Ecoline International

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

SCOPING REPORT

May 2025

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LIST OF ABBREVIATIONS

ASWRA	Azerbaijan State Water Resources Agency
AZN	Azerbaijan manat
CAPEX	Capital Expenditure
CHP	Combined Heat and Power plant
CPI	Consumer Price Index
E&S	environmental and social
EBRD	European Bank for Reconstruction and Development
EHS	Environmental, Occupational Health and Safety
EHSS	Environmental, Occupational Health and Safety, and Social
EIA	Environmental Impact Assessment
ESAP	Environmental and Social Action Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
EU	European Union
GCAP	Green City Action Plan
GDP	Gross Domestic Product
GHG	Greenhouse gases
GIIP	Good International Industrial Practise
IDP	Internally displaced person
LCU	Local Currency Unit
MENR	Ministry of Ecology and Natural Resources
NGO	Non-Governmental Organization
OHS	Occupational Health and Safety
OJSC	Open Joint Stock Company
OPEX	Operational expenditure
PE	Population Equivalent
PIP	Priority Investment Project
PM	Particulate Matter
PPE	Personal protection equipment
PR	Performance Requirement (of EBRD)
RA	Republic of Azerbaijan
SCADA	Supervisory Control and Data Acquisition
SEA	Strategic Environmental Assessment
SEE	State Ecology Expertise
SEP	Stakeholder Engagement Plan
SLCC	State Land and Cartography Committee
SPZ	Sanitary Protection Zone
UNECE	United Nations Economic
UV	Ultraviolet
WW	Wastewater
WWTP	Wastewater Treatment Plant

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

1 INTRODUCTION

The European Bank for Reconstruction and Development (the EBRD or the Bank) is considering providing finance to the Azerbaijan State Water Resources Agency (ASWRA or the Company) for construction of the Ganja Wastewater Treatment Plant (WWTP) (the Project). The proposed Project is one of the components of the wider Ganja Water and Wastewater framework project and Priority Investment Programme being implemented under the Ganja Green City Action Plan (GCAP)[1].

ASWRA, a state-owned company, was established in 2023 to oversee the management and governance of all water resources in Azerbaijan, including providing ASWRA 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 WWTP Project has been categorised as "A" in accordance with the EBRD's 2019 Environmental and Social Policy. This means that it is required to conduct a formalised and participatory Environmental and Social Impact Assessment (ESIA) of the proposed Project and associated infrastructure. Then, the ESIA documents should be publicly disclosed for a minimum period of 120 days and consultations be held during this period.

A consortium of environmental and social (E&S) consulting companies[2] (the Consultant) has been commissioned to prepare the ESIA and associated E&S documents. This Scoping Report has been developed as part of the ESIA package. The purpose of the Scoping report is to scope the assessment required for the ESIA and to facilitate engagement with stakeholders. As such the Scoping Report includes:

- A project description;
- An overview of national E&S legislation in Azerbaijan together with the EBRD and EU requirements;
- A characterisation of the E&S baseline in the area where the Project will be developed;
- A characterisation of the potential impacts of the Project and a description of the assessment that will be conducted.

2 PROJECT DESCRIPTION

The description of the WWTP Project in this section is based mainly on the Feasibility Study[3] and the ESIA Scoping report[4], prepared by SWECO in 2024.

2.1 Project Scope

The primary goal of the Project is to construct a new WWTP that can effectively serve the entire Ganja, accommodating the current and projected population growth, and ensure:

I. a treated effluent that is EU-compliant as well as meeting national discharge standards, and standards for disposal to receiving waters.
II. a stabilized sludge suitable for reuse or final disposal.

[1] EBRD. 2025. GrCF3 W2 - Ganja Water and Wastewater. https://www.ebrd.com/work-with-us/projects/psd/55197.html
[2] The consortium encompasses Ecoline International Ltd. (Bulgaria), Integra Consulting Ltd. (Czech Republic) and ABAK-Az Crowe Ltd. (Azerbaijan).
[3] Sweco, 2024: Ganja Water and Wastewater Feasibility Study Update, Feasibility Study Report.
[4] Sweco, 2024: Ganja Wastewater Treatment Plan – ESIA Scoping Report.

The WWTP Project is crucial to modernizing and significantly improving wastewater management in Ganja. The existing municipal wastewater management system is inadequate and does not meet national and international standards, resulting in environmental pollution and human health risks. The WWTP forms part of the Priority Investment Project (PIP), aimed at improving water and sanitation for the city, including:

- 827 km water supply pipeline including house connections;
- 29,589 water meters;
- A Supervisory Control and Data Acquisition (SCADA) system covering all water reservoirs;
- 75,000 m^3 water storage on nine locations;
- Completion of two of the reservoirs - landscaping, buildings and chlorination neutralization unit;
- 907 km wastewater collection pipes including house connections;
- Maintenance equipment and a new Water Supply and Sewerage Workshop serving ASWRA, including sewer cleaning vehicles, trucks for sludge transport, and specialist maintenance equipment;
- Stormwater management in 3,620 ha of the city– approx. 225 km of pipe and channels.

In 2024, a Feasibility Study Update Report was completed for the wider Ganja Water and Wastewater Project, including the current WWTP Project[5]. Earlier, in 2016, a national Environmental Impact Assessment (EIA) was developed[6] for the WWTP project and a positive statement (EIA approval) was issued by the Environmental Expertise body of the Ministry of Ecology and Natural Resources in 2016.

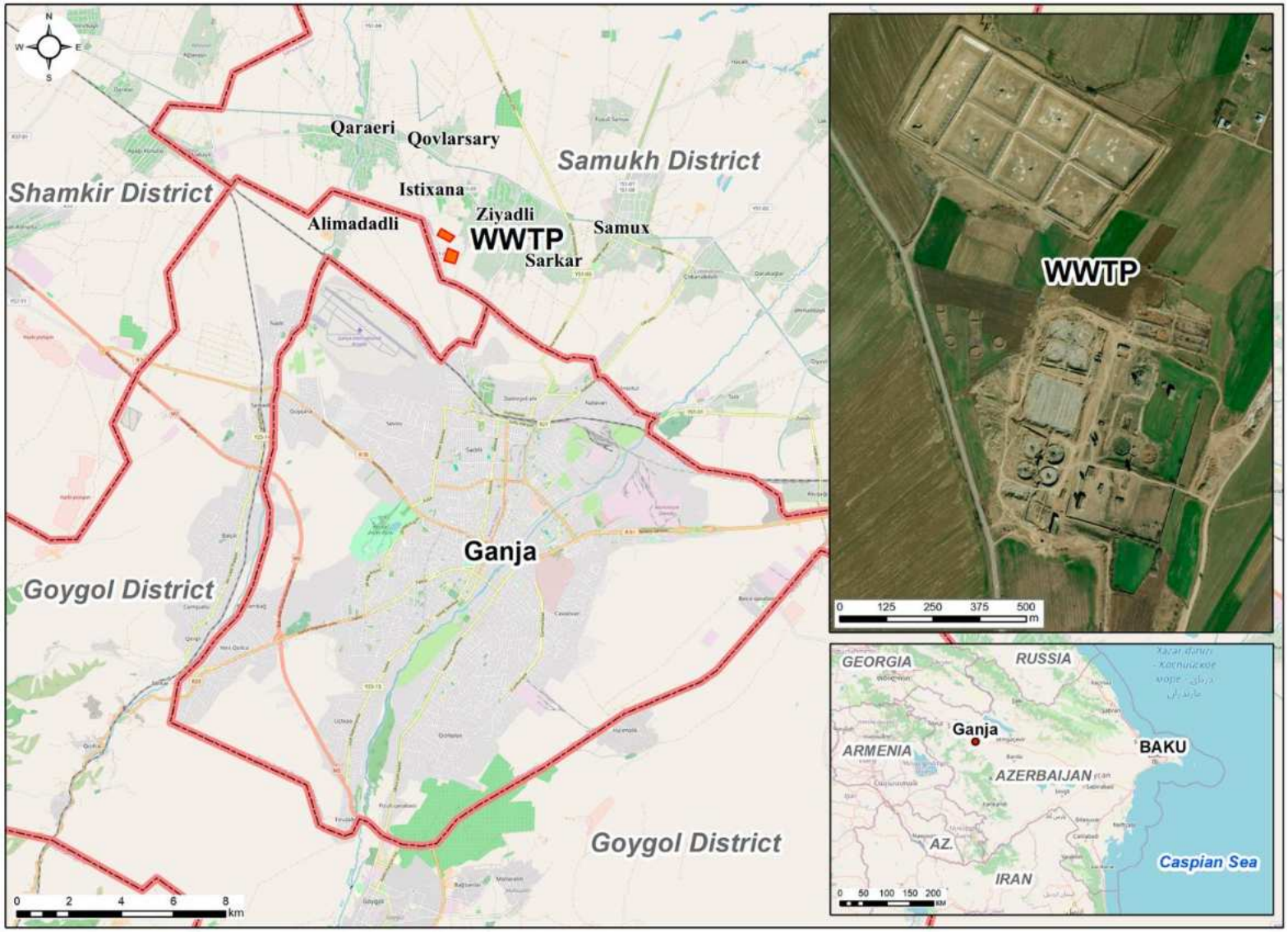
The Feasibility Study Report (Sweco, 2024) recommends single stage construction (not phased), with a nominal capacity of 400,000 Population Equivalent (PE) in 2040. Construction, including detailed design, is expected to take three years. The proposed location for the WWTP is shown on a map relative to Ganja (**Figure 1**).

As the effluent ponds were renovated under the KfW project in 2020, they are not part of the Project. There is a main sewage collector constructed under the KfW project and running from Ganja to the WWTP site, thus this collector is also not part of the Project. The existing sewerage network constructed by the state and KfW financing covers the city centre on both sides of Ganja River and the design is prepared for connecting the remaining areas of the city[7].

[5] SWECO, 2024. Ganja Water and Wastewater Feasibility Study Update, Feasibility Study Report.

[6] Dornier-Schneider Consulting. 2016. Additional Investigation Study for the Wastewater Treatment Plants in Ganja and Sheki-Programme Phase 3. Part 1.3 Ganja Wastewater Treatment Plant. Volume 3: Environmental Impact Assessment Report.

[7] SWECO, 2024. Ganja Water and Wastewater Feasibility Study Update, Feasibility Study Report.



Source: Prepared by the ESIA Consultant.

Figure 1. Location of the Ganja WWTP Site

2.2 The Strategic Environmental Assessment (SEA) for the new Ganja City Master Plan

The SEA[8] took place during the preparation of the new Master Plan of the City of Ganja in 2022 – 2023, supported by the UNECE, in cooperation with the Ministry of Ecology and Natural Resources of the Republic of Azerbaijan (RA) and the State Committee on Urban Planning and Architecture. The lack of functional wastewater treatment system was acknowledged as one of the key environmental concerns and a major hinderance for the city´s further development, and the construction of the new WWTP became one of the key priorities of the environmental component of the new Master Plan. The SEA conclusions in that respect emphasized a need for urgent progress in preparation of the WWT investment (including the initiation of an EIA process), and formulated a few general recommendations for the project preparation:

- Sewage collection pipelines routing should aim to minimize negative environmental and socio-economic impacts of the construction (disruption of natural ecosystems and/or businesses etc.)
- Establish air quality control measures on the WWTP site to treat odours and/or establish buffer zones to protect adjacent land users
- Establish wastewater treatment standards appropriate to receiving water body, implement the best available technology to achieve compliance with the EU standards for discharged waters
- Evaluate water reuse options (e.g. in agriculture, recreation, natural environment), including use of the cleaned effluent for the irrigation of the city public green areas.
- Development of suitable sludge management strategy while considering various management options (e.g. recovery of energy, composting and disposal at waste landfill).

2.3 Principles of Waste Water Treatment

Before presenting the project, the treatment principles used in waste water treatment are outlined as reference framework for the Project. Sewage is the inevitable waste product of human settlements of any kind. In a city, such as Ganja, it makes sense to convey the sewage to a central facility for treatment rather than at source. Water is used to transport the sewage so that it can be pumped through pipelines to the treatment facility. A WWTP, such as that proposed for Ganja, serves to essentially 'recover' the water and ensure that it does not threaten human health or the natural environment by neutralizing the hazardous components of the sewage. The basic steps in treating household sewage are:

2.3.1 Transporting

Waste water is transported by connecting household toilets/bathrooms/kitchens to pipelines that convey the sewage to the WWTP and pumping where required.

[8] SEA is internationally recognized as the key instrument for integrating environmental and health concerns into strategic planning and decision-making to prevent and mitigate possible damage from economic and regional development. SEA should be applied during the preparation of governmental strategic documents in order to ensure that the environmental and health implications of planned developments are analysed and considered early in decision-making processes, before the decisions are made.

2.3.2 Screening

Material that should not be in sewage in the first place such as stones, gravel, bricks and even bottles, as well as material that could block the pipes such as nappies, rags and so forth must be screened out before it can impact negatively on the operation. Such material can be brought into the WWTW where stormwater is channelled into the sewer, but people may also flush some of these materials down the toilet.

2.3.3 Primary Treatment

Organic solid matter (human waste) is separated out through settling the solids in large settlement tanks where the solids sink to the bottom and are pushed towards the centre of the tank where they are pumped away for further treatment. Provided that it is managed correctly the sludge has several potential benefits including use as a fertilizer and heat and power generation.

2.3.4 Secondary Treatment

Primary treatment only removes about 15% of the organic matter and so secondary treatment is required. Human waste contains multiple forms of bacteria, some of which feed on the human waste and break it down. Secondary treatment is based on enhancing conditions that promote the cultivation of this bacteria. For example, 'activated sludge' is a mechanism whereby sludge rich in 'good' bacteria is introduced together with aeration (air is blown through the effluent). Aerobic bacteria which feed off the oxygen added to the water via the process of aeration is thereby cultivated with excess bacteria being removed for reintroduction as 'activated' sludge.

It is also necessary to remove nutrients from the waste stream specifically nitrogen and phosphorous. If not removed these nutrients can result in toxic downstream algal blooms. Nitrogen can be removed by nitrification where ammonia (NH_3) is broken down by microorganisms under aerobic conditions to form nitrates (NO_3). Denitrification is then also used whereby other bacteria convert the nitrates to nitrogen gas (N) which is released to atmosphere removing nitrogen from the stream. In a similar manner, microbes (notably Phosphate Accumulating Organisms) take up the phosphorus in their cells, thereby removing the phosphorus from the water.

2.3.5 Tertiary Treatment

Although sewage treatment is aided by some forms of bacteria, there are other bacteria which are human pathogens (a source of disease) and these must be disinfected before the effluent is discharged. Chlorine is often used for disinfection and is typically 99% effective but chlorine is also hazardous to downstream aquatic life and so must be very carefully controlled. There are other forms of disinfection too including UV light and ozone. Further filtration may also occur during tertiary treatment removing suspended solids, bacteria, and other harmful substances that may remain after primary and secondary treatment. The filtration is a semi-permeable membrane with pores that are small enough to filter out particles, including pathogens like bacteria and viruses.

2.3.6 Other Considerations

There are added challenges too in operating WWTPs and these are a function of other forms of pollution that occurs in modern cities including heavy metals, petroleum products and pharmaceuticals, where anti-biotics, hormones and other active ingredients in modern medicines may be found in the sewage. In an arid country such as Namibia treated sewage effluent is used as a source of potable water because of limited potable water sources. . Such treatment requires significant additional investment; so using WWTP effluent for potable water must be based on the financial cost effectiveness of doing so and the scarcity of water. Effluent can also be treated for other forms of reuse that does not require potable water quality, for agricultural purposes for example.

2.3.7 WWTP Project Main Characteristics and Design

The new WWTP is designed to comply with discharge standards in the EU's Urban Wastewater Treatment Directive, which for large-scale WWTPs above 100,000 PE and for sensitive areas (Goshgarchay River) are[9]:

- BOD5: < 25 mg/l (or 70 - 90% reduction)
- COD: < 125 mg/l (or 75% reduction)
- Suspended Solids (SS): < 35 mg/l (for > 10,000 PE) (or 90% reduction for > 10,000 PE)
- Total Nitrogen (Total N): < 10 mg/l (for > 100,000 PE) (or 70 - 80% reduction)
- Total Phosphorus (Total P): < 1 mg/l (for > 100,000 PE) (or 80% reduction).

The main characteristics of the WWTP Project are summarized in **Table 1**.

Table 1. Main characteristics of the WWTP Project[10]

Project proponent	Azerbaijan State Water Resources Agency (ASWRA)[11]
Estimated investment cost (CAPEX)	EUR 64,428 million, *excl.* VAT.
Design capacity for WW treatment	400,000 PE. Average dry weather flowrate of 100,000 m^3/day.
Start and duration of construction phase	Planned construction starts in the first quarter of 2026. Duration of construction 36 months.
Estimated commission date of new WWTP	June 2029
Design lifetime of new WWTP	50 years (Civil works) 15 years (Mechanical works)
Estimated number of staff during construction	100
Estimated number of staff during operation	21
Estimated gross power consumption at full operation capacity (MWh/year)	6,000 MWh/year

The WWTP Project will employ a three-step treatment process:

- Mechanical (Primary) Treatment: This initial stage will remove large debris using screens, settle out sand, and separate grease from the wastewater.
- 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.
- Tertiary Treatment: The biologically treated effluent then undergoes tertiary treatment, potentially including disc filters and UV disinfection.

[9] Annex 1 of the Directive.

[10] Sweco, 2024: Ganja Wastewater Treatment Plan – ESIA Scoping Report, updated based on the information from ASWRA as of April 2025.

[11] ASWRA replaced Azersu (i.e. the state company providing drinking water and sewage services) in 2024.

Box 1: What is meant by Extended Aeration, Oxidation Ditches, Disinfection including Disc Filters and UV Disinfection

Extended aeration means a longer aeration period – i.e. longer time the wastewater stays in the aeration tank. This extended time facilitates a more complete breakdown of organic matter and supports the nitrification process (conversion of ammonia to nitrates). This type of technology leads to a more stabilized sludge and reduced excess sludge that requires disposal.

An ***oxidation ditch*** is a type of wastewater treatment system that uses a modified activated sludge process, also using microorganisms (bacteria) to break down organic pollutants and nutrients in wastewater. The 'ditch' is typically an oval-shaped channel, designed for continuous circulation of wastewater. This circulation is facilitated by aerators, which also introduce oxygen into the water.

Both extended aeration and oxidation ditches are variations of the activated sludge process. The extended aeration typically involves a series of rectangular tanks or compartmentalized package plants with generally linear flow, progressing through different treatment stages. In comparison, the oxidation ditches can be characterized by a continuous loop channel, where the flow is circular, with continuous circulation of the wastewater. There are also differences in the approach to aeration and mixing the wastewater, as well as in nutrient removal.

In tertiary treatment ***disc filters*** that are covered with filtration media (often a fine mesh fabric or a micro-screen) are used to further filter out remaining solids. When the wastewater flows through the filtration media on the discs, the particles are trapped on the surface of the media, while the filtered water passes through. Ensuring proper filtration is needed to enhance the effectiveness of the subsequent disinfection stage.

Disinfection is required to eliminate harmful microorganisms, such as bacteria, viruses, and protozoa, from the treated wastewater before the water is discharged back into the environment or reused. The disinfection proposed for the WWTP Project will primarily rely on ultraviolet (UV) radiation. Ultraviolet light, produced by UV lamps, penetrates the microorganism cell walls, is absorbed by their genetic material, preventing microorganism reproduction. UV disinfection primarily inactivates microorganisms, rather than killing them but avoids the need for chlorine, for example, which also has potentially negative downstream consequences.

