KAZAKHSTAN

KARAGANDA WWTP MODERNISATION PROJECT

NON-TECHNICAL SUMMARY

February 2024

SWECO in cooperation with EcoSocio Analysts

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LIST OF ACRONYMS AND ABBREVIATIONS

AD	Anaerobic Digestion
CESMP	Contractor Environmental and Social Management Plan
EBRD	European Bank for Reconstruction and Development
EHS	Environmental, health and safety
EIA	Environmental Impact Assessment
ESAP	Environmental and Social Action Plan
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
EU	European Union
EUR	Euros
E&S	Environmental and Social
FS	Feasibility Study
GHG	Green House Gas
H&S	Health and Safety
KS	Karaganda Su
OHS	Occupational health and Safety
PAI	Project Area of Influence (PAI)
PR	Performance Requirement of EBRD
SEE	State Environmental Expertise
WW	Wastewater
WWTP	Wastewater Treatment Plant

1 PROJECT DESCRIPTION

The European Bank for Reconstruction and Development (the “EBRD” or the “Bank”) is considering providing finance to Karaganda Su (“KS” or the “Company”), a partially city-owned company providing water supply, and wastewater management in Karaganda City. The finance will be used for construction of a new wastewater treatment plant (WWTP) and associated infrastructure (the “Project”).

This Non-Technical Summary (NTS) presents the results of the Environmental and Social Impact Assessment (ESIA) of the proposed Project. It also summarizes mitigation and management measures to effectively mitigate the negative impacts of the Project and to enhance the positive impacts.

Karaganda City is located in the north-eastern part of Kazakhstan and is the administrative centre of the Karaganda Region.

Figure 1-1 Location of Karaganda City in north-eastern Kazakhstan

A consultancy team from Sweco Danmark and the Kazakhstani company EcoSocio Analysis (the “Consultant”) was engaged by EBRD to conduct a scoping process to identify key environmental and social issues related to the proposed Project and carry out the subsequent Environmental and Social Impact Assessment (ESIA) of the proposed Project.

A Feasibility Study (FS) with a preliminary design of the new WWTP was prepared by the local design agency Aquarem and presented in June 2023. The proposed new WWTP is to serve a population of nominally 500,000 and have an average influent wastewater capacity of 100,000 m^3/day, and a maximum daily capacity of 130,000 m^3/day. This project proposal forms the basis for the ESIA.

The Project comprises the following key infrastructure components:

- Construction of a new WWTP based on activated sludge technology and with design capacity of 100,000 m^3/day average flow and 130,000 m^3/day peak daily flow (500,000 P.E.) compliant with national and EU standards for urban wastewater treatment.

- Anaerobic Digestor (AD) line capacity to treat sludge from the WWTP process via primary and secondary digestion resulting in on average 22,000 m^3 biogas/day and output of approx. 100 t/day dewatered digested sludge for further drying (Aquarem estimate). Following drying, this results in an estimated final treated and dried sludge quantity of approx. 50 tons/day (at 50% dry solids), which can be used as fertilizer or other land rehabilitation.
- A combined heat and power (CHP) facility to produce heat and electricity from biogas generated by the AD facility, with estimated *approx*. 66,000 kWh/day thermal energy and 50,140 kWh/day electric energy. The power generated by the CHP will be used at the WWTP site (Aquarem estimate).

The Project will be implemented in line with the national and EU standards for wastewater treatment, EU requirements for sewage sludge management, EU BAT requirements for such facilities and EU taxonomy. Once implemented, the project will also lead to a reduced level of odour.

Relocation of parts of the existing 35kV and 6kV overhead power lines that are located on the proposed land extension (12.75ha) for the new WWTP will also be required. The overhead lines are planned to be relocated along the perimeter of the new WWTP and consists of both overhead powerlines and underground cables. It is understood that this component will be implemented by the regional electric company that manages the power grid (not known how costs will be shared) and is considered an 'associated facility' of the proposed Project.

Selected characteristics of the Project in terms of timing and scope are summarised in Table 1-1 below.

Table 1-1: Summary of key project characteristics

Key project characteristics	
Project proponent	Karaganda Su (KS)
Estimated investment cost (CAPEX)	USD 175.7 million (KZT 78,559,378,638), *incl.* VAT. *Exchange rate as in May 2023: 447 KZT = 1 USD.*
Design capacity for WW treatment	500,000 PE, 100,000 m^3/day average and 130,000 m^3/day peak
Start and duration of construction phase	Planned construction start in June 2024. Duration of construction 36 months.
Estimated commission date of new WWTP	June 2027
Design lifetime of new WWTP	50 years (Civil works) 15 years (Mechanical works)
Number of staff during construction	100
Number of staff during operation	50
Estimated gross power consumption at full operation capacity (MWh/year)	17,000

The Feasibility Study proposed:

- The use of modern energy-saving technologies and more advanced equipment for wastewater treatment.
- Implementation of the Project would significantly reduce the amount of wastewater pollution and improve the quality of wastewater suitable for irrigation.
- Improvement of the sanitary and epidemiological well-being of the city's population.

The purpose of the new Karaganda wastewater treatment plant is:

1. To produce a treated effluent that is EU-compliant and meeting discharge standards for disposal to the receiving waters.
2. To produce a stabilized sludge suitable for reuse or final disposal.

