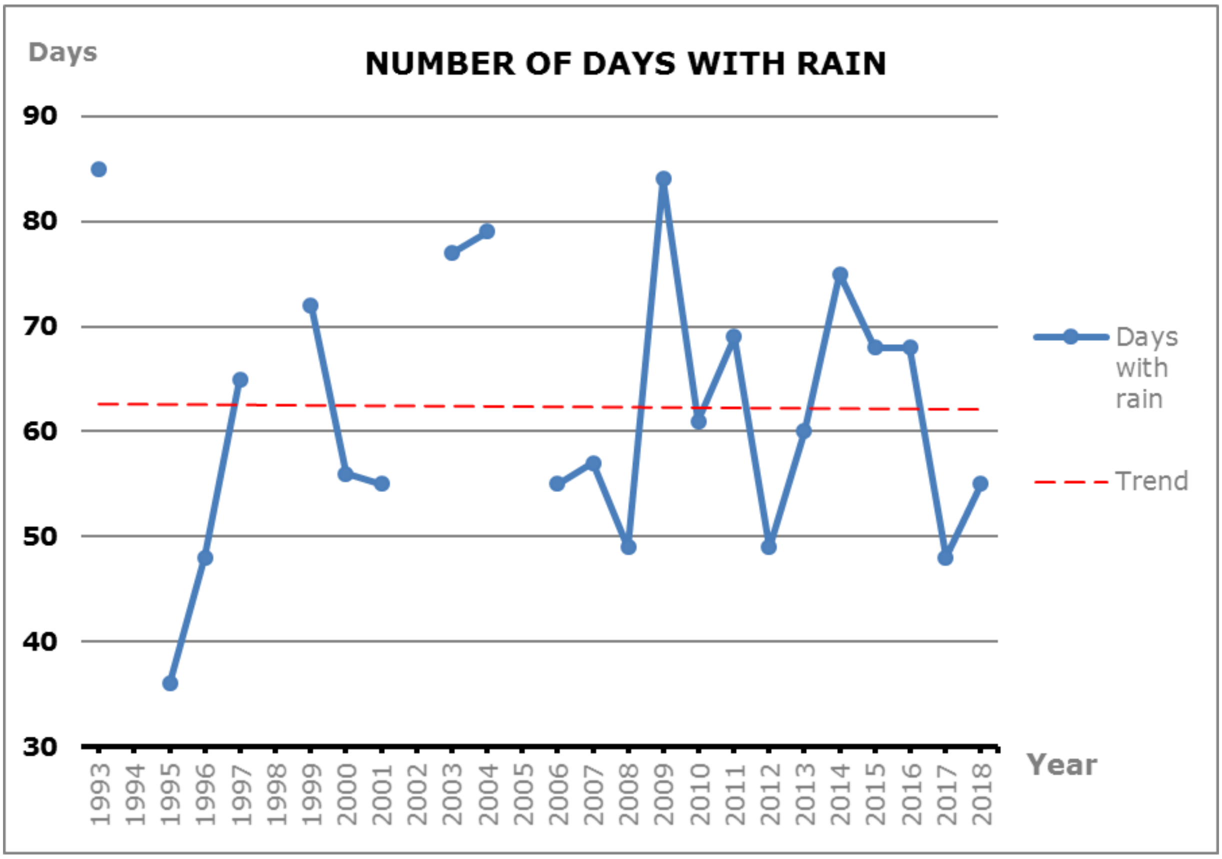

Figure 9.8.7: Number of days with rain in years of 1993-2018

9.8.2.3 Wind conditions

According to observation data from the Jizzakh WS over the period 1961-2013, the average annual wind velocity is rather low and varies from 1.3 to 1.7 m/s, with an overall decreasing trend on ~0.2 m/s during the same period.

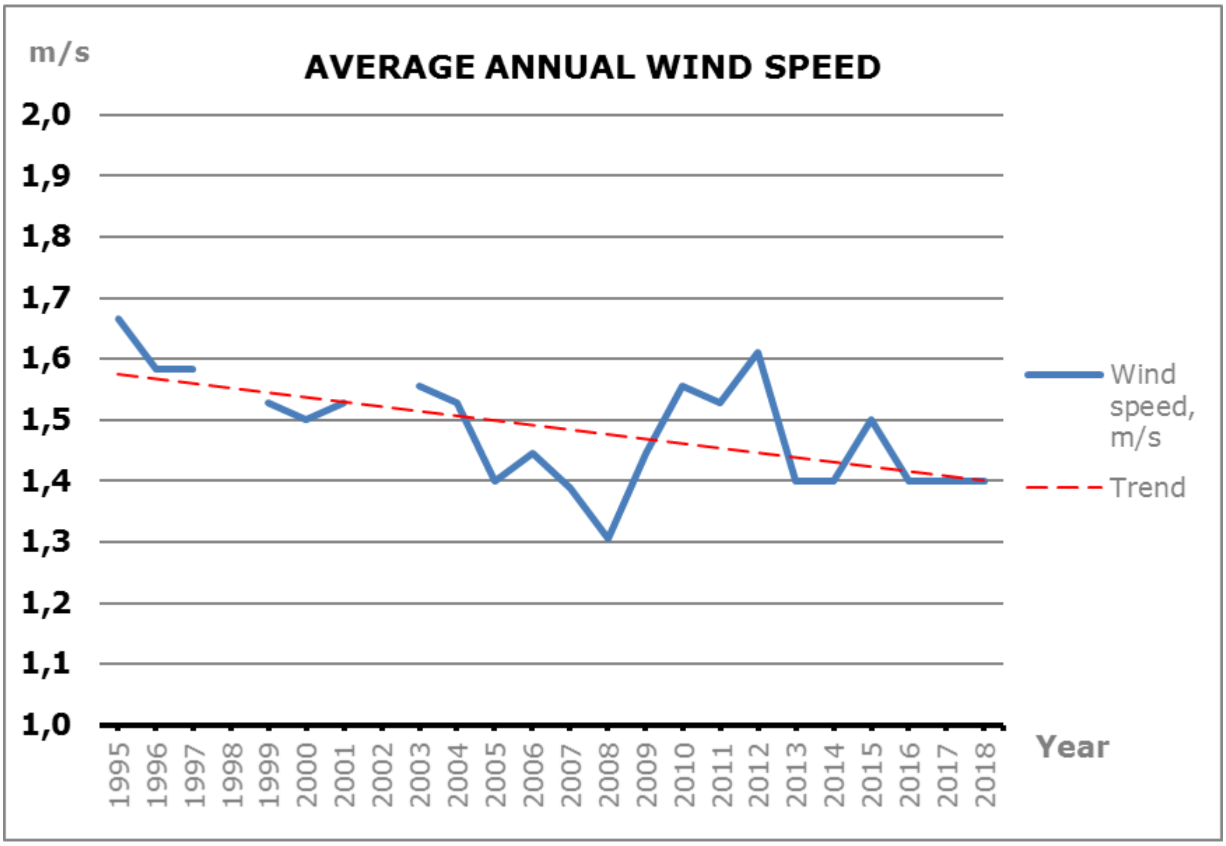

Figure 9.8.8: Number of days with rain in years of 1993-2018

In general, low winds do not support proper air emission dispersion making the dispersion conditions worse. However, the impacted area will be less in this case. Once air emissions and stack parameters are confirmed by the design documentation, air dispersion modelling is required to understand the area of influence in respect to the air impact.

9.8.2.4 Extreme climate events

The statistical data demonstrate the global growth of damage caused by dangerous weather and climate events where 90% of most severe economic losses are happened due to extreme hydrometeorological events like floods, highwater, strong wind, rainstorms, hailstorms, droughts. [170]

The IPCC research reports always refer to the growth of extreme and dangerous events during the climate warming period; this trend is also reported in the Central Asia and namely in Uzbekistan (ENVSEC Report). Reported global numbers of dangerous events are shown in Figure 9.8.9.

[170] Report on the Climate Risks at the territory of the Russian Federation, Roshydromet. - Saint Petersburg, 2017

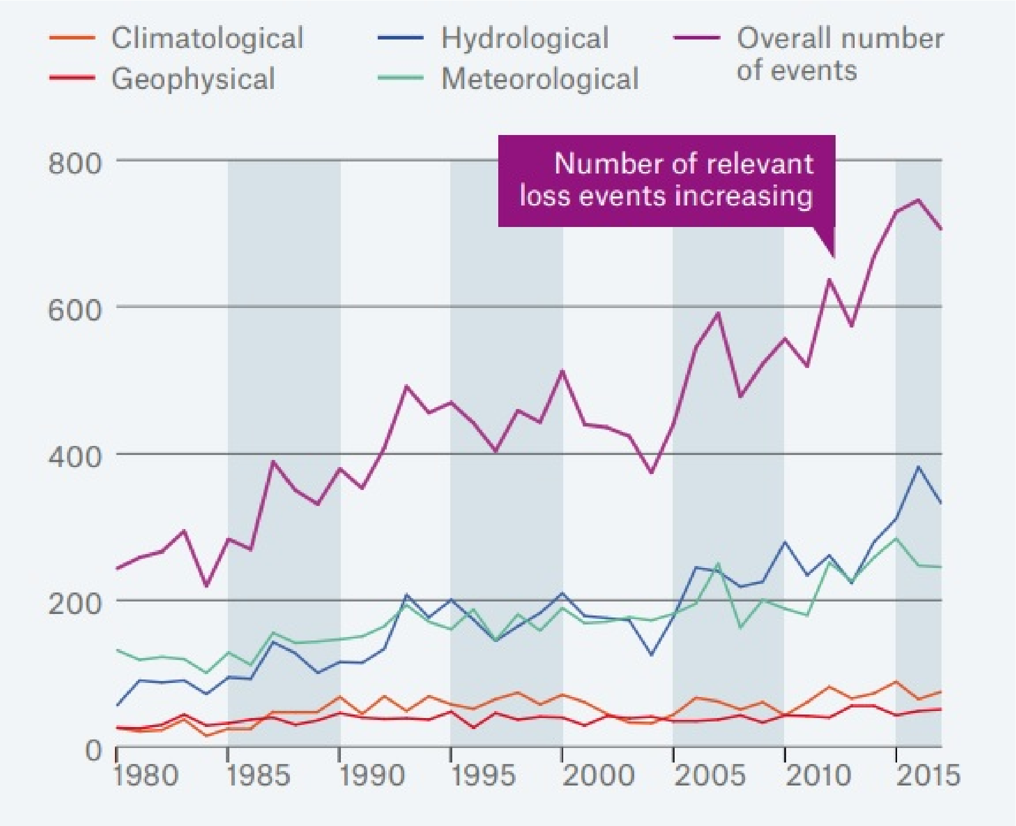

Figure 9.8.9: Number of natural catastrophes over the period 1980-2017[171]

According to the ENVSEC Report, the most dangerous weather events (EWEs) for Uzbekistan are droughts and abnormal heat as they are extreme events coming with the potential for increased water insecurity and serious economic and human consequences.

The severe drought of 2000-2001 in the southern parts of Central Asia might be a forerunner of severe weather events to come. The expert panel for climate risks in Uzbekistan confirmed that over 1971-2013 the number of dry days in Uzbekistan has increased. With the warming trend, low-water years are likely to increase also.

The number of days with temperatures above 40°C has increased in the densely populated southern regions of Central Asia. This change affects agriculture and the health of rural and urban populations suffering from the heat, but the authorities do not routinely issue extreme heat warnings and have not introduced special regulations for working in such conditions.

In respect to the precipitation events, the number of days with hail has increased. The Surkhandarya and Kashkadarya regions are most susceptible to hail events and thunderstorms, especially in the Ferghana Valley and at the foothills, and they cover wider area.

The average annual number of days with thunderstorms during the period of 1995-2018 is 12.7. The number of days with thunderstorm increases with a rising trend of 1 day / 10 years. The average annual number of days with sukhovey and dust storm is 6.4 and 2.3 respectively, with a light declining trend (though non-credible statistically for the short period of 2005-2018). As such events can impact the construction schedule and the Project operation and reliability, they have to be properly considered and mitigated.

Summary of the expected climate impacts is provided in Summary Table.

9.8.2.5 Flood risk assessment for the Project area

The overview of the surface waterbodies in the Project area is provided in Section 7.8.

[171] Topics Geo 2017. Natural Catastrophes. – Munich Re, 2018

The nearest waterbodies are presented by the A.A.Sarkisov Yuzhno-Golodnostepsky Canal (in close vicinity), the Kly river (1 km to the east) and the lake Balykly (2 km north-west). The A.A.Sarkisov Yuzhno-Golodnostepsky Canal goes around the Project site from the north and the east, and the Project site is positioned higher than the waterbodies under consideration. There are no data on extreme flood events in the Project area.

The natural waterbodies in the Project area are impacted by the local economy activities. The water of the Kly river (downstream of the river Sanzar) is used for irrigation, and its flow is very much regulated. The river valley has a form of canyon with a depth of 5 m (from the bank edge to the water level), and the flooding of the Project site in these circumstances is not likely.

Balykly lake is the waterbody used for extraction of therapeutic mud production. The lake bed is surrounded by a network of irrigation canals, but the water doesn’t reach them even in case of high-water events.

The Balyklytau ridge is located to the north-west from the Project site. This could potentially lead to flooding caused by extreme precipitation events. However, a special canal will be built to divide the Balyklytau ridge и the Project site which can accommodate the storm water.

In general, the risk of flooding at the Project site is assessed as low and will be further mitigated by the design solutions.

9.8.3 *Expected climate changes*

In terms of further climate changes in 21st century, IPCC[172] projections indicate temperature growth under all scenarios, considering the solar radiation and greenhouse gas levels in the atmosphere. With various man-caused impact scenarios, the most likely estimated global temperature rise in 2081–2100 compared to the level 1986–2005 in 5–95 % of all models will be within the range from 0.2–1.8°C to 2.6–4.8°C. The differences between precipitation quantities in wet and dry regions, and between wet and dry seasons will increase, although some exceptions are possible in few regions. The Atlantic meridional circulation will most probably diminish; however it is unlikely to change abruptly or cease. The world ocean level is predicted to increase by 0.26-0.55 m to 0.45–0.82 m in 2081-2011 compared to the end of 20th century, and its acidification will continue.

The latest climate models predict climate warming in Uzbekistan in 21st century at a higher rate than the global average warming. The greatest rise in surface level air temperatures is projected in spring (and evenly for other seasons), with the rates increasing from south-east to north-west of the country (NEACC Report). Early in the 21st century climate warming in most regions of Uzbekistan already exceeded the standard deviation that describes the range of outputs from different models. The quantitative differences between the warming scenarios rapidly grow starting from the middle of 21st century.

By the middle of 21st century, annual average temperature in Uzbekistan in general is expected to rise by 1.0–3.5ºC compared to the end of 20th century, depending on scenario. The expected increase of average annual temperature in the Jizzakh region is 0.7-3.7°C by year 2050 and 3.8-7.1°C by 2100, compared to the period of 1986-2005.[173] Simulation in AR5 using Climate Time Series Browser model produced a similar range of potential rise in temperatures based on records from two weather stations not very distant from the Project area with the longest observation period (for the purpose of data normalisation and combination): +0.3-3.2°C by 2050 and +0.4-4.7°C by 2100, compared to the end of 20th century.

It is expected that total precipitation in Uzbekistan will decrease during 21st century. The rate of changes in spring and autumn precipitation will significantly vary between geographic areas. Spring and summer precipitation is predicted to decrease in the central part of Uzbekistan, and autumn precipitation will increase at the south-east part of Uzbekistan (NEACC Report).

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[172] Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 p. http://ipcc.ch/report/ar5/wg1/.

[173] AR5 Climate Model Mapper: CCSM4, CanESM2, NorESM1-M, CSIRO-Mk3-6-0 for surface temperature and precipitation; Climate Time Series Browser output based on 5 stations: Irkutsk, Barguzin, Bodajbo, Kirensk, Vitim, http://climatemodels.uchicago.edu/timeseries

Analysis of the long-term precipitation data in the Jizzakh region shows the local trend of precipitation development is to be minor negative, the same as for Uzbekistan in general (almost stable). However, it is predicted that after 2050 this trend can be changed to noticeably declining, due to overall declining availability of water resources in the Central Asia. Most of the crucial water resources in Uzbekistan is sourced from the mountain area of the neighbouring countries. The warming climate and the upstream economic developments have the potential to alter water regimes and water use patterns, and, if regional water management remains poorly coordinated, may affect water security and increase current tensions over water resources.

The global warming may also result in changes in the occurrence rate and/or intensity of extreme weather events and adverse combinations of weather conditions. A growth of annual maximum and minimum extreme temperatures (values) is reported in most parts of Uzbekistan and in the Project area; the number of days with abnormally high air temperatures tends to increase as well. Projections for the Uzbekistan predict increasing intensity of precipitation events (distinct showers mostly), increase in the number of dust storms, varying weather conditions including heat waves and droughts. Uzbekistan's second national communication on climate change warns of the impacts of such extreme weather events on agriculture and general human wellbeing. These impacts have to be mitigated properly.

9.8.4 Assessment of the Project impact and adaptation

In a situation of potential occurrence of dangerous and adverse phenomena like adverse weather conditions and extreme events, or slow gradual changes of climate (growth of average annual temperature, etc.) and presence of sensitive receptors, a climate risk assessment is required. The identified risk receptors may include Project facilities, processes, infrastructure and associated facilities, personnel, local communities, and neighbouring ecosystems.

Analysis of the observation data and climate projections indicates the changes in the concerned area climate conditions at the rate which, by a combination of certain parameters, is higher than global trends. The predicted rise of extreme and average annual temperatures, potential increase in frequency and intensity of adverse weather events such as heat waves and droughts may invoke climatic factors that will affect the Project in general. The above factors may disturb technological processes, destabilise structures and infrastructure facilities, disrupt transportation of construction materials, feedstock and equipment, and affect personnel health and safety. As the Project operation is dependent on operability of the auxiliary infrastructure and associated facilities, they are also covered by the assessment of impacts and risks. Summary of the assessment of risks and impacts is provided in Summary Table, along with the appropriate adaptation measures.

The increased number and intensity of extreme weather events (heat waves, sukhovey, droughts) and rise in average annual and extreme maximum and minimum temperatures have been identified as low and medium risk factors for the Project. The likely direct *long-term* effects of such risks may include extreme physical ambient impacts on the Project personnel's health and its facilities (uneven and "stressful" loads, sudden temperature changes, etc.). The latest may cause deformations and loss of stability and integrity of the Project facilities and infrastructure. Such risks can be minimized by adopting design solutions that take these factors into account and provide for appropriate positioning and structural design, an increased safety margin for the structures, and by selecting appropriate building materials. After the above adaptation, the risk will be reduced to minor.

An increase in extremity of any weather events will have a cumulative aggravating effect in terms of the impact on reliability of the facilities' operation, air emission dispersion (in case of dust storm or heat waves) and on health and safety of the Project personnel. The risk and significance of this impact is assessed as medium / moderate, however, ensuring response preparedness of personnel, development and implementation of response procedures in case of extreme weather events, and consideration of the current weather conditions when choosing overalls and PPE, developing outdoor work schedules (during construction), selecting the cooling supply mode (during operation), will all contribute to reducing the health risk for the Project personnel to minor, and the potential impact significance to low.

9.9 Greenhouse Gases Emissions

The Project implementation will lead to generation of significant amount of greenhouse gases (GHG) emissions including carbon dioxide, nitrogen oxide (I) and methane, although the specific GHG emission per ton of product will be minimized as much as possible using the best available technologies (BAT)[174], best practice solutions and optimized logistics, and due to the expected overall high efficiency of the technological process.

In 2017, the market capacity for cement in Uzbekistan was 8.2Mt and it is growing since then due to large and extensive country-level construction projects. Partially the required cement is imported from Kazakhstan, Tajikistan and Kyrgyzstan, due to the lack of local capacities. The Project has a great importance for Uzbekistan being able to fully substitute the imported cement. Therefore, the Project's GHG emissions shall be considered in conjunction with its potential for avoiding a part of existing GHG emissions connected with the cement production in other locations and transportation.

In this perspective, the following factors will likely to have a positive effect on the overall GHG emission balance in comparison with the substituted production process:

- The Project will use more efficient technology in comparison with the old plants (dry process based on use of rotary kilns with preheater and precalcination);
- Use of natural gas as fuel on the current stage of development;
- Better lime quality;
- Avoidance of long-distance transportation from Kazakhstan, Tajikistan and Kyrgyzstan.

The total amount of the Project's GHG emissions will be determined by the following activities and impact factors:

- direct emissions:
  - o decomposition of calcium carbonate in kilns as part of the technological process;
  - o natural gas combustion in the technological process for operating kilns;
  - o emissions from motor vehicles (limestone extraction and transportation of limestone, other raw materials);
  - o emissions related to wastewater management (wastewater treatment and sludge disposal);
  - o methane emissions from gas handling facilities;
  - o potentially gas combustion for local boilers (heating at the accommodation camp in winter);
- indirect emissions:
  - o emissions from the combustion of fossil fuels associated with power generation facilities supplying energy to the Project.

The emissions of CO_2 are estimated to be 698 kg/t grey clinker, related to a specific heat demand of approximately 3,180 MJ/t clinker, but this also depends on fuel type and the technology applied. The dry method of cement production using rotary kilns with preheater and precalcination is considered to be BAT technology, which is, being implemented together with use of natural gas and optimized fuel combustion in kilns gives one of the most effective available solution for the Project.

Due to cement grinding with mineral additives, the specific emissions of CO_2 per tonne of cement is lower than for clinker. Approximately 62% of GHG emissions originates in the calcining process and the remaining 38% is related to fuel combustion. The CO_2 emissions resulting from the combustion of the carbon content of the fuel is directly proportional to the specific heat demand as well as the ratio of the carbon content to the calorific value of the fuel. The average specific CO_2 emission is equal to 672 kg/t cement (BREF, petcoke fuel).

New IFC's EHS Guidelines for Cement and Lime Manufacturing[175] published in draft in August 2018 gives the benchmark for GHG emissions (good industrial practice) at the range of 550-700 kg CO_2-eq./t cement which includes already direct nitrogen oxide (I) and methane emissions as well as indirect emissions from electricity consumption from grid.

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[174] Best Available Techniques (BAT) Reference Document (BREF) for the Production of Cement, Lime and Magnesium Oxide, 2013.
[175] IFC Environmental, Health and Safety Guidelines for Cement and Lime Manufacturing (Draft for public discussion) – August 2018

The Project's indicative GHG emissions from the cement production part can be estimated as more than 0.989 Mt $CO_{2\text{-}eq}$ annually. After further clarifications on the emission sources, fuel and power consumption, the detailed inventory of GHG emissions shall be prepared.

This value exceeds the reporting threshold of 25 thousand ton of CO_2-eq./year set by the IFC Sustainability Policy (2012), therefore it will be required to define the GHG emissions from the Project and associated facilities on an annual basis and made the results available to the lenders and relevant government agencies.

The key factors for effective management of GHG emissions are: timely maintenance of equipment after the commissioning of the Project; emissions monitoring and control; updating the inventory of emission sources and GHG emissions register; annual evaluation of total and specific GHG emissions of the Project. Where appropriate during the Project lifecycle, energy-saving solutions in accordance with international best practice should also be implemented whenever possible.

Implementation of the designed resource and energy efficient solutions for the Project will be ensured through the designer supervision and oversight of the practices at the stage of construction and commissioning, and through monitoring of process performance over the transition period till its full-scale operation.

Energy efficiency

Huaxin Jizzakh will adopt technology of enhanced dry process and rotary kiln with multistage preheating and precalcination , which meets the good international industry practice (GIIP) required by the applicable WBG EHS Guideline. As a result, the designed energy efficiency parameters, including fuel energy for cement, electric energy for cement, and electric energy for clinker grinding, all meet the benchmarks suggested by the applicable WBG EHS Guideline limits.

There is no waste heat power co-generation for this project. The current electricity price in Uzbekistan is $0.04/kWh. It makes economic sense only with price above $0.07/kWh. The design leaves interface for co-generation. With potential rising of electricity price, Huaxin may do the co-generation in Phase II project.

Calculation of GHG emissions is given in the table 9.9.1. On the energy efficient indexes the Huaxin Jizzakh Cement Plant plant is expected to be below the regional averages and meet the proposed industry benchmarks by the World Bank Group.

Table 9.9.1: Resource/Energy Consumption and GHG Intensity[176]

Inputs per unit of product	Unit	Industry benchmark (Proposed)	HuaXin Cement Jizzaks Plant [177]	Uzbekistan Average By Independent Engineers[178]
Fuel energy – cement	GJ/t clinker	PHP kiln: 2.9–3.3	3.18	6.1
Electric energy – cement	kWh/t equivalent cement	80–105	87[179]	107
Electric energy – clinker grinding		28–45	41	N/A
Electric energy – all others		N/A	2.7	N/A
Electric energy – total		N/A	89.7	N/A
CO_2 From decarbonation From fuel From Electricity Total	 kg/t clinker kg/t clinker kg/t equivalent cement kg/t equivalent cement	550-700 (Total)	 520 178 66 659	 520 342 79 777

[176] Assumptions:

- Industry average of CO_2 from decarbonation reaction: 520 kg/t clinker ($CaCO_3 \rightarrow CaO + CO_2$; It can vary from 510 to 530 depending of the exact content of carbonates $CaCO_3$ and $MgCO_3$)
- CO2 emission intensity per GJ heat generation: 56 kg for natural gas and 95kg for coal ($CH_4 \rightarrow$ CO2 + H2O + heat)
- Natural gas heat content by USEPA: 0.036 million Btu/m3 or 0.038 GJ/m3
- CO2 emission intensity by Uzbekistan grid: 0.734 kg CO_2/kWh

[177] Clinker capacity: 4,000 t/day, long term operation days: 330 days/year, Clinker factor: 0.85

[178] Gas consumption: 161 m^3/t clinker, Power consumption :107 kWh/t

[179] Electric energy – cement = Electric energy – clinker (54 kWh/t clinker or 54x0.85 = 46 kWh/t cement) + Electric energy – clinker grinding

9.10 Emergency Response

The general emergency prevention measures listed in the Law “On Civil Protection”[180] of the Republic of Uzbekistan are scientific research, forecasting and assessment of potential emergency risks and their socio-economic consequences.

Centre of Hydrometeorological Service “Uzgidromet[181]” conducts monitoring and provides weather forecasts thus playing an important role in mitigation of impact of natural disasters.

The Ministry for Emergency Situations[182] of the Republic of Uzbekistan applies systematic approach to control of risks associated with natural disasters and accidents, including prevention, control, monitoring and forecasting of situations which may cause such events, as well as elimination of their consequences.