The WWTP Project proposed for Ganja has the following process stages:

- Preliminary Treatment Stage
    - Coarse screens which serve to screen hard material such as sand, gravel and stones, that would otherwise inhibit the operation.
    - Inlet Pump Station; dry well arrangement (4 duty + 1 standby).
    - Plant bypass will be designed for discharging inlet wastewater flow exceeding 3 times dry weather flowrate during storm situations – this is to manage the quantity of stormwater that goes through the system and ensure that the operation is not swamped.
    - Fine screens.
    - Aerated Grit (and grease) Removal.
- Secondary Treatment Stage

- Primary effluent will be treated in an Anaerobic[12] Zone to facilitate biological phosphorus removal (1 hour retention time).
- "Racetrack" shaped oxidation ditches to provide Aerobic Zones (oxidation of organics and for ammonia removal) as well as Anoxic Zones (for nitrogen removal – denitrification).
- Secondary Settling Tanks for separation of activated sludge from treated effluent.
- Treated effluent flow will have a simplified micro-filtration and UV disinfection system prior to discharge to Effluent Ponds for further tertiary treatment and further disinfection. Final effluent flowrate is to be measured and discharged to the effluent channel, and subsequently to the irrigation canal (where further dilution occurs) or the river. For local effluent re-use, an effluent manhole should be considered on the effluent line, where farmers can extract treated effluent via a pump.
- Secondary Sludge Pump Station for transport of waste activated sludge to be thickened (water removed).
- Picket Fence Thickener for thickening secondary sludge .
- Although Biological Phosphorus Removal is included in the process design, chemical phosphorus removal will be provided as a back-up to meet the strict discharge quality standards.

The WWTP Project will also include:

- Buildings:
  - Administration Building;
  - Control Room with SCADA (Supervisory Control and Data Acquisition) system that provides for managing, monitoring, and controlling the WWTP;
  - Chemical Laboratory;
  - Maintenance Workshop;
  - Sludge Management Building;
  - Power Supply and Control.
- Standby generator for power supply.
- Instrumentation and control system, including local Programmable Logic Controllers and central SCADA system for monitoring and control.
- Site drainage to limit the amount of stormwater that can enter the WWTP.

No wastewater monitoring was included in the Feasibility Study (Sweco, 2024) and limited wastewater quality data are available. Effluent quality is based on the EU's Urban Wastewater Treatment Directive for projects >100,000 PE discharging to sensitive waters. The design criteria proposed in the 2024 Feasibility Study are set to meet EU Discharge Standards[13] (**Table 2**). The Goshgar River and the Irrigation Canal are receiving waters for the WWTP

[12] In the absence of oxygen.

[13] Note that the IFC has also published Indicative Values for Treated Sanitary Sewage Discharges in their general EHS Guidelines (www.ifc.org/ehsguidelines), incl.: BOD of 30mg/L; COD of 125mg/L; Suspended Solids of 50mg/L; Total Nitrogen of 10mg/L; Total Phosphorus of 2mg/L. These are similar to those published in the EU Urban Waste Water Treatment Directive (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A31991L0271).

Project during the agricultural growth season. 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 relevant capacities.

Table 2. Design criteria as per the 2024 Feasibility Study[14]

Parameter	Design of 2024		Discharge Standard
	DWF Flow, Q	Conc.	
	m3/d	mg/L	mg/L
BOD5	95,564	243	25
COD	95,564	486	125
TSS	95,564	283	35
Total-N	95,564	59	10
Total-P	95,564	10	1

The pollution load to the river without the WWTP is shown in **Table 3** together with the anticipated percentage pollutant removal by the WWTP (designed for approx. 90% removal of organic pollution (BOD5) and nutrients (nitrogen and phosphorus)):

Table 3. Improvement in pollution load to the receiving waters[15]

Para-meter	Design Horizon: Year 2040			Effluent Load (2040)			Improvement	
	Concentration mg/L	Flowrate m^3/day	Load kg/d	Concentration mg/L	Flowrate m^3/day	Load kg/d	%	kg/year
BOD5	243	95,564	23,211	25	95,564	2,389	90%	7,624,813.5
COD	486		46,422	125		11,946	74%	12,547,495.5
SS	283		27,080	35		3,345	88%	8,698,096
Total-N	59		5,674	10		956	83%	1,718,938.3
Total-P	10		928	1		96	90%	304,848

The WWTP infrastructure should have a green buffer zone surrounding the site, including planted trees and grass areas to limit visual and odour impacts (Sweco, 2024). This is normal good practice for WWTP design. Areas within the WWTP which potentially produce odours should be housed and gases collected and treated, e.g. at the inlet works (screens) and sludge dewatering equipment.

Effluent Disinfection

Cereal crops (processed crops, e.g. wheat, sunflower seeds) are grown in the region (Sweco, 2024). If the WWTP discharge were to be used for irrigation of these crops, secondary Treatment and Disinfection must meet EU Re-use Regulation, namely the strict effluent coliform concentration of 100 MPN/100mL. Assuming the existing effluent lagoons are operated as Maturation Ponds, the estimated coliforms in the effluent range from 100 MPN/100mL (in summer at 25^{O}C) to 30,000 MPN/100mL (in winter at 10^{O}C). Dilution in the Irrigation Canal of nominally a factor of 5 would further reduce the coliform content. Although the disinfection standard would be met at summer temperatures of 25^{O}C, it would not be met

[14] Sweco, 2024: Ganja Water and Wastewater Feasibility Study Update, Feasibility Study Report.

[15] *Ibid.*

at lower temperatures, hence a simplified micro-sieving and UV disinfection system is required.

2.3.8 WWTP Project Location

The WWTP Project will be located on an existing site where construction commenced in the 1980s but was never completed (**Figure 1** and **Figure 2**).

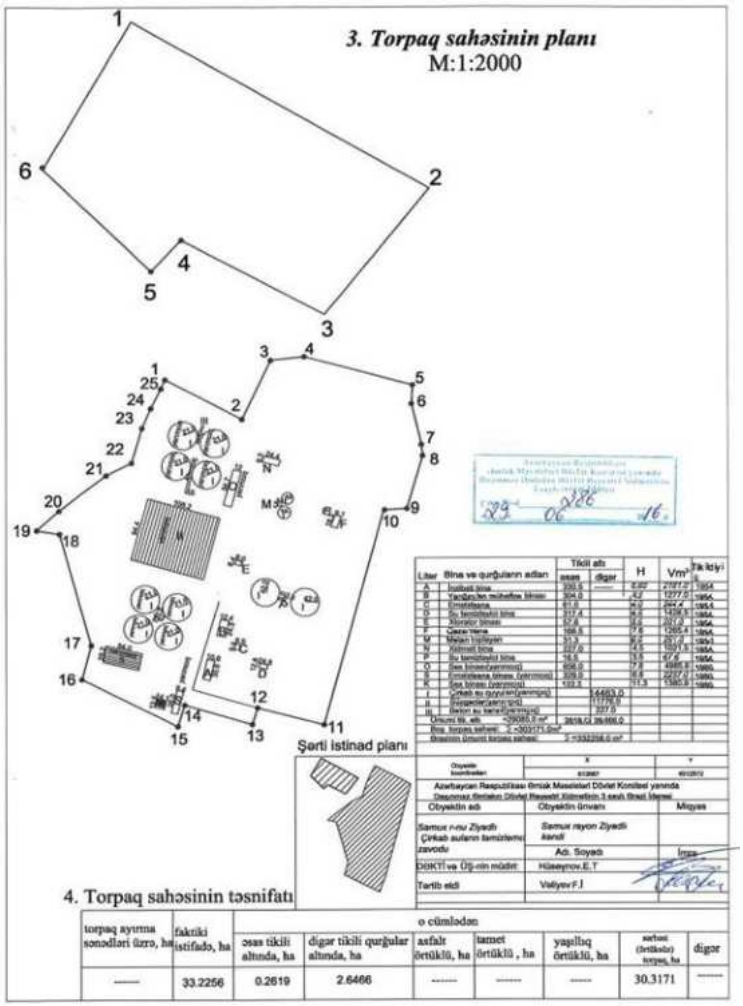


Figure 2. Cadastre map for the WWTP site for Ganja (location of existing infrastructure indicated in the map)[16]

The total area of the WWTP Project site, owned by ASWRA, is approx. 33,000 m^2, including the pond area, and the estimated area required for the WWTP Project structures with a capacity of 400,000 PE would be approx. 15,000 m^2. The conceptual design presented by ASWRA (2024), and which will underpin the detailed design, is shown in **Figure 3.**

[16] Sweco, 2024: Ganja Wastewater Treatment Plan – ESIA Scoping Report.

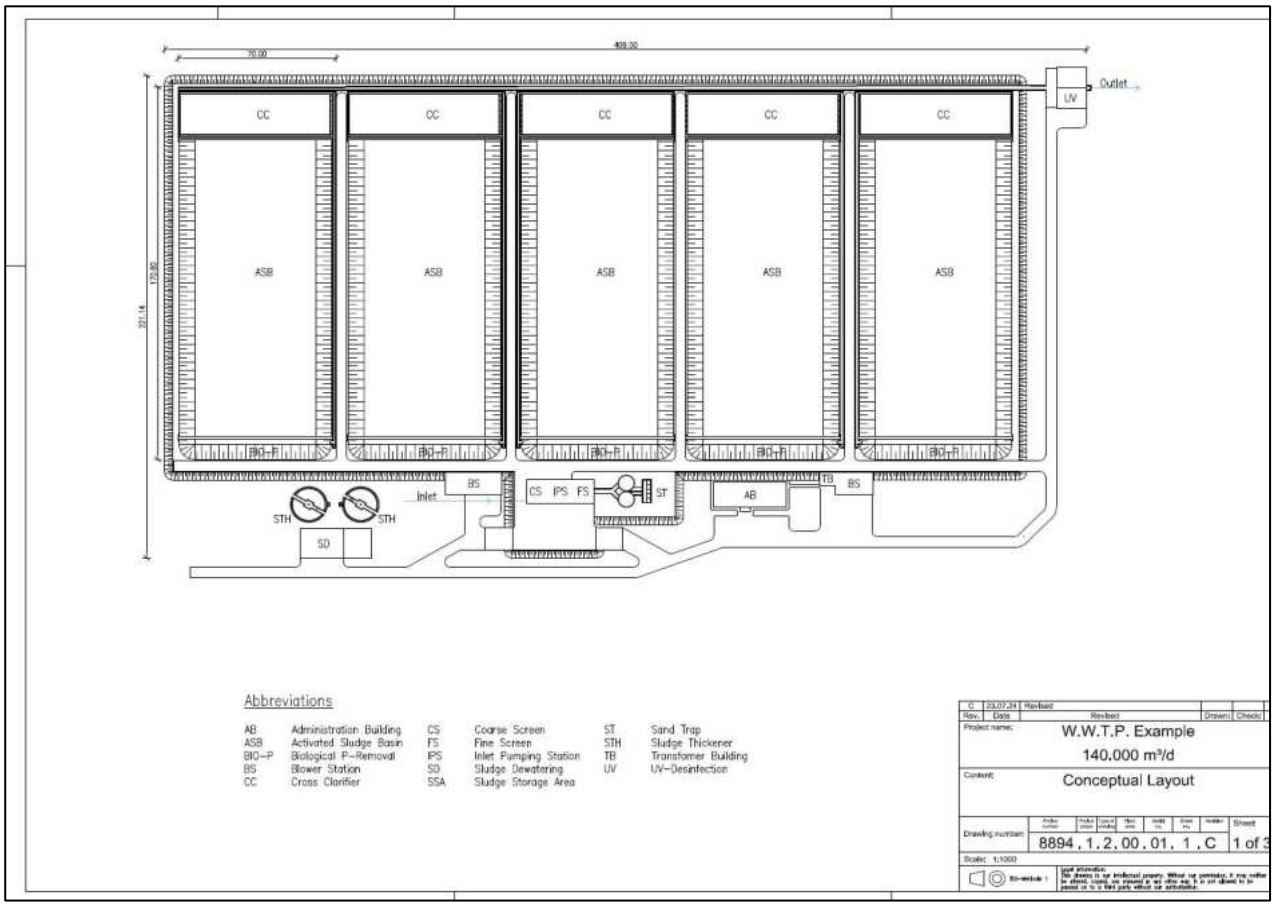


Figure 3. Conceptual layout provided by ASWRA (2024)[17]

2.3.9 On-site sludge storage

One year's sludge storage requires 3.2 ha, so there is more than sufficient land available on-site. A sustainable sludge disposal programme is planned where wind-rowed sludge[18] would be used for agriculture. Without sustainable sludge disposal a long-term sludge storage area would be required on-site, ideally providing five years of sludge storage prior to final disposal at the municipal waste landfill. The most suitable block of land of 11.6 ha which may be procured for managing sludge on-site in the long-term if the agricultural re-use option is not available is shown in **Figure 4**.

Should more space be required for long-term sludge storage on-site, the Eastern side of the WWTP could be used between the road and the planned WWTP. Land owned by ASWRA is sufficient for the new WWTP, but should more land be required for sludge storage, or further drying would decrease the available area the relevant government agencies would be approached by ASWRA.

[17] Sweco, 2024: Ganja Water and Wastewater Feasibility Study Update, Feasibility Study Report.

[18] 'Wind-rowed' sludge" refers to a method of drying sludge that has already undergone initial dewatering. In this process, the dewatered sludge, typically at a solid content of around 20-25%, is stored on-site in wind rows. The primary purpose of windrowing is to increase the dry solids content of the sludge, aiming for approximately 40%. This drying occurs naturally, exploiting the natural heat production from the biological degradation of the sludge and letting it dry in normal weather.

Figure 4. Property for the proposed Ganja WWTP at the existing WWTP site and proposed location of additional land (red line) that may be procured long-term for sludge management, if agricultural re-use is unfeasible (Map source: Google Earth)[19]

Demolition of the existing plant is required to construct new facilities on the site within the current WWTP boundaries. The existing site area will be used efficiently but constructing an additional line as a second phase for the long-term should be considered.

2.3.10 Access Road to WWTP

An access road is required for vehicles to enter and exit the facility for operations and maintenance without obstruction. The proposed WWTP site is accessible via two options as outlined below (**Figure 5**):

1. Direct access from the paved highway R21 to the WWTP is cheaper, and although the road carries little traffic, for safety reasons easy access off the highway to avoid traffic congestion would be required – viz. road widening (cost is included in the budget);
2. Access via an existing unpaved road from Ziyadli Road (which branches off the R21 main road). This more expensive option would require construction of a paved access road of *approx.* 300m and width of 5m.

No other options were considered in the 2024 Feasibility Study due to the existing possibility to access the site through public roads.

[19] Sweco, 2024: Ganja Wastewater Treatment Plan – ESIA Scoping Report.

Figure 5. Options for access road route compared to WWTP site layout[20]

2.4 Project Alternatives

No WWTP site location alternatives are considered as the WWTP is planned to be located within the existing site.

2.4.1 Treatment Options

The two main options for consideration of the treatment process for WWTP Project were addressed in the Feasibility Study (Sweco, 2024):

- Option 1: Conventional Activated Sludge with biogas production but replacing the Secondary Stage with Oxidation Ditches.
- Option 2: Secondary Treatment only via the application of Oxidation Ditches (as proposed in the Conceptual Design Report[21]).

The advantages and disadvantages of both options are provided in **Table 4**.

[20] Sweco, 2024: Ganja Water and Wastewater Feasibility Study Update, Feasibility Study Report.
[21] Dornier-Schneider Consulting, 2017: Conceptual Design Report for the WWTP in Ganja.

Table 4. Advantages and disadvantages of treatment options[22]

Issue	Option 1: Activated Sludge (Anaerobic Digestion and Oxidation Ditch)	Option 2: Oxidation Ditch (no Anaerobic Digestion)
Operations	**Process is more complicated due to Primary Treatment stage and Secondary Treatment stage.**	**Process is simpler (only Secondary treatment), hence operations easier.**
Maintenance	**Primary Treatment has less requirements for equipment maintenance (limited to mixing and heating in digesters).**	**Secondary treatment has more equipment for maintenance (blowers, fine bubble diffusers, valves and instrumentation).**
Power consumption	**Primary treatment reduces power consumption, and biogas process recovers power. OPEX reduced due to lower power costs.**	**High electricity consumption, with no opportunity to recover power. Consequently, OPEX is higher.**
Climate Impacts	**Climate impact reduced due to reduced power consumption.**	**Climate change impact is higher due to higher power consumption.**
Sludge Management	**Primary sludge is easier to dewater (25% dry solids), hence a reduction in volume of sludge for disposal.**	**Secondary sludge is less easy to dewater (15-20% dry solids), hence modestly more sludge for disposal.**

Both options were discussed with ASWRA during the feasibility stage (Sweco, 2024), and according to the current information, the decision on the technological option has been made and the ASWRA will proceed with Option 2, i.e. with an extended aeration process with nutrient removal. This choice has been based on several key factors, including operational simplicity, robustness, and alignment with the technical and human resource capacities available for long-term plant operation.

2.4.2 Sludge Management

Two sludge management systems were compared:

- Option 1: Primary Treatment with anaerobic sludge digestion with production of biogas for combustion in a Combined Heat and Power plant (CHP) for production of electricity. Sludge would be thickened and dewatered to 25% solids, dried in windrows, stored on-site prior to long- term disposal for agricultural re-use.
- Option 2: Sludge thickening and dewatering of aerobically digested sludge (to 25% solids), however no biogas production for electricity generation. Final sludge disposal would be agricultural re-use, or at the municipal landfill.

Economically, anaerobic digestion of the sludge with biogas production and combustion, is preferred, however the alternative option is also acceptable (higher electricity consumption but simpler treatment process). For dealing with the digested sludge from the Anaerobic Digestion (AD) process, in order of preference:

[22] Sweco, 2024: Ganja Water and Wastewater Feasibility Study Update, Feasibility Study Report.

- Sludge re-use for agricultural consistent with the EU Sewage Sludge Directive[23] and management requirements and exploits the benefit of low-grade fertilizer value. The available land adjacent to the WWTP would be for long term sludge disposal.
- Sludge storage on-site (at the WWTP site) or at a long-term storage facility. Although feasible due to available land there are no economic benefits. There might be opportunity for re- using some of the sludge for horticulture or land rehabilitation uses.
- Long-term disposal at landfill but this reduces the municipal landfill lifetime with no economic benefits.
- Sludge disposal via incineration is not viable due to high Capital Expenditure (CAPEX) and OPEX.

The treated sludge disposal options will be further discussed and assessed in the impact assessment phase.

2.4.3 Alternative Options of Effluent Discharge Pipeline

There are also two alternatives of the effluent discharge pipeline, i.e. discharging to the river at 8km, and 4.5km, respectively.

ASWRA proposes to discharge treated effluent to the Irrigation canal during the growing season and to the river during the non-growing season[24]. The Conceptual Design Report (Dornier-Schneider Consulting, 2017) proposed an 8km pipeline, a 4.5km route parallel to the Irrigation Canal is also possible mostly through agricultural land **(Figure 6)**. This shorter route was also recommended by the State Ecological Expertise in 2016.

The effluent line would run from the existing effluent ponds, traverse the adjacent fields (agricultural area) via the existing route of the old discharge line. The pipeline would follow an existing road to the border of Istixana village and continue along the existing road to the Irrigation Canal to the main road (and tunnel under the main road to the river) (**Figure 7)**.

[23] Council Directive 86/278/EEC on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture

[24] Dornier-Schneider Consulting, 2017: Conceptual Design Report for the WWTP in Ganja.

Figure 6. Proposed effluent discharge pipeline route from Ganja WWTP to irrigation canal and river[25]

Figure 7. Effluent pipeline route from WWTP to the Goshgar River[26]

[25] Sweco, 2024: Ganja Water and Wastewater Feasibility Study Update, Feasibility Study Report.
[26] Sweco, 2024: Ganja Water and Wastewater Feasibility Study Update, Feasibility Study Report.

