ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) GANJA WASTEWATER PROJECT, AZERBAIJAN

NON-TECHNICAL SUMMARY OF THE ESIA REPORT

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LIST OF ABBREVIATIONS

ASWRA or "the Company"	Azerbaijan State Water Resources Agency
AZN	Azerbaijan manat
BAT	Best Available Techniques
E&S	environmental and social
EBRD	European Bank for Reconstruction and Development
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
EU	European Union
GHG	Greenhouse gases
MPN/100mL	Most Probable Number
OHS	Occupational Health and Safety
PBF	Priority Biodiversity Feature
PR	Performance requirement (of the EBRD)
PV	Solar power panels
SCADA	Supervisory Control and Data Acquisition
SEA	Strategic Environmental Assessment
SEE	State Ecology Expertise
SEP	Stakeholder Engagement Plan
SPZ	Sanitary protection zone
UV	Ultraviolet
WWTP	Wastewater Treatment Plant

TABLE OF CONTENTS

1 INTRODUCTION 5

1.1 Project Background and Objectives 5

2 PROJECT DESCRIPTION 5

2.1 Current Status of Wastewater Treatment 5
2.2 Principles of Wastewater Treatment 5
2.3 Main Characteristics of the WWTP 6
2.4 Effluent Disinfection 6
2.5 WWTP Project Location 6
2.6 On-site sludge storage 6
2.7 Final sludge disposal 6
2.8 Access Road to WWTP 7
2.9 Electricity supply 7
2.10 Treated effluent polishing ponds 7
2.11 Project Alternatives 7
2.12 Associated Facilities 7

3 LEGAL, REGULATORY AND LENDER FRAMEWORK 8

3.1 Azerbaijan 8
3.2 EBRD 8
3.3 EU 8
3.4 The National EIA processes 8
3.5 SPZ Requirements 9

4 ESIA METHODOLOGY 9

4.1 General information 9
4.2 ESIA Process 9

5 ENVIRONMENTAL AND SOCIO-ECONOMIC BASELINE 9

5.1 Environmental baseline 9
5.2 Climate and meteorology 9
5.3 Geological and Seismic Characteristics 9
5.4 Landscape 9
5.5 Hydrology 10
5.6 Ambient Air Quality 10
5.7 Noise 10
5.8 Soil 10
5.9 Waste Management 10
5.10 Biodiversity 10
5.11 Socio-Economic Baseline 11
5.12 Ganja City 11
5.13 Samukh District 11
5.14 Description of settlements located nearby proposed WWTP 12

6 ASSESSMENT OF POTENTIAL E&S IMPACTS AND RISKS AND MITIGATION 12

7 CUMULATIVE IMPACT ASSESSMENT 16

8 STAKEHOLDER ENGAGEMENT 16

8.1 General 16
8.2 Grievance Redress Mechanism 16

9 CONCLUSIONS AND RECOMMENDATIONS 16

LIST OF TABLES

Table 1. Design reduction in pollution load to receiving waters because of the proposed WWTP 6

Table 2. Summary of assessment of impacts and risks and mitigation for construction of the WWTP 13

Table 3. Summary of assessment of impacts and risks and mitigation for operations of the WWTP 14

1 INTRODUCTION

The European Bank for Reconstruction and Development (EBRD) is considering providing finance to the Azerbaijan State Water Resources Agency (ASWRA) for construction of the Ganja Wastewater Treatment Plant (WWTP). ASWRA, a state-owned company, was established in 2023 to oversee the management and governance of all water resources in Azerbaijan, including water supply and wastewater collection and sewage treatment services in Ganja City. ASWRA will implement the Project with support of its Ganja branch and the Project Implementation Unit. The project is a Category A project and as such requires an Environmental and Social Impact Assessment (ESIA) which is presented in non-technical summary form in this document. The ESIA documents have been disclosed for 120 days, with stakeholder engagement in this period and the documents updated to incorporate and address issues raised by stakeholders.

