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AZERBAIJAN

National Water Supply and Sanitation Project (P096213)

Environmental Impact Assessment (EIA) Executive Summaries

Shamakhi, Gabala, Saatli, Sabirabad

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National Water Supply and Sanitation Project

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EXECUTIVE SUMMARY SHAMAKHI

Introduction

The water supply and sewer system in Azerbaijan is characterized by old, damaged and largely dysfunctional infrastructure and is financially constrained and poorly operated. This results in the level and the quality of the water supply and wastewater treatment (WWT) services especially in small towns being significantly degraded. Water shortage and the use of dirty water for drinking have negatively affected health and welfare of the population accordingly. Uncontrolled flow of wastewaters to non-designated areas has promoted the spread of various infections and caused environmental pollution.

To address this dire situation, the Government of Azerbaijan (GoA) and the World Bank are currently planning the implementation of infrastructure projects for water supply and WWT in small towns and regions. Commencing in 2007, the Government of Azerbaijan started to develop projects for reconstruction and development of water supply and sewer system in 22 rayon centres with the World Bank within the framework of the “National Water Supply and Sanitation Project”. One of these regions is Shamakhi.

Shamakhi region is located in the east of Azerbaijan, 118 km from Baku on the south-east slopes of the Great Caucasus Mountain Range. The total area of the region is 1610 km² and the population is 88,500 of which 29,600 live in Shamakhi town and will benefit from the project. The water supply network is in poor condition and suffers from quality issues and water is supplied to residents for only around 2 hours per day. The wastewater network is essentially dysfunctional, as only 30% of households are connected to the sewer network and the wastewater treatment works does not function and wastewater bypasses the works and is discharged to the environment untreated.

This report presents an Environmental Impact Assessment (EIA) of the project in Shamakhi. The EIA identifies potential impacts on the natural environment and the social situation in Shamakhi region during construction and operation of the project. Where potential adverse effects are predicted, mitigation has been developed and its implementation is presented in an Environmental Management Plan (EMP) and Environmental Monitoring Plan (EMP).

Project description

A Feasibility Study was conducted for the project in 2007 and the Shamakhi scheme is now in detailed design phase (except for the wastewater treatment component) and has recently been tendered for construction. The client is AZERSU (state utility operator) and has a Project Implementation Unit (PIU) which is responsible for project implementation and works closely with Bank staff on project design and assessment and preparation of the bidding documents.

The proposed works comprise:

Water supply

- New boreholes for groundwater extraction within the Pirsaat River floodplain
- New pipeline to water pumping station
- New pumping station
- New pipelines (typically 200-300mm diameter) to feed new (buried, enclosed and fenced) reservoirs

- New underground (covered) reservoirs (four of them) for feeding gravity distribution zones
- New distribution network in Shamakhi serving all households and premises, all fitted with water meters

Wastewater treatment

- Replacement of defunct WWT works with new works
- Repair, improvement and expansion of the sewer collection system

Water source options

Options for water sources were investigated during the Feasibility Study and included surface water for the main river (Pirsaat); springs at higher elevations higher up in the catchment; groundwaters higher in the catchment, some of which are artesian; and groundwater associated with the lower river valley of the Pirsaat River.

The use of surface supplies from the Pirsaat River would entail additional storage and settlement works as the flows are highly variable, being snow and precipitation fed, and are very turbid for long periods and also susceptible to contamination from livestock and waste disposal.

The use of surface supplies from springs at higher elevations would entail additional diversion and collection works and their storage as the flows are scattered and highly variable, being snow and precipitation fed, and are also susceptible to contamination from livestock.