2.5 Associated Facilities[27]

2.5.1 Electrical Transmission Line

A new electrical transmission line and substation to connect the WWTP to the national electrical grid is the main associated facility. Electricity in Azerbaijan is supplied by Azerenerji OJSC and Azerishiq OJSC. Technical conditions for the connection were previously defined, although these expired in 2019.[28]

The ESIA Scoping Report (Sweco, 2024) further provides that:

- There is an existing high voltage power transmission line located adjacent to the proposed WWTP site. Changes to the transmission line are not expected, as it is located outside the site boundary.
- There are smaller low or medium voltage power lines within the site, providing power to existing buildings, which are expected to be relocated as part of the WWTP Project.
- Construction of a short access road is expected to be part of the WWTP Project, hence not an associated facility.
- A main sewage collection pipeline has already been constructed from Ganja to the WWTP site, hence is not a part of this WWTP Project.
- The effluent ponds have been renovated by KfW funds, hence are not part of the current WWTP Project.

2.5.2 Alternative Energy Supply

Solar power panels (PV) could be installed to ensure energy-neutral operations of the WWTP, but this is not in ASWRA's current planning.

3 LEGAL AND REGULATORY FRAMEWORK

3.1 Azerbaijan

Environmental (and social) impact assessment:

- **Environmental Protection Law (1999)** provides the overarching legal, economic, and social framework for environmental protection. It aims to preserve ecological balance, protect biodiversity, and regulate interactions between society and nature.
- **EIA Law (2018)** implements Article 54.2 of the Environmental Protection Law. Mandates EIA for public and private projects, including consultation with the Ministry of Ecology. Defines scope, alternatives, and mitigation measures.
- **EIA Regulations (2022**) requires developers to submit project applications and consult with the State Environmental Review Agency during the pre-design phase. Requires public participation and official publication of the scoping phase.

Surface Water & Wastewater Management:

[27] "These are new facilities or activities: i) without which the project would not be viable, and ii) would not be constructed, expanded, carried out or planned to be constructed or carried out" (EBRD E&S Policy. 2019. Section II. Definitions).

[28] Sweco, 2024: Ganja Wastewater Treatment Plan – ESIA Scoping Report.

- **Water Code (1997)** regulates the use and protection of water bodies and that drinking water must meet sanitary norms. Municipalities designate sources in consultation with national agencies.
- **Wastewater Law (1998)** governs water supply and effluent discharge, emphasising cost recovery, rational water use, and establishment of purification systems. Requires zoning for utility services.

Air Quality: Law on Protecting the Atmosphere (2001) governs emissions, air quality standards, and inventory of pollution sources.

Noise: Noise Decree (2008) establishes maximum permissible limits for indoor and outdoor noise and vibration in residential areas.

Conservation: Fauna Law (1999), Green Belts Law (2014), and Protected Areas Law (2000) establish biodiversity conservation, management of reserves, and use for research and recreation.

Sanitary Protection Zones (SPZ): Building rules and regulations "Planning and construction renovation of city, town and rural settlement" AzDTN 2.6.1 define buffer zones (100–1000m) between WWTPs and residential zones, modifiable based on technical assessments.

Occupational Health and Safety (OHS): Labour Code (No. 618-IQ) establishes safety obligations for employers, mandates protective equipment, and regulates working/resting hours.

Labour and Human Rights:

- **Constitution (1995), Labour Code (1999) and the Employment Law (2018)** guarantee equal work rights, gender equity, and freedom of profession.
- **Gender Law (2006) and Unemployment Insurance (2017)** outline gender-based protections and compensation for job loss.
- **ILO Conventions**: Azerbaijan is party to all core conventions including freedom of association, equal pay, minimum age, and forced labour prohibition.

Land Acquisition and Social Safeguards:

- **Land Code (1999), Civil Code (1999) and Land Acquisition Law (2010)** ensure full compensation for compulsory acquisition. Covers informal users and requires court registration of state need.
- **Resettlement Plans (Cabinet Decree 2012)** required for projects affecting 200+ people. Include compensation, options, and legal remedies.
- **Law on Right to Information (2005)** ensures public access to information related to environmental decisions.
- **Grievances Law (2015)** formal mechanism for citizens to raise issues with public decisions.

International Conventions and Treaties: Azerbaijan has ratified key conventions including the Aarhus Convention (access to environmental information), UN Conventions on Human Rights, Child Rights, Women's Rights, and the Convention on Intangible Cultural Heritage.

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 (RRs)[29]. The ESP sets E&S requirements for the EBRD clients' activities to achieve sustainable results. The following is a summary of the requirements applicable to this Project[30]:

- **PR 1: Assessment and Management of Environmental and Social Risks and Impacts** requires the EBRD client to conduct an E&S assessment and / or audit. Assessment is carried out for all stages of the project (construction, operation, decommissioning). Based on the assessment and audit, an ESAP, an Environmental and Social Management Plan (ESMP), and other plans are developed. An important feature of the EBRD's requirements is the *concept of associated facilities* that are not financed by the Bank, and therefore are not part of the project, but which are significant in determining the success of the project. These associated facilities may be carried out by both the client of the Bank and other parties. However, they should be part of the E&S assessment. PR 1 is also applicable to contractors involved in project implementation. EBRD requires borrowers to implement an E&S Management System (ESMS) appropriate to the nature of the project, as well as reporting to EBRD on the project's E&S performance, including compliance with the relevant PRs and the approved ESMS, ESMP, ESAP, SEP and other documents or commitments.
- **PR 2: Labour and Working Conditions** establishes requirements in terms of labour and working conditions, including the prohibition of forced and child labour in the project. The PR 2 requirements are based on the conventions of the ILO.
- **PR 3: Resource Efficiency and Pollution Prevention and Control** requires efficient use of energy, water and resources, and minimisation of waste, as well as compliance with good international practice (GIP), and application of a mitigation hierarchy. This PR is based on the principles of the EU Industrial Emissions Directive (Integrated Pollution Prevention and Control) [31] and calls for the implementation of EU requirements on the use of Best Available Techniques (BAT) and related standards for emissions and discharges.
- **PR 4: Health, Safety and Security** requires the client (borrower) to identify and assess community and occupational health and safety risks and implement preventive measures. The focus is on preventing and eliminating risks rather than reducing and minimising them.
- **PR 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement** defines requirements related to project-induced land acquisition, including restrictions on land use and access to assets and natural resources, which may cause physical displacement (relocation, loss of land or shelter), and/or economic displacement (loss of land, assets or restrictions on land use, assets and natural resources leading to loss of income sources or other means of livelihood). The key requirement of PR5 is to avoid or, when unavoidable, minimise, involuntary resettlement via feasible alternative project designs/sites. A resettlement framework (RF), including livelihood restoration where needed, is developed in an early stage of the project to detail resettlement principles and organisational arrangements.
- **PR 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources** determines the requirements for the conservation of biological and landscape diversity in the development area. PR 6 requires the borrower to

[29] EBRD. 2019. ESP. https://www.ebrd.com/news/publications/policies/environmental-and-social-policy-esp.html.

[30] PR 7: Indigenous peoples and PR 9: Financial Intermediaries are not applicable to this Project.

[31] Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on Industrial Emissions (Integrated Pollution Prevention and Control). https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32010L0075.

characterise the state of biodiversity, identifying sensitive species and habitats, and developing measures to avoid / reduce impacts. PR 6 defines criteria for critical habitat screening and requires developing a Biodiversity Action Plan (BAP) where significant adverse impacts on biodiversity are expected.

- **PR 8: Cultural Heritage** defines the requirements for the preservation of both tangible and intangible cultural heritage. PR 8 requires exploring the presence / possibility of the presence of objects of cultural heritage in the project's area of influence. Where the assessment identifies that the project may have material impacts on cultural heritage, the client is required to develop a cultural heritage management plan.
- **PR 10: Information Disclosure and Stakeholder Engagement**. The EBRD requires careful and systematic stakeholder identification, including communities that may be affected by project impacts (affected groups) and groups whose vital interests may be affected by projects (vulnerable groups). The EBRD requirements for organising stakeholder engagement are also set out in its Access to Information Directive[32]. Meaningful stakeholder consultations are viewed by the EBRD as an ongoing process throughout the project lifecycle. The EBRD's stakeholder engagement requirements are detailed in the draft Stakeholder engagement Plan (SEP) for the Project.

3.3 EU Environmental Directives

Environmental and social impact assessment: EIA Directive (2014/52/EU) requires impact assessment for projects likely to cause significant environmental effects, and emphasizes public involvement, transparency, and mitigation.

Water and waste:

- **Water Framework Directive (2000/60/EC)** introduces River Basin Management Plans, quality status categories, and an objective to achieve at least 'good status' for all EU waters.
- **Urban Wastewater Directive (91/271/EEC)** requires secondary treatment of all wastewater in settlements >2,000 PE. Sensitive areas need more advanced treatment. New 2022 revision expands monitoring, sustainability, and energy recovery.
- **Sewage Sludge Directive (86/278/EEC)** limits heavy metals in soil, mandates sludge analysis, and requires record-keeping.
- **Water Reuse Regulation (2020/741)** establishes EU-wide minimum quality and monitoring standards for irrigation reuse.
- **Waste Framework Directive (2008/98/EC)** introduces waste hierarchy, polluter pays, and extended producer responsibility.

Noise Regulations: EU Noise Directive (2002/49/EC) requires mapping of environmental noise, public information, and mitigation planning.

Air Quality: Ambient Air Quality Directive (2008/50/EC) sets pollutant limits (e.g., $PM_{2.5}$, NO_2, SO_2, O_3) and targets long-term protection of human health and vegetation.

Conservation: EU Habitats and Birds Directives create the Natura 2000 network and enforce protection of sensitive species and ecosystems.

[32] EBRD. 2019. Access to Information Directive. www.ebrd.com/documents/strategy-and-policy-coordination/access-to-information-policy-directive.pdf?blobnocache=true.

Occupational Health and Safety (OHS):

- **OHS Framework Directive (89/391/EEC)** requires risk assessment, training, and worker participation in workplace safety.
- **Construction Safety Directive (92/57/EEC)** sets up coordination roles for safety in projects with multiple contractors, mandates a pre-construction health and safety plan.

3.4 The National EIA processes

Project developers must consult with the State Ecology Expertise (SEE) Agency within the Ministry of Ecology and Natural Resources (MENR) during the pre-design phase for determining the scope of the EIA. As such, for the Ganja WWTP, ASWRA must:

1. Engage an EIA practitioner and then apply for pre-design consultations with the SEE. The application must include a project description and proposed scope of the assessment.
2. Within 3 days of receipt, the application, project description, and assessment scope, will be published by the Agency on its official website for public review and comment.
3. Following the submission, there is consultation between the developer and the SEE to define the exact scope of the required EIA.
4. The EIA practitioner then conducts the assessment based on the agreed scope. The assessment includes identifying and assessing potential impacts and mitigation.
5. A final EIA report, including project impacts, alternatives, mitigation measures and monitoring plans, is submitted to the SEE for approval, which is a prerequisite for a construction permit.

3.5 SPZ Requirements

SPZs around WWTPs are regulated by state building rules and regulations "*Planning and construction renovation of city, town and rural settlement*" AzDTN 2.6.1. (2001).

These zones serve to mitigate health risks by ensuring a buffer between WWTPs and residential or sensitive areas. The size of the SPZ depends on the capacity and type of the facility, to prevent contamination and odour issues. Regulatory requirements for SPZ sizes for household wastewater infrastructure facilities are summarized in **Table 5** below.

Table 5. SPZ sizes for household waste water infrastructure facilities

Enterprises and facilities	Dimensions of sanitary protection zones (m)
Enterprises for industrial processing of household waste, production capacity - 10 3 t/year: 100 - up to Over 100	300 - 500
Fresh compost bins	500
Landfills*	500
Composting areas	500
Sewage treatment areas	1000
Wastewater receiving stations	300
Waste transfer stations	100
Collection and burial areas of neutralized sludge (by dry matter)	1000

Source: State building rules and regulations "Planning and construction renovation of city, town and rural settlement" AzDTN 2.6.1.

AzDTN 2.6.1. standard also states that the size of SPZ for WWTP facilities shall be established in accordance with the requirements of the existing regulatory document SNiP 2.04.03-85 "Sewerage. External networks and structures"[33]. This SNiP sets a 500 m normative SPZ for WWTPs with a capacity of over 50,000 m3/day (which is a case for Ganja WWTP).

The size of SPZ for the planned WWTP facility will be reviewed with the authorized bodies during the impact assessment phase. It can be reduced twice based on the technical solutions, prevailing winds and other considerations.

4 ESIA METHODOLODY

4.1 General information

The ESIA of a project is the process of identifying potential E&S impacts of a proposed activity, assessing the magnitude and significance of those impacts, and developing measures to avoid and/or mitigate negative impacts and enhance positive effects. A key element of the ESIA is consultation with stakeholders.

4.2 ESIA Process

The key elements of the ESIA are:

- **Scoping** - Preliminary assessment and identification of key issues (this document);
- **Detailed assessment** - collection and analysis of information on 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.

The scheme for conducting the ESIA is presented below (**Figure 8**).

4.2.1 Scoping - Preliminary assessment and identification of key issues

Scoping (this document) serves to scope the assessment required. The approach used here is to identify all project **activities** (for both construction and operations) and for each activity to determine the E&S **aspects**. Aspects are defined as 'elements of an organization's activities that *interact* with the environment' and perhaps the best way of thinking about aspects is the inputs (resources) required by a project and the associated outputs (products, waste and pollution). Social aspects include jobs, spending and skills development. An E&S baseline is also described, highlighting sensitive or vulnerable **E&S receptors**[34]**.** Potential impacts are identified and preliminarily assessed as possible changes to those receptors brought about by the aspects. Scoping is concluded by defining what needs to be assessed and how, in the detailed impact assessment phase.

[33] Construction norms and rules (SNiP). 2.04.03-85 "Sewerage. External networks and structures". https://files.stroyinf.ru/Data2/1/4294854/4294854702.pdf

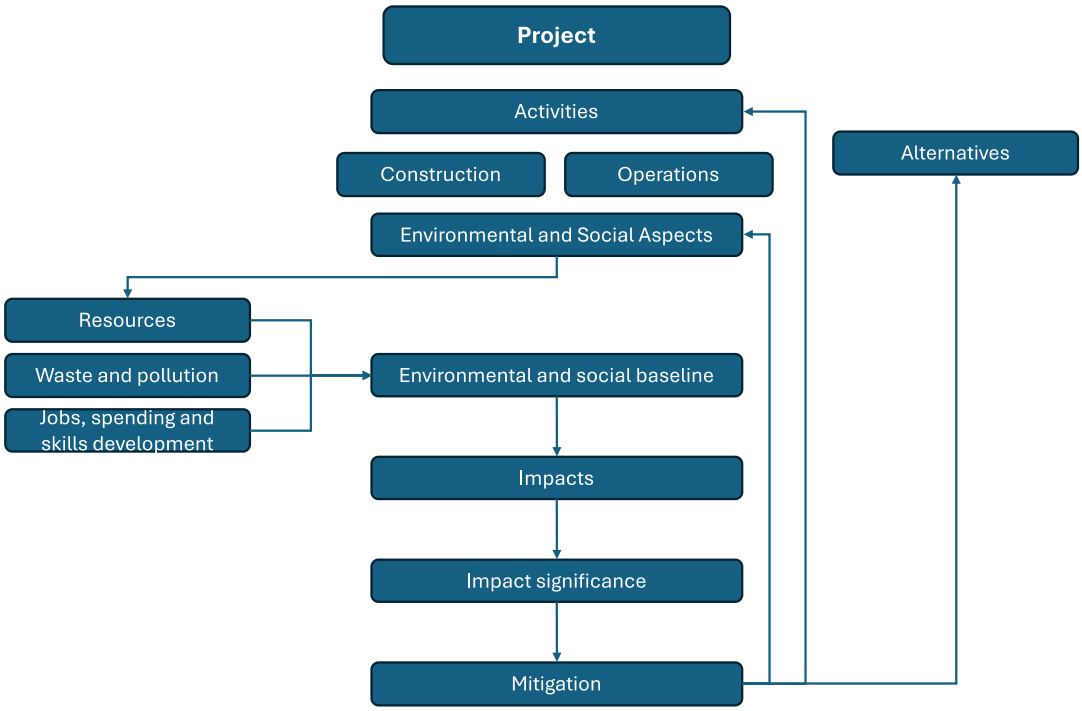
[34] An example of ecological receptors are habitats disturbed as a result of excavation/construction works; an example of social receptors are residents of the district centre who may be employed as construction workers or workers at the planned mining and processing plant.

4.2.2 Detailed assessment

The following types of Project impacts are considered:

- **Direct impacts**: Project impacts arising directly from Project activities and associated E&S aspects. These impacts are typically realized at the same place and time as where and when the Project is implemented. They are also referred to as primary impacts because they have direct consequences for the natural or social environment; for example, waste water discharge from the operation into an adjacent river.
- **Indirect impacts**: may be caused by activities not included in the Project but related to it and/or caused by its implementation. Such impacts often occur over time, affect a wider area, but are reasonably predictable; For example, off-site power generation, that provides electricity to the project.
- **Cumulative impacts**: may result from the combination of the various impacts of the project itself and/or several projects/activities in the same area. Cumulative impacts may also result from the gradual build-up of the impacts of one activity when they add up to the impacts of other past, present and reasonably foreseeable future activities.

While it is the changes to receptors, that are defined as impacts, it is the consequence of those changes that is used to define impact significance. Impact significance is a function of receptor sensitivity and the magnitude of the change (impact).



Source: Prepared by the ESIA Consultant

Figure 8. Conceptual presentation of the ESIA process

4.2.2.1 Assessment of receptor sensitivity

The proposed descriptors and criteria for the sensitivity of a receptor are given in **Table 6**.

Table 6. Criteria for assessing receptor sensitivity

Sensitivity	Main Criteria Descriptors
High	High or very high importance and rarity, international or national scale and very limited to no potential for substitution
Medium	Medium importance and rarity, regional scale, limited potential for substitution

Sensitivity	Main Criteria Descriptors
Low	Low importance and rarity, local scale
Very low	Very low importance and rarity, local scale

4.2.2.2 Assessment of impact magnitude

The proposed descriptors and criteria for impact magnitude are given in **Table 7.**

Table 7. Criteria for determining the magnitude of impacts

Magnitude category	Main criteria
High	Loss of the resource and/or its quality and functional condition; severe damage to its key characteristics, permanent / irreversible change of its properties or components (Adverse impact)
	Large-scale or substantial improvement in the quality of the resource; major restoration or improvement, permanent change in the form of significant improvement in quality characteristics (Positive Impact)
Medium	Loss of a resource that does not lead to a deterioration in its functional condition, partial loss or deterioration of key characteristics, properties or constituent elements (Negative impact) Improvement or addition of key characteristics, properties or constituent elements; qualitative improvement (Positive impact)
Low	Some measurable change in parameters, quality or vulnerability, minor loss or alteration to one (or more) key characteristics, properties or constituent elements (Adverse Impact)
	Minor improvement or addition to one (or more) key characteristics, properties or elements, some positive effect on resource parameters, or a reduced risk of a negative impact (Positive Impact)
Negligible	Very minor loss or deterioration of one or more characteristics, properties or constituent elements (Adverse Impact)
	Very minor improvement or addition of one or more characteristics, properties or constituent elements (Beneficial Impact)
No change	No loss or alteration of characteristics, properties or constituent elements, no noticeable impact in either direction.

5.2.2.1 Assessment of impact significance

Impact significance is based on a matrix that combines receptor sensitivity and impact magnitude (**Table 8**).

Table 8. Impact Significance Matrix

Impact Magnitude	Receptor Sensitivity / Value			
	High	Medium	Low	Very Low
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Minor
Low	Moderate	Moderate	Minor	Negligible
Negligible	Moderate	Minor	Negligible	Negligible

The significance of impacts is based on reasoning and professional judgment and considers stakeholder views. In some cases, impact significance may be quantified using thresholds and scoring criteria but generally significance is expressed qualitatively. The four impact significance categories are summarized in **Table 9**.