Due to the sensitivity of the receiving waters (Sokur River, Intumak dam and Nura River) and the strict discharge standards for the WWTP, the treatment process is designed for biological nutrient removal, with EU-compliant treatment of the entire flow of wastewater. The new WWTP should have at least two separate parallel processing lines to facilitate maintenance, and the main elements of the mechanical equipment must have redundant capacities.

2 BACKGROUND

2.1 Rationale of the Project

The city of Karaganda (the "City") has a population of *approx.* 503,000. The existing WWTP was constructed in 1979 on a 49 ha site *approx*. 5 km to the south-west of the City and is therefore over 40 years old.

Figure 2-1: Location of the existing Karaganda WWTP in Karaganda (Source: Google Earth)

The WWTP collects wastewater (WW) from the city, where approx. 93% of the population is directly connected to the treatment plant via sewers. While the WWTP was designed for a maximum hydraulic capacity of 232,000 m^3/day, the actual average daily inflow to the plant has been reported to be approximately about 95,000 m^3/day. The treated effluent from the Karaganda WWTP is discharged via a channel to the Sokyr River. The Sokyr river flows westwards to the Intumak Dam/Reservoir also located in the Karaganda region. Hence, the Project is not considered a source of transboundary impacts.

The existing WWTP infrastructure has received limited maintenance and is therefore in a poor state of repair. Additionally, the mechanical and electrical equipment of the existing Karaganda WWTP is in poor condition and does not treat wastewater fully to required levels. The existing treatment plant has four treatment lines in parallel, with three lines of biological treatment in a state of disrepair due to the wear of prefabricated reinforced concrete structures of partitions and walls. Due to the discontinuation of processes aligned with the original design of the WWTP, a foul odour emanates from the WWTP when removing sludge and causes reduced wellbeing for nearby residents.

Currently, the effluents from the existing WWTP are of reasonably good quality with regards to BOD, COD and SS, complying with EU effluent standards, but exceed the EU requirements for nitrogen and phosphates. However, the existing WWTP does not meet the strict national maximum permitted discharge standards for BOD, COD, and ammonium nitrogen.

With EBRD involvement, it will also need to treat WW in line with international standards (EU Urban Wastewater Treatment Directive). It is therefore necessary to modernise wastewater treatment in Karaganda to meet both national and EU standards for effluent quality.

2.2 Current environmental and social situation and considerations

2.2.1 Project area

The spatial boundaries of the ESIA comprise the geographical area that is potentially affected by the Project, also referred to as the Project Area of Influence (PAI) and reflects the types and geographical scope of potential environmental and social risks and impacts. The key areas that may be directly affected by project activities (Area of direct influence), and thus falling within the scope of the ESIA, include:

1) The **WWTP site** and adjacent area where physical and biological impacts (such as odour, noise, contamination, etc.) can be felt, including areas used for sludge management.
2) **Main roads to and from the WWTP site**, where heavy transport can be a source of impacts.
3) **Inhabited areas** close to the WWTP site.
    - Kir-zavod 3-4 (approx. 800 m on the north side of WWTP) has approx. 83 houses.
    - Proizvodstvennaya Street (approx. 505m north-east of the proposed WWTP site), two houses in close proximity to the WWTP.
    - Railway junction 737 (approx. 530m on the east side of proposed WWTP site), where residents have a clear view to the WWTP; 34-40 families live in 17-20 houses.
    - Fedorovka micro district
4) **Waterways** downstream from the WWTP, where effluents are discharged and impacts on water quality may be felt, including sedimentation ponds (bioponds), the discharge channel at the south of the existing WWTP and the Sokur River (considered approx. 500m above and 2,500m below the discharge point of the discharge channel to the river).
5) **Arable and horticulture areas** using either treated effluent water for irrigation and/or sludge or digestate from the WWTP.

The PAI informs the ESIA study area for the proposed project and consists of the above key features reflected in Figure 2-2 below.