1.1 Project Background and Objectives

The city of Ganja is the second-largest urban centre in Azerbaijan, with a population exceeding 330,000 people. Rapid urbanization and aging infrastructure have led to poor wastewater management. In a Strategic Environmental Assessment (SEA) for the new Ganja City Master Plan, a functional wastewater treatment system compliant with EU discharge standards, was identified as a key enabler of the city´s further development. Effluent reuse options and suitable sludge management also needed evaluation.

The primary objective of the Ganja WWTP Project is to construct and operate a modern wastewater treatment facility capable of treating domestic effluent from the city and surrounding areas specifically to achieve:

1. Treated effluent that is EU-compliant as well as meeting national discharge standards, and standards for disposal to receiving waters.
2. Stabilized sludge suitable for reuse or final disposal.

2 PROJECT DESCRIPTION

2.1 Current Status of Wastewater Treatment

The existing wastewater system dates to Soviet times. There is currently no functional WWTP for Ganja. The main sewage collectors have been constructed increasing the flow of wastewater to the area of the relic WWTP, from where it is discharged into the environment. The local authorities have constructed diversion ditches to prevent localised flooding, but the circumstance has resulted in odour episodes and human health risks. Stakeholders are understandably concerned about the situation emphasising the importance of establishing the WWTP as soon as possible. . The wastewater is principally sourced from residential areas but there are sources of industrial wastewater too. Only 237 m^3/day would be discharged to the sewer because of limited connections. A key concern is the introduction of industrial pollutants to the sewer.

2.2 Principles of Wastewater Treatment

The basic steps in treating household sewage are transporting the waste water from source to the WWTP and firstly screening out non-sewage material such as stones, gravel and so forth. About 15% of the solid (organic) matter is then settled out in what is known as primary treatment. In secondary treatment (which follows), conditions that enhance cultivation of bacteria in human waste that breaks down the waste, are promoted using aeration (blowing air through the sludge) for example. Nitrogen and phosphorous are also removed to prevent toxic algal blooms downstream. Tertiary treatment (as the final step) may use chlorine, UV, ozone or membrane separation to disinfect the treated effluent from human pathogens.

2.3 Main Characteristics of the WWTP

Construction of the proposed WWTP is planned for 2027 with a construction period of some 36 months. It is estimated that 100 construction workers will be employed and 21 operational staff. Gross power consumption at full operational capacity is estimated at 6,000 MWh/year. The proposed WWTP Project will utilise a three-step treatment process:

1. Mechanical (Primary) Treatment: This initial stage will remove large debris using screens, settle out sand, and separate grease from the wastewater.
2. Biological (Secondary) Treatment: The preferred technology for this stage is Extended Aeration using Oxidation Ditches. This biological process utilizes microorganisms to break down the organic pollution, including nutrients such as phosphorous. Chemical phosphorus removal will be a back-up to meet the strict discharge quality standards.
3. Tertiary Treatment: The biologically treated effluent then undergoes tertiary treatment, potentially including disc filters and UV disinfection.

The anticipated percentage pollutant removal by the WWTP is shown in **Table 1**.

Table 1. Design reduction in pollution load to receiving waters because of the proposed WWTP

Parameter	% reduction
BOD	90%
COD	74%
SS	88%
Total-N	83%
Total-P	90%

The WWTP Project will also include buildings, SCADA (Supervisory Control and Data Acquisition), chemical laboratory, maintenance workshop, sludge management, power supply and control, standby generator and site drainage. The WWTP infrastructure should have a green buffer zone surrounding the site, including planted trees and grass areas to limit visual and odour impacts.

2.4 Effluent Disinfection

Given the cereal crops in the area, effluent to be used for irrigation must comply with the EU Re-use Regulation, namely coliform concentration of 100 MPN/100mL. To meet the disinfection standard for all temperatures a simplified micro-sieving and UV disinfection system is required.

2.5 WWTP Project Location

The WWTP Project will be located on an existing site where construction commenced in the 1980s but was never complete and is some 285,000 m2, including the pond area

2.6 On-site sludge storage

There is sufficient land available for some 2 years' worth of wind-rowed sludge storage (75,000m^2). Additional land (not belonging to ASWRA currently) could also be acquired for additional sludge storage.