Table 9. Criteria for determining the significance of impacts

Significance category	Main Criteria Descriptors
Major	Very large or large magnitude of change in environmental or socio-economic conditions. Impacts, both adverse and beneficial, which are likely to be important considerations at a national and regional level or could result in violation of statutory environmental regulations.
Moderate	Intermediate magnitude of change in environmental or socio-economic conditions. Impacts that are likely to be important considerations at a regional and local level.
Minor	Small magnitude of change in environmental or socio-economic conditions. Impacts may be raised as local issues but are unlikely to be of importance in the project's permitting and approval process.
Negligible	No discernible change in environmental or socio-economic conditions. Impacts that are likely to have a negligible or neutral influence, irrespective of other impacts.

5.2.24 Assessment of Residual Impacts

Residual impacts are those likely to occur after mitigation and enhancement of positive impacts and other management measures. Stated differently the residual impacts are what must be 'lived with' if the project goes ahead. Residual impacts must be environmentally and socially acceptable.

5.2.2.5 Assessment of Cumulative Impacts

Impacts from the project will be assessed in combination with the impacts of other existing or reasonably anticipated future projects recognising:

- Summative impacts - a combination of several similar impacts, from multiple sources to a single receptor.
- Interacting impacts - a combination of several different impacts on the same receptor).

Cumulative impacts will be assessed following the IFC's Good Practice Guidance.

4.2.3 E&S Management and Monitoring

Based on the assessment, mitigation will be identified to avoid, reduce or manage potential negative impacts and enhance benefits. Mitigation measures will be clear, feasible and applicable to local conditions and based on Good International Industrial Practise (GIIP).

Mitigation, monitoring and management requirements identified in the impact assessment will be detailed in an ESMP divided into construction and operations. The ESMP will also contain a management framework, that will ensure E&S risks are included in decision-making and day-to-day operations and track, evaluate, and communicate E&S performance. The ESMP will detail roles and responsibilities for all project parties, including the Construction Contractor.

4.2.4 Stakeholder Engagement and Public Consultation

A Stakeholder Engagement Plan (SEP) has been developed for this ESIA, including stakeholder identification and analysis, engagement and grievance mechanisms.

4.2.5 Data Availability, Assumptions and Limitations

Assessment limitations include:

- Limited E&S information on the project area. Open sources have very limited local data on environmental components (in particular, on the availability and quality of surface and groundwater, air and soil quality, and the state of biodiversity).

- The approaches to source data and information are specified in **Section 6** for each environmental and socio-economic issue. No primary environmental quality data will be sourced.

5 ENVIRONMENTAL AND SOCIAL BASELINE

5.1 Environmental Baseline

The environmental baseline below is based on baseline sections of the EIA report, prepared by Dornier-Schneider Consulting in 2016[35], and the ESIA Scoping report (Sweco, 2024). It also includes relevant information from the SEA for the Ganja Master Plan[36]. The photos were taken by the ESIA Consultant to illustrate the current state of the site. Baseline information will be updated as far as possible during site recognisance. In general, the project site and surrounding area:

- Is in an arid to semi-arid climate with a high average temperature, low annual precipitation, and a high potential evaporation.
- Where the prevailing wind director is westerly (54%) and easterly (33%). The regional wind pattern is plain-mountain during the day mountain-plain at night.
- Has relics of unfinished construction of the planned WWTP, which was launched in 1980',
- Is flat, besides old buildings and other parts of the unfinished WWTP. The landscape is strongly affected by a high voltage power line.
- Has residential areas relatively close to the site (Ziyadli village is the closest, with its nearest structure being 300m northeast from the WWTP site and 125m from the effluent ponds).
- Is mainly irrigated arable land around the site, and anthropogenically dominated flora, fauna and habitats.

[35] Dornier-Schneider Consulting, 2016: Additional Investigation Study for the Wastewater Treatment Plants in Ganja and Sheki-Programme Phase 3, Part 1.3 Ganja Wastewater Treatment Plant Volume 3: Environmental Impact Assessment Report

[36] European Union for Environment, 2024: Strategic Environmental Assessment (SEA) Final Report on Ganja Master Plan

Source: ESIA Consultant, March 2025

Figure 9. The Project area with a local road highlighting the flat landscape and aridity of the area

Source: ESIA Consultant, March 2025

Figure 10. Unfinished buildings from the original WWTP that was never completed

Source: ESIA Consultant, March 2025

Figure 11. Unfinished oxidation pools of the original WWTP that was never completed

5.1.1 Climate

The climate is mild semi-arid and dry arid. Ganja is in the western plains of Azerbaijan, with local climate strongly influenced by terrain, and with strong winds throughout the year. The key climate characteristics are:

- Mean annual air temperature is approximately 14.8°C. In January, February, and December, temperatures can occasionally drop to -5°C to -12°C, although monthly averages typically remain above 3°C to 4°C. In summer, absolute maximum temperatures can reach 36°C to 38°C, but monthly averages generally do not exceed 26.2°C to 27.0°C.
- Little annual precipitation of approximately 235 mm/a. Most precipitation occurs in spring and early summer, with only about 15% during winter. The potential evaporation rate is high at 1,057 mm/a.
- Westerly and easterly winds occur for 54% and 33% respectively. from eastern directions. Stronger winds prevail towards the west and north-west.
- Mean annual relative humidity is 68%.
- Snow cover lasts for about 11 days per year, and hail on average 0.2 days per year.

Table 10. Distribution of the Wind directions in Ganja (%)

North	North- East	East	South- East	South	South-West	West	North- West	Calm
7	6	14	13	6	8	20	26	10

5.1.2 Ambient Air Quality

Ganja has a single stationary automatic air monitoring station, which began operating in 2021. Air quality monitoring from MENR indicates that the average annual concentrations for Ganja generally comply with permissible standards. However, from 2010 to 2022, the average

annual concentration of sulphur dioxide (SO_2) exceeded regulatory limits. The elevated SO_2 levels are mainly due to increased transportation, industrial operations and other anthropogenic factors. MENR's assessment identifies industrial facilities within the city limits and heavy traffic as the primary sources of atmospheric pollution in Ganja.

There are no significant emissions nearby, except for an aluminium factory located approximately 10 km southeast of the area. Combined with the low traffic load on adjacent roads, air quality in the project area is considered good for SO_4, and NO_x. However, dust concentrations may exceed permissible daily averages, particularly during harvesting seasons and extended dry periods in summer.

Table 11. Air quality in Ganja[37]

Emission/average annual concentration by city µgm^3	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Nitrogen 4-oxide (NO_2)	40	30	30	30	30	30	30	30	...	41	35
Sulfur dioxide	39	40	38	38	37	38	37	37	...	35	35
(SO_2)											
Carbon monoxide (CO)	x	x	x	x	x	x	x	x	...	1074	1562
$PM_{2.5}$ dispersed dust	x	x	x	x	x	x	x	x	x	28	26

5.1.3 Noise

Allowable daytime noise levels for residential areas in Azerbaijan are 60 dB(A). Transport and industrial activities are the main sources of noise in Ganja; however, no data are available. As the project site is located far from any significant sources of noise such as industries and main roads, it is relatively quiet.

5.1.4 Geomorphology and geology

The geological base of Ganja (313 masl) is quaternary sediments, ranging from 100 m to 250 m above the basement rock, mainly composed of alluvial material from the Caucasus Mountains. This includes gravel, sand, and clay from limestone, chalk, and gypsum. The area features small "clay lenses" with low permeability within a thick layer of high-permeability coarse material. This clay cover forms an effective semi-permeable layer typical for the region.

The project area has two geomorphological units:

1. The intensively dissected low mountain plain; and,
2. Alluvial-proluvial weakly dissected plain.

Ganja lies on a major fault line stretching across Azerbaijan's intermountain plains, marking the highest seismic zone of the Lesser Caucasus. Earthquakes up to magnitude 7.3 and intensity 9.2 have struck this region from 424 to 1308. Seismogenic layers are found at depths of 5-15 km and 40 km. Due to weak earthquake energy absorption in the area, seismic effects are widespread even during minor quakes.

The 9-point Goygol earthquake in the Ganja-Goygol region showed an elliptical distribution of energy with a sub meridional major axis. The maximum energy class is 16-17, intensity is

[37] MENR, 2023

9-10 points, average seismic activity level is 0.8, recurrence graph angle coefficient is 0.44, and the recurrence period for major earthquakes is 30-40 years.

5.1.5 Soil

Ganja is situated in the northeastern foothills of the Lesser Caucasus Mountains. The city features grasslike chestnut (gray-brown) soils, common chestnut, and alluvial-grass soils in its northern region. The semi-arid clay-loam chestnut soils (brown and greyish soils) and alluvial floodplains are considered valuable for agriculture due to their high natural fertility. However, due to the semi-arid climate, arable farming requires irrigation. The soil in the project area has been impacted by wind erosion, compaction, and irrigation with wastewater. The chestnut soils are valuable for agriculture, and there are areas with semi-desert ecosystems.

Source: ESIA Consultant, March 2025

Figure 12. Irrigated arable land in the project area

Source: ESIA Consultant, March 2025

Figure 13. Irrigated arable land, north-west of the project site

5.1.6 Water Resources (Surface Water and Groundwater)

5.1.6.1 Surface water

Ganja has a semi-arid climate with limited water resources. The main water body is the Ganjachay River, with flow varying significantly throughout the year. From March to June, snowmelt causes an increase in water level, while in winter, the river depends on groundwater, with decreased flow. The river's annual flow sources are snow (38%), rainfall (15%), and groundwater (47%), averaging 4.00 m^3/sec, with spring floods from late March to early June. The annual water flow of the Ganjachay River decreased by 14% from 1961 to 1990.

The MENR's 2019-2020 monitoring report revealed that phenol and ammonium ion levels in the river exceeded permissible limits due to untreated wastewater from nearby settlements. Phenol was 1.3 times higher in 2019, turbidity was 17.1 times higher, and ammonium ions were 1.4 times higher in 2020. The water content is hydrocarbonate-calcium with medium mineralization (150-250mg/l). The Ganjachay River is used for irrigation, energy production, and other purposes.

The Goshgar river which receives the WWTP effluent through a discharge pipeline is fed by an overflow from the Shemkir canal at Qarayeri village, at the crossing point approx. 4.5 km upstream of the planned discharge point. The river runs dry for parts of the year. The semi-arid climate in the investigation area, means that there are no perennial natural surface water bodies. There is a ditch for waste water at the project site (**Figure 14**).

Surface water in the project area is significantly affected by pollution. Apart from the Goshgarchay which shows semi-natural riverbed structures and water dynamics and therefore a high ecological value, is a sensitive area (EU-directive 91/271/EEC).

Source: ESIA Consultant, March 2025

Figure 14. A ditch for waste water at the project site

5.1.6.2 Groundwater

Ganja has groundwater reserves that vary in depth, predominantly located within deeper layers. Groundwater is generally higher in the southern part of the Ganja region, while increasing depths are observed towards the northern and northwestern areas. Mineralization ranges from 3 to 0.8 g/l, with a hydrocarbonate-calcium chemical composition and a content level between 1.5 to 3.0 mg/l. Atmospheric precipitation and surface streams primarily recharge groundwater. Consequently, the groundwater level regime is closely interlinked with the river hydrology.

The WWTP site is overlies a deep and varying groundwater table of more than 5-10 m depth, except for the Goshgarchay valley where the groundwater table is much higher (probably 1-2 m). Ground water flow is south –north according to the inclination of the wide-ranging plain. There are several artesian wells for drinking water abstraction within a perimeter of 3 km (approx. 15 households) downstream of the proposed WWTP. Furthermore, downstream of the tributary point with the Kura River, water is abstracted (8 km downstream of the discharge point).

The project area provides limited groundwater recharge but is relatively significant for drinking water supply. The locations of the drinking-water wells and their proximity to the project site imply high-sensitivity to water pollution.

5.1.7 Landscape

The landscape of the city is mainly anthropogenic, with natural semi-desert landscape. Surroundings of Ganja have natural mountainous landscapes which are under special environmental control by the Government and excluded from the administrative area of the city. According to the SEA report, the ecological potential of landscape in Ganja is low and is subject to significant anthropogenic impacts.

Ganja has green spaces around inner-city parks, industrial enterprises, and government offices. Several small parks serve the city's population, including Khamsa garden, Istiklal park, H.Z. Taghiyev Park, and Jens new boulevard. The city centre left bank of the Ganjachay River, and Yeni Ganja residential area are well-greened, but the southern and southeastern parts lack recreational areas.

The project site is north of the urban area of Ganja. The site is arable land, usually irrigated with wastewater, and includes fields, remnants of the WWTP construction from the early 1980s, and settlements along the existing outfall channel. The streets are lined with trees, and a small settlement is approximately 300 m north of the project site. There is also a high-voltage electricity transmission line. About 1 km north is a greenhouse farming area specialising in pre-seasonal vegetable production and using groundwater for irrigation.

Source: ESIA Consultant, March 2025

Figure 15. The nearby area, picture taken from the Project site

Source: ESIA Consultant, March 2025

Figure 16. The closest residential area to the Project site and high-voltage electricity transmission line

Source: ESIA Consultant, March 2025

Figure 17. Old ruined fence at the Project site

5.1.8 Biodiversity

5.1.8.1 Flora

Geobotanical zoning of Azerbaijan, indicates the natural areas surrounding Ganja with a variety of vegetation types, including plain semi-desert vegetation, subtropical ephemeral vegetation, patchy bush-grass vegetation with salinity dominance, and foothill semi-deserts dominated by wormwood. Vegetation is notably sparse in saline areas. Across the Ganja-Gazakh eco-geographic region, a total of 1,524 plant species, including high-spore, gymnosperm, and flowering plants from 114 families and 478 genera, have been identified. Research indicates the presence of 36 Caucasian and 21 Azerbaijani endemic species within the flora of the Ganja-Gazakh eco-geographic region.

The main species include Eldar pine (Pinus eldarica), Thuja orientalis (Biota orientalis), Common cypress (Cupresus sempervirens), Oriental plane (Platanus orientalis), Caucasian hornbeam (Carpinus caucasica), Georgian oak (Quercus iberica), Small-leaved linden (Tilia chordata), Common ash (Fraxinus excelsior), Horse chestnut (Aesculus hippocastanum), False acacia (Robinia pseudoacacia), Japanese privet (Ligustrum japonicum), and other trees and shrubs.

The vegetation in the project area includes:

- Irrigated arable lands with sparse annual plants and grasses,
- Irrigated fields with species, which are adapted to the traditional land- use such as grasses, herbs and hemi-cryptophytes
- Fallow lands with annual plants and hemikryptophytes (Sonchus, Artemisia)
- Aquatic and amphibian vegetation on riverbanks
- Poplars bordering the road to Qaryeri

The following habitats are typical of the project site:

- Arable lands which are the spatial dominating habitats with common species such as millet, *Convolvulus arvense, Amaranthus*,
- Fields with different kinds of grasses (*Sporghum*), different kinds of clover (*Trifolium spec.*), Plantain (Plantago major, P. lanceolata), and other species
- Semi-wet fallow land with reeds (*Phragmites australis, Carex spec. Juncus spec.*) and herbs such as Mentha spec, Inula along the trenches and depressions
- Alley, tree lines, groves and hedges with old trees such as poplar (*Populus nigra*), walnut (*Juglans regia* (dominating), mulberry (Morus spec.).
- Goshgarchay and its banks are characterized by a rare reed vegetation and perennial herb vegetation with typical specialized species such as *Typha latifolia, Carex spec. Salix spec, Pragmites australis, Arundodonax, Lythrum salicaria, Juncus spec. Equisetum spec. Lycopus europaeus*, and on the flat banks tamarisk (*Tamarisk spec.*)
- Fallow land with a xerophytic weedy vegetation widespread in the investigation area.

Rare or endangered species are not anticipated to occur.

5.1.8.2 Fauna

The city of Ganja and surroundings harbour rich biodiversity in various habitats, including green recreation parks, riverbeds, natural areas, tall trees, old roofs, and open waste sites. These diverse environments support a wide range of animal species including gulls and other birds, as well as mammals. Riverbeds serve as vital nesting and feeding sites for various animal species. Tall trees and old roofs offer suitable nesting habitats for birds and bats, contributing to the area's biodiversity.

Several fish species occur in the upper and lower reaches of the Ganjachay River during ichthyologic surveys, including the European chub - *Leuciscus cephalus orientalis*, the Caucasian scraper - *Capoeta capoeta*, the Kura bleak - *Alburnus flippi*, the North Caucasian bleak - *Alburnus charusini hohenackeri*, the Kura loach - *Oxynoemacheilus brandtii*, the Spined loach - *Cobitis taenia*, the Golden spined loach - *Cobitis aurata*, Flashnout goby - *Neogobius platyrostris*.

Amphibians include Palearctic green toads - *Bufotes variabilis*, Eastern tree frog - *Hyla orientalis*, and Lake frog - *Pelophylax ridibundus*.

A number of reptile species can be found in and around Ganja, including turtles (European pond turtle - *Emys orbicularis*, Caspian turtle - *Mauremys caspica*, and Mediterranean spur-thighed tortoise - *Testudo graeca*), lizards (Caspian gecko - *Tenuidactylus caspica*, Schneider's ssink - *Eumeces schneiderii*, Medium-lizard - *Lacerta media*, Caspian green lizard - *Lacerta strigata*, Rapid racerunner - *Eremias velox*), and snakes (the Javelin sand boa - *Eryx jaculus*, Schmidt's whip snake - *Dolichophis schmidti*, Blotched snake - *Elaphe sauromates* (Red Book of Azerbaijan), Grass snake - *Natrix natrix*, Eastern Montpellier Snake - *Malpolon insignitus*, Levantine Viper - *Macrovipera lebetina*).

Ecological-geographical zoning of mammals for Ganja is the foothills of the Lesser Caucasus. Some 53 species and subspecies of mammals live in this region, which is 46% of all mammals living in the territory of Azerbaijan. There are 31 rare species.

More than 70 bird species occur in Ganja and surrounding areas, which is 18% of the total avifauna of the country, with numerous bird species of Mediterranean type. Multiple synanthropic species occur in the urban areas, Rock pigeon - *Columba livia*, Laughing dove - *Streptopelia senegalensis*, Eurasian collared dove - *Streptopelia decaocto*, Barn swallow - *Hirundo rustica*, House martin - *Delichon urbicum*, Common swift - *Apus apus*, Blue tit - *Cyanistes caurileus*, House sparrow - *Passer domesticus*, Eurasian blackbird - *Turdus merula*, Hooded Crow - *Corvus cornix*, Eurasian Green Woodpecker - *Picus viridis*, Syrian woodpecker - *Dendrocopos syriacus*, Song thrush - *Turdus philomelos*, European goldfinch

- *Carduelis carduelis*, Common chaffinch - *Fringilla coelebs*, European greenfinch - *Chloris chloris* can be found in the parks of the city.