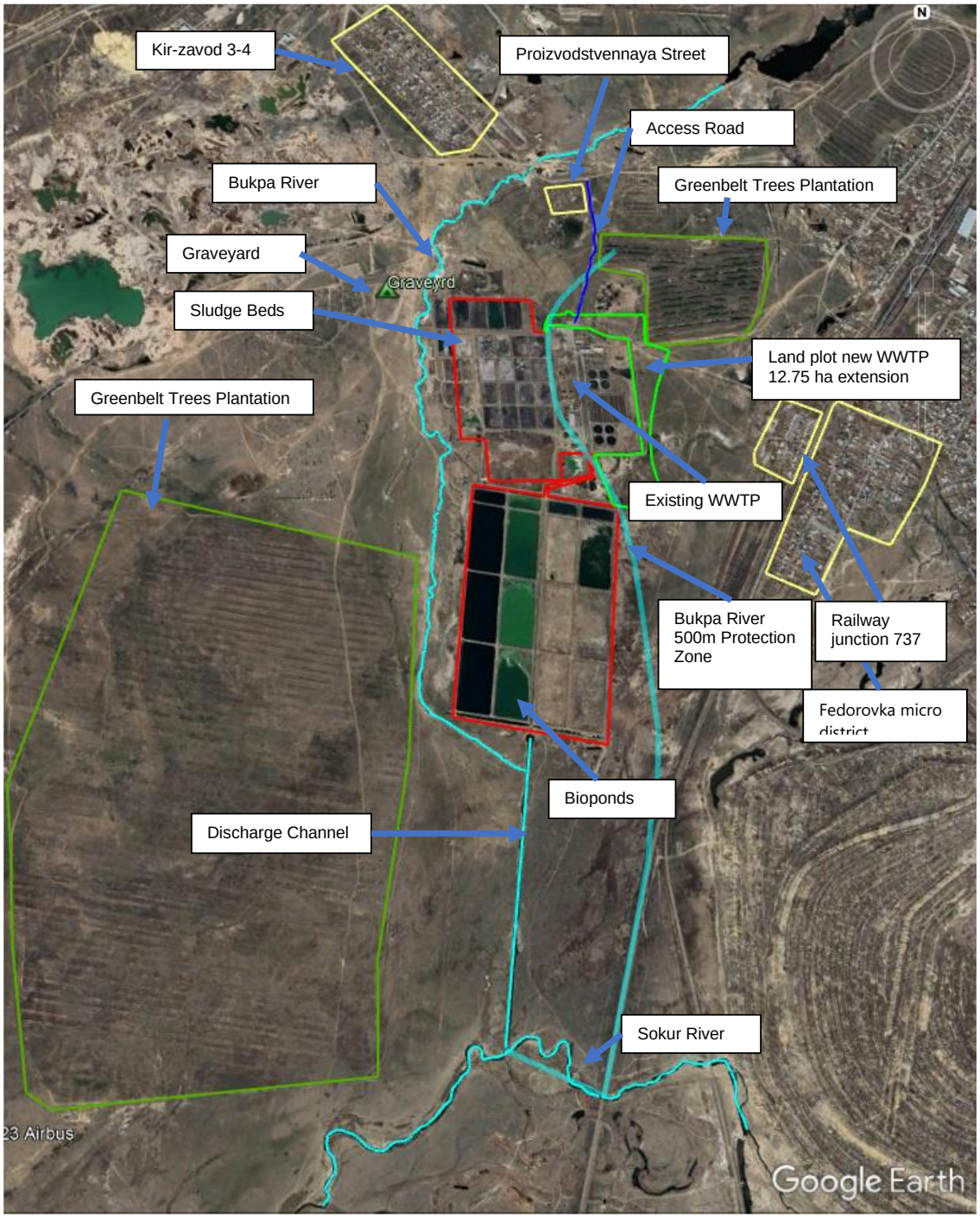

Figure 2-2: The project area of the proposed WWTP Project, consisting primarily of the existing and new WWTP sites, sludge management sites, the discharge channel to the Sokur River, the Bukpa River and associated protection zone, greenbelt forests, houses and settlements in the vicinity of the Project (nearest settlements marked with yellow lines). (Map source: Google Earth).

2.2.2 Environmental situation

The Environmental and Social Assessment has considered the aspects of the physical and natural environment that are likely to be affected by the proposed Project.

The proposed WWTP site will partly overlap with the existing WWTP site, but this will need to be extended 100m to the east. The topography of the existing and the new WWTP site is characterized by relatively flat terrain with a slight incline. Overall, Karaganda experiences very cold and windy winters with a fast transition to hot summers. The climate varies substantially from year to year. Although seasonal and annual variations make it difficult to conclude on climate change trends for Karaganda, the available data indicates that the region is considered likely to experience increasing temperatures within all seasons, as well as increase in precipitation within all seasons.

There are no significant natural surface bodies within the WWTP site. The nearest natural surface bodies are the Bukpa river to the west from the sludge ponds (and dry during winter) and the Sokyr river which is located >2km to the south. The WWTP sludge ponds and bioponds are the significant surface water bodies closest to the WWTP site. Unconfined groundwater appears to be at a relatively shallow depth of 1.4-1.8m depth in September-October and March but may rise to 0.3-0.4m in the beginning of May. It is replenished by thaw and rainwater and presumably by wastewater from the WWTP bioponds, as well as sedimentation and aeration tanks that may be leaking. There are some depressions within the WWTP site which carry thaw water and groundwater throughout the year. The presence of continuous regional clay seal everywhere but under the existing sludge beds that inclines towards the river, protects the deeper aquifer from potential contamination.

The bioponds have the function of a tertiary treatment as they receive and retain effluent water from the secondary sedimentation tanks of the WWTP. The effluents from the WWTP are of reasonably good quality.

The Sokyr river is the final receptor for treated effluents from the WWTP. It has relatively low water flow and hence has limited capacity to dilute large amounts of polluted water and should be considered sensitive in the context of the EU urban WWTP directive. The river is already a subject of various anthropogenic impacts in the form of both water extraction and discharge upstream and downstream. It is classified as class 5 according to the Unified system of classification of water quality in the water bodies.

The Bukpa river runs adjacent to the west of the existing WWTP from the north to the south and is as such not affected by the existing or proposed WWTP. However, the river joins the discharge channel from the WWTP bioponds and potential pollutants in the river are therefore discharged into the Sokyr river at the same location as the WWTP effluents.

Karaganda Su does not monitor the ambient air quality at the WWTP site but due to its location on the outskirts of the city, the air quality is assumed to be better at the WWTP than in Karaganda City.