The FS investigated the water source options, as follows:

- Possible sources of groundwater and springs higher up in the mountains lie within privately owned land of large land owners and it was considered that their potential exploitation would not be acceptable to these particular land owners. Furthermore, the potential resources are unproven and the feasibility of their exploitation would require considerable study, to investigate their individual properties and indeed whether they would need to be agglomerated. There are several springs that outcrop in the area which are used by livestock farmers and these may be at risk from groundwater abstraction. The intensive livestock farming also represents a risk of pollution of the water source. Due to the higher elevations of these possible resources they would not be readily accessible for any maintenance works for around 4 months of the year, making them unattractive as a primary water source for the town.
- The only real advantage of this approach would have been reduced operational costs due to gravity feed; however the aquifers would require detailed investigation of the recharge and drawdown performance, to ensure that sufficient sustainable supplies existed and that no adverse effects would result from their exploitation.
- The land use and ownership constraints for this option have meant that it is not a viable option and certainly not a viable option within the timescale of the project. However, in view of looking ahead at the possibility of reduced operating costs it has been agreed with AZERSU that they would investigate the possibilities of utilising this potential water source.

The preferred scheme has therefore adopted to continue using the groundwater source associated with the Pirsaat River, albeit with an expanded collection system of boreholes further up the river, in the form of a horizontal infiltration gallery, to meet the increased demand from the 20 year forecast horizon (2027). The boreholes will be typically 6-9m in depth and 50m apart and will be connected by a new pipeline to feed into new storage facilities in a new pumping station near to the existing station. The existing pumping station will be retained to serve the nearby village of Sabir.

From the new pumping station water will be supplied by a new water main to four new service reservoirs constructed above Shamakhi. These water storage reservoirs will serve a new distribution network arranged in gravity fed zones. The water supply network will probably be HDPE pipe work, buried in sidewalks and connected to each property, along with a water meter, which will record supplied volumes, which will be used to calculate the water bills. The system is designed to supply good quality water compliant to the EU Drinking Water Directive (98/83/EC) on a 24 hour basis.

The wastewater network includes repair and expansion of the existing wastewater collection system, that currently only connects around 30% of the town and suffers from chronic leakage and regular blockage.

The scheme also includes demolition of the derelict WWT works and replacement with a new WWT works incorporating secondary, biological treatment, designed to perform in compliance with the EU Urban Wastewater Treatment Directive (91/271/EEC), as amended. The discharge arrangements would remain the same and would see discharge of EU compliant effluent compared to the current discharge of untreated wastewater. The catchment of the WWT works is domestic in nature, due to the absence of heavy or polluting industries, meaning that the sludge generated should be suitable for disposal to agricultural land as a soil conditioner and fertiliser. The design will include infrastructure to process the sludge so that it can readily be recycled to agricultural land or otherwise composted for soil improvement in areas such as parks or state reserves or roadside planting.

Environmental baseline

The environmental baseline section of the report presents information on the baseline environmental conditions, against which the potential impacts are assessed.

The study methodology included review and use of data from the Feasibility Study; site visits by the local environmental consultant; data collection; and results of the public consultation. This was supplemented by a site visit on 26/11/2009 involving the local consultant, AZERSU, Bank staff and a visiting Bank environmental consultant.

Shamakhi region is situated on the south-east slopes of the Great Caucasus Mountain Range, and its surface ranges from rolling to steeper hills. Small plateaus and low mountain ranges are located south of Shamakhi town. Jurassic, Cretaceous, Neogenic and Paleogenic rocks, as well as alluvial-proluvial and deluvial-proluvial depositions of the The Fourth Epoch occur, with shale, sandstones, and river gravels. These geological structures expand from north-west to south-east and west of the Pirsaat River (including Shamakhi town). Water erosion and landslides are widespread in the region, as the soils are friable and easily eroded and in places saline.

One of the geological-geomorphological problems of the region is its high seismicity of the area. The area of the region corresponds to 8 score scale on the seismo-tectonic map of Azerbaijan.

Ground waters accumulated in sedimentary rocks cover large areas in the mountainous part of the region. These waters are weakly mineralized and are widely used in many sectors of the economy, including water supply for residents and tourist centres.