The natural hazards are considered in Section 9.8.

9.10.1 Seismic Assessment

According to the Engineering Geological Survey Report[183], the Project area is located in the zone of seismic activity level 7 (scale MSK-64). Taking into account the properties of soils and subsoils the territory of the plant is estimated have seismic activity level 8.

According the Seismic Hazard Distribution Map (Figure 9.10.1) the seismic hazard of the area of Project is medium with Peak ground acceleration (PGA) ranged from 0.8 to 2.4 m/s^2.

In accordance with the Interstate Code of Rules for Design and Construction, design development for the areas with seismicity level 8 should be conducted take into consideration of seismic impacts.

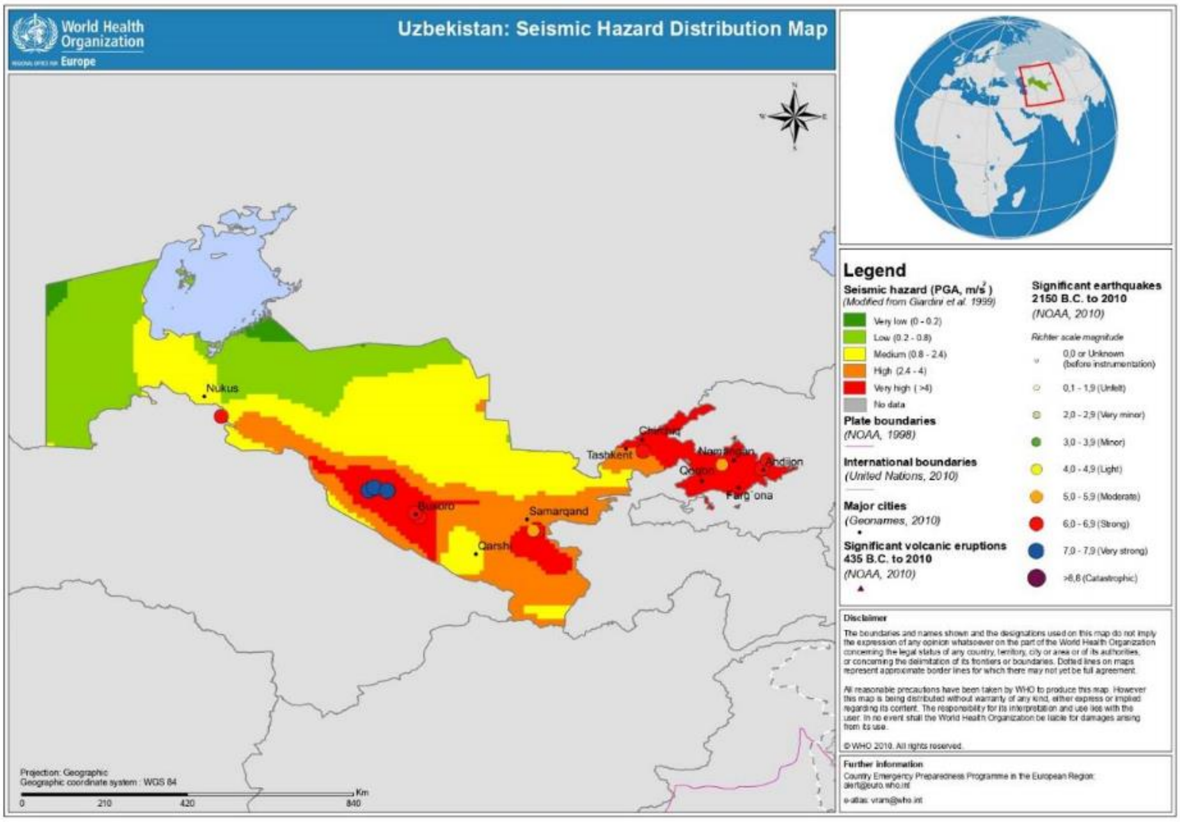

Figure 9.10.1: Seismic zoning map

[180] The Law of the Republic of Uzbekistan of 20 August 1999 No 824-I “On Civil Protection”

[181] http://www.meteo.uz/

[182] https://www.fvv.uz/ru

[183] Geological Survey Report. Construction of Cement plant in Chimkurgan, Zafarabad municipal district, Jizzak region («O'ZGASHKLITI» DUK, 2019)

9.10.2 Fire Safety

In accordance with the Law “On Civil Protection”, fire safety measures shall be developed in compliance with the applicable law of Uzbekistan, and shall be based on analysis of causes of fires and experience of combating them, and on the results of assessment of fire risk of substances, materials, processes, articles, structures, buildings and facilities.

Fire safety measures shall be developed and implemented in relation to industries, buildings, structures and other facilities. In particular, the design shall provide for safe evacuation of people in case of fire.

As a mandatory requirement, all industrial facilities shall have in place fire fighting plans including procedure for people safety.

The site should considers external fire water supply provisions and the use of special fire extinguishing appliances and equipment: fire-fighting machinery, hoses, hydrants, alarm systems, primary firefighting equipment, firewater ponds.

Explosive and flammable substances and materials shall be kept in dedicated premises.

The site must comply with the requirements that mining, transport and road-construction machinery used for the mining operations are in good working order, are equipped with functional signal devices, brakes, safety barriers on moving parts (couplings, transmission elements, pulleys, etc.) and work platforms, fire-fighting equipment, and have adequate illumination, a set of functional tools and control/measuring devices, and an effective overwind protection system.

10. SOCIAL IMPACT ASSESSMENT

10.1 Introduction

This chapter identifies and analyses social impacts of the Project during its construction and operation stages. Measures to mitigate potential adverse impacts and enhance anticipated positive impacts are also proposed in this chapter. Each identified impact is assessed both before and after mitigation (i.e. residual impact).

Social impacts of the Project are assessed considering its social area of influence and baseline socio-economic characteristics of the Project area (see Chapter 8). According to requirements of international financial institutions, the assessment also considers impacts of the Project associated facilities to the extent possible. The methodology used for assessment of the social impacts is presented in Chapter 3. The significance of an impact has been determined by the interaction between its magnitude and the sensitivity of receptors affected.

The broad objectives of the social impact assessment are to ensure that key potential socio-economic impacts have been identified, assessed, mitigated and managed in a consultative and constructive manner. The primary purpose of the social impact assessment is to safeguard the wellbeing of the Project affected communities and where possible, improve people's lives by sharing Project benefits with local communities.

This chapter is structured to be compliant with the IFC Performance Standards to assess potential impacts of the Project in relation to the following social aspects:

- Economy and employment;
- Labour and working conditions;
- Occupational health and safety;
- Community health and safety;
- Traffic impacts;
- Land acquisition and land use;
- Workers' influx;
- Involvement of security personnel;
- Cultural heritage.

The relevant impacts are considered for the Project and associated facilities. Each of the described impacts is assessed for the Project construction and operation stages.

Sections describing each of the above aspects are structured as follows:

- Overview and description of Project activities and its potential risk or impact;
- Assessment of impact considering Project embedded mitigation/enhancement measures and before implementing additional mitigation or enhancement measures (impact significance before mitigation or enhancement);
- Description of additional measures to mitigate adverse impact or enhance benefit;
- Assessment of impact after implementing mitigation or enhancement measures (significance of residual impact).

10.2 Impacts on Economy and Employment

This section provides assessment of economic impacts of the Project construction and operation, including:

- Tax revenues;
- Creation of employment opportunities;
- Procurement of local goods and services;
- Social investment as part of Company's corporate social responsibility (at operational stage);
- Support to civil and industrial construction sector of Uzbekistan (at operational stage).

These potential impacts are considered in detail in relevant subsections below.

Development of the Project and associated facilities will also affect local land users involved in agricultural activities. Assessment of these impacts is provided in Section 10.9 below.

10.2.1 Construction

10.2.1.1 Description of Impacts

Generating tax revenues

Tax contributions paid by the Company to the budgets of different levels can be used for development of local infrastructure and social investment by local authorities. The benefits generated via this impact will be delivered to local communities who are the ultimate receptors of the impact. The impact is positive and of moderate magnitude and significance.

Creation of employment opportunities

The Project will generate employment opportunities that will be most evident during the Project construction stage with a total number of 700 jobs. Construction works are temporary and will be the responsibility of a Huaxin's affiliated company specialized in Huaxin's plant construction to meet Huaxin's operation specifications. There are very limited recruitment opportunities during the construction stage.

The construction of the plant is proposed to be finalized in the first quarter of the 2020.

The Project will have positive impact associated with creation of employment opportunities. The number of jobs created will be equal to approximately 1.5% of the overall number of economically employed population in the district. Despite the population in the potentially affected communities in Zaforobod district are engaged in agricultural activities (such as cotton farming, vegetable plantation and livestock farming). Together with labor bureaus, Huaxin successfully recruited 120 skilled workers (as machine operators) from the district. The hiring of additional workers (including drivers, technical and other specialists) is ongoing; it is expected that majority of those workers will be hired locally. The magnitude and significance of the potential impact are assessed as moderate.

10.2.1.2 Measures to enhance positive impacts

No measures are required to enhance impact associated with generation of tax revenues as their distribution is out of the Company's scope.

The Company will develop and implement local employment procedure (see below).

Local Employment Procedure

The Company developed a recruitment procedure to promote employment of local candidates as much as practical and to the extent permitted by non-discrimination provisions of the Labour Code of the Republic of Uzbekistan. The procedure also applies to hiring performed by Project contractors and subcontractors. In accordance with the best industry practices, Huaxin's local recruitment builds upon the existing job market structure and maximizes the job opportunities to the district residents.

The procedure specifies the approach to hiring and includes the following:

- Utilization of Huaxin group's job descriptions and qualification criteria, establish clear number of job positions;
- Utilization of Jizzakh labor bureau employment center and local workforce database;
- Search for best match of candidates and arranging job interviews;
- Working with Jizzakh labor bureau regarding age and qualification screening of the potential candidates;
- Ensuring that job offers with terms of employment meet the national labor laws as well as Huaxin's corporate Human Resources policies (including paid vocational training, etc.).

The procedure proved to be effective to maximise the local recruitment and prevent hiring of under-aged workers. This procedure will also be used by Huaxin's contractor (including cement packing and loading).

10.2.1.3 Residual Impacts

As the Project will have positive impacts on economy and employment, the respective residual impacts are not assessed.

10.2.2 Operation

10.2.2.1 Description of Impacts

Generating tax revenues

Impacts of the Project operation with respect to tax payments to the budget will be similar to those at the construction stage; at this stage the Company is expected to steadily generate revenue thus ensuring sustainable tax payments to the budgets of different levels, which will form benefits for local communities. The Project's impacts will be positive and of moderate significance.

Creation of employment opportunities

At operational stage, Project's effects on local employment will be of smaller scale; on the other hand, the employment at this stage will have a long-term effect and the Project will employ 300 people. Given that construction sector of Uzbekistan is expected to be positively affected by the Project, additional indirect job generation in this sector may be triggered. The Project will make efforts to engage local workforce to the extent possible. The impact at the operational stage will be positive and have moderate significance.

Embedded enhancement measures

According to information provided by the Company, 70% Uzbek employees will be engaged during the first year after the start of the Project operation, and 80% - during the second year. This commitment has not been officially documented by the moment of the site visit performed as part of this ESIA Report preparation.

Procurement of local goods and services

The local contractors may be attracted for such activities as cleaning, laundry, cooking/ catering services, transportation, waste transportation services, etc. It is, however, expected that the extent of this impact will be lower than at construction stage, and the impact will be positive and have low significance.

Social investment as part of Company's corporate social responsibility (CSR) programmes

It is expected that at operational phase the Company will engage into CSR activities. Currently there are no CSR plans or programmes prepared for implementation. Potential social investment programmes as a part of Company's Corporate Social Responsibility strategy may support development social infrastructure, enhancement of living standards of local communities, etc. This potential impact of the Project is assessed as positive and of low / moderate significance.

Support to construction sector of Uzbekistan

The Project implementation will aid the increasing demand of cement products among enterprises involved into construction of civil or industrial facilities in Uzbekistan, including infrastructure and housing projects development. Provided increasing consumption of cement that is projected to grow 5 percent per annum in the coming years, this positive impact is assessed to be of moderate significance.

10.2.2.2 Measures to enhance benefits

Measures to enhance positive impacts during the Project operation are similar to those identified for the construction stage (see above). In addition, the Company is recommended to develop and implement Social Investment Framework if appropriate. Preparation of this document is recommended to enhance positive social impacts on the affected communities and the Project area of influence in general.

10.2.2.3 Residual Impacts

As the Project will have positive impacts on economy and employment, the respective residual impacts are not assessed.

10.3 Impacts Related to Labour and Working Conditions

This section considers potential impacts of the Project construction and operation with respect to labour and working conditions of the Project personnel. The following key aspects are considered:

- Engagement of contractors and their potential failure to comply with the applicable requirements with respect to labour relations;
- Accommodation of the Project personnel, including provision of facilities of adequate quality and management of related health and safety risks.

Each of the named aspects is considered below.

10.3.1 Construction

10.3.1.1 Description of Impact

Engagement of contractors

As mentioned before, the EPC contractor is Huaxin's group subsidiary, i.e. an affiliated company with the cement project company. The EPC is a highly specialized construction company that follows Huaxin group's recruitment and safety procedures. Almost all construction workers are mobilized from China with a few non-skilled workers hired from local communities.

Potential risks are associated with violation of labour requirements with respect to construction workers. These may include:

- Improper management of labour relations;
- Untimely/unfair remuneration;
- Discriminative practices in relation to certain individuals or groups of personnel;
- Use of child and/or forced labour;
- Failure to protect the right of the workers to organize and the right for a freedom of association;
- Failure to provide safe and adequate working conditions (assessment of health and safety risks is provided in the Section 10.4);
- Absence or inadequacy of grievance mechanism.

Embedded mitigation measures

It should be noted that the Company has experience of implementation of similar projects. Both probability and intensity of the associated risks may be reduced if existing practices are applied to implementation of the Project. In particular, Huaxin has developed Workers Handbook describing key issues related to worker's labour and working conditions (including such issues as employment and salary payment).

The impact may be caused by unplanned events; therefore, the risk is assessed as follows. Due to considerable number of workers to be engaged during Project construction, the potential impact will be of low intensity. Provided that the Company has experience of implementing similar projects and attracting substantial numbers of workers, the probability is assessed as low. Therefore, the risk is assessed as minor.

Provision of accommodation services to Project workers

There will be a total of approximately 700 construction workers at the peak time. Construction workers are temporarily accommodated in mobile rooms (container type), The camp is fenced and secured from unauthorized entrance. Food is provided free of charge to all workers.

Specific management arrangements are required to ensure provision of adequate living conditions for the Project workers as their lack may lead to the following adverse impacts on the Project workers, who are the main recipients of the impact:

- Inadequate living conditions (e.g. scarce area per person, insufficient number of shower cabins, unavailability of leisure opportunities, etc.);
- Substandard health and safety provisions at the accommodation facilities, including ventilation and air-conditioner in the room, laundry facilities, canteen, showing, sanitation facilities, etc.

Given the considerable number of construction workers during construction and severity of the potential risks (including the camp space and the availability of the living space), the intensity of the risk is assessed as moderate; the probability is also assessed as moderate. Therefore, risk of provision of inadequate workers' accommodation is assessed is assessed as medium.

10.3.1.2 Mitigation measures

The potential adverse impacts related to labour and working conditions can be mitigated by measures recommended below. These measures are relevant to mitigation of all aspects examined in this section:

- Ensure effective implementation of Huaxin group's HR Policy, Labour Code of the Republic of Uzbekistan and fundamental conventions of ILO;
- Effective implementation of regular breaks during a work shift, including breaks for messing and rest;
- A medical aid post or clinic needs to be available at the Project construction site;
- Rest, sports and recreation facilities are to be provided to alleviate workplace physical and psychological stress wherever feasible;
- Optimum indoor air temperature and humidity are to be maintained in the residential and working premises[184];
- Balanced nutrition shall be provided at canteens;
- Access to emergency medical evacuation and treatment services to be established with healthcare institutions of Zafarobod district or the city of Jizzakh;
- Implementation of personnel grievance mechanism to address potential problems and complaints regarding labour and working conditions.

The Company shall develop and implement a formal personnel grievance procedure to inform the Project management on potential problems related to working conditions and labour relations and address them in a timely manner. The Company should ensure that this procedure is followed by all (sub)contractors engaged at all stages of the Project lifecycle.

The Company shall establish a system of inspections and/or audits to monitor compliance with requirements of the Labour Code and IFC PS2.

It is recommended that workforce accommodation is provided for the Project workers in compliance with sanitary standards of the Republic of Uzbekistan and international best practice (in particular, Guidance Note by IFC and EBRD "Worker's Accommodation: Processes and Standards"). The Company should make sure that accommodation for (sub)contractors' workers is also provided in line with the named requirements. The accommodation camp shall be properly fenced in order to prevent trespassing of local residents on the territory of the camp.

10.3.1.3 Residual impacts and risks

After mitigation, residual impacts and risks of the considered aspects will be reduced as follows:

- Risks related to engagement of Project contractors: risk intensity will be reduced to low level; risk probability will remain low; overall residual risk is assessed as minor;
- Risks related to provision of accommodation services to Project workers: risk intensity will be reduced to low level; risk probability will decrease to low level; overall residual risk is assessed as minor.

10.3.2 Operation

10.3.2.1 Description of impact

Engagement of contractors

It is anticipated that contractors' involvement during Project operation will be limited. Though potential risks associated with contractors' engagement will be similar to those described during Project construction, the level their intensity and probability are expected to be not significant; therefore, the risk level is expected to be insignificant.

[184] In the shift camp dwellings, air temperature of 20-22 °C (22-25 °C at daily mean outdoor air temperature above 8 °C) and relative humidity of 30-45 % (30-60 % at daily mean outdoor air temperature above 8 °C) shall be maintained. In rooms with sit-down workstations and minor physical stress at work (control rooms, etc.) the requirement is 22-24 °C (23-25 °C at daily mean outdoor air temperature above 8 °C) and 40-60 % (also at daily mean outdoor air temperature above 8 °C).

Provision of accommodation services to Project workers

At the operation stage, the risks associated with accommodation of the Project workers will be similar to the described during the construction stage. It is understood that the accommodation facility will continue to serve as a residence for operational personnel of the Project. Therefore, the risk is assessed as medium/ minor.

10.3.2.2 Mitigation measures

If necessary, the Company will continue implementing the mitigation measures to address potential risks associated with contractors' engagement and workers' accommodation as suggested for the construction stage.

The measures related to occupational health and safety are provided in Section 10.4.

10.3.2.3 Residual impacts and risks

Significance of residual risks is as follows:

- Risks related to engagement of Project contractors is assessed as insignificant;
- Risks related to provision of accommodation services to Project workers is assessed as minor.

10.4 Occupational Health and Safety Risks

10.4.1 Construction and Operation

10.4.1.1 Impact description

The workers involved into cement plants operations are exposed to such risks such dust, noise, and vibrations.

The production of cement includes a series of processes such as crushing, handling of raw material, grinding clinker, blending, packing and shipping of the final product of cement clinker. During these processes accidents and provoking of potential health problems of the workers cannot be fully avoided, and workers are exposed to dust, noise and high temperature effects.

The workers in a cement factory are exposed to many occupational hazards which contribute to cement-related allergies, work injuries and deaths. Cement can worsen workers' health in case of contact with skin or eye and inhalation. The risk of injuries and occupational health problems for cement factory workers depends on the duration and level of exposure and individual sensitivity. Noise is also a major hazard that may be encountered during the production of cement; specifically, milling plants used to grind the cement product may cause high noise levels which can impair workers' hearing levels; maintenance and cleaning personnel are predominantly at risk.

Taking into account the processes in the cement production plant, the following risks may be potentially posed by the Project:

- General and routine risk sources for the entire cement production processes:
    - Safety;
    - Work environment;
    - Work and passage areas;
    - Work equipment;
    - Labelling for safety;
    - Protection equipment;
    - Manual and automatic load handling.
- Special risks during the cement production processes in plant:
    - Raw material processing (crushing);
    - Clinker production (sintering);
    - Grinding and milling processes (raw material, cement, and coal milling);
    - Ladders and scaffolding;
    - Forklifts;
    - Work vehicles;

  - o Welding and cutting activities;
  - o Fuel storage activities;
  - o Use of hazardous materials;
  - o Power generating units/
- Environmental risks:
  - o Dust;
  - o Noise;
  - o Heat effects due to high temperatures;
  - o Fire.

In practice of cement plant construction in general, it was observed that the workers may be exposed to various hazards that result in most serious injuries, death, and breathing problems. The hazards are physical, chemical or accidental due to mechanical and other working conditions.

The impact's risk is assessed as follows. The potential impact will be of moderate or high intensity depending on the source of hazard. The probability is assessed as moderate. Therefore, the risk is assessed as high.

10.4.1.2 Mitigation measures

Huaxin has substantially adopted LafargeHolcim's requirements on occupational health/safety (OHS) and process safety management. Huaxin's requirements on occupational health/safety (OHS) and process safety management also apply to the construction of Huaxin Jizzakh plant.

The measures to protect the Health and Safety of workers during operations are outlined below.

General health and safety management system

- Implement a comprehensive safety and health management system identifying all hazards at the worksite, including development of H&S plans for the different stages of the Project that will apply to the Company and (sub)contractors;
- Development of the H&S procedures and instructions;
- Tool-box talks, training and knowledge tests, certificates and work permits for personnel;
- Determination of hazard class of workplace environment factors; in case of identified deviations from hygienic standards - develop mitigation measures that are in line with Huaxin group's policies and IFC's performance standard requirements;
- Restriction on rotation shift period and duration of work shift at the Project sites;
- Implementation of Lock-Out/Tag-Out systems, development of instructions on their use, appointment of competent officer, provision of training (including for contractors' personnel) on prohibition of deactivation of lock-out system and switching on de-energized equipment;
- Development of a system of monitoring and reporting on H&S issues.

General Safety

- Establish a written hazard communication program to inform all employees about chemical hazards and hazardous substances, reporting of hazards, appropriate personal protective equipment and actions protocol in emergency situations;
- Train workers on safe work practices and methods for all work activities, procedures and equipment as well as on a manner in which it is required to recognize and respond to potential workplace hazards, including rendering first aid;
- Implement personal protective equipment programs. Train workers on selecting, cleaning and maintaining equipment such as respirators, protective clothing and goggles;
- Use safe work practices and appropriate personal protective equipment for all welding, cutting and burning; handling of chemicals (e.g., moist concrete, epoxies, form release agents); and during grinding, chipping, wire brushing, scraping and cleaning;
- Ensure that all tools and equipment, including forklifts, cranes, hoists and rigging, are maintained in a good working condition, are inspected regularly and are operated by thoroughly trained and competent workers.

Health Hazards

- Avoid exposure to cement dust to prevent bronchitis and silicosis;

- Prevent burns, and skin and eye irritation by avoiding skin contact and eye contact with cement dust;
- Set up a noise control program to reduce noise sources. Include sound-level measurements, audiometric testing, training and/or hearing protection equipment;
- Provide appropriate personal protective equipment, such as gloves, boots, goggles or HEPA-filter respirators;
- Avoid dusty areas and water work areas, as appropriate, to reduce or suppress dust;
- Use dust-depression vacuums (such as special HEPA) to clean up dust instead of dry sweeping;
- Reduce silica exposures during chipping of raw materials with engineering controls, such as wet methods and local exhaust ventilation.

Working at Height

- All onsite works undergo a risk assessment with a special attention paid to work at height;
- Any work at height must be subject to receival of a Permit to work;
- All workers are trained through various tool-box talks and safety meetings for harness use and importance standard requirements;
- Hierarchy of controls is set up with preference given to handrails and proper designs (engineering controls) rather than to harnesses (PPE) decreasing the dependency on human errors and unsafe behaviors;
- Disciplinary actions and awards.

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Working at Heights – Scaffolds

- A team form is dedicated to erecting scaffolds & communicated to everyone;
- Clear indicators are used on all scaffolds, communicated to all workers with disciplinary actions;
- Inspections are done by Project team.

Mechanical Lifting

- Inspections of lifting equipment by a third-party inspection company;
- All operators are regularly tested and are issued with a license to operate equipment;
- All lifts are performed through a Lift Plan.

Safety of Quarrying Activity

Safety of work staff and work area is a main objective while performing any task; the site personnel should strictly follow provisions of safety management plan to ensure harmless working conditions.

Mining activity is considered as a risky type of job and a lot of precaution must be taken into consideration. The mining plan for Huaxin Cement Company raw material exploitation will ensure the following items:

- Access roads will be regularly maintained to clear any obstacles and adjust roughness and/or slippery fine material;
- Inclination does will not exceed 6% to prevent slipping of wheel equipment specially if roads are wet during rain;
- Retaining walls or large stone lumps arranged at the side of roads in clear and visible way to prevent fall of equipment’s in case of any unplanned event.

Cement Dust

Exposure to cement dust is able to cause irritation of eyes, nose, throat and the upper respiratory system. To prevent the cement dust exposure the following mitigation measures should be implemented:

- Rinse eyes with water if they contact with cement dust, and provide a consultation with a physician;
- Use soap and water to wash off dust to avoid skin damage;
- Wear respirator to minimize inhalation of cement dust;
- Eat and drink only in dust-free areas to avoid ingesting cement dust.

Machine Guarding

Unguarded machinery used in the manufacturing process can lead to worker injuries. To minimize the risk for workers the following mitigation measures should be implemented:

- Maintain conveyor belt systems to avoid jamming;
- Ensure that guards are in place to protect ensure protection of rebar benders, cutters and cage rollers;
- Establish and follow effective lockout/tagout procedures when providing equipment servicing;
- Ensure that appropriate guards are in place at power tools before using them.

Confined Spaces

Some workshops have confined spaces that pose safety risks for workers. To minimize the risk for workers the mitigation measures should be implemented:

- Follow established procedures for confined space entry and work to assure safety;
- Guard against heat stress when cleaning equipment;
- Wear appropriate protective equipment to avoid dust exposure when work on confined spaces.

Onsite vehicles

Poorly maintained or improperly handled vehicles can lead to crushing injuries at the plant site or other injuries for drivers. To minimize the risk for workers some mitigation measures should be implement:

- Make sure back-up alarms on all vehicles are functioning;
- Avoid overloading cranes and hoists;
- Beware of hot surfaces on equipment and truck components;
- Guard eyes against splashes of aggregate materials during loading and unloading;
- Use hearing protection if needed to guard against excessive noise exposure during cement loading/unloading;
- Be sure that trucks and other vehicles are in good working order, including audible back-up warning signals, before operating them;
- Avoid overloading hoists, cranes and forklifts.