The main source of impacts from the current WWTP is odour. This is already a significant issue and a leading cause of nuisance and reduced wellbeing in the inhabited areas closest to the WWTP. Hence, air quality in relation to odour is considered of high sensitivity, with low capacity to accommodate further negative impacts.

The main vegetation area directly affected by the Project is the proposed WWTP, comprised of approximately 12.75 ha that will be transformed into an industrial (WWTP) area, as well as the relocation of power lines on the periphery of the WWTP site. The area is characterised by a significant anthropogenic impact on vegetation, with the dominant species being weeds, such as Austrian wormwood and southern wormwood. No rare or protected species were identified during flora surveys in June 2023. However, the habitat could be suitable for protected ephemerals and ephemeroids (which have a life cycle that begins immediately after snowmelt) and the presence of these species has not yet been ruled out.

The proposed WWTP site is not diverse in fauna and no mammals and reptiles, their tracks, borrows, excrements or food remains were noted during the fauna survey in June 2023. 48 bird species were observed during the survey, around the existing and proposed WWTP site, sludge ponds, bioponds and associated discharge channel to the Sokyr river. Six species with IUCN status as either vulnerable (VU) or near threatened (NT) were seen in the biopond area and one of these (Northern Lapwing, NT) also around the sludge beds. Additional one species (two individuals) registered in the Kazakhstan red book (Demoiselle Crane, V) was seen in the biopond area. The biopond area will not be affected by the project. No rare or threatened species were found within the site directly impacted by WWTP infrastructure.

An aquatic benthic fauna study conducted in the Sokyr river indicates that the river has homogenous environmental conditions and is characterised by the low flow of the river, which appeared stagnant in places. Hence, the predominant species are Oligochaete worms and Chironomid mosquitoes, which are adapted to low oxygen and high organic matter environments. Species diversity is lowest at the surveyed baseline point, but increases somewhat further downstream, which is somewhat surprising and the reasons for which are unknown (could be measurement error at the baseline, or that increased river flow from effluents originating from the bioponds somehow enables higher species diversity).

2.2.3 Socio-economic situation

Karaganda City is divided in two districts and a number of smaller micro-districts and has a population of 502,964 (2022). The city has experienced a relatively low growth rate in the previous decade, with an average growth rate of 0.53% per annum between the years 2011-2022. In 2022, approx. 47.63% of the population in Karaganda city were of Kazakh origin, while the majority of the remaining population were of Russian origin.

The city's total unemployment rate was 5.1% in 2022, with a higher rate for women (6.3%) than for men (3.9%). Similarly, the youth unemployment rate was significantly higher for women (6.5%) than for men (3.6%). In 2022, 3.8% of the population in Karaganda Region lived below the official subsistence level, which is defined as the minimum level of income to buy food and goods but may not include payment for services such as utility bills.

In 2022, 34,450 persons in urban areas of Karaganda Region (including Karaganda City) were engaged in the construction sector, which constituted 8% of the total workforce and is slightly higher than the percentage of the workforce in Karaganda Region (6.7%) and at national level (7.3%). Industry (mining and manufacturing) was the economic sector in urban and all areas of Karaganda Region that employed the highest percentage of the workforce (22.7% and 24.6%, respectively), which is significantly higher than the percentage engaged in this sector at national level (12.4%).

The social setting of the Project in terms of community-level stakeholders and their distances to WWTP operations is set out in the table below.

Table 2-1: Industries located within a radius of 1-2 km from the new WWTP.

Name of Industry	Main Production	Distance to New WWTP Area
IP "MetalWork"	Metalworking, providing services for the manufacture, repair, and processing of metal products (Source: metal-work.kz).	1 km east of the new WWTP area
Karaganda Boiler Plant LLP	Production of highly efficient automated long burning boilers (Source: kotlyzavod.kz).	1.3 km east of the new WWTP area
Kurylysmet LLP	A subsidiary of ArcelorMittal Temirtau JSC. Repair of mining and transport, electrical equipment. Production and repair of spare parts (Source: https://shymkent.hh.kz/employer/3805439).	1.4 km east of the new WWTP area.
Common Market Corporation	Transport company (Source: https://www.common.kz/main.php?mod=about-hist).	1.4 km east of the new WWTP area

Name of Industry	Main Production	Distance to New WWTP Area
Keratek brick factory	Production of ceramic bricks and ceramic stone (Source: http://www.fasad-optima.kz/kirpich-stroi-keratek.html).	2.2 km north-west of the new WWTP area
KarPlaz	Production of metal products, non-standard equipment (Source: https://kz.orgpage.ru/karaganda/karplaz-too-2631425.html).	1.3 km east of the new WWTP area

There are no registered historical and cultural heritage sites at or close to the proposed site of the new WWTP.

The new WWTP is planned to be constructed east of the existing WWTP, located partly within the existing WWTP site and partly within a 12.75 ha extension of the site towards the east from the existing site. The 12.75 ha land allocated to the new WWTP consist of two plots of land, a plot of 9.1555 ha with the cadastral number #09-142-176-057, and a plot of 3.8 ha with the cadastral number #09-142-176-058. Both land plots are state-owned land. According to the city Land Management Department the land is not under any lease agreement. The Karaganda City Akimat issued Resolution No. 30/29 on 5 April 2023 to grant the Department of Housing and Communal Services, Passenger Transport and Highways of Karaganda City the right to use the land for #09-142-176-057, while a resolution is still pending for plot #09-142-176-058.