The climate of Shamakhi town and its surrounding villages are characterized as mild-hot and semiarid. Winter is mild with short and non-persistent snow. Plenty of rain falls in the beginning of spring/summer season. Summer is slightly humid and mild-hot. Temperature regime of Shamakhi is the same as that of the entire Mountainous Shirvan area.

The area is essentially rural in nature and noise levels are generally low; no noise surveys were conducted or considered as being necessary and no existing data are available.

The vegetation of Shamakhi region consists of alpine and subalpine grassland, mountainous woodland, mountain steppe and semiarid plants. Alpine and subalpine meadows are located in 1800-2500 m height. Total area of woodland is 9,800 ha, mainly expanding over 800-1800 m, north of Shamakhi town, north-west of Pirsaat River basin. Oak and hornbeam are common species, along with xerophytes on the saline soils.

Mountainous xerophytes, wormwood steppes in low mountainous areas, arid ephemeral, wormwood and feather grass steppes in foothills and wormwood semi-deserts dominate in the region.

Various animals live in Shamakhi region typical for various landscape types of the area. Wild pig, jackal (*Canis aureus*) wolf (*Canis lupus*), fox (*Vulpes vulpes*), badger (*Meles meles*), hare (*Lepus europaeus*), European wild cat (*Felis libyca*), axis deer in woodlands, rock squirrel, common field mouse, social vole (*Microtus socialis*) various snakes, various birds, such as pheasant, partridge, pigeon and others live in the region. Many raptors, including short-toed eagle (*Circaetus gallicus*), pallid harrier (*Circus macrourus*) and kestrel (*Falco tinnunculus*) frequent the area with several species nesting on high mountainous areas. Flocks of migrant birds include little bustard (*Tetrax tetrax*), rock dove (*Columba livia*) and black-bellied sand grouse (*Pterocles orientalis*).

The newly established Shahdag National Park and Pirgulu State Reserve within its boundaries are located approximately 15-20 km north of the project area, in the middle of the high mountainous reaches of the Pirsaat River basin. The Pirgulu State Natural Reserve was established on an area of 1,521 hectares in 1968 for protecting mountain forests, herbage of different kinds, fertile soil and expanding forest areas.

The project area is located 1000-1500m below these areas at much lower altitudes and therefore has no potential to affect the integrity of the protected areas.

The project site is dominated by the town of Shamakhi, which continues to expand in several directions up the rolling hills, where individual houses are progressively built, connected to the rest of the town by roads and tracks.

The immediate environs of the town are typically hillsides which are subject to considerable degradation by a combination of garbage and building waste disposal, material borrowing and extensive and intensive livestock grazing, especially by sheep. The lower lying areas into the Pirsaat River are also affected by waste disposal and extraction of alluvial gravels for construction.

The route of the water main from the new intake area to the new pumping station is of low ecological value, as it is heavily disturbed and intensively grazed by sheep. The pipeline route towards the new reservoirs above Shamakhi is also heavily grazed and disturbed

ground, which has an existing pipeline and a track along it. The areas for the reservoirs all lie in hilly areas that are heavily grazed by livestock and have typical hardy grasses and herbs that can tolerate heavy grazing. The surrounding hillsides support many small mammals, such as voles, as well as fox and large raptures are a common sight, hunting overhead and also scavenging on sheep carcasses.

The only big river around Shamakhi town is the Pirsaat River, which flows in a wide, braided (several channels that vary during the year) river valley, dominated by exposed alluvial gravels. It starts from west of the Great Caucasus Mountain Range, slopes of Babadagh peak and flows into the Caspian Sea. The total area of the river basin is 2280 km², and the average perennial flow rate is 6.9m³/sec. The perennial flow rate near Shamakhi town is 4.17m³/sec or 116 million m³. Rain, snow and groundwaters form the river flow. There is no certain regularity in the river regime. Intensive rains in any season of a year cause flooding in the river, predominantly due to the lack of riparian forests along the river course and nonporous rocks in the floodplain. An estimated 14% of the flow comes from snow melt, 70% from rain surface runoff and 16% from groundwater exposure, as the river channels represent exposed groundwater in this unconfined aquifer. Large lengths of the river dry up completely, as groundwater flows recede in the late summer/ autumn periods prior to the rain and the snow melt of spring.