Overhead Hazards

To minimize the risk for workers the following mitigation measures should be implemented:

- Ensure that formwork, casting and stressing operations are adequately braced and chocked to avoid sudden release of materials;
- Ensure certain that rigging is in place to protect against falling objects and materials during hoisting and stacking procedures;
- Do not walk or work under overhead loads.

Emergency Response Plan

During pre-operational mobilization, Huaxin Cement Plant will develop a site-specific Emergency Response Plan for the operational activities. This plan will include a Spill Contingency Plan (chemical and petroleum handling storage and spill management).

The purpose of the spill contingency plan is to describe the methods and procedures necessary to prevent the release of potentially harmful substances into the environment. The spill contingency plan will include procedures and information on:

- Spill prevention planning and preparedness;
- Training of personnel;
- Security;
- Material handling;
- Storage tanks;
- Unloading areas;
- Emergency station, community and agency notification and updates;
- Spill containment and clean-up procedures;
- Spill report preparation.

Providing clear and concise contacts of the appropriate agency, as well as their roles and responsibilities, the Emergency Response Plan will ensure that the impact of any emergency will be minimized. Regular employee training and emergency drills will ensure that all personnel are prepared for emergencies and that the response team is prepared to promptly respond to any potential emergency (e.g., fire, power disruptions, etc.)

10.4.1.3 Residual impacts

Implementation of the mitigation measures will decrease intensity and probability to moderate levels, thus lowering the general risk to medium level.

10.5 Plant Construction Nuisances

10.5.1 Description of Impact

Safety risks associated with Plant construction activities

Construction activities at the Plant site may pose certain risks to health and safety of local communities in absence of adequate control of public access to the site. However, the closest residential community is located at a considerable distance of 4.9 km (Balykly) and 3.5 km (Karatepa). Therefore, safety risks related to the Plant construction activities with respect to permanent residents of the nearby communities will be insignificant. However, the territory at the bottom of the ridge is used for cattle grazing activities by local land users. Such land users were identified in vicinity of the Cement Plant area (see Chapter 8). Project construction works might pose safety risks if accessed by the local land users performing livestock grazing activities (receptor). The potential impact intensity is considered moderate. The impact probability is moderate. Therefore, risk significance is assessed as medium.

Community health risks caused by noise, vibration and air emissions

As the nearby communities are located at a distance of over 2 km from the Plant construction site, no impacts associated with air emissions are anticipated; the level of noise and vibration will not exceed the vibration and noise limits. Only temporary presence of the local land users (agricultural organisations and individuals) performing cattle grazing activities in vicinity of the Plant site during construction might be anticipated. Therefore, the intensity of potential impact to community health caused by noise, vibration and air emissions is considered not significant. Impact probability is also not significant. Therefore, the risk is insignificant.

Stress impact

The stress impact during Plant construction will relate to the following:

- Project traffic and associated noise, dust and vibration, as well as safety risks;
- Arrival of construction workforce and potential conflicts. The accommodation camp will be located at a considerable distance from the nearest residential communities, however the presence of Project workforce in these communities might still be anticipated. Workers might also have conflicts with local agricultural workers performing their activities in proximity of the Project site. The family of one of the agricultural workers also resides in close proximity to the accommodation camp.

The potential intensity of the traffic movements, as well as temporary and local character of the potential impact make impact magnitude moderate. Considering the high sensitivity of receptor that might include vulnerable groups (such as children, elderly and disabled please), the impact significance is assessed as high.

10.5.2 Mitigation measures

The main measures to be implemented to minimize the above impacts are listed below.

Safety risks associated with construction activities

- Protective barriers and fences with warning signs will be provided at the construction site;
- Security personnel shall be provided at the construction site;

- Local residents and agricultural organisations shall be informed on the time and place of construction activities in advance;
- The functioning grievance mechanism shall also provide timely identification of any issues related to safety of local communities.

Community health risks caused by construction noise, vibration and air emissions

Mitigation measures associated with construction noise, vibration and air emissions are outlined in Chapter 9.

Stress impact

Mitigation of this impact will include a combination of measures which have been identified for minimisation of the other impacts, including:

- Measures identified in relation to safety risks associated with construction activities (see above);
- Measures developed to address issues related to workers' influx (see Section 10.10);
- Traffic impacts' mitigation measures (refer to Section 10.9);
- Measures identified to address potential impact on land use (see Section 10.12);
- Regular stakeholder engagement activities;
- Operation of the grievance mechanism.

Detailed description of these measures is provided in dedicated sections of the report.

10.5.3 Residual impact

After implementation of the described above mitigation measures, significance of residual risks and impacts of the Plant construction is assessed as follows:

- Safety risks associated with construction activities – minor;
- Community health risks caused by noise, vibration and emissions to air – minor;
- Stress impact – low.

10.6 Plant Operation Nuisances

10.6.1 Description of Impact

Safety risks associated with Plant operation activities

The community safety risks will be associated with the Plant operational facilities that might be dangerous for people if access to them is not adequately controlled. As the closest permanent residential community is located at over 2 km form the Plant, no safety impacts on its residents are anticipated during Plant operation. However, safety risks refer to the presence of local agricultural workers and cattle in the vicinity of the Plant site.

The safety risks will be local and permanent. The intensity is considered low. The impact probability is low. Therefore, safety risks associated with the Plant operation are assessed as minor.

Community health risks caused by noise, vibration and air emissions

Assessment of potential impacts on community health is performed based on the sanitary protection zone criteria. According to the existing regulatory requirements, a sanitary protection zone (SPZ) is a compulsory element of an industrial facility which might potentially be a source of impacts on the environment and human health. In compliance with the national requirements, the location of a residential area within the SPZ is prohibited. The concentrations of pollutants at the boundary of a SPZ should not exceed the ambient air standard concentrations (1.0 MPC – maximum permissible concentration).

There are no residential communities within the designed SPZ boundaries of the Plant (500 m). The SPZ boundaries will be confirmed/recalculated based on detailed data on air emissions. Only temporary presence of the agricultural workers might be anticipated within the SPZ boundaries, which will not be detrimental for their health. According to preliminary air modelling, the air quality conditions in the communities will not be significantly affected by the Project operation (Section 9.1).

Considering the distant location of the closest residential communities (over 2 km from the Project site), no impacts on their residents associated with noise, vibration and emissions to air are anticipated. Only temporary presence of local herders and livestock is possible in the vicinity of the Plant. The intensity of potential impact is considered low. Impact probability is also low. Therefore, the risk is minor.

Stress impact

The stress impacts related to the Plant operation stage will relate to the following:

- Project traffic and associated noise, dust and vibration, as well as safety risks;
- Presence of operation workforce and potential conflicts.

Considering the intensity of the traffic movements, as well as permanent character of these impacts make impact magnitude minor. Considering the high sensitivity of receptors that might include vulnerable groups (such as children, elderly and the disabled), the impact significance is assessed as moderate.

10.6.2 Mitigation measures

The main measures to be implemented to minimize the above impacts are listed below.

Safety risks associated with Plant operation

- Protective barriers and fence will be provided at the Plant operation site;
- Security personnel will be provided to secure the Plant operation site;
- The functioning grievance mechanism shall also provide timely identification of any issues related to safety of local communities.

Community health risks caused by Plan operation noise, vibration and air emissions

Mitigation measures associated with construction noise, vibration and air emissions are outlined in Chapter 9.

Stress impact

This potential stress impact will be mitigated by measures similar to those identified for the Plant construction stage (Section 10.5).

10.6.3 Residual impact

After implementation of the described above mitigation measures, significance of residual risks and impacts of the Plant construction is assessed as follows:

- Safety risks associated with Plant operation activities – negligible;
- Community health risks caused by noise, vibration and emissions to air – minor;
- Stress impact – low.

10.7 Limestone Quarry Exploration and Mining Activities

10.7.1 Description of Impact

Safety risks

The limestone quarry exploration and mining activities may pose certain risks to health and safety of local communities in absence of adequate control of public access to the site. However, the closest residential community is located at a considerable distance of 2.3 km (Balykly) and 2.6 km (Karatepa). Therefore, safety risks related to limestone quarry exploration and mining activities with respect to permanent residents of the nearby communities will be insignificant. However, the territory at the bottom of the ridge is used for cattle grazing activities by local land users. Such land users were identified in vicinity of the Cement Plant area and on the opposite site of the ridge (see Chapter 8). Blasting operations at the mining area might be dangerous to the local agricultural organisations and individuals performing livestock grazing activities, who are the impact's recipients. The potential impact intensity is considered moderate. The safety risk will be local and permanent. Its intensity is considered moderate. The impact probability is moderate. Therefore, safety risks associated with the limestone quarry exploration and mining activities are assessed as medium.

Community health risks caused by noise, vibration and air emissions

A significant source of air pollution is explosion works in the limestone quarry. Dust will be generated in significant quantities at all stages of limestone quarrying. However, the overall impact of the Project on the air quality of the surrounding area can be generally assessed as low (Section 9.1). The mining activity will involve the use of both blasting and mechanical excavation works. The blasting is planned to take place once or twice per week and restricted to day time only. Vibration will mainly result from blasting during mining activity at limestone quarries. Noise level in mining area, though high especially during blasting, will be only for short duration. Based on the noise assessment of the projects similar to the Huaxin Cement Plant, the noise levels in the communities surrounding the limestone quarry site will comply with permissible noise limits. As show results of the noise modeling, the calculated noise levels are less than 45 dBA at the distance of 2 km from the quarry.

As noted above, the closest communities Balykly and Karatepa are located at over 2 km from the limestone quarry. Considering the described above and taking into account the distances to the nearby communities, the significance of the community health risks caused by noise, vibration and air emissions is minor. The potential impacts related to noise, vibration and air emissions are considered in detail in sections 9.1 and 9.2.

Stress impact

The stress impacts related to limestone quarry exploration and mining activities will relate to the following:

- Blasting works at the Project mining area (presumably, 1-2 times a week);
- Project traffic and associated noise, dust and vibration, as well as safety risks;
- Presence of operation workforce and potential conflicts.

The intensity of the traffic movements, noise associated with blasting works, as well as permanent character of these impacts make impact magnitude moderate. Considering the high sensitivity of receptors that might include vulnerable groups (such as children, elderly and the disabled), the impact significance is assessed as high.

10.7.2 Mitigation measures

Safety risks

- In case of hazardous works, warning signs shall be provided with indication of planned place and time of such works. The signs shall be installed at a safe distance from the performed activities, as well as along the access roads to prevent unauthorised access;
- During blasting works, the Project workers should be present at a safe distance at the areas of likely presence of the local land users to prevent them from accessing the safety area;
- Local residents and agricultural organisations shall be informed on the time and place of blasting works well in advance;
- The functioning grievance mechanism shall also provide timely identification of any issues related to safety of local communities.

Community health risks caused by construction noise, vibration and air emissions

Mitigation measures associated with construction noise, vibration and air emissions are outlined in Chapter 9.

Stress impact

Mitigation of this impact will include a combination of measures which have been identified for minimisation of the other impacts, including:

- Measures identified in relation to potential safety risks (see above);
- Measures developed to address issues related to workers' influx (see Section 10.10);
- Traffic impacts' mitigation measures (refer to Section 10.9);
- Measures identified to address potential impact on land use (see Section 10.12);
- Measures identified in Chapter 9 in relation to various environmental impacts of the Project;

- Regular stakeholder engagement activities (including informing communities on the blasting activities);
- Operation of the grievance mechanism.

Detailed description of these measures is provided in dedicated sections of the report.

10.7.3 Residual impact

After implementation of the described above mitigation measures, significance of residual risks and impacts of the Plant construction is assessed as follows:

- Safety risks – minor;
- Community health risks caused by noise, vibration and emissions to air – negligible;
- Stress impact – low.

10.8 Associated Facilities Nuisances

10.8.1 Description of Impact

Safety risks

The 10 kV overhead power line, high pressure above-ground gas pipeline and twin 110 kV overhead power transmission line will cross or pass nearby the agricultural fields and residential areas, and therefore their construction might pose safety risks to local residents, agricultural workers and cattle. Construction of the Project access road will not affect permanent residents within the Project social area of influence as these are distant from the road construction area. However, this area is used by two agricultural organisations performing cattle grazing activities – Zafaragro Keladjak and Ismail Anora (see Chapter 8). Road construction activities and movements of construction vehicles might pose safety risks to the herders and cattle.

Construction of these linear objects will be temporary and will not require extensive works. However, the impact intensity is medium due to the presence of children in the communities along the linear facilities. Impact probability is moderate. Therefore, the risk significance would be medium.

Community health risks caused by noise, vibration and air emissions

Certain impacts associated with noise might be anticipated during construction of the 10 kV overhead power line, high pressure above-ground gas pipeline and twin 110 kV overhead power transmission line. These facilities will cross or pass nearby the agricultural fields and residential areas. Risks related to construction of the Project access road (related to noise, vibration and air emissions) might be pertinent to workers of local agricultural organisations and the family of Zafagro Keladjak worker. This worker's house is located 110 m from the access road.

As construction of these linear objects will be temporary and will not require extensive works, the potential impact intensity is considered low. The impact probability is high since the works will be performed in vicinity of residential areas where children and elderly reside. Therefore, the risk significance would be medium / minor.

10.8.2 Mitigation Measures

The following measures will be implemented to mitigate potential impacts related to associated facilities' nuisances:

- Protective barriers with warning signs will be provided at the construction sites;
- The functioning grievance mechanism shall also provide timely identification of any issues related to safety of local communities.

10.8.3 Residual impacts

After implementation of the described above mitigation measures, significance of residual risks and impacts related to the Project associated facilities will be minor.

10.9 Traffic Impacts

This section provides assessment of the Project traffic impacts, including:

- Safety risks associated with traffic movements;
- Deterioration of road quality;
- Traffic impacts associated with noise, dust and vibration.

Impacts associated with community health and safety related to the Project construction and operation works, stress impact, etc. are considered in Section 10.5.

10.9.1 Construction

10.9.1.1 Description of Impact

Development of the Project will result in an increase in traffic due to the transportation of construction materials and equipment to the construction site. Excavated material and other waste will also need to be transported away from the site. The Project traffic during Project construction moves along R-37 and R-37b roads, as well as the local road connecting R-37b to the Project site. After construction of the Project access road is finalized, the Project traffic will use R-37b and R-37 roads. The public road networks will be also used during construction of the Project associated facilities (the gas pipeline and two power lines).

Safety risks associated with traffic movements

Construction of the Project is associated with an increase in traffic on the local road network. The current Project traffic does not affect residential communities within the Project social area of influence in Zafarobod district, however the traffic route goes along the communities in other districts, including Tychankuduk, Yangiobod, Tuyamoyin, Quyovboshi, Gandumtosh, etc. It should be noted that these communities are already affected by the current traffic. It is not expected that the Project traffic will deviate from the prescribed routes and use local roads within the communities (such as unpaved roads).

When construction of the Project access road will be finalized, the Project traffic will also use a section of the public R-37b road. The prison camp in Chimkurgon rural settlement is located at over 150 m from the Project traffic route (public R-37b road), and therefore is unlikely to be affected by the Project construction traffic. It is not anticipated that the drivers will make stops at the section of the road in the vicinity of the prison camp as there are no shops, cafes or any amenities. No communication between the drivers and the prisoners is anticipated. Therefore, sensitivity of the receptor (prisoners) with respect to this impact is considered low.

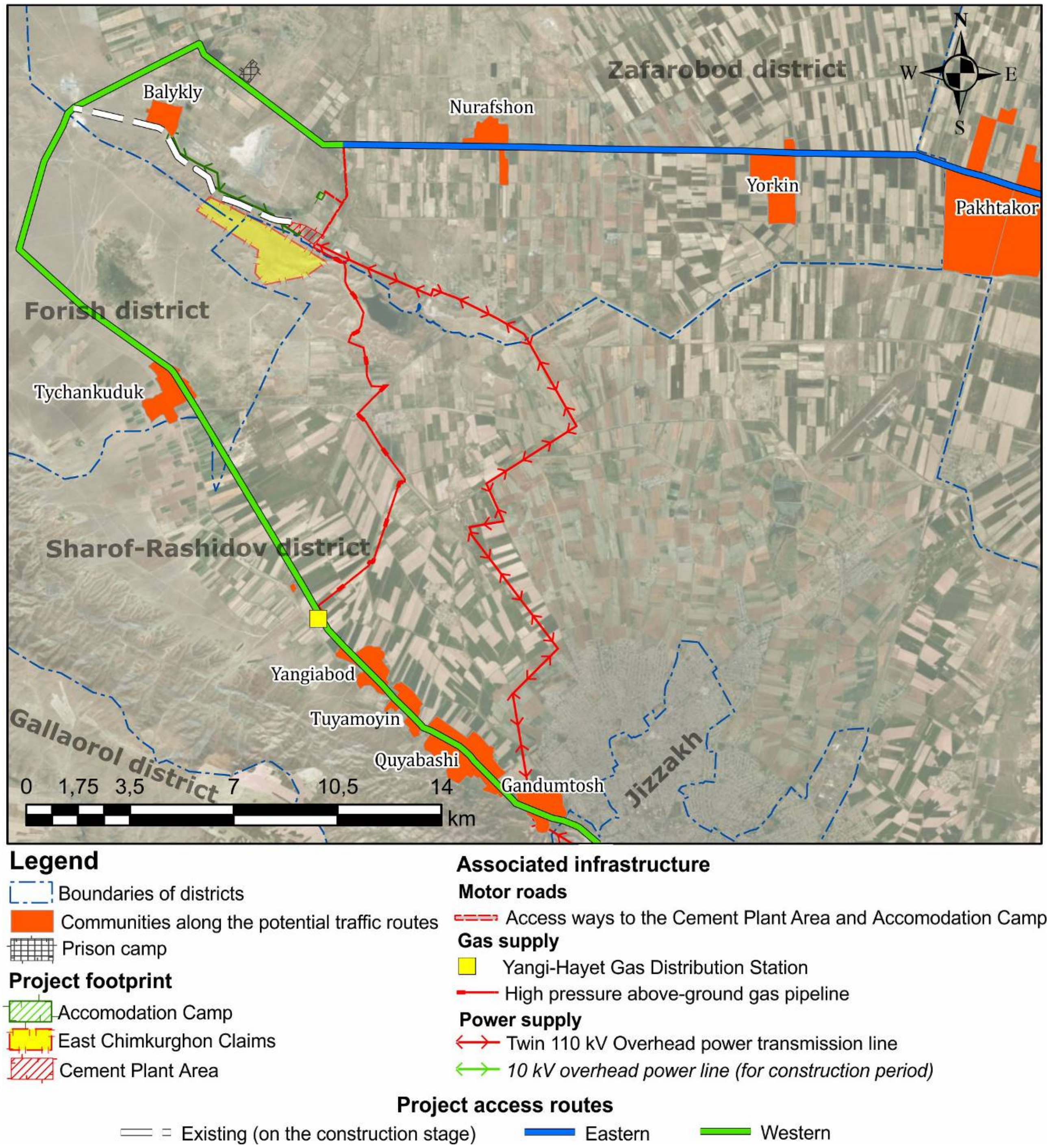

Figure 10.1: Project potential traffic routes

Since the Project area is largely rural, potential traffic safety risks might be relevant to the local agricultural workers and cattle. Traffic safety risks are also relevant during construction of the gas pipeline and two power lines.

Therefore, the traffic increase will result in an increased risk of traffic-related accidents that could lead to injuries or fatalities of other road users and pedestrians. Children, elderly and disabled people are particularly susceptible to potential traffic-related safety risks. In rural areas, children often walk through the communities unaccompanied by adults. This makes them more vulnerable to any impacts associated with traffic, especially in those communities that do not have sidewalks along the access roads. Children are also present at Zafaragro Keladjak agricultural area adjacent to the Project access road.

The intensity of safety risks associated with traffic movements is considered moderate. The impact probability is considered high since the traffic will go in proximity of the house of Zafaragro Keladjak (including children) and along the residential communities (that are affected by the current traffic in the region). Therefore, the risk significance is assessed as medium / high.

Deterioration of road quality

The Project traffic volumes may contribute to deterioration of the quality of the public road network. In particular, this relates to the local road along the ridge, as well as R-37, R-37b and R-36 roads. The magnitude of the potential traffic impacts associated with deterioration of the public roads is considered moderate. Sensitivity of the receptor (community residents and road users) is considered moderate for this impact. The significance of the impact is assessed as moderate.

Traffic impacts associated with noise, dust and vibration

The Project access road lies at 110 m from the house located at Zafaragro Keladjak agricultural area, which is used by one family. The traffic route also goes along several residential communities. The residents of the named house, as well as residents of communities along the traffic route will be affected by noise, dust and vibration generated by the Project traffic. Since the house is located 110 m from the road, and the houses in the communities are already affected by the region's traffic, the impact magnitude is considered medium. Sensitivity of local residents with respect to this impact is considered high due to the presence of vulnerable groups among the residents of the house and communities along the traffic route. Therefore, without implementation of relevant mitigation measures, the significance of Project traffic impacts associated with generation of noise, dust and vibration is assessed as high.

10.9.1.2 Mitigation measures

The main measures to be implemented to mitigate all of the above impacts are listed below:

- The Company will develop Traffic Management Plan (TMP) and will oblige contractors to develop such plans or comply with the Company's TMP provisions. This TMP should be based on existing procedures of Huaxin Cement regulating traffic-related issues;
- The Company will continue to seek maximizing the use of the rail network to minimize road traffic;
- To avoid, if inevitable, to minimize heavy truck movements during the night hours and holidays) to reduce noise nuisance to surrounding communities;
- The Company will consider whether deliveries should be scheduled to avoid peak times to reduce congestion (unlikely for the local conditions) and the risk of incidents as well;
- Local communities and agricultural organisations should be informed on the time and place of construction activities, as well as on the relevant traffic in advance;
- The Company will consider establishment of road signs warning on cattle crossing the road;
- The Company will consult local agricultural organisations/ local authorities to identify availability of specific herding routes to arrange adequate crossing points where herders and their cattle can safely cross the access road (if required);
- Mandatory pre-trip examinations of drivers shall be practiced (including check for potential signs of alcohol of drug intoxication);
- The Company and contractors will adopt a policy of zero tolerance in relation to alcohol consumption, with immediate termination of employment contract in case of violation;
- Drivers' training will be performed to inform them on the relevant speed limits and traffic safety risks (such as presence of road users like children and elderly, potential roads' crossing by cattle, etc.);
- The Company and contractors will regularly monitor compliance with safe driving practices (monitoring measures will be provided as part of the TMP);
- Road maintenance works should be performed in case of the public roads' deterioration due to the construction traffic movements;
- The functioning grievance mechanism shall also provide timely identification of any issues related to safety of local communities.

10.9.1.3 Residual Impact

After implementation of the described above mitigation measures, significance of residual impacts of the Project is assessed as follows:

Plant and adjacent associated facilities

- Safety risks associated with traffic movements – minor or moderate;
- Deterioration of road quality – low;
- Traffic impacts associated with noise, dust and vibration - low.

10.9.2 Operation

10.9.2.1 Description of Impact

Project operation will require transportation of goods from the Cement Plant, as well as transportation of the Project personnel. Excavated material and other waste will also need to be transported away from the site. The Project traffic will use the access road to reach the R-37 road. Reaching this road, the traffic will go East direction via R-37b and R-36 roads to Jizzakh to distribute cement products further throughout Uzbekistan. However, as a secondary route the Project traffic may also go West direction by R-37b road via Nurafshon, Yorqin, Pakhtakor, and further via the chosen road network to Tashkent (see Section 8.10 for more detail).

During operation the Plant will have similar range of traffic impacts as described for the construction stage above. However, as noted above, additional traffic route might be used; no significant traffic impacts related to operation of the gas pipeline and the power line are anticipated. The potential impacts and risks are elaborated in this section above. Significance of the potential traffic safety risks during Project operation is assessed to be medium / high, of impacts related to deterioration of road quality – moderate, of traffic impacts associated with noise, dust and vibration – high.

10.9.2.2 Mitigation measures

Mitigation measures will be similar to those described for the construction stage.

10.9.2.3 Residual Impact

Plant and adjacent associated facilities

- Safety risks associated with traffic movements – minor or moderate;
- Deterioration of road quality – low;
- Traffic impacts associated with noise, dust and vibration – low.

10.10 Impacts Associated with Workers' In-Flux

This section provides assessment of impact of workers influx to the Project social area of influence. It should be noted that this section addresses potential impacts associated with inflow of the workers provided by the contractors and subcontractors that reached the agreements with the Company; due to relatively small scale of the Project, as well as due to ability of the Project to ensure sufficient numbers of workers via selected contractors and subcontractors, opportunistic in-migration of Uzbek migrant workers from other regions of Uzbekistan is not expected. Due to similar nature of the impacts during construction and operations, the impacts at these stages are assessed jointly in one subsection. The potential impacts considered in this section include:

- Increased load on social infrastructure;
- Inflation (growth of prices for vital goods and services);
- Potential conflicts between in-migrants and local communities;
- Potential spread of infection diseases.

These potential impacts are considered below.

10.10.1 Construction and Operation

10.10.1.1 Description of impact

Increased load on social infrastructure

The following elements of social infrastructure might be affected by the Project:

- *Educational institutions*. The Project workforce will reside in the accommodation camp at a considerable distance from the permanent communities. It is expected that workers will stay in the camp without their families and children. Therefore, educational institutions (schools and kindergartens) will not be exposed to increased load;
- *Medical institutions*. It is expected that a medical clinic will be provided at the accommodation camp and/or at the Plant site as appropriate. Therefore, load on medical institutions within the Project social area of influence is not expected to increase substantially. However, special medical services may be also provided to workers by public healthcare institutions. In this case, public healthcare institution(s) in Nurafshon or Jizzakh may be potentially utilised. However, the use of these institution(s) will be occasional/limited and will unlikely lead to much strain on them;
- *Utilities*. It is expected that all elements of the Project, including accommodation camp, will be provided with own power supply, water and wastewater services. Therefore, load on local facilities within the social area of influence is not expected to increase.

According to information provided by the Project representatives, at operational stage the workers will be also accommodated at the same Project camp. Therefore, the risk of increased load on local infrastructure shall be of similar nature as during construction stage, although its intensity may be even lower due to smaller number of attracted operational workers. It is not expected that the families will accompany the workers at operational stage. In the assessment it is also taken into account that the Project aims at employing local job-seekers to the extent possible, which decreases the level of the risks associated with potential impact on local infrastructure caused by workers' influx.