2.3 Project development and planning

A range of Project alternatives were considered in the process leading up the proposed WWTP design. These are summarized in the table below.

Table 2-2: Project alternatives considered

Aspect	Option	Outcome/ Chosen option
Renovate parts of the existing WWTP vs. build an entirely new WWTP	1. Rehabilitation of the existing WWTP and expansion with a new parallel treatment line 2. Brand new WWTP to service the whole population of Karaganda.	Brand new WWTP to service the whole population of Karaganda
Wastewater treatment technology	1. A2O process (Anaerobic-Anoxic-Oxic) 2. Johannesburg process 3. Modified UCT process.	Modified UCT process selected.
Sludge treatment technology	1. Anaerobic sludge digestion with production of biogas for combustion in a Combined Heat and Power plant for production of electricity. 2. Sludge dewatering, drying and combustion; however, no biogas production for electricity generation.	Anaerobic digestion of the sludge with biogas production and combustion.
Use of generated sludge	1. Sludge re-use for agricultural purposes 2. Sludge storage on-site (at the WWTP site) or at a long-term storage facility with opportunity for re-using some of the sludge for horticulture or land rehabilitation uses. 3. Long-term disposal at landfill.	Utilising the digested sludge from the WWTP as fertiliser. An area has been proposed for short term storage of sludge within the WWTP site, prior to collection for land application. However, a detailed plan for sludge reuse and alternatively disposal needs to be developed.

Aspect	Option	Outcome/ Chosen option
Use of existing sludge beds	1. Leave the ponds and allow the sludge to completely dry, and in the long-term, remove the sludge. 2. Decommission ponds and rehabilitate the land for other use. 3. Maintain a small number of ponds for emergency use.	Use of the existing sludge ponds as a standby in emergency situations. Rehabilitation or other works on the sludge beds are not foreseen or planned yet.
Decommissioning of the existing WWTP	1. Retain the existing works for emergency situations. 2. Demolition of existing works.	Demolition of certain components of the existing WWTP, whilst other parts will be kept for use in emergency situations.

3 PROCESS

3.1 National environmental approval process for new WWTP

In accordance with national law, an EIA must be carried out for the proposed WWTP by a company licensed to perform such assessments in Kazakhstan[1]. An EIA is mandatory for a WWTP with a capacity of 30,000 m^3 per day or more, which applies to the Karaganda Project. The correlation between project design stages and corresponding EIA stages is summarized in Table 3-1 below.

In parallel with the feasibility study (FS), Aquarem and the associated local EIA consultant (EcoMusey) have prepared a Preliminary Environmental Impact Assessment (EIA) which was submitted to the State Environmental Expertise (SEE) in December 2023. The FS, with preliminary design by Aquarem, has been approved by KS and delivered to the SEE for review.

To progress to the next stage of the project design, the Preliminary EIA has to be approved by the SEE. If the positive SEE conclusion on the Preliminary EIA does not recommend further environmental work, such approval is considered final. However, if the results of a Preliminary EIA or analogies show that impacts from the projected development are likely to be considerable or uncertain, then the SEE recommends performing a full EIA.

Hence, no official project approval has been obtained from the SEE to date. These are expected in about a month from delivering the EIA, if approved by SEE.

Table 3-1: Correlation between the environmental and engineering stages during design

EIA stage	Engineering stage
Preliminary EIA	Feasibility Study (pre-design documentation)
Full national EIA	Technical/detailed design documentation

At the EIA stage, construction pollution is calculated using the proposed personnel, machinery, and material specifications. Composition of EIA reports can differ between large complex and small benign developments. For the Karaganda WWTP Project, all maximum permitted pollution calculations are to be presented in the SEE approved EIA. These calculations are required to obtain an Emissions Permit. The positive conclusion on an EIA by SEE acts as a permit for the calculated pollution. A sanitary protection zone will be established according to the Sanitary-Epidemiological requirements based on calculation of emissions, discharges, and waste volumes.

[1] The national Law on Permissions and Notifications No. 202-V, dd 16 May 2014

The authorities must be informed about any changes in the project approved by the SEE that may affect the environment. The project will not require a second review as long as re-calculated volumes of the used resources, pollution and waste disposal do not exceed the earlier permitted amounts and the level of negative impacts do not increase.

3.2 International ESIA Process

The ESIA should follow a report format consistent with the EU EIA Directive, and should address the concerns of all EBRD's Performance Requirements (PRs), e.g., projects involving involuntary resettlement (PR5), risks to biodiversity (PR6), impacts on cultural heritage (PR8) will require an assessment in accordance with the respective PR. The ESIA shall include an analysis of reasonable alternatives, in terms of project location, technology, size, scale and design.

Category A projects, like the WWTP Project in Karaganda, require EBRD's Client – in this case KS – to carry out a formalised, participatory disclosure and consultation process which will be built into each stage of the ESIA process, considering the stage of project development. This process involves organised and iterative consultation leading to the client's incorporating, into their decision-making process, the views of the affected parties on matters that affect them directly.