2.7 Final sludge disposal

If sludge cannot be used for agriculture, it will need to be disposed to landfill. Landfill disposal is not ideal because the lifespan of the landfill will be materially reduced and so ASWRA must pursue the option of use of the sludge for agriculture.

2.8 Access Road to WWTP

An access road is required for vehicles to enter and exit the facility for operations and maintenance

2.9 Electricity supply

The power line routing is unknown currently and defined as part of detailed design, for which the Contractor will be responsible.

2.10 Treated effluent polishing ponds

The old effluent ponds will be used for final polishing of the treated effluent. The ponds are shallow, aerobic (freely available oxygen) and with long retention times, allowing sunlight penetration and high dissolved oxygen to kill bacteria and improve water quality.

2.11 Project Alternatives

No WWTP site location alternatives were considered because the site of an originally constructed WWTP (never completed) is considered the most suitable choice.

2.11.1 Treatment & Sludge Management Options

Option 1: Conventional Activated Sludge with biogas production with Oxidation Ditches.

This technology reduces power consumption, and biogas recovery generates power. Primary sludge is easier to dewater (25% dry solids), reducing sludge disposal volumes.

Option 2: Secondary Treatment only via the application of Oxidation Ditches

This technology has greater electricity consumption, with no opportunity to recover power and modestly more sludge but has greater operational simplicity.

Option 2 was selected because of operational simplicity, robustness, and alignment with technical and human resource capacities available. The technology is not the most energy efficient but provides for easier operation thereby ensuring reliable and consistent treatment of wastewater.

2.11.2 Disposal of digested sludge

Disposal of digested sludge is still to be decided but these in order of preference are:

1. Sludge re-use for agricultural
2. Sludge storage on-site or elsewhere but this has no economic benefits.
3. Long-term disposal at landfill but this reduces the municipal landfill lifetime with no economic benefits.

2.11.3 Alternative Options of Effluent Discharge Pipeline

Alternatives routings for the effluent discharge pipeline discharging to the river at 8.2km (Route 1), and 4.5km (Route 2), respectively, were also considered. State Environmental Expertise approved the shorter route only.

2.11.4 Access to treated wastewater

There is considerable interest from farmers in sourcing the treated water for irrigation purposes rather than simply discharging into the Goshgar River via a pipeline. A final decision will be made by ASWRA on making the treated effluent available once detailed design has been completed in 2027.

2.12 Associated Facilities

There are no associated facilities.

3 LEGAL, REGULATORY AND LENDER FRAMEWORK

The ESIA identifies a comprehensive set of national, regional, and international legal instruments governing environmental protection, water management, occupational health, and community engagement.

3.1 Azerbaijan

The main Azerbaijani laws and regulations applicable to the project include:

- Environmental Protection Law (1999) – establishes general principles of sustainable resource use and pollution prevention.
- EIA Law (2018) - Mandates EIA for public and private projects.
- EIA Regulations (2022) requires project applications and consultation with the State Environmental Review Agency, public participation and official publication of the scoping phase.
- Water Code (1997) regulates the use and protection of water bodies and sanitary norms for drinking water.
- Wastewater Law (1998) governs water supply and effluent discharge, emphasising cost recovery, rational water use, and establishment of purification systems.
- There is a range of other legal requirements governing air quality, noise, conservation, OHS, labour and human rights, land acquisition and social safeguards and the ratification of several international conventions and treaties.

3.2 EBRD

The main requirements of the EBRD for its own activities are formulated in the Bank's ESP (2019), and the requirements for the E&S aspects of the Client's activities are set out in the Performance Requirements (PRs) namely:

- PR 1: Assessment and Management of Environmental and Social Risks and Impacts
- PR 2: Labour and Working Conditions
- PR 3: Resource Efficiency and Pollution Prevention and Control
- PR 4: Health, Safety and Security.
- PR 5: Land Acquisition,
- PR 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
- PR 8: Cultural Heritage
- PR 10: Information Disclosure and Stakeholder Engagement.