Considering the above, potential risk of the Project's impact on local social and municipal infrastructure is assessed as follows: probability – low, intensity – low; overall risk of the impact – Minor.

Inflation (growth of prices for vital goods and services)

The number of workers to be engaged is up to 700 workers during construction and 300 persons during operations (according to the data provided by the Project representative during the site visit); however, it is understood that at least to some extent the workers will be sourced locally and, therefore, the actual number of in-migrating workers will be lower at both stages. The workers will be accommodated at the camp with necessary social and shopping infrastructure thus decreasing the need of the workers to attend local shops, cafeterias, barbershops, etc; only sporadic visits to local communities may occur. Therefore, implementation of the Project will not lead to increase of demand for food or other goods in communities within the social area of influence. According to information provided by the Company, no extensive use on local housing market for accommodation of the workers is planned; therefore, the housing rent and sale price level is not anticipated to alter due to the workers' influx.

Therefore, the potential risk of the Project-related workers influx to cause inflation is assessed as follows: probability – low, intensity – low; overall risk of the impact – Minor.

Potential conflicts between in-migrants and local communities

As the workers are to be accommodated in the Project camp during both construction and operations, the frequent visits of Project workers to Balykly or other local communities are not anticipated due to the distant location and self-sufficiency of the camp. According to the data provided by the Company representatives, accommodation of the workers in local communities is not expected. However, contacts of Project employees with workers of local agricultural organisations involved into sheep herding may occur. Additionally, there is a house of a local herder's located in circa 80 m from the accommodation camp site; the herder's family resides in this house as well; as reported during the site visit, the contacts between the Project workers and the herder occurred leading to some minor arguments that were resolved peacefully. It should be noted that this house is not the only residence of the herder.

The number of the workers during construction (up to 700) and operations (up to 300) would be still considerable comparing with the overall number of residents in the closest community of Balykly (341 persons), and sporadic visits of the workers to Balykly are not excluded. Additionally, it is known that there were contacts between the herder's family and the Project workers, including minor conflicts; however, the herder generally characterized the relationship with the workers as 'positive' and peaceful.

Embedded mitigation measures

Huaxin (parent company) has developed Workers Code of Conduct regulating behaviour of the company's workers. However, this document is still to be adapted for the Project.

Therefore, the probability of the impact is assessed as moderate; the intensity of the impact is assessed as moderate. Overall risk of the impact – Medium.

Potential spread of infection diseases

In case of contacts between the Project workers and local communities, a risk may be posed associated with the spread of infection and, in particular, with sexually transmitted diseases (STD), which may affect both local residents and Project personnel. In particular, risks of tuberculosis and HIV/AIDS might be of particular importance. However, considering that:

- Project workers will live in accommodation camp where the workers will reside with access to services necessary to address their primary needs (shopping, leisure, canteen, etc.) at a considerable distance from permanent communities;
- Only agricultural workers and one herder's family might be present in the vicinity of the Project sites,

potential contacts between Project personnel and the locals will be limited. However, as the number of the workers during construction (up to 700) and operations (up to 400) are still considerable comparing with the population of Balykly (341 persons), the intensity of the potential impact is not viewed as completely insignificant and is ascribed with 'low' level. The probability of the impact is assessed as moderate as there are known cases of contacts between the workers and local communities. Overall risk of the impact is assessed as medium / minor.

10.10.1.2 Mitigation measures

The key measures to be implemented to mitigate the impacts described above are listed below.

Increased load on social infrastructure

- Liaison with medical institutions on the issues related to their capacity and potential additional load created by the Project personnel, especially in relation to specific medical services that are not available at onsite clinic provided by the Project;
- Development and implementation of local recruitment procedure and local procurement procedure in order to, inter alia, help reduce potential load on local healthcare infrastructure caused by influx of workers;
- Introduction of an external grievance mechanism in order to facilitate collection of comments and complaints regarding load on medical institutions due to their use by the Project workers.

Potential inflation (growth of prices for vital goods and services)

- Provision of sufficient accommodation facilities with appropriate living conditions, ensuring provision of leisure opportunities, medical center, shop, barbershop, etc. in order to prevent the workers from visiting local communities and from residing in local settlements;
- The Project will ensure comfortable transportation of workers from the assembly point to the Project accommodation facilities and/or work sites in order to avoid workers travelling via local public transportation.

Potential conflicts between in-migrants and local communities

- Development and implementation of the Personnel Code of Conduct (based on existing Huaxin Code of Conduct) which will include, *inter alia*, the following aspects:
  - o Respect and polite attitude towards the local communities;
  - o Prevention of harm to local residents, their property and local environment;

  - Neutral attitude and non-involvement in any situations which may lead to potential conflict;
  - Prohibition of hunting, fishing and gathering of wild crops;
  - Prohibition of pet keeping, including dogs;
  - Respect to cultural heritage of the local population;
  - Zero tolerance policy in respect of alcohol consumption by the shift workers;

- Provision of sufficient accommodation facilities with appropriate living conditions, ensuring provision of leisure opportunities, medical center, shop, barbershop, etc. in order to prevent the workers from visiting local communities;
- The Project will ensure comfortable transportation of workers from the assembly point to the Project accommodation facilities and/or work sites in order to avoid workers travelling via local public transportation.
- Provision of induction training for personnel of the Company and contractors on the issues of interaction with local communities;
- Introduction of an external grievance mechanism in order to facilitate receipt of information on conflicts between Project workers and local residents and timely response to such incidents.

Potential spread of infection diseases

- Development and implementation of the Personnel Code of Conduct (see above);
- Development and implementation of Accommodation Camp Management Plan. The accommodation camp will have the check-in/check-out system implemented to prevent of non-workers trespassing and loitering, thus limiting interactions of the workers with local residents. The camp will be self-sufficient (see Section 10.3 for details);
- Training courses will be provided to raise personnel awareness on the risk of sexually transmitted diseases (particularly HIV/AIDS), tuberculosis, and on availability of confidential consultation services at the medical center(s) – particularly when an infection is suspected;
- Information on the specific healthcare clinics providing sexual health testing will be communicated to workers;
- Condoms will be available to the workforce on open access at the on-site medical clinic where any worker may take it anonymously.

10.10.1.3 Residual Impact

After implementing the described above mitigation measures, significance of the residual impacts is assessed as follows:

- The risk of potentially increased load on healthcare infrastructure is assessed as follows: intensity – low; probability – not significant; overall risk of the impact – insignificant;
- The risk of potential inflation (growth of prices for vital goods and services) is assessed as follows: intensity – not significant; probability – not significant; overall risk of the impact – insignificant;
- The risk of potential conflicts between the Project workforce and local communities is assessed as follows: intensity – low; probability – low; overall risk of the impact – minor;
- The risk of potential spread of infection diseases is assessed as follows: intensity – low; probability – low; overall risk of the impact – minor.

10.11 Impact Associated with Involvement of Security Personnel

This section provides assessment of potential impacts associated with behaviour of the Project security personnel. Since these impacts will be similar at the Project construction and operation stages (despite differences between the stages – in particular, related to different numbers of engaged workers), their assessment is combined.

10.11.1 Construction and Operation

10.11.1.1 Description of impact

The Project will engage security personnel to safeguard its permanent and temporary sites throughout the Project lifecycle. Security personnel will be engaged to ensure safety of personnel and industrial facilities, as well as of local communities (which may be exposed to risks in case of unauthorized access to dangerous industrial sites). The security services will be performed by the Company's workers. It is expected that security personnel will not use fire arms.

Safety impacts and conflicts might occur in case of abuse of authority by security personnel, especially when responsibilities of the security personnel are not clearly defined. The impacts may be caused by inadequate behaviour of security personnel, e.g. inappropriate use of force or offensive language in relation to workers or locals. However, the potential risk will be reduced due to engagement of companies specialized in provision of security services with trained workers and established audit systems.

The potential impact will be local and long-term; its magnitude is assessed as minor or moderate. Receptors of this potential impact are local agricultural workers (and their families), as well as personnel of the Company and contractors. Receptor sensitivity for this impact is considered moderate. Therefore, the potential impact associated with behaviour of the Project security personnel is assessed as low / moderate.

10.11.1.2 Mitigation measures

The key measures to mitigate the named above impact are listed below:

- Measures to prevent unauthorized access to the areas of construction and operation sites (fences, entrance check points, etc.);
- Development of a Security Policy (based on existing procedures of the Company) to describe the key principles of security service operation and behaviour of security personnel;
- Development of job descriptions for security personnel;
- Provision of training for security personnel on compliance with applicable requirements;
- Functioning grievance mechanism may also facilitate receipt of information and complaints regarding behaviour of the security personnel.

10.11.1.3 Residual Impact

After implementation of the above measures, residual impact is assessed as low.

10.12 Impacts Associated with Land Acquisition and Land Use

This section considers potential impacts of the Project construction and operation on land use. Description of the baseline land use characteristics of the Project area is provided in Chapter 8 (Section 8.8).

This section is structured in a way to assesses land acquisition impacts associated with development of:

- Cement Plant and limestone mining area;
- Access road to the Project site and accommodation camp;
- The 10 kV overhead power line, high pressure above-ground gas pipeline and twin 110 kV overhead power transmission line.

Relevant impacts associated with health and safety of local land users are considered in Section 10.5, with Project's traffic movements – in Section 10.6.

10.12.1 Construction

10.12.1.1 Description of impact

Land acquisition and land use impacts associated with development of the Cement Plant and the limestone mining area

As described in Chapter 8, land acquisition associated with development of the Cement Plant and the limestone mining area has already been performed for the Project. No impacts on private land users were reported.

The area in vicinity of the Cement Plan is used for performing cattle grazing activities by some local organisation (see Section 8.8). However, these activities are illegal. Reportedly, this organisation has land plots where it performs cattle grazing activities on legal basis somewhere closer to Pistalikent. No actions from the Company's side are required for mitigating the potential land use impact.

Additional land plots are still required to locate facilities like the crushing station, conveyor belts and other communication corridors between the quarrying area and the Cement Plant site. However, these objects/ facilities will be located in vicinity of the Project site and their development is unlikely to affect the land use practices of local organisations and residents.

The potential impact is assessed as **not significant**.

Land acquisition and land use impacts associated with construction of the access motor road and accommodation camp

The land plot for construction of the accommodation camp has already been acquired (see Chapter 8).

As described in Chapter 8, in April 2019 the Company also acquired the area (fish farming pond) from the local farm Polovkhon Tura. The area covered 6 ha and included fish farming pond, which was not used for fish farming purposes at the time of its acquisition. The Company acquired this area through amicable settlement – “willing seller and willing buyer” – with provision of adequate compensation in accordance with local standards (126.6 million Som or 13 thou Euro). An independent company was engaged for valuation of the area and for the loss calculation. The settlement was negotiated by hokimiyat of Zafarobod district. The land acquisition process is considered compliant with the IFC requirements. No additional measures are required to be implemented from the Company’s side.

The land plots for construction of the access motor road (4.6 ha) has also already been allocated, excluding the access way from this road to the accommodation camp. The access road crosses areas allocated to the local agricultural organisations Zafaragro Keladjak and Ismail Anora which perform livestock farming activities (see Figure 8.11). This may impact agricultural activities of these organisations related to limiting access to the crossed parts of the agricultural fields, etc. The magnitude of the potential impact is considered moderate. Sensitivity of the local agricultural organisations is considered high given the support provided by the government to the Project and potentially limited capacities of the local land users to advocate their interests. Therefore, the impact significance is assessed as **high**.

Land acquisition and land use impacts associated with construction of the 10 kV overhead power line, high pressure above-ground gas pipeline and twin 110 kV overhead power transmission line

Land acquisition for the 10 kV overhead power line, high pressure above-ground gas pipeline and twin 110 kV overhead power transmission line is performed by the government agency/ contractors engaged by this agency. No information on land acquisition associated with development of the named Project associated facilities was available during preparation of this report.

As described in Chapter 8, the overhead 10 kV power line will lie from the Plant along the existing rail road and main watercourse of the A.A. Sarkisov Yuzhno-Golodnostepskiy Canal for approximately 6 km (see Figure 8.2). According to information available, there are no private land users along the power line route. However, there is no information whether the power line will cross any local households near the point of its connection to the existing transmission line. It is not anticipated that construction of the power line will require performing resettlement activities. However, issues associated with economic displacement/ livelihood impacts might be anticipated.

Major parts of the twin 110 kV overhead power transmission line and of the above-ground gas pipeline will lie at the territory of Sharof-Rashidov district; certain part of Gallaorol district will also be affected (Figures 8.2 and 8.3). The territory along the named linear objects is largely rural and is used for agricultural purposes. Residential areas will be also crossed by these Project-associated facilities. Therefore, potential impacts associated with resettlement and economic displacement might be anticipated. However, it is presumed that the power transmission line will be laid along the existing power lines where possible.

The magnitude of the considered impacts is assessed as major given the big number of the affected agricultural land plots and (potentially) households. Sensitivity of the receptor (local residents and agricultural organisations) is considered high due to the support provided by the government to the

Project and potentially limited capacities of the local land users and residents to advocate their interests. Therefore, significance of the considered impacts is high.

10.12.1.2 Mitigation measures

The following measures are envisaged to mitigate all the described above impacts on land use:

- Prepare a land acquisition audit report with respect to performed activities to assess whether there are legacy issues from the government-led process. This document will:
  - Clarify the number of affected land users and households by each associated facility, the status of acquired land plots, etc. (in collaboration with land bureaus, Investment Department and International Trade of Jizzakh Region or other relevant bodies);
  - Clarify whether any resettlement activities are anticipated;
  - Seek to clarify the land acquisition activities performed by the government agency, including relevant compensations provided;
  - Define engagement activities with the affected land users and residents;
  - Define entitlement framework;
  - Regulate provision of compensation payments and performing livelihood restoration activities as appropriate;
  - Establish grievance mechanism;
- Specific measures for the access motor road:
  - Consider establishment of road signs warning on cattle crossing the road;
  - Consult local agricultural organisations / local authorities to identify availability of specific herding routes to arrange adequate crossing points where herders and their cattle can safely cross the access road (if required).

Appropriateness of these measures is to be defined based on discussions with the land users and authorities.

10.12.1.3 Residual Impact

After implementation of the described above mitigation measures, significance of residual impacts is assessed as follows:

- Land use impacts associated with construction of the Cement Plant limestone mining area – not significant;
- Land use impacts associated with construction of the access road and accommodation camp – low;
- Land use impacts associated with construction of the 10 kV overhead power line, high pressure above-ground gas pipeline and twin 110 kV overhead power transmission line – low / moderate.

10.12.2 Operation

10.12.2.1 Description of impact

Land acquisition and land use impacts associated with operation of the Cement Plant and the limestone mining area

Most of the land acquisition activities related to development of the Cement Plant and the limestone area are to be performed during the Project construction stage.

During the Project operation, the Sanitary Protection Zone of the Cement Plant and of the limestone mining quarry will be 500 m (see Chapter 9 for more detail). Several fish farming ponds will fall within the SPZ boundaries of the Plant (in particular, those operated by Chimkurgon Sara Gelos, Mir Asrar Babo and Beliy Amur). However, according to the Uzbek requirements, this will not pose any constraints on performing of these activities[185].

During development of the Project and expansion of the quarry within the limestone mining area, there is a risk that areas used by local organisations and individuals for performing livestock farming activities on the opposite side of Balykly-Tau Ridge (Karatepa side) will also fall within the SPZ area of the limestone

[185] According to SanPiN #0350-17 "Sanitary Norms and Rules on Air Protection of Residential Areas of the Republic of Uzbekistan".

mining quarry. However, this will also not pose any constraints on such activities as per the Uzbek requirements. Potentially, expansion of the Project quarry within the limestone mining area may lead to acquisition of land used by local land users for cattle grazing activities. Chapter 8 shows that such activities are performed at the bottom of the ridge. The potential impact magnitude is assessed as minor as only limited areas used for cattle grazing might be acquired. Sensitivity of the receptor (local residents and agricultural organisations) is considered high due to the support provided by the government to the Project and potentially limited capacities of the local land users and residents to advocate their interests. The impact significance is considered moderate.

Land acquisition and land use impacts associated with operation of the access motor road and accommodation camp

The land use impacts associated with the access motor road and accommodation camp during Project construction will be similar to the described above for the construction.

Land acquisition and land use impacts associated with operation of the 10 kV overhead power line, high pressure above-ground gas pipeline and twin 110 kV overhead power transmission line

It is presumed that most of the required land plots will be acquired during Project construction stage. However, during Project operation easements might be also established on certain land plots used by local organisations or residents, posing relevant constraints on land use. It is expected that the affected local organisations or residents will also receive regular payments to be defined by the easement agreements.

The magnitude of the considered impacts is preliminarily assessed as minor but may be confirmed when more information on the land acquisition activities will be available. Sensitivity of the receptor (local residents and agricultural organisations) is considered high due to the support provided by the government to the Project and potentially limited capacities of the local land users and residents to advocate their interests. Therefore, significance of the considered impacts is moderate.

10.12.2.2 Mitigation measures

The mitigation measures will be similar to the described above for the construction stage.

10.12.2.3 Residual Impact

The significance of residual impacts is assessed as follows:

- Land use impacts associated with construction of the Cement Plant limestone mining area – low;
- Land use impacts associated with construction of the access road and accommodation camp – low;
- Land use impacts associated with construction of the 10 kV overhead power line, high pressure above-ground gas pipeline and twin 110 kV overhead power transmission line – not significant / low.

10.13 Impact on Cultural Heritage

This section provides assessment of the Project impacts on tangible and intangible cultural heritage. As these impacts will be similar during construction and operation stages, they are considered together. Separate assessment is provided for tangible and intangible cultural heritage.

10.13.1 Construction and Operation

10.13.1.1 Description of impact

The Project site will be developed in a greenfield area. By the moment of this report preparation, no cultural heritage sites were identified within the Project area of influence according to information available. No archaeological or cultural heritage surveys were performed at the Project site. The district and local administrations reported no cultural heritage site at the Project area. However, since certain cultural heritage sites have been identified in Jizzakh region, there is still certain probability that such sites might be identified during Project construction and operation.

Cultural heritage sites might be also found during construction of the Project associated facilities, namely the high pressure above-ground gas pipeline, the access motor road and the two power lines (though it is anticipated that the twin 110 kV overhead power transmission line will be at least partly laid along the existing power line routes). According to Chapter 8, certain cultural heritage sites are located close to the twin 110 kV overhead power transmission line.

A local cemetery is located near Balykly. However, it is unlikely to be disturbed by the Project workers given its distant location (2.6 km from the mining area and over 5 km from the Cement Plant and workers accommodation camp).

The magnitude of the potential impact on tangible cultural heritage is assessed as low. The sensitivity of the receptor (population of the Project social area of influence, scientific community) is moderate. Therefore, the impact significance is assessed as low / moderate.

No specific forms of intangible cultural heritage were identified within the Project social area of influence. The Project will not use the cultural heritage (including knowledge or practices of local communities) for commercial purposes, and will not have any significant impact on intangible cultural heritage. The impact is assessed as not significant.

10.13.1.2 Mitigation measures

The Company will develop and implement a Chance Finds Procedure to be applied at all excavation sites. It is designed to ensure safety of any cultural heritage sites which have not been identified before. All contractors and subcontractors will be obliged to follow the procedure while performing earthworks (the appropriate provision shall be incorporated into contract agreements). All the workers performing earthworks will have to undergo induction training on cultural heritage issues. The Company will also make reasonable effort to make organisations constructing associated facilities knowledgeable of the Chance Finds Procedure – in particular, by providing the document describing the procedure and relevant brochures to these organisations.

The Procedure will include the following provisions:

- Definition of objects which may be considered of cultural value, based on the available findings in Jizzakh region (the Procedure should also include photos of relevant cultural heritage objects);
- Description of the course of actions in case such objects are identified:
    - suspension of works;
    - signage and security arrangements;
    - notification (within the Company organisational structure and externally – notification of competent authorities);
    - verification of the potential cultural heritage objects by experts;
    - determination of “red light” (works are stopped until the find is recovered) or “green light” (works can be resumed after survey) for any activities.

The Procedure shall clearly identify telephone numbers and persons to be notified in case of a chance find.

The workers Code of Conduct will regulate workers’ behaviour outside the Project site. This document will also cover issues regarding workers’ respect to cultural heritage of the local population (including cemeteries).

10.13.1.3 Residual Impact

After implementing of the above mitigation measures, significance of the residual impact on cultural heritage is assessed as not significant.

11. DECOMMISSIONING AND CLOSURE

11.1 General Information

Estimated design service life of the main units of the high-quality cement plants is as long as 30-50 years depending on conclusions of technical inspection. After the above period, the main units of the plant must be upgraded/re-equipped. It is planned that the plant will remain operational throughout the period of commercial production of limestone deposits.

East Chimkurgon Sector of Kuterminskoye Limestone Deposits reserves are more than 130 million tons of cement raw limestone. The updated limestone reserves of the Sector have been assessed to be equal to 206 million cubic meters. The rate of limestone extraction is not specified in the available Company documents, but the minimum lifecycle demand of the Project is set equal to 200 Mt of limestone. Depending on market conditions, Huaxin cement Jizzakh will be able to expand the capacity of both quarrying and plant operations in the future.

According to the G5-Category License No. GZ-0031 the claims area of the East Chimkurgon Sector occupies 440 ha, with 82, 8 and 10 per cent of this space being situated within the boundaries of Sharof Rashidov, Forish and Zafarobod Districts of the Jizzakh Region, respectively. The license has been issued on Dec. 06th, 2018 for 2 years of exploration works and must be then prolonged or replaced by a mining license.

The life cycle of the Project and associated facilities will be defined by a combination of external and internal factors including industrial and associated development in the area of the Project location, economic environment, socio-economic and environmental conditions, etc. Estimation of the time of decommissioning of specific elements of the Project and associated facilities is not possible at this stage.

Determination of significance of potential environmental and social impacts of the Project decommissioning and disposal is not possible at this stage. However, it is expected that the impacts will be minimized and mitigated to an acceptable level by application of good national and international industry practice.

11.2 Good International Industry Practice for Decommissioning

Examples of Good International Industry Practice (GIIP) are provided in the IFC Environmental, Health and Social (EHS) Guidelines. In accordance with the general principles of operation and closing down (preservation) of project facilities, project-specific Risk Management Procedures should be in place, to protect community against physical, chemical and other risks associated with decommissioning.

In accordance with the industry EHS Guidelines for Construction Materials Extraction (April 30, 2007), extraction site reclamation and closure activities should be considered as early in the planning and design stages as possible. Sponsors should prepare a reclamation and closure plan that considers factors such as production phasing and overall site life, but all sites will need to engage in some form of progressive restoration during operations. While plans may be modified, as necessary, during the construction and operational phases, plans should include contingencies for temporary suspension of activities and permanent early closure and meet the objectives mentioned below.

Physical integrity. All structures should remain stable such that they do not impose a hazard to public health and safety as a result of physical failure or physical deterioration. The structures should continue to perform the function for which they were designed. They should not erode or move from their intended location under extreme events or perpetual disruptive forces.

Physical hazards such as unguarded roads, quarries, and other openings should be effectively and permanently blocked from all access to the public until such time that the site can be converted into a new beneficial land use based on changed conditions at the site, as well as alternative uses by local communities or other industries for roads, buildings and other structures.

Chemical integrity. Surface water and groundwater should be protected against adverse environmental impacts resulting from excavation and processing activities. Leaching of chemicals into the environment should not endanger public health or safety or exceed water quality objectives in downstream surface water and groundwater systems.

Ecological habitat integrity. While ecological habitat integrity is partially determined by the above factors (e.g., physical issues such as slope stability) and chemical issues (such as metal contaminants), it is also addressed with consideration towards translocation of habitat that is beneficial for future ecological use (if any).

Vegetation translocation and relocation techniques should be used as necessary. Topsoil, overburden, or soils feasible for sustaining growth should be removed in separate operations and segregated for later use during site reinstatement, and materials to be used for site reinstatement should be stockpiled and protected from wind and water erosion, as well as from contamination.

Affected land should be rehabilitated to acceptable uses consistent with local or regional landuse plans. Land that is not restored for a specific community use should be seeded and revegetated with native species.

Test pits, interim roads (internal and access), buildings, installations, and structures of no beneficial use should be removed, and the land should be appropriately rehabilitated. Hydrological systems should be restored to predevelopment runoff rate.

According to the IFC EHS Guidelines for Mining Industry (December 10, 2007), a Mine Closure Plan incorporating both physical rehabilitation and socio-economic considerations should be an integral part of the project life cycle and should be designed so that:

- Future public health and safety are not compromised;
- The after-use of the site is beneficial and sustainable to the affected communities in the long term;
- Adverse socio-economic impacts are minimized, and socio-economic benefits are maximized.

The Mine Reclamation and Closure Plan should address beneficial future land use (this should be determined using a multi-stakeholder process that includes regulatory agencies, local communities, traditional land users, adjacent leaseholders, civil society and other impacted parties), be previously approved by the relevant national authorities, and be the result of consultation and dialogue with local communities and their government representatives.

The closure plan should be regularly updated and refined to reflect changes in mine development and operational planning, as well as the environmental and social conditions and circumstances. Records of the mine works should also be maintained as part of the post-closure plan.

Closure and post closure plans should include appropriate aftercare and continued monitoring of the site, pollutant emissions, and related potential impacts. The duration of post-closure monitoring should be defined on a risk basis; however, site conditions typically require a minimum period of five years after closure or longer.

The timing for finalization of the Plan is site specific and depends on many factors, such as potential mine life, however all sites need to engage in some form of progressive restoration during operations. While plans may be modified, as necessary, during the construction and operational phases, plans should include contingencies for temporary suspension of activities and permanent early closure and meet the following objectives for financial feasibility and physical / chemical / ecological integrity.

The costs associated with mine closure and post-closure activities, including post-closure care, should be included in business feasibility analyses during the planning and design stages. Minimum considerations should include the availability of all necessary funds, by appropriate financial instruments, to cover the cost of closure at any stage in the mine life, including provision for early, or temporary closure[186].

[186] IFC EHS Mining, December 2007

11.3 General Approach and Requirements for Decommissioning in Accordance with National Regulations

At the end of mineral extraction activities, subsoil user shall dispose of or preserve all subsoil use facilities that were previously used for mining operations, except for those process units (blocks, panels, headings) that are intended for further subsoil use activities, in accordance with the design documents and works programme. Subsoil use facilities' disposal or preservation procedures are established by the applicable national law.