The Client is to engage in a scoping process with identified stakeholders at an early stage of the ESIA process to ensure identification of key risks and impacts to be assessed as part of the ESIA. The Client will publicly disclose draft documents from the ESIA process, enabling everyone to provide comments on the draft documents. The public disclosure period is 120 calendar days.

4 SUMMARY OF ENVIRONMENTAL AND SOCIAL BENEFITS, POTENTIAL ADVERSE IMPACTS, MITIGATION AND MANAGEMENT MEASURES

The ESIA has assessed the potential environmental and social (E&S) impacts of the proposed Project to construct a new WWTP to replace the existing WWTP in Karaganda City. The location of the site of the new WWTP, which overlaps with and is partially immediately adjacent to the existing WWTP, is considered appropriate as it allows for continued use of key inflow and outflow piping infrastructure. Furthermore, the new WWTP will be located >500m from the nearest residential area and does not require changes in the current sanitary protection zone (SPZ).

The overall impacts of the proposed WWTP Project are assessed to be positive. There are no significant negative impacts expected after successful implementation of mitigation measures included in the Environmental and Social Management Plan (ESMP) for the Project. This applies to both environmental and socio-economic aspects.

4.1 Environmental Aspects

4.1.1 Benefits

The existing WWTP effluents do not fully meet EU and national effluent requirements, and raw sludge is dried and treated in sludge ponds without prior stabilization. In particular, the sludge handling from the existing WWTP results in substantial odour problems, which are felt in residential areas located approx. 600m to the east from the WWTP.

Hence, the most significant impact of the Project will be improvements in effluent quality to EU and national standards, and the sludge treatment will be much improved with the introduction of anaerobic digestion (AD) to the WW treatment process. Both aspects are expected to significantly reduce or eliminate current odour problems. The improved WWTP sludge handling will also substantially reduce the Green House Gas (GHG) emissions associated with wastewater treatment, compared to the current situation. The outcome of the proposed Project will create an opportunity to reuse both the effluents and sludge for agricultural and/or other land rehabilitation purposes.

The outcome of the proposed Project will create an opportunity to reuse both the effluents and sludge for agricultural purposes, within green forest belts and/or for other land rehabilitation purposes in the vicinity of the WWTP. However, a detailed plan for how to promote effluent reuse and to ensure offtake of the treated sludge has not yet been presented, nor has a plan for closure of the existing sludge ponds. Hence, a plan for this needs to be prepared by the proponent (KS) in parallel with the detailed design of the WWTP, including a plan for alternative long-term storage of treated sludge in case there is not sufficient offtake capacity or interest in the area.

The effluents from the existing WWTP are discharged via existing bioponds and subsequent discharge channel to the Sokyr river, and this arrangement is planned to continue for the proposed WWTP.

4.1.2 Adverse impacts

Potential negative environmental impacts of the project are mostly typical for construction activities and operation of WWTP of similar size and complexity. These include risks of contamination of soil, surface and groundwater through daily construction and operation activities, air quality and noise. Given the relatively low sensitivity of the affected receptors, and moderate distance to residential areas, such impacts are considered of minor to moderate significance if not adequately managed, but they can be effectively mitigated through the implementation of proposed standard measures.

Effective mitigation requires implementation of a robust Environmental and Social (E&S) management system in line with international good practice management system standards. This will bring the negative environmental impacts of the Project to be minor or negligible.

Additionally, construction and operation of the Project is associated with risks for worker health and safety, which are typical to construction and WWTP treatment activities. For this, KS and the involved contractors must adopt strict H&S management procedures. Hence, a prerequisite for successful Project implementation is that Environmental & Social (incl. Health and Safety) management is fully adopted, led, and supervised by KS, and integrated in all works conducted by contractors involved in the Project. To enable this, training, and capacity building in E&S management amongst KS staff and its partners needs to be organised throughout the Project lifecycle.

4.1.3 Mitigation and Management Measures

In addition to general management system measures, impact specific mitigation measures have been included in the ESMP to address the adverse environmental impacts related to the Project's key phases:

- Preconstruction phase and Construction phase
- Operation phase

Pre-construction and Construction phase

Pre-construction activities relate to further detailed planning and design of the Project and is the responsibility of KS in collaboration with its design contractors and consultants. E&S management during construction requires oversight and monitoring from KS, while its organisation and daily implementation is the responsibility of the contractors.

The following present key mitigation measures of the ESMP:

- Develop a plan for closing and rehabilitating disturbed construction areas, and for decommissioning and rehabilitating the part of the existing sludge pond area that is not required for emergency purposes.
- Integrate infrastructure H&S measures, including noise reduction into final design of the WWTP.
- Integrate advance biogas leakage monitoring and control technology into the design of anaerobic digestion plant.
- Integrate detailed groundwater table analysis into site drainage and storm water management plan.
- Design effective site drainage and storm water management infrastructure at the site, including soil erosion mitigation. Include climate resilience considerations in the final design.
- Implement a flora survey by a qualified botanist in spring 2024 with focus on potentially threatened ephemerals and ephemeroids and appropriate mitigation measures determined if protected species are identified.
- Take extra construction precautions to avoid indirect disturbance of the biopond and sludge pond bird habitats during the breeding season.
- Incorporate energy-efficient design principles into the treatment plant layout and infrastructure.
- Implement controlled excavation practices to minimise soil and vegetation disturbance.
- Complete a pre-demolition audit and inventory of existing WWTP components that are suitable for reuse.
- Design and implement a demolition plan for existing WWTP site, including measures to dispose of demolition waste.
- Implement spill prevention and control measures.
- Choose equipment and machinery with low noise emission levels.