3.3 EU

EIA Directive (2014/52/EU) requires impact assessment for projects likely to cause significant environmental effects, and emphasizes public involvement, transparency, and mitigation. There are a range of directives on River Basin Management Plans, urban wastewater, sewage sludge, water reuse, waste, noise, air quality, conservation and OHS. Azerbaijan is not an EU member and so the directives are not fully applicable.

3.4 The National EIA processes

For the Ganja WWTP, ASWRA will require a positive conclusion from the Sate Ecology Expertise (SEE) on an EIA report, including project impacts, alternatives, mitigation measures and monitoring plans.

3.5 SPZ Requirements

Sanitary Protection Zones (SPZ) serve to establish a buffer between sources of potential human health risks and residential or sensitive areas with potential human exposure. The size of the required SPZ for the WWTP facility will be determined on the completion of detailed design but is nominally 500 m with 10 m on either side of the proposed discharge pipeline. No /limited agricultural activities will be allowed in the SPZ.

4 ESIA METHODOLOGY

4.1 General information

Environmental and Social Impact Assessment (ESIA) serves to assess the magnitude and significance of potential E&S impacts of a proposed activity and how to avoid and/or mitigate negative impacts and enhance positive effects. Stakeholder engagement is a key underpinning of ESIA.

4.2 ESIA Process

The key elements of the ESIA are:

- **Scoping** - Preliminary assessment and identification of key issues
- **Detailed assessment** - collection and analysis of E&S baseline conditions; analysis of alternatives; assessment of impacts and risks, and defining mitigation of negative impacts and enhancing benefits together with monitoring and management activities,
- **Consultation** with stakeholders throughout the process.

Impact significance is determined as a function of receptor sensitively and impact magnitude.

5 ENVIRONMENTAL AND SOCIO-ECONOMIC BASELINE

5.1 Environmental baseline

The environmental baseline was determined from existing documentation, supplemented with scientific articles, authority reports and a brief biodiversity survey.

5.2 Climate and meteorology

Ganja has a semi-arid and arid climate, with hot, dry summers (average 26–30 °C) and cold winters (average 2–4 °C). Annual precipitation is around 235 mm, mostly in spring and autumn. Prevailing winds are westerly and easterly. A continuous increase in temperature in Azerbaijan is projected throughout the 21st century. Per capita GHG emissions in Azerbaijan were 6.3 tons of CO_2 eq, and net emissions, 5.6 tons of CO_2 eq. Azerbaijan has signed and ratified the Paris Accord committing to a reduction of 35% by 2030 and 40% by 2050.

5.3 Geological and Seismic Characteristics

The site is within the dry steppe and lowland intermountain plain of Quaternary alluvial deposits with two distinct geomorphological units namely an intensively dissected low mountain plain (the site of the WWTP) and an alluvial-proluvial weakly dissected plain. Azerbaijan is one of the most seismically active regions of the Alpine fold belt experiencing repeated occurrence of powerful, destructive earthquakes. Ganja itself is on a fault line with major earthquakes experienced every 30-40 years.

5.4 Landscape

Land use is agricultural with sparse settlements. The site has limited scenic sensitivity.

5.5 Hydrology

Surface water in the area is dominated by the Ganjachay River, with flow deriving from snowmelt, rainfall and groundwater. Monthly average flows vary greatly throughout the year and the river can dry up during August–September. Untreated wastewater from settlements caused phenol, turbidity, and ammonium ion levels to exceed legal limits materially. Groundwater occurs at depths of 5–10 m and flows generally towards the river. Some 15 households source drinking water from artesian wells within 3 km downstream of the proposed WWTP.

5.6 Ambient Air Quality

Baseline monitoring, albeit limited, shows air quality within national standards, except for sulphur dioxide, which was elevated due to heavy traffic and industrial activities.

5.7 Noise

Given that the Project site is situated at a considerable distance from major noise sources such as industrial facilities and main roads, ambient sound levels at the location are comparatively low.