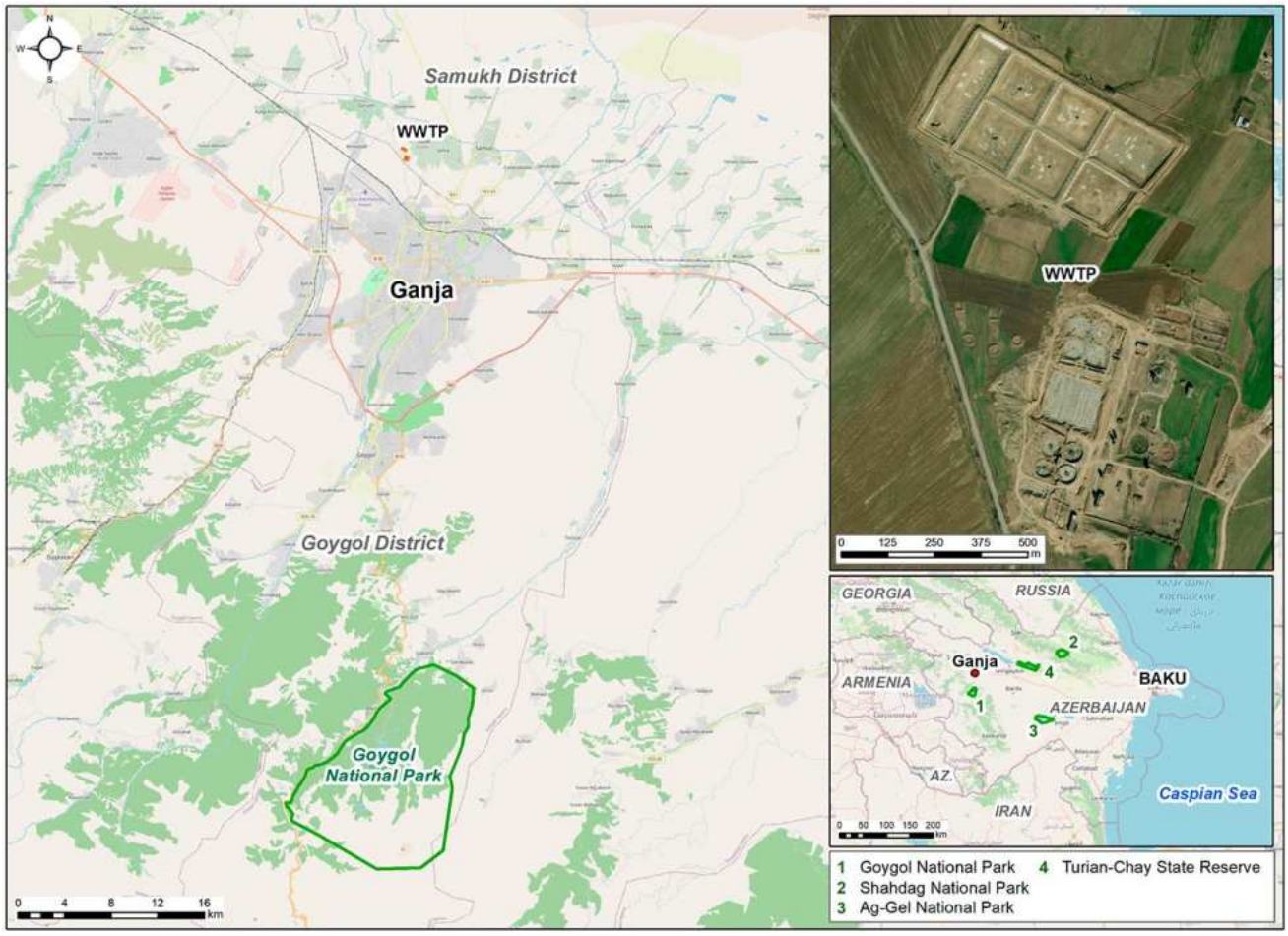
The natural areas around the city are species diverse with several listed in the Red Book of RA e.g. Cinereous vulture - *Aegypius monachus*, Egyptian vulture - *Neophron percnopterus*, Long-legged buzzard - *Buteo rufinus*, Steppe eagle - *Aquila nipalensis*, Eastern imperial eagle - *Aquila heliaca*, Lesser Kestrel - *Falco naumanni birds of prey*, and the Black Francolin - *Francolinus francolinus* found year-round in bushy areas. Spanish sparrow - *Passer hispaniolensis*, Common kestrel - *Falco tinnunculus*, Hen harrier - *Circus cyaneus*, Crested lark - *Galerida cristata*, Corn bunting - *Emberiza calandra*, Red-backed shrike - *Lanius collurio*, etc. can be found among numerous species. During the breeding season in the vertical soil sections of the Ganjachay valley, species such as Sand martin - Riparia riparia, European bee-eater - *Merops apiaster*, Blue-cheeked bee-eater - *Merops persicus*, European roller - *Coracias garrulus*, Eurasian hoopoe - *Upupa epops* build their nests.

Fauna in the project area is symbiotic because natural biotic elements of the semi- arid desert have been largely replaced by irrigation. Typical animal species of this vegetation zone such as gazelle, wild boar, coypu, Caspian gecko, pheasant and others no longer occur there. do not appear there. Rare or endangered species are not expected on the site and in the vicinity as these areas were used for vine-years until 1988 and then cotton and other technical crops were cultivated periodically over years. In the Goshgarchay fish occur infrequently.

5.1.8.3 Nationally Protected Areas

There are no NPAs in the administrative area of Ganja but there is a close connection with nearby Specially Protected Areas existing in the Ganja-Gazakh Economic Region:

- Goy-Gol National Park is the nearest protected area to the WWTP site located approximately 30 km south (**Figure 18**).
- The latest Red Data Book for Azerbaijan (2013) lists 223 animal and 140 plant species including Caucasian endemics such as Eldar pine (Pinus eldarica), the relic iron3 State Nature Reserves - Korchay, Eldar Shami, Garayazi
- Four State Nature Preserves - Korchay, Shamkir, Kizilca and Garayazi-Aghstafa.



Source: Prepared by the ESIA Consultant

Figure 18. Protected areas nearest to the WWTP site

5.1.8.4 Internationally Recognised Areas (IBAs, KBAs, Emerald Sites)

There are no Internationally Recognised Areas near Ganja (**Figure 19**).

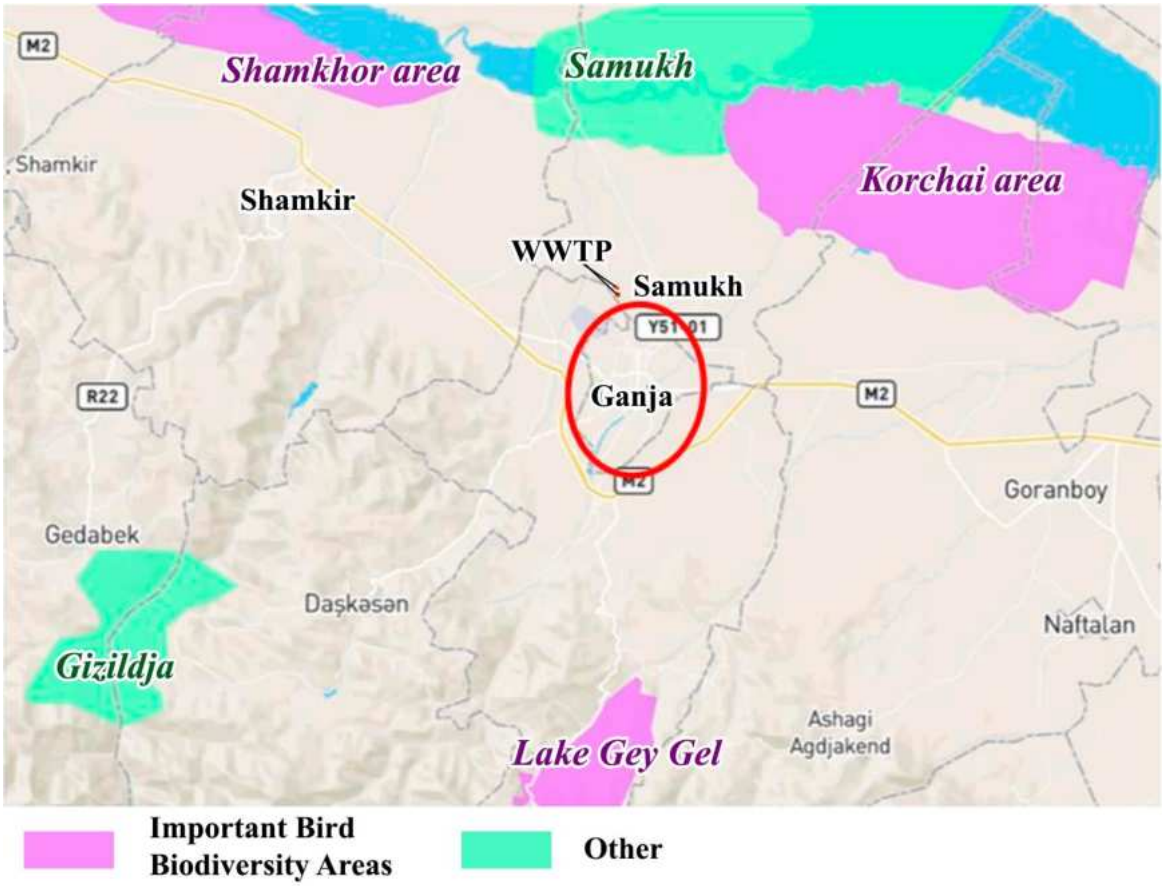


Figure 19. Key Biodiversity Areas in the context of Ganja and the wider region, IBAT

5.2 Socio-Economic Baseline

5.2.1 Administrative Structure of the Project Implementation Area

The proposed WWTP will serve Ganja City and is sited in Ziyadli Municipality of Samukh District (**Figure 1**). This report focused on Ganja only. Samukh District will be described in the detailed assessment using municipal statistics to be yet collected and field studies.

5.2.2 Demography

5.2.2.1 Population

Ganja is the third-largest city in Azerbaijan, and is a major cultural, economic, and historical centre. The latest estimates of the State Statistical Committee show the population of Ganja at 330.7 thousand people (early 2024) compared to 228.8[38] in 2010. The city experienced an average population increase during 2014-2023 of 0.19% per year due to high birth rates, urbanization and in-migration from rural areas. Over the last four years the population growth rate reduced because of a larger death rate in 2020-2021.

Table 12. Current population of Ganja (thousand)[39]

[38] RA State Statistical Committee. 2024. Demography. https://www.stat.gov.az/source/demography/?lang=en

[39] RA State Statistical Committee. 2024. Demographic indicators of Azerbaijan. https://www.stat.gov.az/menu/6/statistical_yearbooks/?lang=en

	2010	2015	2021	2022	2023	2024
Population (beginning of year, thousand)	314.6	328.4	329.4	329.4	330.3	330.7
per 1+,000 person:						
Growth rate	3,9	6,4	0,2	-0,6	2,2	1,6
Birth rate	9,5	12,2	9,0	7,8	8,7	8,0
Death rate	5,6	5,8	8,8	8,4	6,5	6,4

The Feasibility Study assumed a slightly larger annual population growth over the next 25 years. Three population growth rates are shown in **Table 13**. The expected growth scenario, with an annual increase of 1%, gives a population of approximately 354,126 people in 2030 (end of the PIP), and 361,244 people in 2032 (the PIP plus 2 years).

Table 13. Updated population growth scenarios for Ganja[40]

Year	Scenario 1 – Low	Scenario 2 – Expected	Scenario 3 – High
	Population with 0% annual increase	Population with 1% annual increase	Population with 2% annual increase
2023	330,300	330,300	330,300
2030	330,300	354,126	379,411
2032	330,300	361,244	394,739
2035	330,300	372,190	418,900
2040	330,300	391,176	462,500
2045	330,300	411,130	510,637
2050	330,300	432,101	563,785

Ganja's land area was 0,11 thousand km^2 in 2011 meaning an average density of 2.875 people per km^2 increasing to 3,006 per km^2 by 2024[41].

Table 14. Population by settlements of Ganja (as of 01.01.2024)[42]

Administrative units	Total		Male		Female	
	person	%	person	%	person	%
Ganja total	330,663	100,0	161,159	100,0	169,504	100,0
Including:						
Hajıkend settlement	458	0,14	231	0,14	227	0,13
Javadkhan settlement	5841	1,77	2794	1,73	3047	1,80
Mehseti settlement	16103	4,87	8055	5,00	8048	4,75
Natavan settlement	5033	1,52	2434	1,51	2599	1,53
Sadıllı settlement	14756	4,46	7398	4,59	7358	4,34
Shıkhzamanlı settlement	7612	2,30	3773	2,34	3839	2,26

[40] Ganja Water And Wastewater Feasibility Study Update. April 2024.

[41] RA State Statistical Committee https://www.stat.gov.az/source/regions/

[42] RA State Statistical Committee. 2024. Demographic indicators of Azerbaijan. https://www.stat.gov.az/menu/6/statistical_yearbooks/?lang=en

5.2.2.2 Ethnic composition

Most of the population of Ganja are Azerbaijanis (99.93%) (**Table 15**) with remaining ethnic groups less than 1%.

Table 15. Ethnic composition of population (2019 census results)[43]

Groups	Total		Male		Female	
	%	person	%	%	person	%
Ganja	328823	100,0	160230	100,0	168593	100,0
Including:						
Azerbaijanis	328596	99,93	160141	99,95	168455	99,92
Lezgins	5	0,00	3	0,00	2	0,00
Russians	132	0,04	33	0,02	99	0,06
Ucrainan's	8	0,00	2	0,00	6	0,00
Turks	30	0,01	22	0,02	8	0,00
Tats	1	0,00	-	-	1	0,00
Sakhur	1	0,00	-	-	1	0,00
Georgians	14	0,01	6	0,00	8	0,01
Armenians	1	0,00	-	-	1	0,00

5.2.2.3 Age structure

Ganja's population is young, with 41.3% of the population younger than 30. The elderly population (above 60) constitutes a smaller but growing segment. The sex-age population of Ganja is shown in **Figure 20**. A comparative analysis of sex-age structure of the city, country and regional levels is shown in **Table 16**.

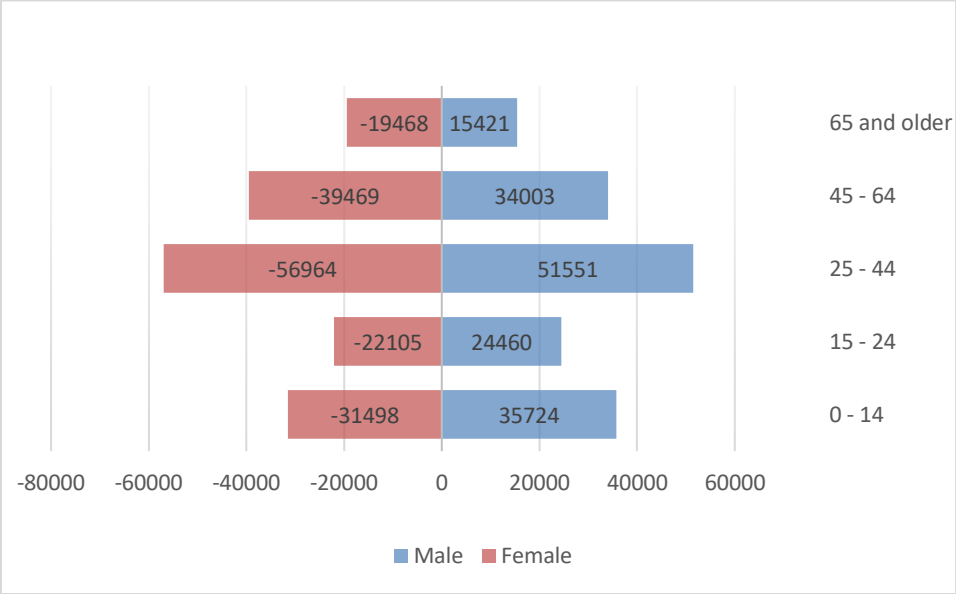


Figure 20. Sex-age population in Ganja

[43] RA State Statistical Committee. ps://www.stat.gov.az/source/regions.

Table 16. Distribution of women and men by main age groups, economic regions and administrative territorial units of the RA (1 January 2024)

Names of economic regions and administrative territorial units	Younger than working age		At working age[1)]		Older than working age		Total
	women	men	women	men	women	men	
Republic of Azerbaijan	1010,7	1150,3	3486,5	3508,9	616,4	408,0	10180,8
Share in a group	46,8%	53,2%	49,8%	50,2%	60,2%	39,8%	
Share in total population	9,9%	11,3%	34,2%	34,5%	6,1%	4,0%	100,0%
Baku city - total	197,3	221,7	832,7	812,3	164,9	116,0	2344,9
Share in a group	47,1%	52,9%	50,6%	49,4%	58,7%	41,3%	
Share in total population	8,4%	9,5%	35,5%	34,6%	7,0%	4,9%	100,0%
Ganja-Dashkasan economic region - total	***57,7***	***67,4***	***204,1***	***203,6***	***39,2***	***25,8***	***597,8***
Share in a group	46,1%	53,9%	50,1%	49,9%	60,3%	39,7%	
Share in total population	9,7%	11,3%	34,1%	34,1%	6,6%	4,3%	100,0%
Ganja	***31,5***	***35,7***	***115,2***	***110,0***	***22,8***	***15,5***	***330,7***
Share in a group	46,9%	53,1%	51,2%	48,8%	59,5%	40,5%	
Share in total population	9,5%	10,8%	34,8%	33,3%	6,9%	4,7%	100,0%

[1)]for the beginning of 2024 - male at age 15-64, female at age 15-62,5

Source: AR State Statistical Committee.

5.2.3 Education

Ganja boasts a remarkably high literacy rate, estimated at over 99.8%. The city is home to several esteemed universities, including Ganja State University, Azerbaijan Technology University, and Azerbaijan State Agricultural University, in addition to numerous schools and vocational institutions. The total number of students in the city may fluctuate seasonally depending on their study programmes. Actual numbers will be sourced for the detailed assessment. The city's population education structure is shown in **Table 17**.

Table 17. Education structure of the population, 2019 Census data[44]

	Total	including	
		male	female
Population aged 15 and above, Ganja	248 894	117922	130972
including:			
Higher education	56702	26899	29803
Colleges	21596	9167	12429
Professional schools	8904	4737	4167
Complete secondary schools	138222	65474	72748
Incomplete secondary schools	19022	9418	9604
Primary schools	3908	1997	1911
Beginner courses	28	13	15
Illiterate	512	217	295

[44] https://www.stat.gov.az/source/regions

5.2.4 Language and religion

Azerbaijani (Azeri) is the official language, spoken by most people. Russian is widely used, especially among older generations and in business. Minority languages like Talysh and Lezgin are spoken in their communities. Some 99.93% of Ganja population speak Azerbaijan (**Table 15**) and it is expected that the others understand it well. Most of Ganja's population practices Shia Islam, while a smaller portion follows Sunni Islam. There is also a small Russian Orthodox Christian community and other minor religious groups in the city.

5.2.5 Economy and employment

5.2.5.1 Macroeconomic Context

Azerbaijan, at the crossroads of Eastern Europe and Western Asia, is rich in natural resources, particularly oil and natural gas. This wealth has significantly influenced its economic landscape. Inflation in Azerbaijan has been moderate, fluctuating in response to exchange rates and global commodity prices. The Central Bank of Azerbaijan targets price stability but must manage external shocks. The Azerbaijan manat (AZN) has depreciated, impacting inflation and economic stability negatively. The government generates significant revenue from oil and gas but faces the challenge of managing these revenues to ensure long-term economic stability.

Azerbaijan has a relatively low level of public debt and requires prudent management to prevent potential fiscal imbalances. The government is investing in infrastructure, tourism, and agriculture to diversify the economy. Reforms aimed at improving the business environment include reducing regulatory burdens and increasing transparency.

Azerbaijan has aimed to diversify its economy away from hydrocarbons. Over the past 20 years, petroleum has made up 40% of GDP and averaged 90% of export earnings. Hydrocarbon revenue has driven other sectors, making growth reliant on energy prices.