The total area of the region is 1610 km² and population is 88,500, 29,600 of which live in Shamakhi town and will be supplied with water and wastewater treatment.

Shamakhi region is located in the east of Azerbaijan, 118 km from Baku, on the south-east slopes of the Great Caucasus Mountain Range. Due to the region having a favourable natural-geographical position it is one of the most ancient human settlements not only in Azerbaijan, but also in the whole South Caucasus region. The region borders Gobustan, Davachi, Guba, Ismayilli, Aghsu and Hajiqabul regions.

Shamakhi administrative region was formed on August 8, 1930. There is 1 town (Shamakhi), 3 townships (Shahriyar, Madrasa and Sabir) and 46 rural municipalities in the region. There are 372 members of local municipalities. Many of the municipalities have actively participated in solving social and economic problems of their local communities.

The main economic activity in the Shamakhi region, which is the part of the Mountainous Shirvan economic region, is specialized agriculture and animal husbandry. Cereal and grape production, cattle and sheep-breeding and honey production are well developed agriculture sectors.

There are a small number of project affected people (PAP), as follows:

- An employee of AZERSU, who lives part of the year with his family along the pipeline route to the pumping station, within land that is part of the sanitary protection zone for the water supply
- A resident of the town that travels to an area within the current sanitary protection zone and cultivates a small field, which will not be directly affected by the new pipeline from the boreholes, but lies within the sanitary zone and will therefore not be accessible in future. He currently rents this land to farm here and the RPF as agreed with AZERSU will see him offered alternative land, so he is not disadvantaged.

Shamakhi is one of the ancient historic towns of Azerbaijan. The name of the town was first mentioned in works of the ancient Greek geographer Ptolomey as "Shamakheya" and

"Kemakheya" and later extensive information about the town was provided in antique works of different Arabic, Persian, Turkish, Russian and middle century European authors. The area still has several historic monuments and buildings, but none are known from the vicinity of the proposed works.

Environmental impacts and mitigation

Introduction

This section of the report presents the potential environmental impacts and mitigation associated with construction and operation of the water and sanitation project and is based on 'superimposing' the project components onto the baseline compiled during the various studies, which include the FS and the individual EIA report for the Shamakhi scheme. Mechanisms for implementing the mitigation are presented in Section **Error! Reference source not found.**, EMP.

Overall, the project is designed to be very beneficial to the residents of Shamakhi, through provision of a reliable water supply and to bring benefits to both residents and the riverine environment due to discharge of treated wastewater, compared to today's untreated wastewater. Thus the majority of potential adverse impacts are associated with the disruption during construction of the infrastructure, especially the replacement piped water supply and sewer network within the town.

Section 3 of the report provides a description of environmental baseline conditions in the project area. This baseline knowledge permits identification of environmental parameters that may be affected by the proposed project.

The potential positive and negative changes resulting from the Project activities are predicted for the project area during the construction phase and into operations. These predicted changes (impacts) are then evaluated using a significance ranking. An outline of the impact assessment procedure is as follows:

- Identification of the baseline receptors;
- Identification of the key project activities;
- Impact evaluation; and significance ranking.

During the EIA study no data were available regarding the water quality of the untreated wastewater discharges and the receiving waters. Thus the effects of changing from untreated to treated wastewater discharges cannot be predicted and quantified and are thus rather generic in nature. However the project is fully compliant with the precautionary principle and is of significant environmental benefit as it will remove large volumes of untreated wastewater currently discharged to the river system, replacing them with EU compliant discharges that can also be used for agricultural irrigation downstream.