The Uzbek legislation does not require the preparation of a design for conservation or for the dismantling of capital facilities at the time of the project design development or at the primary construction phase of a project. A separate design should be developed at an undefined point in the future and include appropriate preliminary engineering environmental surveys. The closure design is subject to governmental expert review. One of the information sources for the engineering environmental survey for the decommissioning phase of the Project will be the results of the operational environmental monitoring conducted throughout the entire operations phase of the Project. In conformity with the requirements of the applicable construction rules, the environmental survey program for the Project closure phase should include, amongst other requirements, an assessment of changes in the natural and technogenic environment during the operations phase of the Project (including changes caused by the Project impact), an assessment of the consequences of environmental impacts and their effect on the public health, an assessment of the contamination indicators of used or removed soils, recommendations relating to the dismantling (demolition) methods to be used in the process of the closure procedure, as well as proposals for rehabilitation of the natural environment.

In connection with the gradual commissioning of the Huaxin Cement facilities and due to differences in the lifecycle of various project facilities, their decommissioning and closure will also require a phased approach over a period of time: from a few years to few decades. The requirements to the design development for the Huaxin Cement decommissioning cannot be fully defined currently for the following reasons:

- Changes in the existing relevant regulatory and legal framework by the time of the decommissioning and closure of the Project facilities;
- Changes in the Project during its planned lifecycle and its condition at the time of the closure; and
- Development of new technologies and methods for conservation and closure of facilities, which would be available at the time of the closure, including also the experience gained at similar facilities elsewhere.

The actual conservation and closure procedures for the Huaxin Cement facilities can be determined and implemented in the form of an overall plan developed with due consideration of the applicable requirements of the federal legislation of the Republic of Uzbekistan and the legislation of the member territory, as well as the most efficient and safe international industrial practices. The latter is represented currently by the IFC's Performance Standards. According to their basic principles, the decommissioning and closure process will comprise the following stages:

- Safe shutdown of the production / technologic processes on a step-by-step basis;
- Removal of liquid and solid products/wastes for their treatment and disposal; in case of pipelines, reservoirs and process vessels, they should be washed and cleaned to remove residual petroleum products and other industrial liquids and wastes;
- Assessment of potential use of the empty and cleaned vessels, structures and equipment to take the best possible decisions optimal from the environmental, social and economic viewpoints in conformity with the appropriate international industrial practices;
- Dismantling and removal of decommissioned aboveground and underground vessels and process pipework;
- Conservation and abandonment of boreholes using the best available international practices; and

- Additional research is to be conducted to assess the degree of the environment pollution caused by the Project operations and development of a plan for reinstatement of the original conditions in conformity with the appropriate international industrial practices.

According to current Uzbek legislation, the main part of the work associated with demolition (dismantling) of buildings and facilities with subsequent technical reclamation of the affected area can be classified as construction activities and in this context it is not different from any other construction operation with regard to the environmental protection measures to be taken. The general regulatory requirements to the design development for demolition (dismantling) of capital facilities, except for the linear facilities, should contain the following information:

a) Substantiation of the need for development of a design for organization of work for demolition or dismantling of capital buildings, structures and facilities;
b) List of capital buildings, structures and facilities subject to demolition (dismantling);
c) List of measures aimed at decommissioning of capital buildings, structures and facilities;
d) List of measures preventing entrance of people and animals to the capital buildings, structures and facilities subject to demolition (dismantling) and protecting the existing vegetation;
e) Description and justification of the adopted demolition (dismantling) methods;
f) Calculation and justification of the dimensions of the zone affected by demolition and hazardous zones depending on the adopted demolition (dismantling) method;
g) Assessment of the probability of damage inflicted to engineering infrastructure facilities, including operating underground engineering networks, in the process of demolition (dismantling);
h) Description and justification of measures and devices to be used for protection of engineering networks agreed upon with the network owners;
i) Description and justification of solutions proposed for safe execution of demolition (dismantling) operations;
j) List of measures aimed at ensuring the safety of the local communities, including their warning and evacuation (if required);
k) Description of solutions relating to waste removal and disposal;
l) List of measures aimed at land reclamation and site improvement (if required);
m) Information relating to networks, structures and facilities remaining after demolition (dismantling) underground and in water bodies; information relating to existing permits issued by the relevant supervisory agencies for preservation of such networks, structures and facilities installed underground and in water bodies, if such permits are required by the Uzbek legislation;
n) Information relating to approvals issued by the relevant supervisory agencies for the technical solutions adopted for demolition (dismantling) of a facility by blasting, burning or any other potentially hazardous method, as well as a list of additional safety measures when using potentially hazardous demolition methods.
In addition, the graphical part of the project design documentation for demolition (dismantling) of capital facilities should be prepared including the following components:
o) Schematic layout of the site and adjacent areas with indication of the facility to be demolished, associated engineering network, hazardous zones in the process of demolition, areas to be used for short-term storage of dismantled materials, structures, parts and equipment;
p) Drawings of protective devices of the engineering infrastructure facilities and underground networks; and
q) Process flow diagrams indicating the sequence of operations for demolition (dismantling) of civil engineering structures and equipment.

Currently, the highest level of uncertainty in connection with the future closure of the Huaxin Cement Project is associated with the technical solutions to be used for waste management: the landfill to be constructed for domestic and industrial solid waste disposal has a lifecycle duration of 30-50 years, which is shorter than the design life of the gas processing plant. This means that the significant volumes of wastes generated in the process of the demolition (dismantling) of the buildings and facilities may have to be transported to other waste disposal facilities located at a distance from the construction zone. An alternative could be construction of a new landfill in the direct vicinity of the site.

Taking into account the abovementioned uncertainties, it is not possible at this stage of the Project implementation to determine potential environmental and social impacts associated with the decommissioning and closure of the Project facilities with any certainty. Nevertheless, the application of the best available international practices should ensure minimization and reduction of such impacts to acceptable levels.

Preparation of Abandonment Plan should be based on the following basic principles for determination of liquidation objectives:

1) Physical integrity - Any object in a subsoil area which is left in place after decommissioning shall be abandoned in a physically stable state. Decommissioning is deemed to be successfully completed if all physical structures are abandoned in a condition which does not pose risks to community health and safety, wildlife, aquatic flora and fauna, or general environment;

2) Chemical integrity - Any object in a subsoil area which is left in place after decommissioning shall be abandoned in a chemically stable state, i.e. no chemicals emitted by such elements pose any risks to life and health of local communities, wildlife and the environment, and are not capable of causing harm to quality of water, soil and air in a long term;

3) Long-term passive maintenance - Any object in a subsoil area which is left in place after decommissioning shall be abandoned in a state that does not require any active maintenance in a long term;

4) Land use principle - All land affected by subsoil use activities and subject to abandonment shall be brought to a condition compatible with other surrounding land areas, water bodies, including natural biophysical conditions, landscape features, potential land use, habitats, sites of probable special environmental, scientific, cultural and recreational value, aesthetic aspects, etc.

It is preferable to provide progressive liquidation of subsoil use consequences and reclamation of land, and/or decommission any structures and production facilities which will no longer be used for the subsoil use operations.

The progressive liquidation approach yields the following benefits:

- Reduced scope and cost of final disposal activities, and hence smaller amount of provisions to be made for the purpose;
- Understanding performance of certain liquidation activities which may be used at the stage of final disposal;
- Better environmental situation, due to shorter period of harmful impacts on the environment.

Two or more implementation alternatives should be considered at the stage of determination of liquidation objectives. Stakeholder opinions should be duly considered and documented in a protocol of hearings or work group meetings, and/or letter in relation to specific subsoil area.

11.4 Closing Down Strategy

A tentative strategy of the land reclamation works for the Project facilities in general proposed by the Consultant is summarized in Table 11.1.

Table 11.1: Tentative Closing Down Strategy of the Project Facilities

Project facilities	Reclamation activities
Quarry	Decontamination/decommissioning and removal of machinery/mobile equipment
	Grade and re-contour
	Surface binding and re-vegetation
Waste Rock Dumps	Stability inspection / geotechnical studies
	Grade and re-contour
	Cover placement
	Re-vegetation

Project facilities	Reclamation activities
Above-ground buildings and infrastructure	Decontamination/ decommissioning and removal of machinery/mobile equipment
	Decontamination/ decommissioning and demolition of buildings
	Decontamination/decommissioning and remove of tanks and distribution systems (fuel, chemicals and reagents)
	Break-up of foundations
	Grade and re-contour
	Cover placement
	Re-vegetation
Site roads	Grade and re-contouring
	Re-vegetation
Waste management	Non-hazardous wastes will be removed to landfills for storage and disposal
	Whenever possible, recyclable materials (such as steel, copper, etc.) will be recovered and reused as scrap material
	Slab debris and demolition waste will be removed for disposal final disposal at the pit
	Any contaminated materials and hazardous waste will be removed for final disposal, at a licensed facility
Contaminated soil and ground	Conduct soil sampling in areas of possible/suspected contamination
	Excavate and treat contaminated soil to applicable standards

Reclamation of the quarry mining area

The following activities are recommended at the stage of technical reclamation and liquidation of the facilities:

- Stripping of topsoil, stockpiling and storage of topsoil and potentially rich soil throughout the period of quarry mining activities;
- Removal of litter from the area;
- Re-contouring of quarry slopes;
- Covering prepared surfaces with topsoil;
- Grading and packing of topsoil.

To prevent development of erosion processes, graded surface should be flat, with a slight slope of 1–2º to enable draining of excess precipitation water. The moisture accumulation activities which are also planned for implementation during the technical reclamation period are well harmonized with the erosion prevention measures (against wind and water erosion). For instance, restraining water flows on slopes will support water absorption in soil for subsequent use by plants. At the same time, development of streams and surface scouring with water will be prevented.

Surface grading is conducted in two steps during the quarry reclamation activities - before and after application of reclamation topsoil layer. Topsoil is evenly spread on pre-graded ground surface. Variations of thickness of the topsoil layer are dictated by the requirement to maintain adequate surface slope after reclamation. Final grading of topsoil is intended to adjust microrelief to produce a smooth surface.

The above activities are followed by biological reclamation, after which the areas are fully fit for use as pasture land.

Huaxin Cement approach for limestone quarrying reclamation

Huaxin Cement approach to decommissioning and closing-down should be based on the most efficient and safest international industry practice. Whenever possible, the Company should provide for progressive reclamation as structures and facilities are decommissioned throughout the Project period. This way, environmental impacts are mitigated, and scope and cost of works at the stage of final closing-down of the Project is reduced. In addition to the post-closure reclamation activities, the Company applies additional rehabilitation efforts to restore biodiversity in the affected areas also during the Project operation phase.

Rehabilitation work will be undertaken progressively as soon as reshaped, benched and topsoiled areas become available. With the completion of quarrying, the benches within the pit will remain. They will be spread with top dressing material and native vegetation species will be sown directly in these areas. The main aim will be to ensure that the pit is left geotechnically stable.

12. TRANSBOUNDARY IMPACTS

12.1 Transboundary Impact Criteria

In accordance with IFC Guidance Note 1[187], transboundary impacts are impacts that extend to multiple counties, beyond the host country of the project, but are not global in nature.

In the Convention on Environmental Impact Assessment in a Transboundary Context (Espoo, 2001[188]), the notion of "transboundary impact" is defined as any impact, not exclusively of a global nature, within an area under the jurisdiction of a Party caused by a proposed activity the physical origin of which is situated wholly or in part within the area under the jurisdiction of another Party.

In accordance with the ESIA methodology adopted by Ramboll (Chapter 3), transboundary impact is an impact that affects receptors, beyond the boundaries of the country in which the project is located and produces transboundary effects, including global effects.

Location of the Project site in relation to the national frontiers of the Republic Uzbekistan is shown in Figure 1.1. The nearest frontiers of other countries are located at a distance of around 60 km (Kazakhstan to the north-east) and around 70 km (Tajikistan to the south and the east-south-east).

12.2 Potential Transboundary Impacts

Considering the Project location, scale and nature of impacts, the potential for transboundary impacts from the Project can be assessed and summarized as follows:

- All the Project activities will be entirely located within the Republic of Uzbekistan and the key potential impacts will be of local scale (Section 7.1).
- It is anticipated that the Project's input to background sulphur dioxide concentrations from fuel (gas and coal) combustion during operation of the Project will have insignificant region-scale and vanishingly small, in terms of transboundary transfer, implications;
- The technology used allows for relatively low nitrogen compounds. The impact on air is described in Section 9.1. Due to the Project location, no noticeable contribution of Project emissions that would transfer across the state border is expected.
- Project waste will be either handled on site (such as overburden rocks) or landfilled (see also Section 9.7). All Project infrastructure is located in the territory of the Republic of Uzbekistan (licensed contractors will be only employed).
- Water for construction and operation will be supplied from the A.A. Sarkisov Yuzhno-Golodnostepsky Canal which receives water from the Syr Darya. The Syr Darya is considered the transboundary river as the river basin is divided among Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan. The impact form the Project is assessed as low, short-term and local (less than 1 % from the canal flow) (Section 9.4), which is negligible in terms of transboundary context.

Transboundary impacts are therefore not anticipated. However, it should be noted that GHG emissions through the lifecycle of the Project will contribute to the global problem of climate change. This issue is addressed in Section 9.9.

[187] International Finance Corporation's Guidance Notes: Performance Standards on Environmental and Social Sustainability, 2012
[188] The document was signed by the Russian Federation on 06.07.1991 and took effect on 10.09.1997.

13. CUMULATIVE IMPACTS

13.1 Introduction

This Chapter presents a cumulative impact assessment (CIA) on the natural and social environment associated with the existing or planned activities, taking into account also other types of commercial activities carried out within the subject area and in adjacent territories. The approach to assessment of cumulative impacts is provided in Section 3.7.

The following program documents relating to development of the subject area have been examined as part of the cumulative impact assessment:

- Concept of the Republic of Uzbekistan Development Strategy until 2035 “Strategy further development of the Republic of Uzbekistan", including the Action Plan on five priority areas for the development of the Republic of Uzbekistan in 2017-2021;
- Republic of Uzbekistan Innovation Development Strategy for the period 2019-2021 (Uzbekistan President Decree of 21.09.2018 No. UP-5544);
- Republic of Uzbekistan President Decree of 17.01.2018 No. PP-3479 “On measures on constant supply of the country’s industries by highly demanded types of products and raw materials;
- Republic of Uzbekistan President Decree of 03.04.2019 No. PP-4265 “On measures for further reforming and increasing of investment opportunities of the chemical industry” (incl. Development program of the chemical industry for the period 2019 — 2030);
- Republic of Uzbekistan President Decree of 07.02.2019 No. PP-4165 “On approval of the strategy for nuclear power development in the Republic of Uzbekistan for the period 2019-2029”;
- Republic of Uzbekistan President Decree of 23.08.2017 No. PP-3236 “On measures for further development of the silk industry in the Republic”;
- Republic of Uzbekistan President Decree of 02.05.2017 No. PP-2947 “On action plan for further development of hydropower for the period 2017 — 2021”;
- Republic of Uzbekistan President Decree of 28.09.2016 No. PP-2614 “On measures for increasing production of export-oriented finished products based on raw hydrocarbons deep conversion for the period 2016 — 2020”;
- Republic of Uzbekistan President Decree of 13.06.2017 No. PP-3054 “On program of further development and modernization of coal mining industry for the period 2017 – 2021”;
- Republic of Uzbekistan President Decree of 27.11.2017 No. PP-3405 “On state program of irrigation development and land-improvement for the period 2018-2019”;
- Republic of Uzbekistan President Decree of 21.12 2016 No. PP-2687 “On action plan for further development of cotton and textile clothing industry for the period 2017-2019”;
- Draft of the concept for development of cotton and textile clothing industry for the period 2020-2024[189];
- Republic of Uzbekistan President Decree of 01.06.2017 No. PP-3028 “On measures for further management improvement and accelerated development of the automobile industry for the period 2017-2021”;

[189] https://regulation2018.gov.uz/ru/document/1982

- Republic of Uzbekistan President Decree of 05.03.2016 No. PP-2505 “On measures for further development of raw materials base, intensification of processing of fruits and vegetables and meat and dairy products, increase of production and export of food products in the period 2016-2020”;
- Republic of Uzbekistan President Decree of 19.07.2018 No. PP-3874 “ On additional measures to facilitate investment and infrastructure projects in the period 2018-2019”;
- Republic of Uzbekistan Cabinet of Ministers Decree of 18.03.2019 No. 230 “On further measures for development of cotton and textile clotting manufactures”;
- Republic of Uzbekistan President Decree of 17.04.2019 No. PP-4291 “On approval of waste management strategy on the Republic of Uzbekistan in the period 2019-2028”;
- Strategy of tourism development in the Republic of Uzbekistan for the period 2019-2025 (Annex 1 to the Republic of Uzbekistan President Decree of 05.01.2019 No. UP-5611);
- Republic of Uzbekistan President Decree of 21.04.2017 No. PP-2916 “On measures for radical improvement and development of the waste management system for the period 2017-2021”;
- Republic of Uzbekistan Cabinet of Ministers Decree of 31.05.2017 No. 223 “On complex measures to accelerate development of production industries, testing of new approaches and methods of stimulation of entrepreneurial activities in the Jizzakh region”
- Republic of Uzbekistan President Decree of 03.01.2019 No. UP-5609 “On development of effective model of the state regulation and integrated development management of the Jizzakh region”;
- Republic of Uzbekistan President Decree of 09.11.2018 No. PP-4009 “On measures to establish an agrocluster in the Jizzakh region”;
- Republic of Uzbekistan Cabinet of Ministers Decree of 05.06.2017 No. 352 “On measures to recover activities and effective use of non-operating and inefficient enterprises in the Jizzakh region”;
- Republic of Uzbekistan President Decree of 04.05.2018 No. PP-3695 “On measures for supply improvement of the Jizzakh region population with quality drinking water”;
- Republic of Uzbekistan Cabinet of Ministers Decree of 23.10.2018 No. 852 “On complex action plan for development of Zafarobod district of the Jizzakh region for the period 2018-2019”.

13.2 Scoping Phase I –VECs, Spatial and Temporal Boundaries

The output of the Phase I and Phase II scoping is summarized in Annex A to this Chapter and is the result of the scoping process described in Section 3.7. Based on the residual significance of the Project impact on VECs (Chapters 9 and 10), probability of cumulative effects, analysis of the impacts generally recognised as important on the basis of scientific concerns and concerns from the affected communities, including results of stakeholder consultations conducted during the site visit, the following VECs have been identified for further CIA analysis:

- Atmospheric air;
- Natural habitats;
- Landscape (visual impacts);
- Community health and safety;
- Local infrastructure.

Spatial boundaries. The cumulative impacts are assessed within the Project area of influence (AoI) described in Sections 7.1 and 10.1.

Temporal boundaries.

In accordance with IFC PS1, the assessment covers the existing, planned, and/or reasonably predictable future projects and developments that are not directly associated with the Project. According to the EC guidance[190], consideration is normally given to the projects expected to be initiated within a period of 5 years from the date of scoping. The 5-year period is adopted as a reasonable starting point for the Project CIA.

13.3 Scoping Phase II Results– Other Activities and Environmental Drivers

This section identifies the former, current operations, as well as clearly described future projects near the Project area. Potential temporal and/or spatial interaction of the Project and the above activities may result in cumulative impacts.

13.3.1 Former and current activities in the Project area

Historically, most part of the region of the Project location (with the only exclusion of steeply graded mountain slopes and peaked summits) was used for sporadic grazing. In 19th century the irrigated farming has been initiated in this area. Since 1950-s the Project's area of influence has become a part of the larger-scale irrigation zone where native soils have been deeply transformed to meet agricultural requirements. Period of intensive irrigation development in this area was completed by 1990 due to basins water reservoir exhaustion and a number of ecological aggravations (especially in the downstream Aral Sea area) followed by secondary soil degradation processes.

The Project site is surrounded by agricultural land use including pastures (sheep, caws), irrigated lands and fish ponds (Chapters 7, 8 and figures below).

Figure 13.1: Pasture land use in surroundings of the Project

[190] Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions, European Commission (EC), 1999

Figure 13.2: The AA Sarkisov Yuzhno-Golodnostepsky Canal from Syr Darya River to Aydar Lake

Figure 13.3: Balykly lake – mud is used for medical and cosmetic purposes

As described in Section 8.8, mud of Balykly lake (located 1.5 km to the north and the northwest from the Project) is used for medical and cosmetic purposes by health centers.

The only industry in the vicinity of the Project is another cement plant (the Jizzakh cement Plant) located around 8 km to the northwest from the Project site (Figures 13.4, 13.5).

Figure 13.4: Jizzakh cement plant

The Jizzakh cement Plant of JSC "Almalyk MMC" on production of white and general-purpose construction portlandcement was constructed in 2014 and then was expanded in 2019. The Plant design capacity white cement was 350 000 tons per year, or on construction portlandcement – 760 000 t/y. Investors plan to increase production capacity up to 1 million tons a year of white cement and 4 million tons a year of portlandcement. The raw materials are supplied from the lime quarries Balykly and Kutarma located 1.5 km to the plant. The open pit is located at the north-eastern edge of the same ridge (named as Balycly-Tau, see Figure 13.5) at a distance of 4.7 km from the Huaxin's claims.

Figure 13.5: Quarries of Jizzakh cement Plant

The industrial railway close to the Project connects the mine Uch-Kulach and the railway Syrdarinskaya -Jizzakh (Figure 13.6). The open-pit lead-zinc-barite mine Uch-Kulach of JSC

"Almalyk MMC" is located far from the Project site (around 40 km to northwest of the Project site). The ore was delivered to Almalyk located 320 km from the pit by a railway. The mine Uch-Kulach together with the settlement of workers Uch-Kulach was constructed in 1979. In the period 1997-2002 the extraction of ore was suspended.

Figure 13.6: The industrial railway adjacent to the Project site connecting Uch-Kulach mine with the railway Syrdarinskaya -Jizzakh

The existing public motor roads (of regional and local importance) surround the Project Site at distances of 2 to 6 km.

13.3.2 Proposed operations

Starting 1 of March 2019, implementation of a pilot project "Innovative Region" development program starts in Jizzakh region, during which large-scale work is planned to improve all spheres of the Jizzakh region with a focus on attracting large investments. The Jizzakh region is planned to be developed into the industrial hub.

A program has developed which intends to implement around 600 investment projects in the region during 2019-2020 accounting for 21 trillion 956 billion soums and creating over 22.3 thousand jobs. These include projects for production of basalt fiber and devices for wind energy in the Forish district, solar panels in the Dustlik district, medicines in the Zaamin district, decorative and thin glass in the city of Jizzakh.

The region has a great potential for creating new and expanding existing production facilities, and also has a sufficient raw material base for organizing industrial production. In particular, there are more than 30 deposits of mineral resources in the region, such as cement raw materials, barite, facing stone, expanded clay, lime, wollastonite, gypsum, tungsten, zinc, lead, etc.

Priority tasks for development of the region includes establishment of an agrocluster in the Jizzakh region[191]. The first stage will be implemented in 2019 in Arnasay and Mirzachul districts, the second stage – in Dustlik and Pakhtakor districts by 2020. The main activities of the cluster are the establishment of cotton processing enterprises, the construction of modern reception centers for cotton and cotton fiber processing stations, and a workshop for the production of fat-and-oil

[191] Republic of Uzbekistan President Decree of 09.11.2018 No. PP-4009 "On measures to establish an agrocluster in the Jizzakh region"

products; development of drip irrigation; production of milk, meat and eggs, and construction of a modern greenhouse complex. The regional development priorities also include further effective use of existing opportunities for the development of livestock, fish farming, beekeeping, poultry farming and sericulture.

In the Jizzakh region there are two free economic zones (FEZ) "Jizzakh" and "Zomin Farm" and small industrial zones, with special tax privileges and preferences for participants. The ongoing projects of the FEZ “Jizzakh” include production of collectors, automobile brakes, polypropylene pipes, video and IP-phones, telecommunication equipment and accessories, LED lamps, household equipment, sewing furniture, heat insulating materials (fiberglass), ceramic tiles, shoes and leather processing, pet foods and etc.

The main projects planned for implementation in the Jizzakh region in the near future are listed in Table 13.1 below.