Table 18. Macroeconomic indicators for Azerbaijan[45]

NB: This table will be fulfilled at the next ESIA stage

Indicators	2015	2020	2021	2022	2023	2024
Nom. Gross development product (GDP) ($ per cap)						7,397
Real GDP growth (%)						3.1
Consumer price index (CPI) (% change, annual avg.)						3.0
Local Currency Unit (LCU)/USD (annual avg.)						1.7
LCU/Euro (annual avg.)						1.9
Nom. wages ($ per month)						581.5
LCU wage growth (%)						6.1
Real LCU wage growth (%)						3.0

Ganja is one of the largest industrial cities in Azerbaijan and hosts a mix of heavy, light and food manufacturing activities around the outskirts of the city. Much of the industrial output is a result of the rich pool of natural resources within the wider region. Some 271 large and medium size enterprises and 417 small enterprises operate in the city. The largest enterprises

[45] Ganja Water and Wastewater Feasibility Study Update. 2024. Sweco Danmark A/S in cooperation with Alter, ACE and BDO

by employee numbers are "Azeraluminium" LLC (aluminium manufacturing), "Ganja Automobile Plant" PU (car/tractor production), "Ganja Sharab-2" OJSC (wine production).

The number of tourists visiting Ganja increased from 15,186 in 2015 to 28,712 in 2023, with peak tourist season in June, July, and August. In 2022, there were 20,712 registered overnight stays in the city. Assuming 75% of the overnight stays occurred in June, July, and August, then on average 170-175 visitors stayed overnight in Ganja each day/night during summer. The actual number of daily visitors may be higher, as not all overnight stays may be recorded. The annual number of tourists may continue to rise, potentially creating additional job opportunities in the tourism and hospitality sector.

5.2.5.2 Unemployment level

Unemployment in Ganja is higher than other regions in Azerbaijan, but it is not clear why (**Table 19**). This issue will be further investigated in the detailed assessment.

Table 19. Unemployment rate in Ganja and surrounding areas (%)[46]

	2015	2016	2017	2018	2019	2020	2021	2022	2023
Azerbaijan Republic	5.0	5.0	5.0	4.9	5.0	7.2	6.0	5.6	5.5
Baku city	6.0	6.1	6.1	6.0	4.7	7.0	6.0	5.7	5.4
Ganja – Dashkesen Economic Zone	5.3	5.4	5.4	5.4	5.9	8.6	7.3	6.8	6.5
Ganja	5.9	6.0	6.0	6.1	6.7	9.9	8.7	8.2	7.9
Ganja - number of unemployed population, person	*10364*	*10751*	*10897*	*11086*	*10261*	*15258*	*13611*	*12884*	*12435*
Unemployment level difference between Ganja and:									
Baku city	-0.1	-0.1	0.0	0.1	2.0	2.9	2.7	2.6	2.5
Country average	0.9	1.0	1.1	1.2	1.7	2.6	2.7	2.6	2.5

Unemployment in Ganja increased during the Covid-19 pandemic, from 6.7% in 2019 to 9.9% in 2020. In 2022, unemployment decreased to 8.2%. Data disaggregated by gender are not available.

5.2.5.3 Urbanization

Ganja's population is principally urban but some settlements were ‘annexed’ in recent decades. Formally, the settlements are urban but inhabitants lead rural lifestyles.

5.2.5.4 Migration Trends

Ganja draws migrants from rural regions of Azerbaijan due to its economic prospects and urban infrastructure. There is also limited international migration, including expatriates and foreign workers. No official migration data are available for Ganja. Some 21,630 Internally Displaced Persons (IDPs) in 6,318 households were on record in 2024 but some may have returned home since then. IDPs are included in the official population data.

Migration from Ganja to Russia is like broader Azerbaijani migration trends. While specific data on migration from Ganja alone are not readily available, general migration patterns from Azerbaijan to Russia coupled with the socio-economic context of Ganja allow inferences. Key factors driving migration from Ganja to Russia and other neighbouring countries include:

[46] https://www.stat.gov.az/source/labour/

- Economic challenges, including limited jobs and lower wages compared to Russia. Many Ganja migrants seek work in cities like Moscow, St. Petersburg, and other Russian industrial hubs.
- Networks of relatives or community members who provide housing, job leads, and support, in Russia.
- Azerbaijan's historical ties with Russia, including the Russian language and cultural familiarity, make it easier to integrate into Russian society.
- Migrant remittances from Russia are a crucial income source for many families in Ganja, encouraging migration (**Table 20**).

Table 20. Personal remittances to Azerbaijan, received (% of GDP)[47]

1995	2000	2005	2010	2015	2020	2021	2022	2023
0.1241	1.0836	4.7053	2.6655	2.3927	3.2865	2.7845	5.0122	2.6436

Although the number of migrants from Ganja to Russia is not systematically tracked, estimates suggest **600,000 to 1 million Azerbaijanis** live in Russia, many from Ganja, Baku, and Sumgait. Ganja likely contributes significantly to migration, with thousands moving to Russia annually, temporarily or permanently. While some are exploring destinations like Turkey and EU countries, Russia remains a primary choice due to existing networks and lower entry barriers.

Migration from Ganja to Russia is significant driven by economic disparities and established migration networks. While exact numbers are unknown, thousands of people from Ganja migrate to Russia annually, contributing to large Azerbaijani diaspora. Trends suggest that migration will continue, though economic and political factors in both countries may influence the scale and nature future.

5.2.6 Income and expenditure levels

5.2.6.1 Income level

The main sources of household income are direct employment in manufacturing of industrial and agricultural products, trade, and tourism and the public sector.

Table 21. Main sources of income of the population by gender in the Ganja-Dashkasan economic region in 2023 [48]

Sources of income	Male	Female	Total
Total	47.8	52.2	100.0
Salary to hired persons	17.9	12.8	30.6
Self-employment	15.9	3.8	19.7
Production of goods for p\individual consumption	0.5	1.8	2.3
Property and other investments	-	-	-
Pension to retired persons	4.5	8.8	13.3
Labour pension on loss of family head	-	0.1	0.1
Labour pension on injury	1.3	1.2	2.5
Disability allowance and allowance for a child under 18 years of age with disability	0.3	0.5	0.8

[47] World Bank. 28.01.2025. World Development Indicators, https://data.worldbank.org/indicator/BX.TRF.PWKR.DT.GD.ZS

[48] State Statistical Committee of Azerbaijan (AzStat), Report: "Household Income and Expenditure Survey" (latest: 2023). Table: "Structure of Income by Source and Gender". https://www.stat.gov.az → "Social Statistics" → "Household Surveys"

Sources of income	Male	Female	Total
Other allowances	-	0.9	0.9
Educational allowances	0.3	0.4	0.7
Other pensions	0.0	0.0	0.1
Unemployment insurance payments	-	-	-
Targeted state social assistance	-	0.1	0.1
Borrowings, aid, sales of assets	-	-	-
Transfers from abroad	0.3	0.3	0.6
Other persons governance (patronage)	6.8	21.5	28.2
Other	0.0	0.0	0.1

Average per capita income for national and regional levels from 2021 to 2023, including comparisons for Baku city are shown in Table 22. Ganja's income levels may surpass the regional average.

Table 22. Average income per capita in Ganja-Dashkasan region, Baku city, and at national level, 2021-2023 (AZN/capita/month)

Area	2021	2022	2023
Ganja-Dashkasan region	286.30	337.30	350.60
Baku city	327.00	346.80	351.30
Azerbaijan	300.60	327.60	343.20

Local incomes will be assessed in more detail in the next phase.

5.2.6.2 Expenditure level

Average monthly expenditure per capita (**Table 27**) shows expenditure slightly higher than income in Ganja Dashkasan region, Baku city, and national level. Some households might be using savings to cover some expenditures, others may not have reported their full incomes, or both conditions might apply.

Table 23. Average consumption expenditure per capita in Ganja-Dashkasan region, Baku city, and at national level, 2021-2023 (AZN/capita/month)

Area	2021	2022	2023
Ganja-Dashkasan region	301.30	344.70	358.10
Baku city	332.00	353.60	359.00
Azerbaijan	308.60	333.40	348.10

No statistical data on household income and expenditure for Ganja are available but will be sourced during the next phase of the assessment. Income and expenditure is expected to differ between urban and rural areas.

5.2.6.3 Poverty

Poverty data are not available for Ganja but for urban and rural areas of Azerbaijan and separately for women and men (**Table 24**).

Table 24. Poverty levels for urban and rural areas of Azerbaijan and by women and men, 2021-2023

	2021	2022	2023
Poverty line (AZN/capita/month)	204.70 AZN	229.60 AZN	247.10 AZN
Total national poverty level	5.9%	5.5%	5.2%

National poverty level for men	5.9%	5.6%	5.3%
National poverty level for women	6.0%	5.1%	4.8%
Poverty level for urban areas	4.3%	2.9%	3.9%
Poverty level for rural areas	7.8%	8.6%	6.8%

There has been a decrease in poverty from 2021 to 2023. Less poverty is noted in urban areas compared to the rural areas. Poverty in urban areas also decreased from 4.3% to 3.9% from 2021 to 2023. Both for 2022 and 2023 there was less poverty level for women (5.1% and 4.8%, respectively) than men (5.6% and 5.3%, respectively). Total poverty in 2022 and 2023 is 5.5% and 5.2%, respectively.

5.2.6.4 Social assistance

Targeted state social assistance was provided to 1,895 low-income households and 7,927 persons in 2023 (**Table 25**).

Table 25. Households and persons receiving targeted state social assistance in Ganja, 2021-2023

	2021	2022	2023
Number of households	2,354	1,048	1,895
Number of persons	9,541	4,392	7,927

Other vulnerable groups in Ganja receiving different types of support in January 2024 were[49]:

- 21,630 IDPs in 6,318 families
- 888 persons disabled from wars
- 445 martyrs (“shakhids” or “those who died”)[50] from wars
- 669 families of martyrs (whose who died) from wars
- 5,527 persons with disabilities.

5.2.7 Public utilities infrastructure

5.2.7.1 Access to water supply and wastewater services

Ganja ASWRA provides water supply and wastewater services within the city only and is not intending to provide such services outside of the city boundaries in future.

Access to water supply services

Ganja ASWRA had 69,381 domestic water supply customers (households) in July 2024 (**Table 26**). Other customers include 2,309 commercial entities and 96 budget organisations. Around 63% of household customers and 90% of commercial and budget organisation

[49] https://ganja-ih.gov.az/az/ehalisi.html

[50] Categories of people who are considered ‘Shakhids’ are defined in the resolution No. 10 of the RA cabinet of ministers “On approval of the "Rules on perpetuating the name of a martyr and applying benefits to the families of martyrs", January 15, 1994. These included those who died for the freedom, sovereignty and territorial integrity of Azerbaijan, who went missing in connection with a military operation, who died in a plane crash in Leninakan, who are considered dead in accordance with the procedure established by law, and other as is set out in the resolution. ‘Those who died’ and their families received special social benefits and are under priority social protection provisions.

customers have water meters. Most are mechanical with a small number of smart meters operating with a pre-payments.

Table 26. Water supply customers in Ganja, July 2024

Customer type	Number of customers
Households	69,381
Non-residential and commercial entities	2,309
Budget organisations	96

ASWRA supplies piped water to approximately 196,898 people, or around 60% of the total population. This seems low compared to maps showing the existing water supply network. Previous studies indicated that 65% of households had piped water, while the remaining 35% relied on private wells before the KfW project. Completed in 2020, the project updated 40% of the city's water supply network. It is estimated that 65% of the remaining 60% of the city still has piped water, meaning a total coverage of 79%.

Given an average household size of 4.12 persons, some 285,800 people in 69,381 households have piped water (about 85% of the population). This aligns with ASWRA's data that 16% of Ganja's population lacks water network access.

Many households, especially where water supply is still to be rehabilitated/replaced, have water storage tanks and they purchase water from Ganja ASWRA. The water is supplied from two water trucks, and from private trucks, when there is insufficient water in the piped system. This is especially true during the summer. Private water trucks appear to source water from the local ASWRA branch which comes from the Goygol water pipeline.

The difference between water extracted from natural sources (12,578,495.00 m³) and water used (9,034,434.00 m³), is 3,544,061.00 m³ (28%). Such water loss which may include leaks, inefficient distribution, or unauthorized use exceeds the regulatory limit of 10%. To meet future demands both water conservation practices and infrastructure improvements will be necessary.

Access to piped wastewater services

Ganja ASWRA provided piped wastewater services to 53,130 domestic (household) customers, 2,271 commercial entities and 96 budget organisations (July 2024) (**Table 27**).

Table 27. Wastewater customers in Ganja, July 2024

Customer type	Number of customers
Households	53310
Non-residential and commercial entities	2271
Budget organisations	96

The 53,130 household customers comprises 147,371 individuals, indicating current wastewater network coverage provided by ASWRA exceeds 70% of the population. Given that the wastewater collection is smaller than the water supply approximately 219,000 individuals in 53,130 households may be connected to the piped wastewater network, implying approximately 67% of the total population. This aligns with information from ASWRA that 25% of the Ganja population are not connected to the wastewater network.

5.2.7.2 Affordability and subsidies related to water supply and wastewater services

Ganja ASWRA manages 68 public “martyr” water points, honouring soldiers who perished in recent conflicts and providing free access to water. The Ganja Executive Authority pays for the water consumption. Households without direct connections, and limited piped water

supply, utilize these water points for their needs. IDPs are given 5,000 litres of water per person per month free of charge, equating to approximately 167 litres/person/day. The IDP Committee pays for that water.

Households not able to pay for water and wastewater can apply for debt instalments over a period of 2-12 months. In 2023, 257 household applied for payment instalments, with ASWRA approving 238 applications.

5.2.8 Land Use

Ganja has residential, commercial, and industrial land use, with surrounding agriculture. City management challenges include aging infrastructure, environmental issues and pressure on green spaces. Sustainable planning and modernization investments are crucial for the future of the city.

Table 28. Summary: General Land Use in Ganja - Main indicators on land use and plans for 2027 and 2040 under the Master Plan

Indicator	2020	2027	2040
	ha (%)	ha (%)	ha (%)
Total area of Ganja	12,387.0 (100.0)	12,529.0 (100.0)	13,406.0 (100.0)
Including:			
Residential areas	5,180.5 (41.80)	5,383,70 (42.97)	5,781.85 (43.12)
Social-business	412.09 (3.32)	569.10 (4.54)	860,70 (6.42)
Recreation	576.60 (4.65)	945.55 (7.55)	1,630.75 (12.16)
Industrial zones	1,482.53 (11.97)	1,451.29 (11.58)	1,395.34 (10.41)
Transport infrastructure	776.09 (6.30)	815.40 (6.51)	888,37 (6.62)
Engineer-communication supply	31.47 (0.25)	29.50 (0.24)	25,81 (0.19)
Agriculture	904.84 (7.30)	1,010.43 (8.06)	603.16 (4.50)
Special appointment	166.0 (1.34)	10.09 (0.08)	10.09 (0.08)
Military and other regimes	342.92 (2.77)	330.70 (2.64)	307.97 (2.30)
Areas used under special requirement	69.15 (0.56)	419.54 (3.35)	1.070.27 (7.98)
Specially protected	686.67 (5.54)	685.90 (5.47)	685.90 (5.12)
Spare areas	1,758.14 (14.20)	877.80 (7.01)	145.79 (1.10)

Source: The SEA for the Master Plan of the city of Ganja. April, 2024. P.69

The actual land use on the proposed WWTP site and vicinity will be investigated during the detailed phase of the assessment.

5.2.9 Public Health and Safety

Public health and safety in Ganja, are important elements of the city's overall development. Despite advances in healthcare services and public safety measures, challenges persist.

5.2.9.1 Healthcare Infrastructure

Ganja has a well-developed healthcare system, including:

- **Central City Hospital**: The largest public hospital in the city, offering a wide range of medical services.
- **Specialized Clinics**: Include maternity hospitals, paediatric clinics, and diagnostic centres.

- **Private Healthcare Providers**: Offer specialized services and shorter wait times.
- **Primary Healthcare Centres**: Provide basic medical services and preventative care to residents.

5.2.9.2 Key Health Indicators

Life expectancy in Ganja is approximately 73 years (aligned with the national average). While the Infant Mortality Rate has declined due to better maternal and child healthcare, it remained high in 2023 at 26.8 per 1,000 births. Common health issues include cardiovascular diseases, respiratory illnesses, and diabetes. Limited access to advanced medical technologies stems from a shortage of qualified doctors, modern equipment, and specialized care. The healthcare network needs more professionals and modernised facilities.

5.2.10 Gender

Azerbaijan's **human development index** was 0.760 in 2022, 95th out of 193 countries, and categorised as 'high human development' (UNDP, 2023/2024)[51]. The highest HDI was 0.762 in 2019, declined to 0.722 in 2020, likely due to COVID-19, but began improving in 2021. Azerbaijan is ranked 77th out of 193 countries in the **gender inequality index**, with a value of 0.329. Additionally, its **gender development index** stands at 0.961[52], positioning the nation within the group characterized by medium to high equality in human development index achievements between women and men.

Gender issues in Azerbaijan are shaped by a combination of cultural traditions, economic conditions, and social norms. Although Azerbaijan is making progress in achieving gender equality, particularly in education and political quotas, economic and cultural barriers persist. The government's 2024-2030 gender strategy aims to mitigate these disparities through enhanced enforcement and economic incentives.

The male to female ratio in Ganja 49% to 51%[53]. Ganja has a significant number of working-age men migrating to Baku, Turkey, or Russia for employment in construction and oil industries, affecting gender ratios. Men's employment constitutes 68–70%, primarily in construction (30%), industry (25%), transport (20%), and services (25%). Women's employment constitutes 50–53%, mainly in education (35%), healthcare (25%), textiles (20%), retail (15%), and informal work (5%)[54].

The official unemployment rate for men is approximately 5–6% and for women 8–10%, due to post-marriage dropout rates. Women earn approximately 30–35% less than men in formal sectors. Some 25% of employed women work unpaid in family businesses (e.g., small shops, agriculture)[55]. Ganja reflects both national progress and persistent gaps in gender but has implemented localized gender-related initiatives including:

- Ganjia's Small Business Development Agency provides low-interest loans and training for women-led startups.

[51] UNDP. 2023/3024. Human Development Report. Breaking the gridlock. https://hdr.undp.org/system/files/documents/global-report-document/hdr2023-24reporten.pdf

[52] *Ibid.*

[53] State Statistical Committee of Azerbaijan. 2024. Population.

[54] State Statistical Committee of Azerbaijan. 2023. Labor Force Survey, available at https://www.stat.gov.az (Tables: "Labor Market Indicators by Region").

[55] State Statistical Committee of Azerbaijan. Report: "Labor Market Indicators by Region (2023)". Table: "Average Monthly Wages by Gender and Economic Activity (Gəncə-Gazakh Economic Region)"

- Co-working hubs (e.g., "Gəncə İnkişaf Merkezi") target female freelancers in tech and design.
- State-funded courses in textiles, IT, and agriculture (e.g., at Ganja Technical University) prioritize women.
- Ganjia's 2024 municipal elections saw 25% female candidates (below the 30% target but up from 18% in 2019).
- 1 out of 5 district mayors is a woman (improved from zero in 2020).
- Ganja has 1 state-run shelter (operated by the State Committee for Family, Women, and Children Affairs) and 2 NGO-supported safe houses.
- A 24/7 GBV hotline was launched in 2023 (handled 500+ cases in its first year).

5.2.11 Cultural Heritage

Ganja is among the most ancient cities in Azerbaijan, with a history extending over 2,500 years. Throughout its history, it has served as a hub of culture, trade, and education. The city is renowned for its historical landmarks, including the Nizami Mausoleum, Juma Mosque, and Ganja Gate. Located on ancient trade routes and caravan paths, the city has been significant in the history and culture of Azerbaijan. In 1918, Ganja served as the temporary capital of the Azerbaijan Democratic Republic, which was the first democratic and secular state in the Turkic and Islamic world.