As a general measure, a site-specific/detailed Contractor's Environmental and Social Management Plan (CESMP) needs to be developed based on the Client's ESMP developed for this Project, prior to starting construction. Construction mitigation measures are mainly to be implemented by the selected contractor(s).

Operation Phase

Implementing mitigation measures related to the operation phase will mainly be the responsibility of KS. As explained in further details in section 4.4, KS is to have in place an Environmental and Social Management System (ESMS), based on ISO14001 (Environmental Management) and ISO45001 (Occupational Health and Safety Management). This provides the framework for integrating environmental and social considerations into KS's WWTP operations. The following present specific key mitigation measures of the developed ESMP:

- Develop a resource management and conservation plan, that amongst other includes a plan for reusing effluents and sludge from the WWTP, including measures to consult relevant farmers and other stakeholders with regards to utilisation of these resources and to determine alternative sludge disposal options if sludge reuse is not possible.
- Maintain an effective site drainage and storm water management infrastructure at the site.
- Monitor sludge and effluent quality.
- Monitor air quality and odours at the site boundary and within sanitary protection zone.

- Create or enhance biodiversity habitats nearby to compensate for any lost or impacted habitats, e.g., through rehabilitation of the existing sludge pond area. A dedicated biodiversity management plan is not required, but biodiversity considerations should be given due attention in the construction stage environmental management to avoid fauna disturbance, as well as in rehabilitation of the sludge pond area.
- Select native plant species appropriate for the site conditions and recreate habitats that support local biodiversity.
- Develop and implement an emergency response plan for the WWTP construction and operations, including climate resilience considerations.

4.2 Socio Economic Aspects

4.2.1 Benefits

The Project will through improvement of the wastewater treatment have a positive effect on the prevalence of water and sanitation related diseases in the Project area. This will, together with the significant reduction in odour, which is mentioned by communities as a significant annoyance, substantially improve the health and wellbeing of the population in the Project area.

The construction of the WWTP will require around 100 workers during the 36-month construction phase which will create temporary employment opportunities for the population in the nearby settlements and in Karaganda Region in general. As construction workers are expected to be hired locally there will be no significant influx of workers.

4.2.2 Adverse Impacts

The Project will have few negative socio-economic impacts. Due to the WWTP site's location in the outskirts of Karaganda City in an area with several industries and no communities in the immediate proximity, the Project impacts on community health and safety due to construction impacts on air quality and noise is of moderate significance and will with adequate mitigation and management be reduced to minor significance. Increased traffic and transport are moderate during construction if not adequately managed but can be effectively mitigated through the implementation of indicated measures. The risk of communicable diseases and the risk of gender-based violence and harassment are assessed to be minor after mitigation, as influx of construction workers is not foreseen.

While some employment opportunities will be created during construction, there will be a reduction of WWTP staff in the operation phase, as the current WWTP staffing is considered excessive for the operation of the new WWTP. Efforts will be made to avoid collective dismissals by redistributing staff to other workplaces within the company. In case this is not possible, the process will be carried out in line with national and EBRD requirements.

The Project may lead to increased wastewater tariffs which could have negative impacts for vulnerable groups in Karaganda City. This needs to be monitored during operations to ensure that such impacts are adequately mitigated and managed by KS.

Other social aspects such as impacts on land use and cultural heritage are considered negligible after the implementation of proposed mitigation measures.

4.2.3 Mitigation and Management Measures

Impact specific mitigation measures have been included in the ESMP to address adverse socio-economic impacts related to the Project's key phases:

- Pre-construction phase and Construction phase
- Operation phase

Pre-construction and Construction phase

As mentioned earlier, E&S management during construction requires oversight and monitoring from KS, while its organisation and daily implementation is the responsibility of the contractors. A site-specific/ detailed Contractor ESMP is to be developed based on the Project ESMP.

The following present key mitigation measures of the ESMP:

- KS to ensure that the land acquisition be implemented in accordance with the resolution dated April 5, 2023, and that a resolution for the plot #09-142-176-058 is obtained prior to construction.
- The Contractor to adopt and implement a local recruitment policy and a Labour Management Plan including human resources policy and procedures, which will set out the approach to labour management consistent with the EBRD requirements and the laws of Kazakhstan.
- The Contractor to provide construction workers with access to an effective grievance mechanism.
- The Contractor to have in place a workers Code of Conduct including zero tolerance for gender-based violence and harassment (GBVH) and provide inductions and trainings for Contractor's and sub-contractors' staff to include awareness on GBVH definitions, prevention, encouragement to report/submit concerns and grievances related to GBVH etc.
- The Contractor to disseminate Project relevant information among local communities and provide access to a functioning grievance mechanism.
- The Contractor to develop and adopt a Chance Find Procedure for cultural heritage for the construction work.
- KS to develop and adapt an Occupational Health and Safety Policy and procedures for the construction Project, within their overall OHS management system. The policy and procedures are to be further developed and adopted by the contractor and sub-contractors.