5.8 Soil

Ganja has fertile soils that make the area valuable for agriculture but requiring irrigation. Local soils have been affected by wind erosion, compaction, and wastewater irrigation and a resultant decline in fertility. No data is available on soil contamination at the proposed WWTP site.

5.9 Waste Management

Waste management in Ganja faces major issues, as current methods fall short of modern standards. Most waste is dumped 1.5 km east of the city at an overcapacity, non-compliant site where it is burned or buried. Over 250 tonnes are collected daily. Poor disposal practices have led to soil and water pollution, unpleasant odours for nearby residents, and air pollution from burning. The site's co-disposal of medical and general waste threatens health and the environment, and informal waste pickers work in unsafe conditions. Ganja currently lacks an EU-standard landfill, hazardous waste system, formal separation, and recycling facilities.

5.10 Biodiversity

The project area is mostly disturbed agricultural land with patches of grassland. Geobotanical zoning around Ganja has diverse vegetation types: semi-desert plants, subtropical ephemeral species, saline bush-grass patches, and foothill wormwood-dominated areas. Saline zones have sparse vegetation, while the project area features dry steppe groups. Five plant species are Priority Biodiversity Features (PBF) per EBRD PR6:

- Broad leaved cotton grass and *Sternbergia vernalis* – endangered
- Eldarica pine and oriental plane tree – vulnerable
- Pomegranate – vulnerable

All priority species occur sporadically with limited numbers.

The following habitats occur:

- Arable lands which are the dominant habitats with common species such as millet.
- Fields with different kinds of grasses clover, Plantain and other species,
- Semi-wet fallow land with reeds and herbs such along the trenches and depressions,
- Alley, tree lines, groves and hedges with old trees such as poplar, walnut and mulberry.

- The Goshgarchay and its banks are characterized by a rare reed vegetation and perennial herb vegetation and tamarisk on the flat banks.
- Widespread fallow land with a xerophytic (plant species that survive on little liquid water) weedy vegetation.
- The existing discharge point is shallow rocky riverbed, with riverbanks overgrown by shrubs and trees
- The proposed discharge point (in Garaeri) is a concrete riverbed.

Among 37 flora species and 45 fauna species identified during the biodiversity surveys, 5 plant species (Broad leaved cotton grass, *Sternbergia vernalis*, Eldarica pine oriental plane tree and Pomegranate), 1 fish species (spined loach), 1 reptile species (Greek tortoise) and 2 bird species (Black Francolin and Gray Partridge) were PBFs according to the EBRD PR6. Aquatic biota in the river was not assessed due to the very poor water quality.

5.11 Socio-Economic Baseline

Socio-economic factors—including demographics, ethnicity, gender, economy, employment, public utilities, health, income, expenditures, and education—at regional, municipal, and local levels are outlined in this chapter.

5.12 Ganja City

Ganja, Azerbaijan's third-largest city, has a population of 330,700 as of early 2024, with a slightly slower growth rate compared to the national average. The city is predominantly Azerbaijani (99.93%) and has a young population, with 41.3% under 30. Ganja boasts a high literacy rate (over 99.8%) and several universities, contributing to its strong educational infrastructure.

As Azerbaijan's industrial hub, Ganja faces challenges like limited job opportunities, especially for women and young people. Despite economic growth, unemployment remains high, driving migration to Russia for better wages. While average incomes are rising, many families struggle financially, relying on loans and social transfers to meet basic needs. Average consumption expenditure, poverty levels, social assistance, public utilities infrastructure, land use, and public health and safety data highlights the city's strengths and areas for improvement, including the need for water conservation, infrastructure modernisation, and sustainable urban planning.

Gender-based violence (GBV) and harassment is concerning in Azerbaijan. Estimates suggest that 43% of women in Azerbaijan have experienced domestic violence, yet official reporting remains low due to cultural perceptions of violence as a private matter, fear of stigma, and limited access to victim-centred support services.

Ganja, faces challenges with infectious diseases, likely linked to poor water quality, despite improvements in healthcare facilities. While gender equality is progressing, economic barriers persist, particularly for women and pensioners. Ganja boasts a rich cultural heritage, with historical landmarks and a legacy as a cultural and trade hub on the Silk Road. Cultural sites in Azerbaijan can boost local economies and enhance the country's profile, but current development plans lack integration of cultural environments.