Table 13.1: The main planned projects/ activities within the Project AoI (Forish, Zafarobod, Sharof-Rashidov and Gallaorol districts of Jizzakh region)

No.	Investment project name and brief description	District	Tentative terms of implementation, potential new jobs
Industry			
1.	Extention of the current cement production in the region: • Increase of production capacity up to 1 million tons a year of white cement and 4 million tons a year of portlandcement at the Jizzakh cement Plant of JSC “Almalyk MMC” due to access to a new limestone quarry at Almaz. The project is implemented by UTD-Holding, the founders of which are two German companies and a private investor.	Forish district	2019-2021, 1500 jobs
	• New cement plant with the capacity of 1.2 million tons of potlandcement based on coal fuel. The project is planned to be located within the area of 70 ha of Egizbulok Village, 5 km to the north-west from Balykly village. The plant will be located at a distance of 1.5 km from the limestone quarry “Kutarma-3”.		No information available
2.	Construction of the Jizzakh oil refinery – production of 3.7 million tons of motor fuel corresponding to the Euro-5 standard, over 700,000 tons of aviation kerosene, as well as liquefied gas, fuel oil, bitumen and other products through the processing of 5 million tons of oil per year. The project will also include construction of oil pipeline from the Uzbek-Kazakh boundary. The implementation of the project is currently suspended due to decision of modernisation of oil refineries in Bukhara and Fergana.	Zafarobod district	2017-2020, around 2000 jobs
3.	Uch-Kulach mining development with production of 500 thousand tons per year of polymetallic ore and increase of	Forish district	2018-2020, around 500 jobs

No.	Investment project name and brief description	District	Tentative terms of implementation, potential new jobs
	zinc production up to 5.2 thousand tons per year with by-product production of lead concentrate and silver.		
4.	Construction of nuclear power plant (NPP) consisting of two VVER-1200 “3+” generation power units with a capacity of 1,200 megawatts each. The priority site is selected close to the Tuzkan lake.	Forish district	2019 – 2022 site selection, 2019 – 2022 design of the plant and external facilities; 2022-2030 construction and commissioning of the plant Creation around 2700 jobs directly related with nuclear power industry including 1900 jobs at NPP
5.	Production of secondary processing of ferrous metallurgy and metal rolling, 157.8 thousand tons (“Triumph eco Recovery”)	Jizzakh city	2018-2020
6.	Manufacturing of wide range of glass products, 16 mln.m2 (mingYuan Silu Industry Co.Ltd”)	Jizzakh city	2018-2019, 400 jobs
7.	“Jizzakh textile” projects (open-end sun yarn, coloring of knitted fabric, etc.)	Jizzakh city	2018-2022, 1000 jobs
8.	Leather production ("Uz turk charm"), 120 mln m2	Jizzakh city	2018-2019,
9.	Construction of solar power plants	Jizzakh region	2019-2021
10.	Production of paints for fabric and metal (JV “Sofitel”), 4.0 thousand tons	Jizzakh city	2019
11.	Production of import-substituting synthetic fabrics (JV “Zamin teks imi”), 5.8 thousand tons	Jizzakh city	2019
12.	Establishment of an industrial park (construction of a technopark and a logistics center).	Jizzakh city	2020-2021
13.	Production of aluminum cans	Jizzakh city	2020-2021
14.	Construction of Chanan Central Asian Industrial Complex.	Jizzakh city	2020-2022
15	Production of finished knitted fabric, Aydarkul Invest Tekstil	Zaforobod region	2019, 200 jobs
Agriculture / food industry			
15.	Development of goat breeding and modern processing of diary milk products (OOO “FARISH AGRO NURAFSHON” and	Forish district	2017-2022, 350 jobs

No.	Investment project name and brief description	District	Tentative terms of implementation, potential new jobs
	OOO “FORISH AFRO VALLLEY”) which include construction of a large farm of 10 ha, 5000 of animal units		
16.	Construction of water reservoir “Karaman” which will allow to irrigate 20 thousand ha of undeveloped lands. New agricultural lands are planned to be cultivated by sugar-beet. There are also plans to construct a new sugar plant there. Processing waste can be used as a forage and facilitate development of livestock farming.	Forish district	Reportedly under construction, but no reliable information on the terms of construction and the site location.
17.	Construction of agro-logistic complex (greenhouses, refrigerators, shock-freezing and calibration) (BMB Logistic, "Silver leafe international”), 10,000 tons, 5 ha.	Sharof-Rashidov district	2019
18.	Processing of fruits and vegetables	Gallaorol district	2019-2020
Irrigation/ land-improvement			
21.	Construction and reconstruction of irrigation canals	Gallaorol, Sharof-Rashidov districts	2018-2019
22.	Creation of field protection forest ranges at the areas of water users’ associations	Sharof-Rashidov, Forish, Zafarobod and Gallaorol districts	54.5 km (2018-2019); 2.5 km (2018); 58.9 (2019); 30 km (2019).
Infrastructure/ utilities			
23	Implementation of the project “Improvement of drinking water supply system in Jizzakh region using water of Zarafshan river”. The project includes construction of water intake facility, WWTP, water distribution facility and water mains.	Jizzakh region	2018-2020
24.	Development of sewage system in Jizzakh city, 30 thousand m3/d	Jizzakh city	2016-2020
25.	Construction of affordable residential buildings (initiator – IC ”Qishloq Qurilish Invest”)	Jizzakh region	2017-2021
26.	Modernization of waste management system in Jizzakh region (development of regional management plan)	Jizzakh region	2020-2022
27.	Construction of solid household waste treatment plant	Jizzakh city	2019-2021
28.	Increase of production potential of OOO “ECO House”:	Jizzakh region	2019

No.	Investment project name and brief description	District	Tentative terms of implementation, potential new jobs
	Construction of 3 facilities for production of PET fiber; compost production; production of biofertilizers;		
29.	Construction of solid household waste to energy incineration facility.	Jizzakh region	2022-2028

13.3.3 Other anthropogenic impacts

Other environmental pressures in the region include agricultural activities (irrigation croplands, cattle and sheep grazing), past soil contamination and unsustainable waste management practices.

Agricultural activities are the main human commercial activities in the studied area and described in detail Chapters 8 and 10. Grazing is noted as one of the major causes of land degradation in Jizzakh Region of Uzbekistan. During the past decades, there has been an extensive reducing of pasture lands due to unsustainable use of pastures for livestock grazing, lack of maintenance of pastures and other human activities. As discussed in Section 7.4 the Project AoI is characterised by soil and land degradation due to a combination of the following processes: salinization and water logging, water and wind erosion, overgrazing, loss of organic matter and soil fertility, loss of biodiversity.

Overall waste management infrastructure in the residential areas and industrial sites of the Jizzakh Region is considered not sufficient for proper management of generated waste. Untimely collection of domestic waste has led to occurrence of unauthorized waste dumps in the cities and rural areas of the Region.

Use of pesticides in Uzbekistan has been significantly decreased for last 10 years (in 4 times), though contamination of soil with pesticides is still an issue in some regions. Intensive use of highly toxic pesticides in Soviet times in agriculture has led to the accumulation of large quantities of banned, obsolete pesticides, including POPs. Therefore, an important issue for Uzbekistan is the problem of environmental pollution by persistent organic pollution.

According to the national report "On environmental conditions and use of natural resources in the Republic of Uzbekistan" (2008-2011)[192] the most contaminated areas are former aerodromes of farming aviation. The total quantity is more than 460, predominantly with contamination of chlorine-organic pesticides. Farming aerodromes of Zafarabad and Forish regions are contaminated with phosphorus 2-3 times the maximum concentration limit.

According to the Working Document management of Obsolete Pesticide[193]" a tailing pit of large amount of toxic pesticides disposed in 1987 (20,000 m3, 2,205.7 tons, banned for use hazardous pesticides, including POPs – GHCG, toxaphene, heptachlor) is located 6 km from the Egizbulok Village, Forish District.

The external anthropogenic factors which might affect the whole area of the Republic of Uzbekistan are climate changes including changes of temperature regime, water availability, frequency and intensity of adverse events like climate extremeness and increase in number of dangerous hydro-meteorological phenomena like drought, "heat waves", dust storms, mudflows (in the slopes of the Nuratau) and floods (Please, see Chapter 9.8 for more detail).

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[192] National Report on environmental conditions and use of natural resources in the Republic of Uzbekistan/ edited by N.M. Umarova; State Committee of the Republic of Uzbekistan on Environmental Protection – Tashkent: Chinor ENK, 2013. - 260 p. https://livingasia.online/wp-content/uploads/2017/05/natdok-uz.pdf

[193]Working Document management of Obsolete Pesticide in Uzbekistan, IHPA, 2017 http://www.ihpa.info/docs/library/other/improving/Uzbekistan-WD-ENG.pdf

Climate change in a long run may reduce moisture availability and correspondingly reduce productivity of croplands and pastures. Lack of moisture in combination with increasing of anthropogenic load will lead to enhancement of pressure on natural pastures and their further degradation. Climate change aggravates land desertification processes, fragmentation of habitats and reduction of biodiversity. Presumably, climatic changes are the reasons for habitat changes for some species and fauna complexes of vertebrate animals in plain and low mountain zones. Increase in frequency of droughts occurrence will enhance risks of degradation for aquatic and coastal ecosystems, contribute to water quality degradation and biodiversity loss and decrease of ecosystem productivity.

Increase of air temperature will entail upward shift of zonal belts in mountains. Substantial negative impact on majority of bird and large animal species will be associated with competitions with domestic animals because their number will unavoidably be increasing in mountain pastures and watering sites.

Sifting in intra-year seasons, and in particularly late fall of major precipitation amount may adversely impact on survival of ephemerous and ephemeroid plants as well as other early flowering plants due to mismatch of actual temperature and humidity regimes with favorable ones for their growth. Insect species may also suffer[194][195].

Climate change may also aggravate health issues related with poor water quality with microbial and chemical pollution due to insufficient infrastructure to treat wastewater and purify drinking water. Bacterial pollution increases with the temperature, which is reflected by an increased number of cases of intestinal diseases during summer (e.g. bacterial dysentery increases by a factor of three). An increased burden of intestinal, cardiovascular and respiratory diseases was found to be associated with heat and heat waves. Dust storms have increased in Uzbekistan due to accelerated desertification, driven by water shortage, climate change and land degradation. Excessive exposure to dust constitutes a major health risk for about 5.5 million inhabitants of the country[196].

There is a major uncertainty about magnitude and nature of such externally induced changes throughout the Project life cycle. Thus, the CIA provides only a high level qualitative assessment of the climate change effects.

13.3.4 Discussion

Assessment of potential contribution of the Project to the cumulative impacts is enabled by the preceding review of existing activities and future projects (construction scope, distance to the Project area, area size). Table 13.2 provides results of the analysis and details of the future projects which were included to or excluded from CIA (it is considered that construction projects excluded from the assessment will not produce any significant cumulative impacts with the Project), as well as projects with high uncertainty factor, or projects which are not clearly described and thus may not be adequately assessed for their potential cumulative impacts.

Based on the analysis in Table 13.2, the following potential activities have been included in CIA:

- Extension of Jizzakh cement Plant and/ or new cement plant;
- Uch-Kulach mining development;

[194] Third National Communication of the Republic of Uzbekistan under the Framework Convention on Climate Change, Centre of Hydrometeorological Service at the Cabinet of Ministers of the Republic of Uzbekistan, Tashkent 2016 https://unfccc.int/sites/default/files/resource/TNC%20of%20Uzbekistan%20under%20UNFCCC_english_n.pdf

[195] The Sixth National Report on The Republic of Uzbekistan of the Conservation of Biological Diversity/ edited by B.T. Kuchkarov / Tashkent, 2018. - 207p. https://www.cbd.int/doc/nr/nr-06/uz-nr-06-en.pdf

[196] National report. Assessment of Climate Change Impact on Health, Vulnerability and Adaptation of the Health Care System in Uzbekistan, 2011.

- Construction of NPP;
- Delivery of the final cement products to consumers;

Other projects have been excluded from CIA for the following reasons:

- their temporal and/or spatial interaction with the Project will not cause any significant negative cumulative impact;
- the proposed construction projects are only at the conceptual development stage, or have been suspended; and
- lack of information for adequate assessment.

Table 13.2: Analysis of operations/projects which may cause potential cumulative impacts in combination with the Project

Potential development	Interaction with the Project	Included / Not included in CIA
2nd stage of the Project	Cumulative impact is possible.	Not included (unknown timeframes)
Extension of Jizzakh cement Plant (up to 5 million tons a year) or/ and new cement plant	Cumulative impact is possible if the same VECs are affected. It shall be noted that the exact location of the potential extension/ new cement production is unknown (possibly 5 km to the northwest from Balykly village).	Included
Construction of the Jizzakh oil refinery	The Project implementation is currently suspended. In case of implementation, cumulative impact is possible if the same VECs are affected.	Not included.
Uch-Kulach mining development	The site is located at a significant distance from the Project area. Cumulative impact is possible if the same VECs are affected.	Included
Construction of nuclear power plant	The site is located at a significant distance from the Project area. Cumulative impact is possible if the same VECs are affected.	Included
Ongoing and prospective projects in Jizzakh city	Located at significant distance from the Project area. Potential temporal interaction with the Project (the construction of the Project associated facilities) will unlikely result in any significant negative cumulative effect.	Not included
Construction of solar power plants in Jizzakh region	Cumulative impact is possible if the same VECs are affected. The exact site location for the potential development has not been defined yet.	Not included
Development of goat breeding and modern processing of diary milk products in the Forish district	The current status of the potential development as well as the exact site location are unknown. It is obviously located quite far from the Project AoI and a potential temporal interaction with the Project will unlikely result in any significant negative cumulative effect.	Not included
Construction of water reservoir “Karaman” for irrigation	Details of the potential development including the location are not available. The project implementation will be resulted in further development of the region	Not included

Potential development	Interaction with the Project	Included / Not included in CIA
	(extension of irrigation lands, new processing facilities, influx of workers etc.).	
Construction of agro-logistic complex in Sharof-Rashidov distict	Details of the project location are not available. Potential temporal interaction with the Project (the construction of the Project associated facilities) will unlikely result in any significant negative cumulative effect.	Not included
Construction and reconstruction of irrigation canals within the affected districts of the Jizzakh region	Cumulative impact is possible if the same VECs are affected. Though, temporal interaction with the Project will unlikely result in any significant negative cumulative impact.	Not included
Infrastructure/ utilities projects within the affected districts of the Jizzakh region	Potential interaction with the Project will unlikely result in any significant negative cumulative impact.	Not included
Delivery of the final cement products to customers by railway and motor road	Cumulative effects are possible.	Included

13.4 Assessment, Significance and Management of Cumulative Impacts

This section provides a review of potential cumulative impacts on important social and environmental components. Table 13.3 provides a summary of the analysis and indication of the future project activities that have been considered by CIA for VEC.

Table 13.3: Activities / projects included in VEC-specific CIA

VEC	Activities / development plans					
	Current agricultural activities	Existing motor road traffic	Extension of Jizzakh cement Plant and/ or new cement plant	Uch-Kulach mining development	Construction of NPP	Delivery of the final cement products to consumers
Atmospheric Air		v	v	v		
Landscape (visual impacts)		v	v			
Terrestrial habitats	v	v	v	v	v	
Community health and safety		v	v	v	v	v
Local infrastructure			v	v	v	v
Waste management facilities	v		v	v	v	

V - activities/projects included in the assessment

13.4.1 Atmospheric air

The residual impact of the Project construction and operation on atmospheric air is assessed as low; the ground-level concentrations of pollutants in atmospheric air (nitrogen dioxide, sulphur dioxide and dust) are expected to comply at the SPZ boundary (500 m) with the applicable norms (Section 9.1).

The tentative area of influence of the Project is likely wider than the SPZ and depending on the weather conditions and direction of wind might include the nearest residential area (the settlement Balykly).

The settlement Balykly is located at approximately the same distance from the Project site and the Jizzakh Cement Plant and might be affected by overlapping influence of both plants. It shall be noted that the exact location of the potential extension of the existing cement production and /or a new cement production plant is unknown. Possibly, the new cement development area will be located close to the current Jizzakh Cement operations (around 1.5 km distance to the west). Considering the distances, significant cumulative effects are not expected (the concentration of pollutants will unlikely exceed 0.1 MPC). In dry season the air quality may be aggravated by dust from motor roads and areas with degraded vegetation. The cumulative effects can be assessed as low.

The air emission modelling taking into consideration baseline air quality conditions (and the prospective extension of Jizzakh Cement Plant) is highly recommended.

13.4.2 Natural habitats

As discussed in Section 9.5, the Project's residual impacts on terrestrial habitats are assessed as low. The main impacts of the Project implementation on natural habitats will be associated with their long-term physical loss as a result of the land take for construction of the Project facilities, quarry and infrastructure, clearing of vegetation, complete loss and fragmentation of habitats within the boundaries of the allocated land and synanthropization of landscapes (construction of road, other linear facilities, etc.).

Natural habitats in the Project area have long been exposed to anthropogenic transformation due to agricultural development – irrigated lowlands have been used for crop production and foothills and other areas not suitable for crop production – have been extensively used as pastures for cattle grazing. The Project area of influence matches the criteria of modified habitats as it was used for irrigation agriculture and cattle grazing over decades.

The Project implementation may further enhance the process of pasture degradation[197] (generation of dust, intensification of erosion processes, etc.) toward domination of plants with stronger resistance to anthropogenic impacts (e.g. wormwood), which may entail further degradation of ecosystems accompanied by reduction of phytocenoses productivity and deterioration of ecosystem services.

Any new land take from the current land use will likely cause additional pressure on the areas used for cattle grazing and on natural habitats consequently. The information on the area required for extension of the Jizzakh Plant (including location of the new quarry) was not available at the time of developing the current report (the current quarries are located in the north-western part of the Balykly-Tau Ridge). Therefore, lack of endangered species and critical habitats in the Project AoI

[197] Pasture degradation is gradual transformation of plant community exposed to excessive grazing load. The process of pasture degradation means a decline in grass stand productivity, depletion of biodiversity, and displacement of steppe grass with weeds. Valuable feed cereals and legumes are the first to disappear from the plant communities. Pasture degradation is a long process which takes multiple years and consists of four stages: 1) feathergrass/mixed-herb stage (slightly and moderately trampled); 2) fescue (medium-trampled); 3) wormwood/fescue (heavily trampled); 4) completely treaded out (bare ground surface with occasional depressed weeds).

allows to assess the receptor sensitivity as Low and, after implementing mitigation measures, residual impacts will be Low to Negligible. The cumulative impact is assessed as Low.

13.4.3 Waste management facilities

As discussed in Section 9.7, the capacities of existing waste management facilities (including hazardous waste management facilities) in the Jizzakh region are unlikely to meet the needs of the Project and to comply with the sanitary, environmental and operational requirements (especially for operation phase). This might be an issue in the cumulative context. All planned projects will increase pressure on the existing waste management capacities in the Jizzakh region. Based on the analysis of the regional development programs the situation is unlikely to be solved in the coming few years. In case of absence of adequate mitigation measures within the scope of individual projects, cumulative effects can be assessed as moderate.

13.4.4 Landscape (visual impacts)

As discussed in Chapter 9.6 the cement plant and the quarry site will have a negative influence on the visual environment; both are visible from the surrounding villages (Balykly, Nurafshon) and roads, at the northern slope of the Balyklytau ridge, due to the flat topography of the area. This negative visual impact can be aggravated by the visual impacts of operating and planned facilities[198] of the Jizzakh Cement Plant/ a new cement plant and the quarries located 2.5 -3 km in good visibility from another site of Balykly. The impact is assessed as moderate.

13.4.5 Community health and safety

The main Project impacts with cumulation potential of negative effects on community health and safety in combination with other existing and planned development projects include the following:

- Community safety risks related to influx of migrant workforce from other regions (residual risks of the Project is assessed as minor);
- Community safety risks related to heavy machinery and vehicles traffic on the public roads - increased traffic intensity may affect road safety and increase the risks of traffic accidents (residual risks of the Project is assessed as minor or moderate for both construction phase and operation phases).

The risks related with influx of migrant workforce due to Project construction and operation might be aggravated by the ongoing extension of the Jizzakh Cement Plant/ or a new cement plant located 2.5 km from Balykly. According to the regional development documents it will create around 1,500 new jobs, which is considerable comparing with the overall number of residents in the closest community of Balykly (341 persons). Reportedly, there were contacts between the herder’s family and the Project workers, including minor conflicts. However, taking into account the generally favorable attitude of the local communities to implementation of major projects in their region, the cumulative impact relating to this aspect is assessed as moderate.

Road safety risks for the local communities located along the public roads (incl. Nurafshon, Yorqin, Pakhtakor, Tychankuduk, Yangiobod, Tuyamoyin, Quyovboshi, Gandumtosh) might be also increased due to other development projects which traffic is related with the same public motor roads, including extension of Jizzakh cement Plant/ a new cement plant, Uch-Kulach mining development and to a lesser degree - construction of nuclear power plant which will start after 2022. The cumulated risk can be assessed as moderate.

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[198] The exact location of the potential extension is unknown. The adverse impact can be cumulated in case of location of the planned extension close to Balykly.

13.4.6 *Local infrastructure*

Construction activities under all planned projects will increase intensity of heavy machinery traffic on the public roads. Such traffic may deteriorate quality of local roads, and hence more funding from the local public budgets will be required to maintain the road network. In view of absence of adequate mitigation measures within the scope of specific projects, overall cumulative impact on local infrastructure can be assessed as moderate.

13.5 Management of cumulative impacts and main conclusions

Management of cumulative impacts requires appropriate mitigation measures at their source at each stage of the Project. The Company is committed to take a proactive approach to management of such impacts by ensuring strict compliance with the respective mitigation measures within the framework of the Project implementation, in continuous interaction and consultations with local communities (see Chapter 4 and 10).

The CIA did not identify any significant environmental and social cumulative impacts that would require special mitigation or control measures in addition to those already developed for the Project (see Chapters 8 and 9). However, it shall be noted that development of the cement industry in the district is very likely in the coming years, even though the exact location is currently unknown. Therefore it is further advisable that the Company is engaged in community consultation activities in case of any new projects, which may be developed near the Project site and its area of influence in the future. In case of completion of any additional survey by the Company, it is recommended to undertake a closer study of the identified uncertainties, verify and update the CIA, and develop the mitigation measures if required.

Annex A. Phase I and II scoping assessment summary

VEC		Nature of impact	Specific sensibility/ Susceptibility	Residual impact	Spatial extent of VEC	Temporal extent of impact	Potential impact of non-industrial influences/ trends	Potential impact of other development projects	Discussion	Include into CIA
General	Specific									
Air	Humans (local community, workers)	Human health	Some potential susceptibility on hot conditions	Low	The nearest communities (Balykly) and accommodation camp	During the lifecycle of the Project	Climate change (dangerous hydro-meteorological phenomena)	Existing and potential motor road and railway traffic (due to extension of Jizzakh Cement Plant/ new cement plant and Uch-Kulach mining development); current and prospective operations of Jizzakh Cement Plant and a new cement plant; construction and operation of the 2nd stage of the Project.	The residual impact from the Project is assessed as low. Cumulative impacts are possible.	Yes
	Humans (workers)	Human health		Low	The Project area				Workers should be considered at the level of individual projects and not in the cumulative impact context.	No
	Climate change	GHG		N/A	-		-		Assessed in Section 9.9.	No
Geological environment/ soil	Subsoil	Static and dynamic deformation (buildings, structures,		Low	Project area	Potentially long-term impacts		2nd stage of the Project.	Impact is limited to the allocated land.	No

VEC		Nature of impact	Specific sensibility/ Susceptibility	Residual impact	Spatial extent of VEC	Temporal extent of impact	Potential impact of non-industrial influences/ trends	Potential impact of other development projects	Discussion	Include into CIA
General	Specific									
		earthworks, blasting etc.)								
	Soil, subsoil and groundwater	Chemical impacts (air-borne pollutants, spillage, waste)	High buffer capacity of serozems in relation to acids. But the soils' potential to accumulate contaminants in upper horizons is much higher than ability to translocate it. Shallow aquifer is not protected from contamination by water-tight strata.	Low	Project area, Project AoI	Potentially long-term impacts		Potential past contamination of the area (if any). 2^{nd} stage of the Project	No plans identified for the coming years within the Project AoI which might cause any significant cumulative effect with the Project.	No
		Withdrawal of soil resources		Low	The nearest affected communities and agricultural enterprises	Construction, operation	Climate change	Jizzakh Cement plant extension/ a new cement plant	See "land use" and "habitats" below	See "land use" and "habitats" below

VEC		Nature of impact	Specific sensibility/ Susceptibility	Residual impact	Spatial extent of VEC	Temporal extent of impact	Potential impact of non-industrial influences/ trends	Potential impact of other development projects	Discussion	Include into CIA
General	Specific									
		Mass movement (incl. wind and water erosion, change of groundwater conditions)		Low	Project area	During the lifecycle of the Project	Agricultural activities, external hazards (earthquakes, rainfall flooding, etc.), climate change	Overgrazing	Local impacts should be considered at the level of individual projects and not in the cumulative impact context.	No
	Groundwater	Water abstraction		Low	Project AoI	construction		No specific plans which will require groundwater abstraction identified for the coming years within the Project AoI	Cumulative effects are not anticipated	No
Surface water bodies	Irrigation canal	Water intake	Generally, there is a scarcity of drinking water in the region.	Low	Irrigation canal system	Construction and operation	Agriculture, climate change	Past and current irrigation activities, 2nd stage of the Project	The Project's residual impact is low and short-term. No precise plans on future development (extension on cultivated areas, new industrial projects) were identified within the Project AoI.	No

VEC		Nature of impact	Specific sensibility / Susceptibility	Residual impact	Spatial extent of VEC	Temporal extent of impact	Potential impact of non-industrial influences / trends	Potential impact of other development projects	Discussion	Include into CIA
General	Specific									
	Irrigation canal, river Cly	Impact on water quality		Low	Water basin of the Cly river, Sarkisov Yuzhno-Golodnostepsky Canal	During the lifecycle of the Project (especially during construction phase)		Past and current agricultural activities.	The Project's residual impact is assessed as low. Cumulative effects are not anticipated. No precise plans on future development (extension on cultivated areas, new industrial projects) were identified within the Project AoI.	No
Waste management facilities	Waste management infrastructure of the Jizzakh region	Impact on capacity	Waste management infrastructure of the Jizzakh Region is considered not sufficient for proper management of generated waste	Low (construction) to moderate (operation)	Jizzakh region	During the lifecycle of the Project		All other projects in the region will be associated with generation of additional waste amounts.	The capacities of existing waste management facilities are unlikely to meet the needs of the Project and to comply with the sanitary, environmental and operational requirements. This might be an issue in a cumulative context.	Yes
Physical impacts	Humans (workers)	Noise impact		Low	Project area, accommodation camp	During construction and operational phases		Motor roads and railway. Other projects in Zafarobod and Forish districts are located at a significant distance from the Project area. 2nd stage of the	Local impacts should be considered at the level of individual projects and not in the cumulative impact context.	No
	Humans (local community)	Noise impact (blasting operations in open pit,	High susceptibility of infants	Low	Settlements along the main roads				Impacts are not regular and temporary. Cumulative effect is not expected.	No

VEC		Nature of impact	Specific sensibility/ Susceptibility	Residual impact	Spatial extent of VEC	Temporal extent of impact	Potential impact of non-industrial influences/ trends	Potential impact of other development projects	Discussion	Include into CIA
General	Specific									
		transport vehicles)						Project (in case of implementation)		
Terrestrial fauna	Avifauna	Noise, illumination, direct loss of habitats	Potentially possible prese of the Red Data Book and IUCN Red list species incl. nesting birds	See below 'Terrestrial habitats'	In Project area and Project AoI	During the lifecycle of the Project	Climate change, agricultural activities	All other projects in the region can affect habitats of the same species (including migratory species)	The range of disturbance zones is normally limited to 2-3 km from the boundary of the impact source. Blasting operations can be heard also at larger distances. Such impacts have irregular and temporary character and will unlikely result in any significant cumulative effect. Loss of habitats is considered in a general sense below as 'Terrestrial habitats'.	See below "terrestrial habitats"
	Mammals and reptiles	Noise, disturbance factors, physical loss and fragmentation of habitats, synanthropization	Protected species (Goitered Gazelle and Desert Monitor) and commercial species (wild boar, hare, porcupine, nutria, gophers, fox, corsac fox, wolf, jackal, stone marten, etc.) can be found	Low See below 'Terrestrial habitats'	In Project area and Project AoI	During the lifecycle of the Project	Climate change, agricultural activities	Automobile roads and railway. All other projects in the region can affect habitats of the same species.		See below "terrestrial habitats"