Operation phase

Implementing mitigation measures related to the operation phase will mainly be the responsibility of KS. The following present key mitigation measures of the developed ESMP:

- Adopt and implement an OHS management system based on ISO 45001 for occupational health and safety management of KS's WWTP operations.
- Include the new WWTP traffic and transportation into KS's management plan.
- Develop and implement a Retrenchment Plan, including a staff reduction strategy at different stages of Project implementation.
- Monitor closely the affordability for low-income households after potential tariff increases due to the Project.

4.3 Cumulative impacts

The ESIA study has considered the potential cumulative impacts in relation to other existing, planned and/or proposed projects within the PAI. With regards to existing activities, the following cumulative impacts may be of relevance:

- **Noise** and **traffic safety** due to the increase in heavy traffic during the construction phase of the WWTP, which will be in addition to existing traffic load in the city. The main access to the proposed Project site is outside the city centre and through an existing industrial area, hence significant cumulative impacts affecting traffic levels in the city are not anticipated. However, some increase in traffic may be felt during the construction phase, in areas adjacent to the access road, e.g., in the Kir-zavod 3-4 residential area.

- **Water quality in the Sokyr river**; the Sokyr river is already affected by various anthropogenic activities other than the Karaganda WWTP, both upstream and downstream from the effluent discharge point from the existing WWTP. This includes potential pollutants in the Bukpa river which runs through Karaganda City and discharges into the discharge channel connecting the WWTP bioponds and the Sokyr river. Existing impacts would be reflected in the background water quality and benthic fauna characteristics reflected in the respective baseline data.
- **Odour** from the WWTP activities; The existing WWTP is likely the most significant source of odour impacts in the area (based on, among others, focus group discussions). However, it is possible that other activities, e.g., the nearby pig farm located to the west from the WWTP, may be sources of odour during periods. The extent of odour contribution from such other potential sources is difficult to assess due to the absence of systemic monitoring/registration of odour in the area.

Based on the information available during the ESIA process, no planned or proposed activities have been identified that could result in further cumulative impacts in the context of the proposed WWTP Project.

4.4 Monitoring

KS needs to have in place an integrated Environmental and Social Management System (ESMS), based on ISO14001 (Environmental Management) and ISO45001 (Occupational Health and Safety Management). The ESMS has the overall purpose to ensure appropriate management of E&S matters at the corporate level, and for the Project throughout the whole project lifecycle, including successful implementation of the ESMP and mitigation measures identified through the ESIA process.

An ESMS is a systemic approach for organisations to identify, manage, and mitigate the environmental and social risks and impacts associated with their activities, products, and services. It is designed to promote sustainable practices, ensure compliance with applicable regulations and standards, and engage with stakeholders in a responsible and transparent manner. An ESMS typically comprises a range of policies, procedures, and practices that enable an organization to effectively address its environmental and social responsibilities. It provides a framework for integrating environmental and social considerations into the organization's decision-making processes and day-to-day operations.

Monitoring ESMP Implementation

The KS ESMS should include procedures to internally control the effectiveness of the ESMS components and the implementation and completion of the Project ESMP and its mitigation measures. Activities should be reflected as internal audit and control procedures within the overall ESMS, with the aim to check that the ESMS and the ESMP are being implemented.

In terms of the responsibilities of contractors to implement the ESMP, KS shall have in place procedures within its overall ESMS to verify construction contractors' ESMS procedures and ESMP compliance. This verification can be through control audits of contractors' E&S management systems and performance, and through regular and frequent reporting by contractors to KS on E&S incidents and other key performance indicators related to the ESMP.

As an example, the monitoring of contractors' performance shall include (but not be limited to) contractors and subcontractors' compliance with OHS performance as per requirements in contracts, and compliance with the labour requirements as a special clause in the service and supply contracts. KS will also monitor contractors and subcontractors for compliance with requirements through regular labour and OHS inspections establishing compliance on the above.

Operational Environmental Monitoring

The operational Environmental Monitoring plan summarises the environmental monitoring measures stemming from the ESIA. It reflects recommended monitoring activities which are required to monitor the effectiveness of the indicated mitigation measures, and to verify the expected positive or negative impacts of the WWTP Project on key receptors during operation. This monitoring is the responsibility of KS, but can be outsourced to specialised service providers, as relevant. The following environmental aspects need to be monitored during the operation phase and are reflected in the proposed monitoring plan:

- Soil quality
- Climate and climate change aspects - GHG emissions
- Quality of effluents and digested sludge
- Water quality in the receiving Sokyr river
- Ambient air quality - Odour monitoring
- Noise, particularly with regards to impacts on workers' health and safety
- Benthic fauna in the Sokyr River
- Use of effluents for irrigation and compliance with effluent reuse standards
- Use of treated sludge for land application and compliance with sludge reuse standards

Furthermore, KS should closely monitor the affordability for low-income household after potential tariff increases due to the Project. Continuous stakeholder engagement will be important in ensuring timely information on affordability issues concerning vulnerable households. Furthermore, the monitoring should include indicators such as i) outstanding payments among low-income households, and ii) customer grievances related to payment of tariffs, drawing on data from the KS customer department.

5 CONTACT DETAILS

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