5.13 Samukh District

Samukh District, located in north-west Azerbaijan, has a population of 58,587 people, with a slightly higher proportion of men than women. The district has a young population, with 41.8% under the age of 30, and a high literacy rate of 99.3%. While most of the population speaks Azerbaijani, Russian is also widely used, and the district is predominantly Muslim.

The Samukh region's economy is primarily agricultural, with a focus on grains, sunflowers, vegetables, fruits, dairy, and poultry. While the labour force and employed population have grown,

new job creation has slowed. Despite being below the national average, Samukh's unemployment rate remains consistently low.

Samukh has a well-developed infrastructure, including natural gas, electricity, and water supply. The district faces challenges like land degradation and a lack of specialised healthcare services. Despite a rich cultural heritage, gender-based violence, particularly domestic violence, remains a pressing issue. Samukh District boasts natural monuments like the Eldar Pine and cultural landmarks like the Heydar Aliyev Centre. The proposed Project site has no tourist appeal.

5.14 Description of settlements located nearby proposed WWTP

The proposed wastewater treatment plant and its effluent discharge pipeline will pass near several villages in Samukh District, including Ziyadli, Istikhana, Garaeri, Sarkar, and Govlarsari. The villages have similar land use patterns. Settlements and treatment facility sites are surrounded by agricultural lands for crops and livestock. Untreated wastewater from Ganja flows through an open channel to the river. Irrigation channels, fed by groundwater, irrigates agricultural lands. A high-voltage power transmission line runs through the area with the safety zone used by locals for farming.

Istikhana has the smallest population and Garayeri the largest, with 6,484 residents. Population age structures differ, with most villages having relatively young populations, especially Ziyadli and Garayeri, where children are 21–24% of residents and the elderly 3.9–6.9%. Istikhana has an aging population and a low proportion of youth. Literacy levels are generally high, with most residents completing secondary education.

Most households have individual plots used for crops and livestock. Crops include grain, vegetables, fruits, fodder, and sunflower oil. Households also raise poultry, cattle, sheep, goats, and bees. Residents grow food for their own use and for sale, with around 35–45% of the produce sold, primarily in Ganja and Baku. Key products include milk, cheese, yogurt, eggs, lamb, beef, and poultry.

Economic activity is limited to small enterprises and self-employment. Unemployment is highest in Istikhana (29%) and Ziyadli (15%), and lowest in Garayeri (5.4%) and Sarkar (6.5%). New job creation is slow. Average household incomes range between 300–700 AZN. Bank loans for farming or housing are common, indicating financial vulnerability. Vulnerable groups include low-income families, pensioners, recipients of social assistance, large and single-parent families, persons with disabilities, and a small share of refugees/internally displaced persons.

Access to electricity and gas is widespread. Drinking water mainly comes from artesian wells. None of the villages has sewage treatment. Roads are mostly in good condition with public transport available with bus routes connecting villages to nearby cities like Samukh, Ganja, and Shamkir.

6 ASSESSMENT OF POTENTIAL E&S IMPACTS AND RISKS AND MITIGATION

The assessment of potential E&S impacts and risks and mitigation is summarised in **Table 2** for construction and **Table 3** for operations.

Table 2. Summary of assessment of impacts and risks and mitigation for construction of the WWTP