VEC		Nature of impact	Specific sensibility/ Susceptibility	Residual impact	Spatial extent of VEC	Temporal extent of impact	Potential impact of non-industrial influences/ trends	Potential impact of other development projects	Discussion	Include into CIA
General	Specific									
Terrestrial flora	Habitats	Physical loss of habitats	The ecosystems are suffered by pasture degradation. Rare and endangered species are not found.	Low	In Project area and Project AoI	During Project implementation	Climate change, cattle grazing	All other projects in the region can affect habitats of the same species.	The area has been transformed to a significant degree by human activities. Though, loss and defragmentation of habitats close to the Project site can cause additional pressure to modified habitats in the surrounding areas. Cumulative impacts are low.	Yes
Aquatic ecosystems	Hydrobionts	Water quality of A.A. Sarkisov Yuzhno-Golodnostepskiy Canal		Low	Canal (downstream)	During Project implementation	Current irrigation activities.		The Project's residual impact is low and mainly temporary. No precise plans on future development (extension on cultivated areas, new industrial projects) were identified within the Project AoI.	No
Landscapes	Visual amenity	Visual impacts		Low	The Project AoI	During construction and operational phases		Jizzakh cement Plant (ongoing and prospective operations)/ a new cement plant	There are operating quarries that already pose some visual negative impacts. Include in CIA.	Yes
Social sphere (local communities)	Community health and safety	Local residents, agricultural workers (construction activities,		Construction risks - minor; stress impacts - low	Local communities (settlements of Balykly, Karatepa)	During construction and operational phases		Jizzakh cement Plant (ongoing and prospective operations)/ a new cement plant	Given the distance to other development projects significant cumulative effects are not anticipated.	No

VEC		Nature of impact	Specific sensibility / Susceptibility	Residual impact	Spatial extent of VEC	Temporal extent of impact	Potential impact of non-industrial influences / trends	Potential impact of other development projects	Discussion	Include into CIA
General	Specific									
		air pollution and noise exposure, stress).								
		Hazards / Project emergencies		Low	Local communities in settlements located in direct vicinity of Project area	During construction and operational phases	External hazards (earthquakes, rainfall flooding, etc.)	-	It is unlikely that local impacts will be able to cause significant cumulative impacts.	No
	Labor and working conditions	Various impacts	Some potential susceptibility on hot conditions	Low	Project area	During construction and operational phases		No	Project specific and not relevant to CIA	No
	Traffic impacts	Road traffic safety		Safety risks – minor or moderate	Local communities (incl. Nurafshon, Yorqin, Pakhtakor, Tychankuduk, Yangiobod, Tuyamoyin, Quyovboshi, Gandumtosh)	During construction and operational phases		Other development projects which traffic is related with the same motor roads, incl. extension of Jizzakh cement Plant/ a new cement plant, Uch-Kulach mining development;	Cumulative effects are possible. Include it in the CIA.	Yes
		Road deterioration		Low						

VEC		Nature of impact	Specific sensibility / Susceptibility	Residual impact	Spatial extent of VEC	Temporal extent of impact	Potential impact of non-industrial influences / trends	Potential impact of other development projects	Discussion	Include into CIA
General	Specific									
								Construction of NPP.		
Local communities	Workers in-flux	Pressure on social infrastructure (incl. health care)		Negligible	Settlements of Zafarobod district/ Jizzakh	During construction and operational phases		Other development projects which traffic is related with the same motor roads, incl. extension of Jizzakh cement Plant/ a new cement plant, Uch-Kulach mining development; Construction of NPP.	Although major incidents / emergency situations at individual projects can create short-term pressure on regional medical services, they are not considered as a factor generating cumulative effects due to the following reasons: (1) incidents coinciding with each other in time are very unlikely; and (2) identified development projects are located at too significant distances from each other to create a domino effect of emergency scenarios.	No
		Potential conflicts between in-migrants and local communities		Minor	Local residents and agricultural workers	During construction and operational phases		extension of Jizzakh cement Plant/ a new cement plant	Cumulative effects of potential risks are possible. Include it in the CIA.	Yes
	Land use	Land acquisition, potential impact on		Low	Project area, Project AoI, and areas	During construction and	Climate change	No potential development identified which	No potential development identified which will affect the same land users. Though, loss and defragmentation of habitats	No

VEC		Nature of impact	Specific sensibility / Susceptibility	Residual impact	Spatial extent of VEC	Temporal extent of impact	Potential impact of non-industrial influences / trends	Potential impact of other development projects	Discussion	Include into CIA
General	Specific									
		agriculture conditions			adjacent to Project AoI	operational phases		will affect the same land users.	close to the Project site can cause additional pressure of cattle grazing to remained natural habitats in the surrounding areas. See "terrestrial habitats".	
Cultural heritage	Tangible cultural heritage	Potential physical loss		Not significant		During the lifecycle of the Project		All development projects in the region.	The impact is of local character – it should be considered at the level of individual projects, rather than from the viewpoint of cumulative impact.	No
	Intangible cultural heritage	Potential disturbance of local cultural traditions, lifestyle etc.		Not significant		During the lifecycle of the Project		All development projects in the region.	Scoped out as residual Project impact is negligible (or zero impact)	No

14. ENVIRONMENTAL, SOCIAL, HEALTH & SAFETY MANAGEMENT

14.1 The Project ESHS Management

The Company will manage and monitor the Project's environmental, social, health&safety (ESHS) issues throughout its life cycle – from design development to decommissioning. Specific mechanisms will be provided at each phase to ensure prevention, minimization, mitigation of potential negative impacts, as well as measures to enhance the positive effects including:

- Environmental and social impact assessment in compliance with international requirements, including concerns expressed by stakeholders during public discussions;
- Development of design documentation in line with the best industry practices and best available techniques, internal review of design solutions;
- Appointment of qualified contractors capable to ensure compliance with the Project Applicable Standards, and monitoring of contractor's practices for compliance with such requirements throughout the contract period;
- Procurement of modern equipment and materials which meet up-to-date environmental and safety standards;
- Ongoing supervision and monitoring of construction activities on the site, and use of modern construction technologies;
- ESHS training of the Company and contractor's personnel;
- Day-to-day and long-term management of environmental, occupational health and safety, community safety impacts and risks through implementation of specific ESHS management plans.

The Project ESHS management plans and procedures shall be developed and implemented in order to provide adequate management of environmental, social, health and safety impacts and risks associated with the Project implementation, including respective site-specific construction and operational practices. The Project management and monitoring procedures shall be developed taking into account the findings of the current ESIA.

In particular, the Company shall develop the following key documents:

- Framework Environmental and Social Management Plan (ESMP) and specific construction (CMP) and operation OMP) management plans;
- Environmental and Social Action Plan (ESAP);
- Stakeholder Engagement Plan (SEP).

The ESAP is developed by the Consultant for the Company and presented as separate document.

14.1.1 Environmental and Social Management Plan

The Framework ESMP is a document, which establish the general methods and approaches to management and monitoring of environmental, health and safety and social issues, interaction with contractors, distribution of management functions and responsibilities for compliance with applicable requirements and key mitigation measures throughout the Project development and implementation.

The document will be supplemented as required by a set of environmental and social management plans and procedures for specific Project activities which are of special significance and require special attention to control, mitigate and monitor environmental and social impacts. The format of these documents will be agreed with Huaxin Cement and may be either standalone documents or component parts of integral ESMP for the various project components.

In view of the natural, industrial and socio-economic baseline which was described in the previous chapters, the potential environmental and social impacts and proposed measures for their prevention and mitigation, the list of management plans and procedures to be developed for the Project includes but is not limited to the following:

- Construction Environmental and Social Management and Monitoring Plan (for "umbrella" main contractor engaging several subcontractors);
- Waste Management Plan for construction and operation phases;

- Wastewater Management Plan including arrangements for surface run-off and snowmelt water management;
- Air Quality Control Plan (operation);
- Traffic Safety Plan (construction);
- Operational Health and Safety Plan;
- Construction Workforce Accommodation Management Plan (if needed);
- Site Personnel Code of Conduct (also applicable to contractors' personnel).

Taking into consideration the nature of the Project area, the Environmental and Social Management Plan will allow for prompt response to changing circumstances and unforeseen events, and for revision of action plans based on monitoring and analysis of the Project activities.

14.1.2 Environmental and Social Action Plan

During the ESIA process the Consultant identified potential compliance gaps against the requirements of international lenders and described recommended measures to achieve compliance which are listed in Chapters 9, 10 and 13. The above measures which shall be implemented to secure allocation of the loan funding formed the basis for preparation of the Environmental and Social Action Plan. ESAP is issued as a separate document.

14.1.3 Stakeholder Engagement Plan

As part of the ESIA package, the Company should prepare the Stakeholder Engagement Plan (SEP), which includes the list of stakeholders, the engagement approach and a range of recommended measures to ensure the consultations and disclosure practice of the Company are aligned with the IFC requirements. It is important that the SEP should include also a grievance mechanism which can be used by stakeholders and the Company's and contractors' workers.

14.2 Management of Contractors

The HSE requirements applicable to contractors working in the Project shall be set in standard clause on Contractor's HSE Duties being an integral part of any contract between the Company and its contractors.

The following provisions in the contractors' agreements are recommended (not limited to):

- comply with the applicable HSE law and internal procedures and requirements of the Company, procure the required environmental licenses, permits and other documents in due time, as required for contractor's operations;
- prior to commencing any works, identify occupational health hazards (including those affecting any third parties engaged), environmental and social issues, assess and review risks. Develop and implement appropriate measures to manage the risks and prevent or mitigate their negative effects to an acceptable level;
- train their personnel on the Company's corporate HSE regulations applicable to the contractor's works;
- assure implementation of the applicable health and safety, social, fire and industrial safety, and environmental protection measures (including monitoring) set out in the Framework Environmental and Social Management Plans and discipline-specific ESMPs (if any);
- ensure that qualified full-time HSE personnel are always present on site;
- immediately report to the Client on any incidents and conduct investigations when applicable, in compliance with the applicable Russian regulations and the Client's requirements;
- follow the Site Personnel Code of Conduct.

The Company shall monitor HSSE performance of its contractors working in the Company's premises or sites throughout the period of their contract agreements. The monitoring is implemented in the form of regular scheduled or unscheduled inspections, checks and audits by the appointed internal specialists of the Company. Results of the inspections/audits are reported in the form of Inspection Reports with description of any failures identified, which are provided to the respective contractor. Contractor is required to develop a Corrective Action Plan with proposed deadlines for rectification of the identified failures and submit it for approval to authorized officer of the Company. Contractors' performance is assessed for compliance with the Environmental and Social Management Plans.

15. CONCLUSIONS

15.1 Summary of Findings

An ESIA has been conducted for Project in accordance with relevant environmental and social guidelines of the International Finance Corporation with an overall objective to ensure acceptable environmental and social performance of the Project. The ESIA identified potential impacts through a systematic scoping process whereby the activities (both planned and unplanned) associated with the Project have been considered with respect to their potential to interact with environmental and social resources or receptors, which may generate potentially significant environmental and social impacts have been further assessed in the ESIA, with appropriate mitigation and enhancement measures recommended for alleviating potential negative impacts or enhancing potential positive impacts from the Project. It is concluded in the ESIA that with proper implementation of the recommended mitigation measures, the residual environmental and social impacts causing by the construction and operation of the Project would be of no larger than moderate significance, as summarised in *Table 15.1*.

To ensure proper delivery of the committed mitigation measures identified in the ESIA Study, an Environmental and Social Management Plan will be prepared for the Project that will provide the procedures and processes to be applied to the Project activities in order to check and monitor compliance and effectiveness of the mitigation measures during the construction and operation of the Project. In addition, this ESMP will be used to ensure compliance with statutory requirements and corporate safety and environmental policies. Overall, it is expected that the Project will be constructed and operated with acceptable environmental and social performance under proper implementation of the ESMP.

Table 15.1.1: Environmental Impacts Summary

Impact	Direcion	Receptor	Receptor Sensitivity	Stage	Impact significance	Risk Significance	Mitigation measures	Residual significance		
								Likelihood	Impact Rating	Risk Rating
Air Quality										
Air pollution	N	Personnel Local population Natural environment	M	C	M	L	Implement dust suppression measures when loading/unloading loose materials and performing earthworks; Prevent soil erosion and soil being carried away from the site by wheels of motor vehicles; Perform regular maintenance of construction machinery and motor vehicles engines; Using of fuel with high ecological class; Monitoring the use of personal protective equipment by employees	L	L	Mr
Air pollution	N	Personnel Local population Natural environment	M	O	M	L	The project has adopted a number of technological solutions aimed at reducing pollutant emissions: • The main fuel used is natural gas with the addition of coal, which leads to less dust and soot; • In areas of increased dust formation, highly effective electrostatic precipitators are used; The construction features of the rotary kiln and the relatively low combustion temperature cause a lower level of NOx formation due to a decrease in thermal NOx	M	L	Mr
Noise and Vibration										
Noise and vibration	N	Communities	M	C	M	Mr	Construction noise emissions are generally intermittent and not expected to be continuously operational during the entire construction period. Overall, construction noise impacts have a high likelihood of occurrence yet are considered to be of minor of temporary and reversible nature as they cease to exist once the construction activities are terminated. Additional noise mitigation measures at the source include:	L	L	Mr

					nce	e		Residual significance		
							• Selecting adequate equipment (fit with noise mufflers) and minimizing machinery or equipment idling conditions; • Maintaining an active community consultation and positive relations with local residents will assist in alleviating concerns and resolve any potential noise complaints.			
	N	Communities	M	O	M	Mr	Mitigation measures could be adopted to reduce noise limits to permissible noise levels including: • se of properly tuned engines, proper mountings and muffling of equipment and equipment fitted with silencers; • Providing permanent enclosures around the heavy noise producing equipment; • Ensuring good maintenance and repair of the heavy equipment; • All equipment shall be switched off when not in use. • Equipment and trucks used shall use the best available noise control techniques (e.g., improved mufflers; equipment redesign; use of intake silencers, ducts, engine enclosures and/or acoustically attenuating shields or shrouds) wherever feasible and necessary. • Stationary noise sources shall be located as far from sensitive receptors as possible. If they must be located near sensitive receptors, they shall be muffled to the extent feasible and enclosed within temporary shed.	L	L	Mr
Occupational noise	N	Employees	M	C, O	M	M	In order to mitigate such impacts on the occupational health, Huaxin Cement Plant and its contractors shall: • Provide adequate Personnel Protective Equipment (PPE) to construction workers at all noisy activities/locations that exceed permissible occupation noise level limits set in the Uzbekistan Permissible threshold Occupational noise level standards in different work areas. • Install high noise warning boards which will be displayed in areas of noise levels and mandate ear protection the identified high risk area. • Noise level monitoring should be conducted regularly to ensure that noise levels during all times are within national noise exposure standards.	M	M	M
Vibration Impact from Mining Activity	N	Communities	M	C, O	M	Mr	Vibration (as well as noise) level decreases with the increase of distance of measurement and it is proportional to the quantity of explosives detonated. Air over pressure,	L	L	Mr

					nce	e		Residual significance		
							noise and vibration can be effectively contained within limits by adopting Huaxin Cement Plant's proposed techniques in addition to those stated below: • The frequency of blasting shall be determined and amount of explosives used per round of blasting shall be properly calculated; • Blasting needs to be restricted to a limited part of the day; • Covering the detonating fuse with at least 150 mm thick cover of sand or drill cuttings; • Supervision of drilling and blasting operations to ensure the designed blast geometry; • Avoid blasting when strong winds are blowing towards the residence; • Further based on the safe blasting limits it is recommended that the peak particle velocity (ppv) should be kept at 10 mm/sec.			
Soils and Subsoil										
The loss of soil resources	N	Soil resources of the impacted communities	M	C, Cm, O, DCm	M	M	Minimizing the area of the Project's footprint and physical disturbance. Translocating the topsoil within the planned earthworks areas (where the soils were irrigated and cultivated for a long period of time) to help restore neighboring eroded and historically disturbed locations of the Project Area. Developing a site-specific soil remediation plan. Landscaping the Project Area to the extent possible. Providing adequate compensations to affected farmers	M	M	M
	N	Soil resources of Zafarobod District	L		L	Mr		L	L	Mr
	N	Soil resources of the Jizzakh Region	N		N	I		N	N	I
Soil contamination with air-borne pollutants originated from the Project's emissions	N	Agricultural (irrigated, cultivated) soils within the Project's SPZ	M	C, Cm, O, DCm	M	M	Using of fabric and electrostatic filters for kilns, mills and separators (already provided by the Project). Applying of dust suppressants to unpaved haul and other motor roads (especially the sections used routinely by Project vehicles that pass through or close to residential areas or agricultural fields). Designing road alignments to minimize travel distances and eliminate unnecessary traffic. Locating stockpiles within the site boundaries considering the location of potential sensitive receptors and the predominant wind direction. Setting speed limits for road traffic to minimize creation of fugitive dust.	M	M	M
	N	Other soils within the Project's SPZ	L		M	Mr		L	M	Mr
	N	Soils of the Project's zone of influence	L		L	Mr		L	L	Mr

					nce	e		Residual significance		
		(other than those within the SPZ)					Removing grass vegetation and topsoil (whenever needed) together (i.e. mixed) so that plant matter will help to hold the soil material. Where practical, rehabilitation of disturbed soils should be progressive, i.e. implemented as soon as quarry section is worked out or the land plot is abandoned after short-term (construction related) use. Stimulating grass and shrub vegetation within SPZ that plays important role in minimizing dust emissions by reducing surface wind speeds and trapping a lot of dust			
Soil contamination by spillage of chemicals and seepage from waste	N	Soils within the Project's footprint	M	C, Cm, O, DCm	M	H	Collection and use of snowmelt, storm and drainage water to the extent possible. Staking out the boundary of water protection zones onsite for the construction and quarrying period to make sure the personnel of construction and mining companies is aware of its location. Maintaining the legal regime of water protection zones where applicable. Predominating use of non-hazardous construction materials for human health and environmental protection. Constructing an impermeable protective base layer underlying areas with potential hazardous liquids storage or use. Handling liquid fuels at enclosed storage areas only. Storage of potentially polluting materials in appropriate areas equipped with secondary containment. Installing suitable sanitary facilities with appropriate septic tanks; ensuring regular disposal of liquids. Removal of any contaminated soil occurred during construction to a licensed disposal site. Providing close circulation of the process water with a settlement tank or other facility for treatment. Ensuring that the cement plant complies with corporate (Huaxin), national (The Republic of Uzbekistan) and international standards and guidelines applicable to wastewater management and discharge. Thorough washing of surfaces in case of polluting materials spillages and further processing of collected washings as special waste. Appropriate collection and transportation of potential polluting materials (e.g. spent oils, lubricants, etc.). Performing any washing activities exclusively on areas with appropriate containment	H	L	Mr
Subsoil and groundwater contamination	N	Soils and groundwater within the Project's SPZ	M	C, Cm, O, DCm	M	H		H	L	Mr
Mobilization of pollutants already present in soils or subsoil of the Project sites	N	Subsoil and groundwater within the Project's footprint and SPZ	M	C	L	M		M	L	Mr

					nce	ce		Residual significance		
Non-recoverable loss of subsoil material (limestone, loess, sand, Fe-containing and other raw materials) and extracted groundwater as commercial products or by-products along with depletion of the operated mineral deposit and aquifer	N	Limestone and other mineral resources of Uzbekistan	N	O	L	N	No measures are needed in environmental contexts	N	N	I
		Dustlik Aquifer	M	O	L	Mr	Developing and implementing a plant-wide water-saving management program Providing conditions of the groundwater extraction and overall development of the catchment area which protects the aquifer from penetration of contaminants from above	M	L	Mr
Increasing the thickness of the vadose zone as affected by quarrying activity	N	Shallow groundwater	L	O	L	Mr	Since the Project's quarrying is associated with cutting positive topography forms rather than digging that would require pumping groundwater out, no measures are needed in environmental contexts	L	L	Mr
Increase of the mass movement rates as affected by construction and quarrying activity	N	Soils, subsoil and development of the Project footprint area	H	C, Cm, O, DCm	M	H	Gradual rehabilitation of locations where extraction works have been completed. Remediation of historical pits and temporary used lands. Minimization of excavations face during construction and quarrying. Stabilizing slopes of quarries and embankments. Temporary drainage grooves and sedimentation ponds for surface runoff collection. Other site-specific erosion-control and soil-saving measures (to be further detailed based on the mining project documentation)	L	C, Cm, O, DCm	H
	N	Soils, subsoil and development of the area adjacent to the Project footprint	H	C, Cm, O, DCm	L	H		L	C, Cm, O, DCm	M
	N	Soils, subsoil and structures of the developed areas closest to the Project footprint	H	C, Cm, O, DCm	L	L		M	C, Cm, O, DCm	N to L
Static and dynamic deformations of the subsoil by buildings and structures, earthworks, blasting, pile works, vehicle and railroad traffic	N	Subsoil of the Project footprint area	L	C, Cm, O, DCm	H	H		H	L	Mr
	N	Subsoil of the area adjacent to the Project footprint	L	C, Cm, O, DCm	M	M		M	L	Mr

					ce	e		Residual significance		
	N	Subsoil of the developed areas closest to the Project footprint	M	C, Cm, O, DCm	N to L	L		L	N	I
					Water Bodies					
Contamination of surface water bodies and artificial canal	N	Natural water bodies, artificial canal	M	C	L/M	Mr/M	Discharge of wastewater into the surface water bodies during the construction and operation is not provided for in the design decisions. Water protection measures include: • ensuring collection and transfer of wastewater to existing sewerage systems; • prevention of ingress of untreated wastewater into water bodies (management of leaks, spills in the sewerage system); • construction works shall be conducted within the boundaries of the allocated land parcels only. During construction planning and provision, follow legal restrictions on activities permitted in the water protection zone. Earthworks are to be provided in accordance with the construction plan; stockpiles have to be stabilized; • develop an optimal transportation plan as well as vehicles and machinery traffic and movement schedules to avoid any stops and parking near water streams and within their protection zones. No vehicle movement outside of temporary and permanent access roads; • provide adequate vehicles parking area (including topsoil stripping, hard paving and bunding) outside the water protection zones. Make sure that vehicles and machinery used on site are in good condition; • collection and temporary on-site storage of waste shall be provided at appropriate locations with impermeable paving; • storage of fuel and lubricants on site shall be provided in compliance with the nation and international requirements including premises and handling issues; • cleaning of debris and redundant materials after completion of construction; cleaning of the adjacent catchment area.	L	L/N	Mr

					nce	e		Residual significance		
Impact of activities conducted near water bodies	N	water protection zones	H	C	L	Mr/M	• prohibition of vehicle traffic outside the temporary and permanent access roads • Prohibition of washing of motor vehicles and other machinery outside designated and adequately equipped areas with waterproof paving • prohibition of fuels and lubricants storage near the water bodies • earthworks arrangements taking into account the season, river water level, and ground conditions • minimization of period during which excavated trenches may remain open before installation of pipes • removal of construction wastes and remaining materials upon completion of construction works, cleaning of surrounding water catchment area.	L	N	Mr
Depletion of ground water to be abstracted	N	ground water	M	O	L	Mr	Abstraction will be limited to the technological process needs, which is considered to be low.	L/I	L	Mr
Change in water quality of ground waters	N	ground water	H	C, O	M/L	Mr/M	• ensuring collection and transfer of wastewater to existing sewerage systems; • prevention of ingress of untreated wastewater into water bodies (management of leaks, spills in the sewerage system); • domestic wastewater shall be collected and stored temporarily in a way preventing leaks; • storage of fuel and lubricants on site shall be provided in compliance with the nation and international requirements including premises and handling issues; • cleaning of debris and redundant materials after completion of construction; cleaning of the adjacent catchment area.	L	L	Mr
Pollution of surface water courses by wastewater leaks/ oil / fuel spills	N	surface waterbodies ground water	M	C, O	M	M	Emergency prevention and response actions include the following: • follow legal restrictions on operations permitted in the water protection zone; • in case of fuels or lubricants spillage on the ground, mechanical removal of the spilled liquids, polluted soil mixing with sorbent and removal of the mixture to a dedicated waste disposal site; • manage surface run-off from the site preventing it from getting to the water courses, collection of contaminated storm water and disposal for treatment; • bunding of the areas designated for storage of fuel and lubricants and construction of drainage system.	L	L/M	M/Mr

					nce	e		Residual significance		
Biodiversity										
Loss of habitat	N	Vegetation	L	C	M	H	Since the Project Area is characterized by absence of sensitive vegetation ecosystems and there are no endangered and rare species at or near the Project area the following impact mitigation measures are required: • Optimization of land use within the boundaries of allocated land plots and linear facilities; post restoration of habitat; • The areas of the habitats lost on a short-term basis during the construction phase (e.g. topsoil stockpiles, provisional facilities) are subject to land reclamation immediately after the construction completion and sawing with grass or other native plant species • Implementation of modern de-dusting equipment • Planting of trees around the proposed Plant and the access ways as an additional barrier for dust particles • Water- and foam-based suppression method at the quarry development • Ambient air monitoring system for agricultural plants (cotton fields) • Adopting of corrective measures in the case of negative impact on agricultural plants • Prohibition to burn dry old grass in spring	L	L	L
Physical and chemical contamination	N	Vegetation	L	C, O	M	Mr		M	L	Mr
Loss of habitats, physical transformation of habitats	N	Terrestrial vertebrates	L	C	M	Mr	• Provision of a wire mesh fencing around the sites to prevent access of terrestrial vertebrates; • Prohibition to leave open trenches and excavations for a long period of time to prevent entrapment of reptiles, amphibians and minor mammals; • Prevention of the fall of animals into vessels and storage tanks at all Project facilities; • Stabilization of soil dumps and slopes (geoweb with crushed stone filling, sawing of grass); • Regular checks of compliance with the right-of-way dimensions for the linear facilities to be constructed; • Prohibition of introduction of invasive plant species and prevention of their spread; • In case of identification of habitats of rare and protected species near the accommodation camp and the Project site SPZ, additional measures will be developed for protection of such habitats.	L	L	Mr