The reference to Ganja can be found in the book "Kitabi Dede Korkut" (meaning "the Book of Dede Korkut"), which is a historical literature work of Oghuzs, ancestors of Azerbaijani people. The book contains epic stories on morals and values important to the social lifestyle of the Turks and is part of the cultural heritage of all Turkic countries.

Being located between the Mediterranean and the Far East, Ganja benefited from inns, caravan stops, and other related establishments along the Silk Road. Goods from eastern countries were transported west through caravan routes passing this city. Merchants and traders of the Silk Road often stayed in caravanserais in Ganja before continuing their journeys. For centuries, Ganja facilitated the exchange of art, ideas, and technology.

Archaeological excavations in Ganja have uncovered ancient habitations from the 2nd century B.C. and Bronze Age artifacts. The city's history includes periods of destruction by invaders followed by revival. The Shah Abbas Mosque, built in 1606 and also known as the Juma Mosque, is a prime example of 17th-century Azerbaijani architecture. Located in Ganja, it has two minarets added in 1776 and includes a madrasa. Notable monuments in the city include the Mausoleum of Jomard Gasab, Sheikh Ibrahim Mausoleum, Sharafkhanly and Shahsevan Mosques, and old bathhouses. Ganjachay River divides the city, with the 12th-century Great and Small Bridges recognized for their unique architecture.

Ganja is the birthplace of poets Nizami Ganjavi, Mahsati Ganjavi, and Mirza Shafi Vazeh, known as the "sage of Ganja." The Mausoleum of Nizami Ganjavi is situated at the entrance to the city. Nizami's tomb has been a site of pilgrimage for many centuries. Given its rich cultural and natural heritage, the city provides a unique platform for intercultural and inter-religious dialogue among diverse communities and civilizations. It remains a place where Christians and Muslims coexist peacefully and with mutual respect.

Alexander Nevsky Church, German Lutheran Church, Bagmanlar Church, Divankhana, Khan's Palace, Castle, Garden, Caravanserai, Sharafkhanli Mosque, Shahsevaner Mosque, Albanian Temple, Men's and Girls' Gymnasiums, Russian Orthodox Church, fortress walls and gates, Imamzade tomb, Nizami mausoleum, ancient bridge over Ganjachay River, and so forth are part of Ganja's legacy.

In the 17th century, Ganja was known as Abbasabad. It became a city in 1824, named Yelizavetpol from 1804 to 1918. After Azerbaijan gained independence in 1918, it was called

Ganja until 1935. During the Soviet era (1935-1989), it was named Kirovabad but reverted to Ganja in 1989. Khan Baghi, a 3 ha recreation area in Ganja, is a historic garden and natural heritage site dating back to 1582. Despite some trees being cut down after the Russian occupation, it remains famous for its rich flora and serves as one of the oldest natural parks in the Caucasus and Azerbaijan.

Cultural sites can boost local economies and enhance Azerbaijan's national and international profile. For this, the surrounding areas must be well-presented, and sites maintained effectively. Resulting economic activity supports site maintenance by providing locals with tourism-related jobs. Current "conceptual alternatives" appear not to integrate cultural environments into strategic development plans.

6 PRELIMINARY IDENTIFICATION AND SCOPING OF POTENTIAL E&S IMPACTS

Scoping identifies issues to be assessed and information to be provided in the ESIA Report. In the section that follows each E&S theme is presented as follows:

- Potential Impacts – provides an overview of the potential impacts they may arise on the parameter because of construction and / or operational activities;
- Possible mitigation measures – outlines initial suggestions of the measures to avoid, mitigate or compensate the likely impacts, and
- Scope of Work for ESIA - provides a tabulated summary of the baseline surveys and assessments to be conducted in the detailed assessment phase.

The scope of the ESIA is based on the review of available information, including the Feasibility Study (Sweco, 2024), the associated ESIA Scoping Report (Sweco, 2024), and an earlier EIA report (Dornier-Schneider Consulting, 2016) [56], and includes findings from the initial preliminary site visit.

6.1 Potential Impact on Air Quality

6.1.1 Construction

The potential air quality impacts during construction are:

- Dust from earth works, demolition activities, and transport of dry materials on the construction site and along the access roads, potentially having an adverse impact on nearby receptors; and
- Exhaust emissions from construction traffic and machinery may result in a deterioration of local air quality notably ambient nitrogen dioxide (NO_2), VOCs, SO_2 and particulate matter ($PM_{2.5}$ and PM_{10}) concentrations.

Mechanically generated dust emitted by construction activities may cause impacts on nearby receptors, such as residential properties, agriculture and people through:

- Dusting / soiling of surfaces, crops, water bodies, and others; and
- Adverse human health effects through exposure to airborne fine particulate matter.

[56] Dornier-Schneider Consulting, 2016: Additional Investigation Study for the Wastewater Treatment Plants in Ganja and Sheki-Programme Phase 3. Part 1.3 Ganja Wastewater Treatment Plant. Volume 3: Environmental Impact Assessment Report

6.1.2 Operation

The likely air quality impact during WWTP operation is mainly odours, emitted by the biological decomposition of organic matter in the wastewater. Odour may affect nearby settlements and create a nuisance impact. The most prominent odour-causing compounds may include hydrogen sulfide (H_2S), ammonia (NH_3), volatile organic compounds (VOCs), and mercaptans.

Traffic during WWTP operations (service cars and trucks, employees' cars, sludge transport, and so forth) will also have emissions (NO_2, VOCs, SO_2, $PM_{2.5}$ and PM_{10}), but likely to be insignificant due to the small volume of traffic.

6.1.3 Possible mitigation

Construction phase impacts can be effectively mitigated by judicious selection of transport corridors avoiding inhabited areas, and water-spraying the construction site during dry months, cleaning vehicles and so forth.

Odour-related impacts can be avoided or significantly mitigated simply by properly operating of the WWTP. The WWTP technology is energy intensive but this means easier operation and so a higher likelihood that odours will not be generated.

6.1.4 Scope of Work for ESIA

Further work is required to gain a better understanding of the baseline environment to complete the ESIA for this parameter with tasks presented in **Table 29** but it must be noted that no air quality monitoring or measurement will be conducted.

Odour risk will be modelled using a dispersion model (Symos 97), deriving possible emissions of odorous compounds from emission factors and comparing the predicted concentrations of the odour causing compounds (such NH_3 and H_2S) with the limits usually used in the EU countries.

Table 29. Air Quality: Further Work for the ESIA

Data required
Desk Based
Obtaining metrological data.
Obtaining information on expected construction duration and organisation, including access roads, the scope of earth works, traffic intensity, and so forth, to estimate air emissions.
Review of the national regulations on the sanitary zones.
Obtaining information on the traffic intensity during operation to estimate related air emissions.
Obtaining information on the emissions of the main substances causing the odour from the WWTP technology.
Odours modelling using Symos 97 software.[57]

[57] Symos 97 is a modelling system for stationary sources of air pollution, developed by the Czech Hydrometeorological Institute Prague and programmed by IDEA-ENVI s.r.o. It is recommended by the Ministry of the Environment in the Czech Republic for air quality assessment.

Analysis of the relevant BREF[58] documents to specify requirements for odour management and control.
Site Surveys
None

6.2 Potential Impacts on Water Resources

6.2.1 Construction

During construction, surface and ground water resources may be negatively affected by spillage or leakage of hazardous materials, especially hydrocarbons, from construction traffic and machinery.

6.2.2 Operation

Water quality in surface water receiving a discharge of treated effluent (i.e. Shemkir irrigation channel, if used, and Goshgar river) can be negatively affected if discharge standards are not met. If effluent is used for irrigation, both surface and groundwater can be contaminated over a wider area. The increase of paved areas within the project site will increase runoff conditions, resulting in increased volume and velocity of stormwater,

6.2.3 Possible mitigation

The likely impacts during construction phase can be effectively avoided or significantly mitigated by proper maintenance of construction vehicles and machinery, and parking, re-fuelling and cleaning should take place where there is leakage prevention.

To prevent or minimise adverse impacts on the water resources during operation:

- Proper operation of the WWTP and compliance with effluent standards
- Proper sewage and sludge management
- Effluent monitoring
- Process monitoring of the WWTP technology (activated sludge, sludge treatment), and of the treated wastewater
- Sensitive areas should be identified, where the effluent cannot be discharged used (e.g. near potable water resources)

To mitigate increased runoff, the design of the WWTP should minimize paved areas, integrate elements of rainwater management including collection and reuse, implementing erosion protection through velocity inhibiters and lining channels.

6.2.4 Scope of Work for ESIA

Further work is required to gain a better understanding of the baseline environment to complete the ESIA for this parameter; the tasks are presented in **Table 30**.

[58] BREF stands for Best Available Techniques (BAT) Reference Document and is published by the European Commission. BREF documents provide information on the most effective and advanced techniques for preventing or, where that is not practicable, reducing emissions and the environmental impact of certain industrial activities.

Table 30. Water Resources: Further Work for the ESIA

Data required
Desk Based
Review of the ground water investigation results from the feasibility study. Obtaining data on surface water quantity and quality, in Shemkir irrigation channel, if used, and the Goshgar River. Documenting groundwater quality from secondary sources (such as wells or water taps in adjacent villages, farms, etc.).
Site Surveys
There are rivers, water reservoir and irrigation channels in the area. A walkover survey will be undertaken to characterise and map the surface water conditions but there will be no additional water quality monitoring or measurement.

6.3 Potential Impact on Soil Resources, Geology and Geo-hazards

6.3.1 Construction

During construction, excavations may impacts underlying geology and soil cover. Borrow pits may also be established to source aggregate needed for the construction. Soil may be negatively affected by spillage or leakage of hazardous materials, especially hydrocarbons, from construction traffic and machinery. Construction activities can result in the soil compaction and stormwater runoff may cause erosion and off-site sedimentation. As Ganja is in a highly seismic zone, seismic risk must be assessed.

6.3.2 Operation

Soil can be contaminated by leakage or spills of untreated sewage and/or sludge. Use of a sludge as a fertilizer can result in the contamination of agriculture soil if the sludge has not been effectively disinfected.

6.3.3 Possible mitigation

Construction phase impacts can be effectively avoided or significantly mitigated by maintenance of construction vehicles and machinery, and parking, re-fuelling and cleaning occurring where there is leak protection.

Topsoil should be removed before the construction, safely stored and reused (at the site or in other suitable locations).

Operational impacts can be prevented or minimised by:

- Proper operation of the WWTP
- Proper sewage and sludge management
- Regular soil monitoring
- Identifying areas where sludge should not be used (e.g. near potable water resources)
- Following good agriculture practices

6.3.4 Scope of Work for ESIA

Further work is required to gain a better understanding of the baseline environment to complete the ESIA for this parameter; the tasks are presented in **Table 31**.

Table 31. Geology, Soil and Geo-hazards: Further Work for the ESIA

Data required
Desk Based
Review of the soil investigation results and seismic risk assessment from available ESIA, EIA and feasibility study documents. Analysis of areas, where sludge could be used safely as a fertilizer.
Site Surveys
A site walkover survey will be undertaken to provide up-to-date visual information on land use and land quality but there will be no additional soil quality monitoring or measurement.

6.4 Potential Noise and Vibration Impacts

6.4.1 Construction

Potential construction noise and vibration impacts may arise from:

- Construction activities (earth works, drilling, excavation, building and so forth).
- Construction traffic such as large trucks, scrapers and graders, heavy rollers and heavy goods vehicles servicing, delivering and removing materials (including spoil and fill).

6.4.2 Operation

Traffic during the WWTP operation (service cars and trucks, employees' cars, sludge transport, and so forth) will be a new noise source in the surrounding areas.

6.4.3 Possible mitigation

The construction works and transport of the materials should be limited to daytime i.e. between 7am and 6pm.

Access routes to the WWTP and for sludge transport should avoid populated areas.

6.4.4 Scope of Work for ESIA

Further work is required to gain a better understanding of the baseline environment to complete the ESIA for this parameter; the tasks are presented in **Table 32**.

Table 32. Noise and Vibration: Further Work for the ESIA

Data required
Desk Based
Identify inhabited areas near the WWTP site and along potential access and transport roads. Obtaining information on construction duration and organisation, including access roads, earth works, traffic intensity, and so forth to estimate noise. Obtaining information on operations phase traffic to estimate noise.
Site Surveys
No noise and vibration measurements will be conducted.

6.5 Potential Impact on Biodiversity

6.5.1 Construction

Construction activities may impact biodiversity through clearing of vegetation and resultant loss and/or fragmentation of habitat. In addition, fauna may be displaced by disturbance from construction activities including noise and lighting. However, as available information does not identify valuable ecosystems and protected species at and around the project site, the likely impacts on flora and fauna can be considered insignificant.

6.5.2 Operation

There may be impacts on aquatic ecosystems in the irrigation channel and Goshgar river and its banks caused by pollution of water by effluent. Again, the absence of valuable ecosystems and protected species in the receiving waters imply impacts will be insignificant.

6.5.3 Possible mitigation

The design of WWTP should incorporate green areas (trees, shrubs, lawns) to compensate potential loss of habitats and biodiversity.

To avoid or mitigate operational impacts proper operation of the WWTP and compliance with effluent quality standards must be ensured together with water quality monitoring in the irrigation channel and Goshgar river.

6.5.4 Scope of Work for ESIA

Further work is required to gain a better understanding of the baseline environment to complete the ESIA for this parameter; the tasks are presented in **Table 33**.

Table 33. Biodiversity: Further Work for the ESIA

Data required
Desk Based
Review of available literature and biological records. Review of the project design to ensure inclusion of green elements.
Site Surveys
A biodiversity survey will be conducted on the project site.

6.6 Potential Impact on Landscape

6.6.1 Construction

Construction activities may have an impact on landscape character due to ground clearing, excavations, borrow pits, temporary stockpiling of material, large construction vehicles and machinery, scaffolding and shuttering and so forth. However, considering the scale of the project and the character of the landscape, the likely impacts can be considered as insignificant and temporary.

6.6.2 Operation

New buildings and other parts of WWTP may change the visual perception of the area.

6.6.3 Possible mitigation

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6.6.4 Scope of Work for ESIA

Further work is required to gain a better understanding of the baseline environment to complete the ESIA for this parameter; the tasks are presented in **Table 34.**

Table 34. Landscape: Further Work for the ESIA

Data required
Desk Based
Review of the existing land-use plans to understand planned development in the area, in particular residential areas.
Site Surveys
A walkover survey of the site and nearby area will be undertaken to provide up-to-date visual information on landscape, land use and land quality.

6.7 Potential Impact on Climate Change and of the Related Risks

The impacts related to climate and climate change are assessed from two perspectives:

- The impact the project will have on climate and climate change, through GHG emissions
- The potential climate related impacts on the Project and its resilience to climate change risks.

6.7.1 Construction

The use of construction machinery and heavy vehicles will result in direct CO_2 emissions. However, these are expected to be relatively insignificant in the context of the overall Project. The construction of the WWTP also requires substantial amounts of building materials, including concrete and steel, which come with embodied GHG emissions in the production of the building materials required for construction of the WWTP.

In terms of climate change-related risks, the construction phase is vulnerable to extreme weather events, however these risks can be managed through standard construction site management measures, especially provision for more intense precipitation and stormwater management.

6.7.2 Operation

More material GHG emissions from the WWTP will occur during operations phase:

- Direct GHG emissions from the WWTP process and associated sludge handling.
- Electricity consumption in operating the WWTP
- On-site generation of energy (if any)

Climate change risks have been estimated in the Project feasibility study (Sweco, 2024) and are not expected to be significant. Future climate characteristics in the Project area have been analysed using the following data sources:

- Fourth National Communication to the United Nations Framework Convention on Climate Change from the Republic of Azerbaijan (2021)
- World Bank Climate Change Knowledge Portal
- 5th Intergovernmental Panel on Climate Change (IPCC) Assessment Report (AR5)
- RCP8.5 (Representative Concentration Pathways) scenario.

In the long-term perspective, the temperatures in Azerbaijan are projected to increase, as will the number of extreme heat days. Precipitation is projected to decrease slightly, but without a clear trend. However, within the timeframe of the Project, no notable increase in extreme heat events, drought or flooding is expected according to the existing projections. All three of these relevant climate risks are considered in the Project since they are already of relevance at present – and even though they are not expected to increase in occurrence during the Project´s lifespan. The facilities are all designed for extreme heat; stormwater management system proposed as a part of the Project will manage the flood risks in the affected areas. The SWECO (2024) Feasibility Study further provides the following overview of the climate-related risks including related mitigation measures (see table below):

Table 35. Climate Change Risks to the Project

Hazard	Likelihood	Impact on project	Risks	Mitigation measure
Extreme heat events	Low	Staff health impacts due to high temperature.	Health hazard due to dehydration; serious consequences.	Staff facilities require access for potable water and refrigeration unit at WWTP. Administration and Chemical Laboratory to be air-conditioned. This is normal design procedure.
		In high temperatures, the WWTP biomass requires additional oxygen, otherwise the discharge standards will be exceeded.	Poor quality effluent due to high temperatures, however not considered a long-term impact on the WWTP effluent discharge.	Additional aeration needed at plant. Requires a change of operation, which is common procedure.
Droughts	Low	Higher concentration of pollutants in wastewater if drought leads to water scarcity, however the pollution load stays the same.	No major risks identified, since WWTP is designed for the load.	No measures proposed.
		Potential lack of water resources. Based on information from the Shamkir reservoir, this seems unlikely.	No major risks identified.	No measures proposed.
		High water demand	Insufficient capacity in system.	Use of water trucks. Already in place in Ganja.
Floods	Low	Flooding of plant	Based on elevation and (lack of) nearby water bodies no risk is identified.	No measures proposed. Normal drainage system at plant. Placement of sensitive (electronic) equipment at higher elevation.
		Stormwater inflow to sewer system.	Diluted wastewater and overflows occurring.	With the construction of a separate stormwater system, the issue should be mitigated.

Source: SWECO, 2024

The Project is designed with respect to identified present climate risks (floods, droughts, extreme weather events) and while taking into consideration climate scenarios over the Project lifespan.

6.7.3 Possible mitigation

The minimization of the GHG emissions during the construction phase can be achieved through use of energy-efficient machinery and materials with low carbon footprint.

Reduction of the GHG emissions during operations can be achieved through technology selection (including sludge handling), implementation of biogas recovery, and flare combustion system, as well as through energy efficiency measures reducing electricity consumption.

Relevant climate change risks are provided for in the Project design including suitably sizing stormwater collection to avoid overflow and flooding of the facility (already being implemented). Climate change risks need to be further considered in the strategy for effluent water reuse.

6.7.4 Scope of Work for ESIA

Further work is required to gain a better understanding of the baseline environment to complete the ESIA for this parameter; the tasks are presented in **Table 36.**

GHG emissions from construction phase are scoped out from the ESIA.

The ESIA will not assess (quantify) the construction process GHG emissions of the Project, as they are insignificant in the context of the Project life cycle, with few practical alternatives to reduce GHG emissions during construction. This is also true in regard to the GHG emissions embedded in construction materials, as no low-emission alternatives (e.g. green steel and concrete) are realistically available in the Project context.

GHG emissions from the operation phase are scoped in in the ESIA.

With regards to the emissions from the WWTP operational process, the GHG assessment will use emission factors for to quantify emissions from the WWTP, using EIB's carbon footprint methodologies[59]. The ESIA will make use of the results of the analysis prepared within the SWECO 2024 Feasibility study following the EBRD's Green Economic Transition (GET) approach. It will verify the input data and validity of the adopted assumptions based on the most up-to-date available project design and technology information.

Climate risks are scoped out from the ESIA.

For climate change-risks, the assessment provided in the Project feasibility study (SWECO 2024), indicated no significant increase in climate related risks compared to the current climate baseline situation. Climate risks will therefore not be further assessed. However the ESIA and related management plans will continue to take into consideration the findings of the climate risks assessment to ensure the identified risks are adequately reflected in the Project design and related management plans (including in the strategy for handling the sludge and effluent) to be developed later in the Project preparation cycle..