Construction					
Potential impacts	***Receptor sensitivity***	***Impact Magnitude***	***Impact significance***	***Mitigation***	***Residual impact***
Soil	Medium	Low	Minor	Soil Rehabilitation Plan	Minor
Ground and surface water	High	Medium	Moderate	Construction Hazardous Materials and Spill Prevention and Countermeasures Management Plan	Minor
Air	High	Moderate-low	Moderate-low	Atmospheric Emissions Control and Management Plan	Minor
Climate Change	Construction GHG emissions considered negligible				
Waste Generation	High	Low	Moderate	Waste management plan	Moderate
Noise and Vibration	Medium	Low	Minor	Noise management Plan	Negligible
Biodiversity					
PBF: Broad-leaved Cotton grass oriental plane-tree	Medium	Medium	Moderate	Biodiversity Management Plan	Negligible
CH: Greek (Mediterranean) tortoise	High	Negligible	Moderate		
CH: European glass lizard	High	High or Medium	Major		
CH: Dice snake	High	Low	Moderate		
PBF: Black Francolin Gray Partridge	Medium	Negligible	Minor		
Landscape and Visual Amenity	Low	Negligible	Negligible		Negligible
Local Economy and Incomes (local framers)	Low	Medium +	Medium +	Local Procurement Plan	Minor to moderate+
Local Employment and Labour Market	Low / medium	Low to medium	Low to negligible (Ganja) and moderate + (rural)	Implement all management and mitigation plans	Minor+ to negligible for Ganja and moderate+ for rural (Samukh)
Infrastructure and Public Services	High	Low	Minor	Implement all management and mitigation plans	Minor
Roads	Medium	Medium	Moderate	Traffic and Waste Management Plan	Negligible
Electricity and gas	Low	Low			
Water supply systems	High	Low			
Waste	High	Low			

Construction					
Potential impacts	***Receptor sensitivity***	***Impact Magnitude***	***Impact significance***	***Mitigation***	***Residual impact***
Occupational Health and Safety	High	High	Major	Construction Occupational Health and Safety (OHS) Management Plan	Moderate
Community Health, Safety and Wellbeing	High	Moderate to major	Moderate to major	SEP, Traffic management plan and Emergency Preparedness and Response Plan	Minor
Local Land Use and Livelihoods	Medium	Low	Moderate	SEP, Resettlement Framework, Resettlement Action Plan	Negligible
Gender Inequality and Vulnerable Groups	Moderate	Low	Minor	Community awareness and engagement, prioritise local hiring	Minor
Cultural Heritage	Negligible to high	Low	Low to major	Chance finds procedure	Negligible

Table 3. Summary of assessment of impacts and risks and mitigation for operations of the WWTP

Operations					
Potential impacts	***Receptor sensitivity***	***Impact Magnitude***	***Impact significance***	***Mitigation***	***Residual impact***
Soil	Medium	Medium	Medium	Sludge management strategy	Minor
Ground and surface water	High	High +	Major +	Maintain good operational performance	Major +
		High - sewage sludge	Major -	Sludge management strategy	
Air	High	High	Major	Application of BAT in design and operation of plant	Minor
Climate Change	High	Medium+	Medium+	Options for solar PV and sludge utilisation	Medium+
Waste Generation	High	Medium	Major	Waste and sludge management plans	Minor
Noise and Vibration	Medium	Low	Minor		Negligible
Biodiversity					
Plant species					
PBF: plant Eldar pine	Medium	High	Major	Protect two Eldar pines	Minor
Fish species					
Spined loach	High	Medium positive	Moderate positive	Maintain good operational performance	Moderate positive
Aquatic biodiversity	High	High+	Major +	Maintain good operational performance	Major+

Operations					
Potential impacts	***Receptor sensitivity***	***Impact Magnitude***	***Impact significance***	***Mitigation***	***Residual impact***
Landscape and Visual Amenity	Low	Low	Negligible	Establish green belt	Negligible
Local Economy and Incomes (local framers)	Low	Minor to medium	Moderate	Implement mitigation so that effluent can be used for irrigation	Moderate +
Local Employment and Labour Market	Medium / low	Low	Minor to moderate +	Prioritise employment of local residents	Minor to moderate +
Infrastructure and Public Services					
Roads	Medium	Low	Minor	Regulate monitoring and Emergency and Preparedness Planning	Minor
Electricity and gas	Low	Low			
Water supply systems	High	Medium+			
Waste	High	Low (excluding sludge)			
Occupational Health and Safety	High	High	Major	Operations Occupational Health and Safety (OHS) Management Plan	Moderate to minor
Community Health, Safety and Wellbeing	High	High +	Major+	Maintain good operational performance of WWTP and implement SEP	Major _
Local Land Use and Livelihoods					
Economic displacement	Low to medium (farmers)	Negligible to medium	Negligible to Moderate	Replacement of lost pastures and cultivated areas	Negligible
Physical displacement (if not fully avoided)	High	Negligible to medium	Moderate to major	RAP	Negligible
Gender Inequality and Vulnerable Groups	Moderate	Low	Minor - to Minor +	Promote gender equity and ensure services to vulnerable households	Minor+
Cultural Heritage	Negligible to high	None			