					nce	e		Residual significance		
Presence of people	N	Bird Fauna	L	C, O	M	Mr/M	The impact of nuisance will be addressed by restricting access to surrounding territory for the site personnel. Specific administrative measures will be adopted to prevent poaching, shooting and entrapment of animals. Workers will be prohibited to feed and allure wild animals, and to bring domestic animals to the site and leave them unattended; Provision of a wire mesh fencing around the sites to prevent access of terrestrial vertebrates; Keeping kitshen waste in covered containers and in places where they cannot be accessed by birds and mammals Regular checks of the condition of areas designated for short-term waste storage Reporting of any violation relating to hunting and trading activities.	M	L	Mr
Attractive effect of roads as an element of habitat	N	Terrestrial fauna	L	C, O	L	Mr/M	• Drivers shall take all adequate precautions to prevent collision with birds or running over land-living animals at day and night time, respect the speed limits; • Organization of transport routes in such a way that all construction sites will be connected by motor roads; • Prohibition of vehicle traffic outside of the approved roads and sites; • Development of a Transport Traffic Management Plan.	M	L	Mr
Impact of noise	N	Larger mammals, migratory birds	L/M	C, O	M/L	M	Noise impacts will be mitigated by use of industrial equipment and machinery with noise emissions in compliance with the applicable regulations. Maintenance and operation of equipment will be provided in line with manufacturers' standards. In addition, the following mitigation measures are required: • Prohibition of noisy works and vehicles traffic at night;	M	L	M/Mr
Impact of light and power transmission lines	N	Terrestrial vertebrates	L	C, O	L	M/L	Limitation of the artificial illumination at nighttime (the light should be directed inside the sites and along the guarded perimeter; lowering of the security illumination intensity). Provision of bird-protection devices on overhead power transmission lines (if killed birds are reported); efficiency monitoring.	M	L	M/Mr
Water contamination in the process of construction stage and operation	N	Hydrobionts	L	C, O	L	Mr	• Modern de-dusting equipment • Dust suppression at the quarry • Planting the trees and an additional anti-dust barrier	L	L	Mr

					nce	e		Residual significance		
Landscapes										
Loss of Grazing Land at Quarry and Plant Sites	N	Community members who keep kettle	M	C	M	M	The following mitigation measure can be implemented to limit the impact of the quarries on grazing resources: • Containing the quarry operations to the quarry sites this will ensure that the area effected is limited to the quarry and does not spill over onto adjoining grazing lands. Quarries need to be fenced to ensure that local herders and their livestock do not enter the quarry site and run the risk of injury.	M	L	L
Impact of Dust on Agricultural and Grazing Land	N	Community members who keep kettle	M	C, O	M	M	The following mitigation measure can be implemented to limit the impact of dust at the quarries and plant site: • Implementation of modern de-dusting equipment in the plant; • Tarring of heavily used roads; • Wetting (fog or mist) of gravel roads and other surfaces which release dust; • Planting of trees around the plant and quarry sites to act as a net for dust particles; • Use of water and foam-based suppression methods at the quarries.	M	L	L
Visual Impact of Plant and Quarry Site	N	Local population	M	C, O	M	M	The following mitigation measures can be implemented to limit the impact: • Planting of tall and dense vegetation at the borders of the site; • A variation of color on the plant structures so as to blend into the environment (green and grey hues); Consultation with villages to address their particular impacts.	L	L	L
Waste Management										

					nce	ce		Residual significance		
Waste management facilities	N	Waste management infrastructure of the Jizzakh Region	H	C	M	-	Minimization of waste volumes, incl. by recycling, incineration, compaction Construction materials will be managed in a way to avoid over-ordering, poor storage and maintenance, mishandling as well as improper operation procedures Construction wastes will be separated into reusable items and materials to be disposed of or recycled whenever possible Moderate volumes of hazardous waste generation Identification of adequate disposal routes (including transport options and disposal sites) for all wastes generated Segregation of waste where possible. Hazardous wastes should be segregated and disposed separately from non-hazardous wastes using an authorized waste management operator Waste oil should be used for the kiln start-up Disposal of waste at authorised facilities. The local landfills are not suitable for disposal of any hazardous waste and should be only used for inert and non-hazardous waste only; Disposal at landfills with limited capacity is permitted only when all other methods of disposal are impractical Treatment/recycling/ reuse of major part of wastes containing valuable components (PE, cardboard, paper, metal scrap) at specialised facilities. Regular waste removal either by licensed contractors or through own efforts provided that relevant permits/ licenses is in place. Use chain of custody documentation to control potential unauthorised waste dumping by contractors. Overburden and excess rock associated with the quarrying operations, undersized materials or material rejects from the lime process will be stockpiled for later use as reclamation materials within the quarry. Lime from dust collection and partially calcined limestone minerals from the lime manufacturing process and emission control systems will be re-introduced into the process or sold where possible	-	L	-
	N		H	O	H	-		-	M	-
Health impact	R	Personnel, construction workforce	H	C, O	H	H	Segregation of hazardous waste by types. Safe temporary accumulation of waste strictly within designated areas.	L	L	L

					nce	ce		Residual significance		
							Hazardous waste accumulation areas shall be located at a distance from sensitive receptors, e.g. existing production facilities, hazardous facilities, accommodation areas Prevention of theft and vandalisms risks. Fitting of waste collection containers with tightly closing lids; all waste storage containers shall be kept closed. Disinfection of containers and surface under them no less than once in 10 days (except for the winter season). Regular waste removal and off-site disposal either by licensed contractors or through own efforts provided that relevant permits/ licenses are in place • Time limit for temporary waste accumulation shall be determined for each type of waste in accordance with its properties, but in any case, shall not exceed 11 months; • Permitted duration of food waste storage in containers at 0oC or lower temperatures is three days, maximum; at temperature above zero - not more than one day; • Medical wastes shall be removed by special vehicles 2 times per week during warm season and on a weekly basis during cold season; • Preventing presence of unauthorized persons during transportation of waste, except for the escorting personnel of the operator. Training for workers and management personnel with responsibility for managing hazardous waste. Monitoring of observance of environmental, sanitary and occupational safety rules during waste handling operations; Control of vermin (rodents, insects, birds) at waste accumulation areas through timely eliminating waste which serves as their feeding source. Organic/ food waste may be supplied to local communities for composting and use as fertilizer. Conducting deratization around kitchens and catering facilities as needed, Portable toilets should be provided at the construction sites with regular removal of septic sludge using specialized vehicles to the wastewater treatment facility.			
Environmental impact	R	Surface and ground water	H	C, O	M	M	Hard paving of roads using materials resistant to petroleum products. Collection of liquid waste and contaminated soil from occasional spills during transportation. Inspecting containers prior to waste transportation, to avoid dusting, spills and other losses along the route. Transportation of hazardous waste only subject to having a hazardous waste certificate, by vehicles specially equipped	L	N	N

					nce	ce		Residual significance		
							and provided with special signs, subject to observing safety requirements for the transportation of dangerous goods. Equipping temporary waste accumulation sites with adequately marked steel and plastic containers with lids, leak-proof bags, etc. Provision of spill response kits at liquid waste collection sites Asphalt or concrete paving under containers and 1.0-1.2 m fencing on three sides to prevent litter spread onto adjoining area. Collection of liquid waste in tanks or drums on sites with bunding capacity equal to 110% of the total waste storage capacity Provision of access drive- and walkways to each temporary waste accumulation area.			
Environmental impact	R	Atmospheric air	M	C, O	L	-	Overburden and excess rock associated with the quarrying operations, undersized materials or material rejects from the lime process will be stockpiled for later use as reclamation materials within the quarry. Watering of overburden and excess rock piles during the dry seasons to prevent dusting Waste disposal sites closest to the Project facilities should be selected to minimise waste transportation distance. Waste will be transported by the specialised dump trucks with covers to prevent dusting. Containers will be inspected prior to waste transportation, to avoid dusting, spills and other losses along the route.	-	N	-
Environmental impact	R	Terrestrial fauna	M	C, O	L	-	Elimination of feed sources for rodents through secure temporary storage of food waste in closed containers in dedicated areas, regular collection and removal either by licensed contractors or by own efforts provided that relevant license and special vehicles are available Collection of liquid waste (septic sludge) in special containers and timely removal to wastewater treatment plant by specialised vehicles	-	N	-
Environmental impact	R	Environment (general regulatory requirements)	M	C, O	M	-	Appointment of personnel responsible for waste management at each separate site Development of waste management procedures within the scope of design documentation and permitting documentation which should include a waste inventory developed in the planning stage, to establish the types of wastes expected from the construction and operation,	-	N	-

					nce	ce		Residual significance		
							estimation of generational and disposal waste volumes for each type, identification of temporary accumulation requirements at the site and appropriate disposal routes (onsite and offsite) Timely training of personnel responsible for waste management. Segregation of hazardous waste. Monitoring of observance of environmental, sanitary and occupational safety rules during waste handling operations; Timely contracting the licensed waste operators for waste treatment and disposal Transportation of hazardous waste only subject to having a hazardous waste certificate, by vehicles specially equipped and provided with special signs, subject to observing safety requirements for the transportation of dangerous goods. Transported of waste only to the authorized waste disposal facilities. Ensure that waste is not dumped in the unauthorized locations (e.g. use waste chain of custody documents).			
Climate Change										
Climate Factor: increase of annual average, annual maximum and extreme maximum temperatures, decrease of extreme minimum temperatures										
In general in winter better working conditions due to higher average annual minimum temperature	P	Personnel	M	O	L	-	Consideration of the current weather conditions when choosing work clothing and PPE, developing outdoor work schedules, selecting the cooling supply mode (O)	-	-	-
Deterioration of working conditions due to higher extreme maximum, annual average maximum and annual average temperatures	N		H	O	M	M		M	L-N	Mr
Minor reduction of power consumption due to lower heat demand during cold season	P	Resources: natural gas, electric power	M	O	-	-	Introduction of automatic cooling and heat supply control system and provision of central generation capacities to serve the changing heat and cool demand Process waste heat recuperation	-	-	-
Increased power consumption for cooling of equipment and rooms	N		M	O	M	M		M	L	Mr

					nce	e		Residual significance		
Deterioration of reliability of the main equipment and infrastructure, disruption of processes due to extreme temperature	N	Facilities and infrastructure	L	O	L	Mr	Selection of design solutions and technical characteristics allowing for the predicted growth of extreme and average temperatures during the Project operation	L-N	L-N	I
Climate Factor: increase in frequency and intensity of extreme weather events: Heat waves, dust storms, sukhovey, thunderstorms										
Deterioration of working conditions, increased risk of injury, health and life risk	N	Personnel	H	C, O	M	M	Development of response procedures in case of extreme weather events as well as working condition requirements. Arrange responsibilities in case of EWE for the personnel members and provide all necessary resource for EWE preparedness. Making personnel aware of procedures to be followed in such events. Training. First aid provisions Consideration of EWE forecasts at preparation of work schedules and selection of work clothing (warnings to be agreed with the local authorities for emergency preparedness or department for meteorological service, as appropriate)	L	L	Mr
Deformation or destruction of structures and infrastructure facilities affected by EWEs	N	Facilities and infrastructure	H	C, O	H	M-Mr	Design solutions for potential preservation of the facilities and infrastructure Development and implementation of response procedures and instructions in case of extreme weather events	L	L-N	Mr-I
Breakdowns in construction schedule (C) and Project operation mode (O)	N		H	C, O	M	M-Mr		M	L	Mr
Emergency Response										
Seismic activity	N	Facilities and infrastructure	H	O	-	H/M	In accordance with the Interstate Code of Rules for Design and Construction, design development for the areas with seismicity level 8 should be conducted take into consideration of seismic impacts.	M/L	-	M/Mr

Table 15.1.2: Social Impacts Summary

Impact	Direction	Receptor	Receptor Sensitivity	Stage	Impact significance	Risk Significance	Mitigation measures	Residual significance		
								Likelihood	Impact Rating	Risk Rating
Economy and Employment										
Generation of tax revenues	P	Administrations of different levels, population of Zafarobod district and Jizzakh region	M	C	M	N/a	Not required	N/a	N/a	N/a
				O	M	N/a		N/a	N/a	N/a
Creation of employment opportunities	P	Population of working age within the Project social area of influence and in Zafarobod district in general	M	C	M	N/a	Development and implementation of local recruitment procedure	N/a	N/a	N/a
				O	M	N/a	Maintain the procedure developed at the construction stage	N/a	N/a	N/a
Procurement of local goods and services	P	Organisations supplying construction materials and providing transport, accommodation, catering services, etc., and their personnel	M	C	M	N/a	Development and implementation of local procurement procedure.	N/a	N/a	N/a
				O	L	N/a	Maintain the procedure developed at the construction stage	N/a	N/a	N/a

Impact	Direction	Receptor	Receptor Sensitivity	Stage	Impact significance	Risk Significance	Mitigation measures	Residual significance		
								Likelihood	Impact Rating	Risk Rating
Implementation of social investment programmes	P	Communities within the Project social area of influence, population of Zafarobod district in general	M	O	L/M	N/a	Development of Social Investment Framework is advisable	N/a	N/a	N/a
Support to construction sector of Uzbekistan	P	Businesses involved into construction activities and their potential employees	M	O	M	N/a	Not required	N/a	N/a	N/a
Labour and Working Conditions										
Risks associated with contractors' engagement	N	Project workers	H	C	N/a	M/Mr	Ensuring (sub)contractors comply with requirements of the RK labour law and applicable international requirements, including: • Development of the Project HR Policy; • Incorporation of appropriate provisions into contractors' management procedures and the agreements; • Establishing a system of inspections/audits; • Development of a system of monitoring and reporting on labour relations and working conditions; Development and implementation of grievance mechanism for personnel, contractors.	L	N/a	Mr
				O	N/a	I		NS	N/a	I
Risks associated with provision of accommodation services to Project workers	N	Project workers	H	C	N/a	M	Ensuring provision of accommodation services in accordance with national requirements and international best practice, including development of Accommodation Management Plan; Development and implementation of grievance mechanism for personnel, including contractors.	L	N/a	Mr
				O	N/a	M		L	N/a	Mr

Impact	Direction	Receptor	Receptor Sensitivity	Stage	Impact significance	Risk Significance	Mitigation measures	Residual significance		
								Likelihood	Impact Rating	Risk Rating
Occupational Health and Safety										
Occupational health and safety risks	N	Project workers	H	C, O	N/A	H	A set of measures in the following fields shall be implemented: • General health and safety management system • Overhead Hazards • General Safety • Health Hazards • Working at Height • Working at Heights – Scaffolds • Mechanical Lifting • Safety of Quarrying Activity • Cement Dust • Machine Guarding • Confined Spaces • Onsite vehicles Development of the Emergency Response Plan	M	N/A	M
Community Health and Safety										
Safety risks associated with construction	N	Local residents, agricultural workers and cattle	M	C, O	N/a	H	• Protective barriers and fences with warning signs will be provided at the construction sites; • Security personnel shall be provided at the main construction sites and/or regular patrol inspections shall be arranged in the area to prevent unauthorized access; • In case of hazardous works, warning signs shall be provided with indication of planned place and time of such works. The signs shall be installed at a safe distance from the facilities under construction, as well as along the access roads to prevent unauthorised access. During blasting works, the Project workers should be present at a safe distance at the areas of likely presence of the local	L	N/a	Mr

Impact	Direction	Receptor	Receptor Sensitivity	Stage	Impact significance	Risk Significance	Mitigation measures	Residual significance		
								Likelihood	Impact Rating	Risk Rating
							land users to prevent them from accessing the safety area; • Local residents and agricultural organisations shall be informed on the time and place of construction activities and blasting works well in advance; The functioning grievance mechanism shall also provide timely identification of any issues related to safety of local communities.			
Community health impacts caused by construction noise, vibration and air emissions	N	Local residents, agricultural workers and cattle	M	C, O	N/a	M/Mr	Mitigation measures associated with construction noise, vibration and air emissions are outlined in Chapter 9.	L	N/a	Mr
Stress impact	N	Local residents, agricultural workers and cattle	M	C, O	N/a	H	• Protective barriers and fences with warning signs will be provided at the construction sites; • Security personnel shall be provided at the main construction sites and/or regular patrol inspections shall be arranged in the area to prevent unauthorized access; • In case of hazardous works, warning signs shall be provided with indication of planned place and time of such works. The signs shall be installed at a safe distance from the facilities under construction, as well as along the access roads to prevent unauthorised access. During blasting works, the Project workers should be present at a safe distance at the areas of likely presence of the local land users to prevent them from accessing the safety area; • Local residents and agricultural organisations shall be informed on the time and place of construction activities and blasting works well in advance; The functioning grievance mechanism shall also provide timely identification of any issues related to safety of local communities.	N/a	L	N/a
Traffic										

Impact	Direction	Receptor	Receptor Sensitivity	Stage	Impact significance	Risk Significance	Mitigation measures	Residual significance		
								Likelihood	Impact Rating	Risk Rating
Safety risks associated with traffic movements	N	Local and region's residents, agricultural workers and cattle, road users	H	C, O	N/a	M/ H	• The Company will develop Traffic Management Plan (TMP) and will oblige contractors to develop such plans or comply with the Company's TMP provisions. This TMP should be based on existing procedures of Huaxin Cement regulating traffic-related issues; • The Company will seek to maximize the use of the rail network for bulk deliveries and abnormal loads to minimize road traffic; • Delivery hours to reduce noise nuisance will be restricted (in particular, avoiding heavy truck movements during the night hours and holidays); • The Company will consider whether deliveries should be scheduled to avoid peak times to reduce congestion (unlikely for the local conditions) and the risk of incidents as well; • Local communities and agricultural organisations should be informed on the time and place of construction activities, as well as on the relevant traffic in advance; • The Company will consider establishment of road signs warning on cattle crossing the road; • The Company will consult local agricultural organisations/ local authorities to identify availability of specific herding routes to arrange adequate crossing points where herders and their cattle can safely cross the access road (if required). • Mandatory pre-trip examinations of drivers shall be practiced (including check for potential signs of alcohol of drug intoxication); • The Company and contractors will adopt a policy of zero tolerance in relation to alcohol consumption, with immediate termination of employment contract in case of violation; • Drivers' training will be performed to inform them on the relevant speed limits and traffic safety risks (such as presence of road users like children and elderly, potential	L	N/a	M/ Mr
Deterioration of road quality	N	Local and region's residents, agricultural workers and cattle, road users	M	C, O	M	N/a		N/a	L	N/a
Traffic impacts associated with noise, dust and vibration	N	Local and region's residents, agricultural workers and cattle, road users	H	C, O	H	N/a		N/a	L	N/a

Impact	Direction	Receptor	Receptor Sensitivity	Stage	Impact significance	Risk Significance	Mitigation measures	Residual significance		
								Likelihood	Impact Rating	Risk Rating
							roads' crossing by cattle, etc.); • The Company and contractors will regularly monitor compliance with safe driving practices (monitoring measures will be provided as part of the TMP); • Road maintenance works should be performed in case of the public roads' deterioration due to the construction traffic movements; The functioning grievance mechanism shall also provide timely identification of any issues related to safety of local communities.			
Migration Flow										
Increased load on social (medical) infrastructure	N	Residents of Zafarobod district/ Jizzakh	M	C, O	N/a	Mr	• Liaison with medical institutions on the issues related to their capacity and potential additional load created by the Project personnel, especially in relation to specific medical services that are not available at onsite clinic provided by the Project; • Development and implementation of local recruitment procedure and local procurement procedure in order to, inter alia, help reduce potential load on local healthcare infrastructure; Introduction of an external grievance mechanism in order to facilitate collection of comments and complaints regarding load on medical institutions due to their use by the Project workers.	NS	N/a	I
Inflation (growth of prices for vital goods and services)	N	Residents of Zafarobod district	M	C, O	N/a	Mr	• Provision of sufficient accommodation facilities with necessary living conditions, leisure opportunities, medical center, shop, barbershop, etc. in order to prevent the workers from visiting local communities and from residing in local settlements; The Project will ensure comfortable transportation of workers from the assembly point to the Project accommodation facilities and/or work sites in order to avoid workers travelling via local public transportation.	NS	N/a	I

Impact	Direction	Receptor	Receptor Sensitivity	Stage	Impact significance	Risk Significance	Mitigation measures	Residual significance		
								Likelihood	Impact Rating	Risk Rating
Potential conflicts between in-migrants and local communities	N	Local residents and agricultural workers	H	C, O	N/a	M	• Development and implementation of the Personnel Code of Conduct which will include, inter alia, the following aspects: o Respect and polite attitude to the local communities; o Prevention of harm to local residents, their property and local environment; o Neutral attitude and non-involvement in any situations which may lead to potential conflict; o Prohibition of hunting, fishing and gathering of wild crops; o Prohibition of pet keeping, including dogs; o Respect to cultural heritage of the local population; o Zero tolerance policy in respect of alcohol consumption by the shift workers; • Provision of sufficient accommodation facilities with necessary living conditions, leisure opportunities, medical center, shop, barbershop, etc. in order to prevent the workers from visiting local communities; • The Project will ensure comfortable transportation of workers from the assembly point to the Project accommodation facilities and/or work sites in order to avoid workers travelling via local public transportation. • Provision of induction training for personnel of the Company and contractors on the issues of interaction with local communities; Introduction of an external grievance mechanism in order to facilitate receipt of information on conflicts between Project workers and local residents and timely response to such incidents.	L	N/a	Mr
Potential spread of infection diseases	N	Local residents	H	C, O	N/a	M/Mr	• Development and implementation of the Personnel Code of Conduct (see above); • Development and implementation of Accommodation Camp Management Plan. The accommodation camp will have the check-in/check-out system implemented to prevent of non-workers trespassing and loitering, thus limiting interactions of the workers with local residents.	L	N/a	Mr

Impact	Direction	Receptor	Receptor Sensitivity	Stage	Impact significance	Risk Significance	Mitigation measures	Residual significance		
								Likelihood	Impact Rating	Risk Rating
							The camp will also be self-sufficient (see Section 10.3 for details); • Training courses will be provided to raise personnel awareness on the risk of sexually transmitted diseases (particularly HIV/AIDS), tuberculosis, and on availability of confidential consultation services at the medical center(s) – particularly when an infection is suspected; • Information on the specific healthcare clinics providing sexual health testing will be communicated to workers; • Condoms will be available to the workforce on open access at the on-site medical center(s) where any worker may take it anonymously.			
Behaviour of Security Personnel										
Impacts associated with behaviour of security personnel	N	Local agricultural workers and their families, Company's and contractors' personnel	M	C, O	L/ M	N/a	• Measures to prevent unauthorized access to the areas of construction and operation sites (fences, entrance check points, etc.); • Development of a Security Policy (based on existing procedures of the Company) to describe the key principles of security service operation and behaviour of security personnel; • Development of job descriptions for security personnel; • Provision of training for security personnel on compliance with applicable requirements; Functioning grievance mechanism may also facilitate receipt of information and complaints regarding behaviour of the security personnel.	N/a	L	N/a
Land Use										
Land use impacts associated with development of the Cement Plant and the limestone mining area	N	Local agricultural organisations and land users	H	C	N	N/a	• Development of Resettlement and Livelihood Restoration Framework (and of the subsequent Resettlement and Livelihood Restoration Plan). This document will: o Clarify the number of affected land users and households by each associated facility;	N/a	N	N/a
				O	M	N/a		N/a	L	N/a

Impact	Direction	Receptor	Receptor Sensitivity	Stage	Impact significance	Risk Significance	Mitigation measures	Residual significance		
								Likelihood	Impact Rating	Risk Rating
Land use impacts associated with construction of the access motor road and accommodation camp	N	Local agricultural organisations and land users	H	C	H	N/a	o Clarify whether any resettlement activities are anticipated; o Seek to clarify the land acquisition activities performed by the government agency, including relevant compensations provided; o Define engagement activities with the affected land users and residents; o Define entitlement framework; o Regulate provision of compensation payments and performing livelihood restoration activities as appropriate; o Establish grievance mechanism; • Specific measures for the access motor road (in addition to development of the Resettlement and Livelihood Restoration Framework): o Consider establishment of road signs warning on cattle crossing the road; o Consult local agricultural organisations / local authorities to identify availability of specific herding routes to arrange adequate crossing points where herders and their cattle can safely cross the access road (if required). Appropriateness of these measures is to be defined based on discussions with the land users and authorities.	N/a	L	N/a
				O	H	N/a		N/a	L	N/a
Land use impacts associated with construction of the access motor road and accommodation camp	N	Local agricultural organisations and land users	H	C	H	N/a		N/a	L/M	N/a
				O	H	N/a		N/a	N/L	N/a
Cultural Heritage										
Impacts on tangible cultural heritage (potential physical loss or damage of identified objects)	N	General population of the Project social area of influence, scientific community	M	C, O	L/M	N/a	• Development and implementation of a Chance Finds Procedure to be followed by personnel of the Company and contractors in case of identification of potential cultural heritage object; • Notifying organisations constructing Project associated facilities on the Chance Finds Procedure and provision them relevant brochures; Development and implementation of the Workers Code of Conduct.	N/a	N	N/a

Impact	Direction	Receptor	Receptor Sensitivity	Stage	Impact significance	Risk Significance	Mitigation measures	Residual significance		
								Likelihood	Impact Rating	Risk Rating
Impacts on intangible cultural heritage (potential disturbance of local cultural traditions, lifestyle, etc.)	N	General population of the Project social area of influence, scientific community	M	C, O	N	N/a	Not required (negligible or zero impact)	N/a	N	N/a

15.2 Recommended Further Steps

There is a number of areas that Ramboll recommends further study in order to understand environmental impacts and the mitigation measures that will be necessary to manage potential impacts that may arise from the future operations of Huaxin Cement plant and associated facilities. These include:

- Surveys of flora and fauna in the limestone concession at the cement plant during the wet season. This is also valid for the project AOI. These should be scheduled to occur in wet season, preferably in March 2020;
- Carry out a hydrogeological investigation to determine the sustainability of the expanded Project's water use and effect on existing users and evaluate quality of groundwater;
- Develop Construction and Operation Environmental and Social Management (CMP and OPM, correspondingly) and Monitoring Plan (for "umbrella" main contractor engaging several subcontractors) as well as CMPs and OPMs for specific project activities;
    - Waste Management Plan for construction and operation phases;
    - Wastewater Management Plan including arrangements for surface run-off and snowmelt water management;
    - Air Quality Control Plan (operation);
    - Traffic Safety Plan (construction);
    - Operational Health and Safety Plan;
    - Construction Workforce Accommodation Management Plan (if needed);
    - Site Personnel Code of Conduct (also applicable to contractors' personnel).
- Develop a Resettlement and Livelihood Restoration Framework (and of the subsequent Resettlement and Livelihood Restoration Plan). This document should:
    - Clarify the number of affected land users and households by each associated facility, the status of acquired land plots, etc. (in collaboration with land bureaus, Investment Department and International Trade of Jizzakh Region or other relevant bodies);
    - Clarify whether any resettlement activities are anticipated;
    - Seek to clarify the land acquisition activities performed by the government agency, including relevant compensations provided;
    - Define engagement activities with the affected land users and residents;
    - Define entitlement framework;
    - Regulate provision of compensation payments and performing livelihood restoration activities as appropriate;
    - Establish grievance mechanism;
- Develop a Stakeholder Engagement Plan, including:
    - Identification of Project stakeholders;
    - Provision of summary of completed stakeholder engagement;
    - Development of the engagement plan (including information disclosure and consultations);
    - Establishment of grievance mechanism;
    - Specifying monitoring and reporting arrangements, etc.