Table 36. Climate: Further Work for the ESIA

Desk Based
Obtaining data on the population served by the WWTP (PE), average flowrate per day*BOD concentration per capita per day, sludge disposal (volumes, treatment). Obtaining data on electricity consumption of the facility.

[59] EIB Project Carbon Footprint Methodologies. Methodologies for the assessment of project greenhouse gas emissions and emission variations. V.11.3. January 2023 (Annex 6)

6.8 Land use and possible land acquisition

The WWTP site is close to two settlements: Ziadli and Istixana villages. The nearest residential building(s) in Ziadli are very close to the effluent ponds (125 m). The site is not fenced and informal economic activities (growing crops, grazing livestock, and so forth) may occur directly on the site and in the immediate vicinity, thus creating risks for the village inhabitants.

6.8.1 Construction

- Land acquisition between the two parts of the WWTP site may be required for sludge disposal. The site owner(s), formal and informal use, and the willingness of the owner(s) to voluntarily sell the land or give up its lease should be established.
- It is necessary to clarify the nature and extent of current informal use of the WWTP site.
- Formal establishment of a SPZ: it is likely that one or more residential buildings will fall within this zone. Consequently, buildings closest to the wastewater ponds may be excluded from the housing stock and resettlement required.

Informal land use is to be clearly identified and assessed within the ESIA. The site is to be fenced; residential buildings and informal economic activities are to be removed from WWTP and, ideally its SPZ, before construction begins; physical resettlement and economic displacement is to be fully compliant with EBRD E&S Policy of 2019.

6.8.2 Operation

It is to be clarified if the easements are to be established for the effluent pipeline(s) during the operations. The lands use restrictions will apply within the SPZ and along the effluent pipeline.

6.8.3 Scope of Work for ESIA

Within the ESIA the following activities will be undertaken:

- A baseline survey of households and economic activities on the WWTP site and in its vicinity.
- Assessment of the need for physical resettlement within the required SPZ and of economic resettlement at the site, within the SPZ, and along the effluent pipelines.
- Assessment of the level of informal activities on the WWTP site and vicinity and the potential impacts of the Project.
- A Resettlement Framework is to be developed and disclosed as part of the ESIA package.

6.9 Job Creation and SME involvement

6.9.1 Construction

Temporary jobs will be created for construction workers and firms. The significance of this aspect will be assessed on the project information provided by the client.

PR2 requirements on working conditions and labour management must be complied with. Every worker is to have a legal contract and social guaranties provided by law; if the workers came from another region fit and proper accommodation is to be provided.

Temporary job creation will have a positive impact on local employment and small business development and influence local incomes. The value and significance of these impacts will be assessed at the next stage but significance of these benefits will vary from low to moderate.

6.9.2 Operation

Permanent jobs will be available for operations although the number of jobs will be well less than for construction.

6.9.3 Scope of Work for ESIA

- Brief baseline survey of local employment, professional skills, incomes and spending in Ganja and nearest villages;
- Qualitative assessment of potential impacts will be conducted using a survey and available project information.

6.10 Potential Impacts on Public Utilities, Services and Transport Infrastructure

6.10.1 Construction

No information about social infrastructure (schools, health facilities) in the vicinity of WWTP is currently available and will be obtained during the site visit (April-May 2025). The possible impact of the Project on social infrastructure during construction will be assessed but likely to be of low significance).

The impact of the Project on road infrastructure both on the construction and operational stages will be assessed during the ESIA, including alternative route (**Figure 5**).

6.10.2 Operation

A discrepancy in the Project design documentation between the volume of water supplied and wastewater discharged requires further investigation and elaboration.

6.10.3 Scope of Work for ESIA

- Brief survey of social infrastructure in the vicinity of WWTP and assess potential impacts on such infrastructure (if any);
- Improve the accuracy of initial data on water supplied and waste water discharge with ASWRA;
- Assess potential Project impacts on road infrastructure.

6.11 Potential Impacts on Community Health, Safety, and Security

6.11.1 Construction

The following community health, safety and security risks are potentially associated with construction:

- Risk of traffic accidents due to movement of construction vehicles;
- Risk of accidents due to open pits or trenches,
- Restricted access to social infrastructure facilities for pedestrians/vehicles
- Possible nuisance related to noise pollution and vibration, light pollution, air / dust emissions
- Possible influx of job seekers

6.11.2 Operation

The following risks are associated with operations of the WWTP:

- Nuisance to local communities due to odours,

- Increased safety risk during maintenance.

6.11.3 Scope of Work for ESIA

Community health and safety risks are to be assessed and mitigation developed.

6.12 Potential Impacts on Occupational Health and Safety

6.12.1 Construction and Operation

An OHS audit of current activities was conducted by SWECO in 2024.

There is a corporate OHS management department (in Baku). ASWRA in Ganja has one dedicated H&S manager.

Management of H&S aspects is driven primarily by legal compliance, monitoring and reporting to authorities. OHS risk assessments, specific work instructions, staff training and so forth are planned and controlled by the Baku office and enforced locally.

The following risks could be specifically associated with the Project:

- Traffic accidents;
- Injuries from falls, slips, working in confined spaces, and so forth.
- Exposure to hazardous materials in air, electric shock risks and treatment facilities, hazardous chemicals / vapours, pathogens and vectors and so forth.

6.12.2 Scope of Work for ESIA

Occupational health and safety risks are to be assessed and mitigation developed.

6.13 Potential impacts on Cultural Heritage

No impacts on cultural heritage are expected as no registered cultural heritage exists in the Project vicinity.

The new property to be acquired has not been previously surveyed by archaeologists. Consultation with the authorized body and a specialist archaeologist is necessary and a chance find procedure implemented during construction.

7 STAKEHOLDER ENGAGEMENT

7.1 Stakeholder Identification and Analysis

During Scoping the following stakeholder groups have been identified:

- Potentially affected parties:
  - Potentially affected communities (residents of nearby settlements; farmers using surrounding lands; landowners affected by sludge storage or pipe construction; residents of Ziyadli and Sarkar village who could face resettlement; residents of settlements impacted by the construction of discharge pipeline; residents of Ganja);
  - Potentially vulnerable groups (women-headed households, single-parent families, pensioners, families with disabled members, households officially recognized as living in poverty and children attending nearby schools or living near construction sites);

- Potentially affected commercial and public organizations (public and private enterprises connected to the WWTP and Local businesses (including greenhouse nearby).

- Interested parties:
  - State authorities (ASWRA, Ministry of Ecology and Natural Resources and its bodies; Ministry of Emergency Situations and its regional department in Ganja; Ministry of Health and sanitary and epidemiological services; Ministry of Agriculture and Food; Azerbaijan Water Amelioration and Management OJSC; State Tourism Agency; zerenerji OJSC and Azerishiq OJSC; State Land and Cartography Committee; State Committee for Urban Planning and Architecture);
  - Regional/city/district authorities (Ganja Executive Authority, Samukh Executive Authority; Local municipalities of Ganja, Samukh, Ziyadli, Sarkar; Regional Department N10 of Ecology and Natural Resources; Ganja ASWRA; Ganja division of Agency for Sustainable and Operational Social Security; Ganja Housing and Communal Production Union/ Service);
  - Communities (community leaders / elderly committees (aghsakals) in particularly Ziyadli village);
  - Non-commercial organizations (non-governmental organizations (NGOs); national, regional and distric media; academic and research institutions; health providers (hospitals, medical points in identified settlement);
  - Commercial organizations (Contractors and subcontractors)
  - International financial institutions (EBRD)
  - International initiatives and projects (Covenant of Mayors for Climate and Energy - Europe).

The stakeholder groups mentioned above have been identified based on their interests, concerns, and level of influence. A detailed description of each group can be found in the SEP. Any stakeholders that are not included in the table but wish to receive information about the Project and its potential E&S impacts can approach ASWRA.

7.2 Existing Stakeholder Engagement at ASWRA

ASWRA employs various communication channels for stakeholder engagement, including a website, social media platforms (Facebook, Twitter, Instagram, Telegram, YouTube), online platforms (e-su and e-gov), traditional media (TV, radio, newspapers), and direct interaction via meter readers and staff.

ASWRA has an established external grievance mechanism for its water supply and wastewater services in Ganja, accessible through a 955-hotline, its website, an online monitoring platform (www.enezaret.az), social media, and in-person submissions at its Ganja office. Grievances are logged and typically resolved within 2-3 days, despite a national mandate allowing 15-30 days. Feedback from ASWRA's customer department indicates the mechanism's success in addressing stakeholder needs.

The construction of a WWTP was considered in strategic documents like the Green City Action Plan, Ganja Master Plan, and the SEA report in 2022 and 2023. Stakeholders, including ASWRA, academia, experts, NGOs, and Ganja's executive authority, participated in interviews, focus groups, and meetings. Preliminary discussions with local stakeholders arranged on July 23, 2024, during the ESIA Scoping stage, involving ASWRA (Baku), Ganja Sukanal, the Department of Ecology and Natural Resources, Kapaz and Nizami Municipalities, Ziyadli Municipality, and local residents. At the meeting, the Project's background was presented, and participants shared questions and concerns. Ziyadli village

representatives supported the project, expecting minimal impact and adherence to international standards.

7.3 Stakeholder Engagement Programme

The SEP was developed for the Project to cover its design, pre-construction and construction phases. The detailed description of the engagement programme is provided in the SEP.

During Project Design (2025-2026), it is planned to create a Project webpage with E&S information along with related materials about the Project, establish a grievance mechanism in May 2025, and release initial media publications about the Project. The scoping stage disclosure and consultations in May-June, 2025 will include an announcement, a 30-day public disclosure of the Scoping Report and SEP, public consultations in Ganja and nearby villages (Ziyadli, Sarkar, and Istixana) and analysis of stakeholder feedback. The draft ESIA disclosure and consultations, from August to December 2025, includes announcement, a 120-day disclosure of the ESIA package, public consultations in October-November 2025, and analysis of comments.

During the Pre-Construction Stage (2026-2027), stakeholders will be provided construction start dates, traffic safety measures and other important information. Information boards will be installed with contact details for the grievance mechanism. A Frequently Asked Questions leaflet covering project details, E&S impacts, and mitigation will be prepared.

During Construction (2026-2029), ASWRA will maintain a grievance logbook, provide project progress updates, hold stakeholder meetings as needed, update the SEP based on monitoring, and publish annual E&S performance reports according to EBRD guidelines.

Communication channels include ASWRA's website, social media (Facebook, Twitter, Instagram, Telegram, YouTube), local media, and face-to-face or online meetings. Information in the media will be updated throughout the Project.

A grievance mechanism will be established to provide stakeholders with a channel to raise concerns and complaints. The grievance requests will be accessible through multiple channels of ASWRA, including:

- 955-hotline;
- ASWRA's website;
- the Online Public Monitoring Platform - www.enezaret.az;
- social media platforms: Facebook, Telegram, Instagram;
- face-to-face interactions at the ASWRA office in Ganja.

The process will be transparent, with clear procedures for registering, investigating, and resolving grievances. The mechanism will resolve grievances in a timely manner, with a maximum timeframe of 30 days. Grievances can be submitted anonymously, although national laws prohibit anonymous appeals. However, it is recommended that contact information be provided so that ASWRA can provide a written response to the grievance.

A grievance review committee will be established to oversee the process. All grievances will be recorded in a Grievance (and Proposals) Log. The log will be maintained and analysed throughout the project lifecycle to identify trends and areas for improvement.

The SEP includes a monitoring framework. Stakeholder engagement will be maintained throughout the project lifecycle (planning, construction and operation). To successfully organise, implement, evaluate, and report on stakeholder engagement activities, ASWRA and its regional office in Ganja will have a dedicated person in charge of these processes. The engagement process will be monitored using specific indicators, such as the SEP accessibility, stakeholder feedback (comments, grievances, and resolution rates, disaggregated by gender and location), media coverage, and trends in grievance categories.

These indicators will help improve the efficiency of engagement. Stakeholder engagement activities will be recorded in a dedicated log. All engagements will be documented.

Outcomes of the stakeholder engagement process will be analysed monthly and quarterly, and the analysis included in the annual E&S reports submitted to the EBRD by ASWRA. The SEP will be periodically reviewed and updated, potentially with additional consultations if significant project changes introduce new E&S risks and impacts to project-affected parties.

8 RED FLAGS AND POTENTIAL PROJECT STOPPERS

No red flags or fatal flows were identified at the stage (to be verified and confirmed at the next ESIA stage).

9 ESIA WORK PROGRAMME AND TIMELINE

The tables below outline the subsequent steps planned in relation to the Project's E&S aspects stemming from its expected activities.

9.1 Construction

Table 37. ESIA Work Programme: Construction

Environmental and social aspects		Potential impacts	Survey/Assessment	Timeline
Pollution	Dust	Air quality	Not anticipated to be significant during construction but dust control still necessary at least during the demolition and earthworks phase of construction. Meteorological data will be sourced for the site but there will be no direct air quality measurements. Will be qualitatively assessed and management measures proposed.	April-May 2025
	PM			
	NO_2			
	Greenhouse gases	Climate	Unlikely to be significant during construction but will be qualitatively assessed and mitigation defined.	April-May 2025
	Noise	Nuisance	Unlikely to be significant during construction but standard construction mitigation will be defined for these aspects.	April-May 2025
	Light			
	Visual			
Waste	Waste water	Surface water	Limited to stormwater that may be contaminated on site and cleaning of concrete mixers. Will be assessed qualitatively and mitigation defined.	May-August 2025
		Groundwater		
	Non-hazardous waste	Landfill airspace	Likely to be of moderate to high significance as a function of the building rubble derived from demolition of the existing infrastructure to make way for the new. Disposal options will be qualitative assessed and mitigation defined to reduce the impact.	May-August 2025
	Hazardous waste	Soil quality	Hazardous waste during construction would be limited to spills of hydrocarbons, where contaminated soil may need to be excavated and	April-May 2025
		Land capability		
		Groundwater		

Environmental and social aspects		Potential impacts	Survey/Assessment	Timeline
		quality	disposed of. Will be qualitatively assessed and mitigation defined.	
		Surface water quality		
	Materials spillage	Soil quality	Construction activities always pose the risk of hydrocarbon and other hazardous materials spills would likely pose a low to moderate impact risk. Will be qualitatively assessed and mitigation defined.	April-May 2025
		Water quality		
		Groundwater quality		
Resource use	Liquid fuels	Climate	Likely to be of low to moderate significance. Will be quantified as far as possible and mitigation defined.	April-May 2025
		Natural resource depletion: Non-renewable resources		
	Electricity	Climate		
		Natural resource depletion: Non-renewable resources		
	Water	Natural resource depletion: Non-renewable resources	Likely to be low to moderate significance depending on the sourcing of the water. Will be qualitatively assessed and mitigation defined.	April-May 2025
	Land transformation	Archaeological / Cultural	Unlikely to be significant during construction given that the land footprint required for the Project is relatively small, the land has already been mostly transformed and there is limited archaeological, biodiversity and sense of place value in the transformed area. Additional consultations with the competent authorities (archaeological, environmental, and land use) will be conducted. The site will be visited, including experts' observation, photo documentation	April 2025
		Biodiversity / Ecological Impact: General		May 2025
		Land Capability		May 2025
		Visual / Aesthetic / Sense of Place		May 2025
	Natural resources	Natural resource depletion: Non-renewable resources	Various building materials will be required including cement, gravel and steel. Will be qualitatively assessed and mitigation defined.	April-May 2025
Land use	Land acquisition	Physical displacement	A potential area of the SPZ to be discussed with the authorities. The scale of potential physical displacement will be determined and presented in the Resettlement Framework, as needed.	April-May 2025
		Economic displacement	The land use at the site to be explored during the site visit and interviews. The scale of economic displacement will be determined and presented in the Resettlement Framework.	
Social	Full time jobs	Employment	Likely to be of low to moderate significance	April-May

Environmental and social aspects		Potential impacts	Survey/Assessment	Timeline
	Contractors	Employment	Likely to be positive moderate significance at the construction stage. The qualitative assessment will be done, measures for increasing the positive effects will be suggested.	2025
	Full-time women-staff	Gender equality	The measures for women involvement / gender equality will be suggested.	
	Contractors women-staff	Gender equality		
	Local spending	Economic growth	The impact is preliminary assessed as low. Will be looked into at the ESIA stage.	
	Capacity building	Skills development	The high-level capacity building measures will be suggested.	May 2025

9.2 Operation

Table 38. ESIA Work Programme: Operation

Environmental and social aspects		Potential impacts	Survey/Assessment	Timeline
Pollution	Dust	Air quality	Not anticipated to be significant during operations. Will be qualitatively assessed and management measures proposed	April-May 2025
	PM			
	NO2			
	GG	Climate	Likely to be more significant during operations due to the relatively high energy requirements of the proposed technology. Will be quantified, assessed and mitigation defined.	April-May 2025
	Odorous emissions	Nuisance	Emissions of odorous compounds will be determined, dispersion modelled and predicted concentrations compared to defined odour thresholds. Requires	April-May 2025
	Noise	Nuisance	Unlikely to be significant during operations but will require careful consideration in design. Will be qualitatively assessed and design requirements and criteria defined.	April-May 2025
	Light			
	Visual			
Waste	Waste water	Surface water	A key potential impact from the WWTW requiring an assessment of the design performance of the plant and resultant discharge quality, characteristics of the receiving water environment and associated risk factors.	April-May 2025
		Groundwater		
	Non-hazardous waste	Landfill airspace	Limited to municipal solid waste and relatively small quantities. Although sewage sludge must ultimately be treated to be non-hazardous it will be assessed as a hazardous waste.	April-May 2025
	Hazardous	Soil quality	The second key impact from	April-

Environmental and social aspects		Potential impacts	Survey/Assessment	Timeline
	waste	Land capability	operations of the WWTP, sewage sludge requires effective treatment to sterilise the sludge before disposal. Optimal sludge disposal options will be assessed and mitigation defined	May 2025
		Groundwater quality		
		Surface water quality		
	Materials spillage	Soil quality	Likely to be more limited than during the construction phase and deriving from vehicles required for operations of the WWTP. Will be qualitatively assessed and mitigation defined.	April-May 2025
		Water quality		
		Groundwater quality		
Resource use	Liquid fuels	Climate	Unlikely to be significant and limited to vehicles required for WWTP operations.	April-May 2025
		Natural resource depletion: Non-renewable resources		
	Electricity	Climate	An important potential impact during operations, given the relatively high electricity usage requirements of the WWTP technology. GHG emissions inventory will be compiled, assessed and mitigation defined as appropriate.	April-May, 2025
		Natural resource depletion: Non-renewable resources		
	Water	Natural resource depletion: Non-renewable resources	Unlikely to be significant but water use will be quantified, assessed and mitigation defined.	April-May, 2025
	Natural resources	Natural resource depletion: Non-renewable resources	Unlikely to be significant but other resources required for operations of the WWTP will be quantified, assessed and mitigation defined.	April-May, 2025
Land use	Land acquisition	Longer- terms land acquisition effects can manifest at the operational stage	The longer-terms effects of land acquisition will be qualitatively assessed. Monitoring activities will be proposed at a high-level in the Resettlement Framework.	May-June, 2025
Social	Full-time jobs	Employment	Presumably, the low significance positive impact will take place. The qualitative assessment will be done	April-May, 2025
	Contractors	Employment	At the operational stage the low-profile positive impact will take place. The qualitative assessment will be done.	
	Full-time women staff	Gender equality	The efficient measures of women involvement and gender equality are to me developed.	
	Contractors women-staff	Gender equality		
	Local spending	Economic growth	The effects are assessed as low up to moderate. The qualitative assessment will be done.	
	Capacity building	Skills development	The existing capacity will be assessed on the qualitative level; the high-level capacity building measures will be suggested.	