7 CUMULATIVE IMPACT ASSESSMENT

During construction, cumulative impacts may affect air quality, waste, the local/regional economy, the labour market, employee health and safety, and the environment. These impacts are short-term and localised, varying depending on the construction activities and traffic intensity. Since the planned activities are city-wide, the cumulative impacts on air quality and employee health and safety are minor negative.

Several parallel construction projects over several years will increase waste production, including hazardous waste, which can contaminate soil, surface and groundwater, air quality, odour, and overall environmental quality and public health. Given existing insufficient capacities and current waste management practices not meeting contemporary standards, the cumulative impacts associated with waste generation can be evaluated as moderate to major negative. Parallel construction activities over several years may create new direct workplaces, improve worker well-being, and increase demand for goods and services, thus evaluating the cumulative impacts on the local/regional economy and labour market as moderate positive.

The water resources and health of the local population are the valued environmental and social components that can be affected by the WWTP's operation. The enhanced wastewater management and sanitation system in Ganja, part of the WWTP, should improve water quality and reduce health issues. Therefore, the cumulative impacts on water quality and population health are positive.

8 STAKEHOLDER ENGAGEMENT

8.1 General

Stakeholder engagement for the WWTP project began in July 2024, with initial consultations held in Ganja. Consultations were held with local government, community members, non-governmental organizations (NGOs), and utility providers. Engagement Methods included public notices and information sessions, focus-group discussions in affected neighbourhoods and interviews with local NGOs and health officials. Key issues raised were odour control, preference for hiring local labour, fair compensation for temporary restrictions on land access and regular communication and grievance channels. Stakeholder engagement will continue to include updates on the interim management of wastewater (before the WWTP is commissioned), presentation of the detailed design and updated odour assessment, and decision-making on the discharge of the treated effluent.

8.2 Grievance Redress Mechanism

A formal GRM will allow affected persons to submit complaints via phone, email, or municipal office. All grievances will be logged, investigated, and resolved within defined timeframes.

9 CONCLUSIONS AND RECOMMENDATIONS

The Ganja WWTP Project is environmentally acceptable and socially beneficial, if mitigation and monitoring measures are properly implemented. Key recommendations include:

- Conducting detailed biodiversity surveys prior to construction in areas where land will be transformed, and including the treated effluent discharge point into the Goshkar River and the power line routings when they have been defined. Mitigation must be defined and implemented where biodiversity risks are identified, together with ongoing monitoring.
- Equipping the sludge storage area with leachate management mechanisms to prevent sludge leachate from mobilising off site.

- Developing and implementing a medium to long term sludge disposal strategy well before sludge storage capacity is exhausted. Agricultural disposal is the preferred option provided the sludge meets the quality criteria defined for such. Landfill is the least preferred option and will also need to meet quality requirements for disposal and take up valuable airspace.
- Maintaining and operating the WWTP to achieve the treated effluent limits and prevent odour.
- Fully connecting the old sewer system in the city to the new collector pipeline to stop ongoing discharge of untreated wastewater into the Goshkar River, or else the positive effect of the WWTP will be reduced. Strict adherence to ESMP and contractor environmental specifications.
- Continuous stakeholder engagement throughout construction and operation.
- Annual environmental audits and capacity-building programs.
- Integration of renewable-energy options (e.g., biogas from sludge digestion) to reduce the carbon footprint.
- Collaboration with local universities for water-quality research and technical innovation.

With these safeguards in place, the project will substantially improve urban sanitation, river ecosystem health, and quality of life for the people of Ganja.