Soil and water

Spills of fuel, oil and other liquids have the potential to cause contamination of soil and groundwater. The Contractor shall implement measures to contain such spills and avoid contamination as much as possible. However, it is possible that some contamination may occur and the Contractor will be required to implement remediation measures in accordance with project and MENR requirements.

Fuel and oil storage tanks will not be located within 50m of any watercourse, well or dry river bed. Wherever possible, refuelling and maintenance of mobile plant within 50m of all

watercourses/water bodies, dry riverbeds and within designated wetlands and aquifers will be prohibited.

All tanks will be either double-skinned design and / or placed in a bund of at least 110% of the tank's maximum capacity. If more than one tank is stored within the bund, the system must be capable of storing 110% of the biggest container's capacity or 25% of their total capacity, whichever is greater. The bund will be impermeable (e.g. concrete-lined and painted with epoxy), without drainage points or other breaches. In the case of any uncertainty, this clause supersedes any other requirement specified elsewhere.

The area is susceptible to surface erosion, especially after heavy rain, therefore efforts will be made to reduce the potential for soil erosion during construction activities. Temporary berms will be constructed where necessary to control any run-off to prevent rills or gulleys forming or soil wash out to surface water features. Correct groundworks and compaction will be specified in the contract documentation to prevent soil erosion. The contractor is also required to design a reinstatement plan.

Waste

Inert, solid waste (metals, asphalt chunks, rocks, concrete, gravel, sand etc.) will be generated during drilling wells and pipeline installation operations. The replacement and installation of water distribution pipes in the town will include removal of asphalt surface and importation of suitable padding and backfill (eg sand) as well as backfilling using suitable excavated material. Repair of paved roads and walkways and asphalt surfaces will also be required.

Solid wastes generated in construction sites and during the construction of pipelines and sewer drains will be transported by the construction contractor. Transportation and disposal of such waste will be agreed with local executive authority and regional department of MENR, as necessary.

Social and community

A construction yard (no worker accommodation) will be created to the south-west of Shamakhi town, near the existing pumping station for laydown of plant and material, maintenance of machinery and prefabrication of infrastructure components.

The main effects on the local community during construction are associated with the considerable disruption that the works will have within the town through excavation of defunct infrastructure and installation of new water mains and sewer pipes in the roads and connection of water supply pipes and water meters to individual properties. The proximity of the works to residents also raises the issue of health and safety, as well as traffic disruption and interference with access to houses, work places and public buildings such as hospitals and schools.

Another area of potential concern is contamination and possible disease spread to residents (and workers) caused by exposure to untreated wastewater during excavation and replacement of the sewer network.

The potential resettlement issues have been addressed in a separate Resettlement Policy Framework (RPF) that has been developed for the project. In summary, the two households that are affected by loss of access to farm land will be compensated by additional lands as alternatives, as agreed with AZERSU.

Safety at the work site, both for workers and residents has been discussed at length with AZERSU, who will ensure that contractors develop and implement safe working practices.

At project induction stage the construction contractor will train its personnel on safety, environment and quality control, as well as implementation of all the safety rules. Works will be guided by existing laws, sanitary rules and AZERSU work manuals.

Analysis of alternatives

Introduction

This section presents the alternatives that were considered for the project, which includes the do-nothing option, in accordance with World Bank Policy and best practice. Three main alternatives were considered, namely do-nothing, water supply only; and the preferred scheme. There were some alternative aspects within the water supply source considerations and these have been presented in this EIA report within the water supply only option.

One of the key objectives in an EIA report is to analyse the environmental implications of each viable option and then compare the options to evaluate their environmental performance, which feeds into overall project design, along with cost-benefit and other factors. In this case however, there is a general absence of site specific data on aspects such as the existing quality of wastewater discharges and their current effect on the environment. This is due to a lack of routine environmental monitoring by authorities and it should also be noted that many discharges from households are not formalised, as only approximately 30% of Shamakhi is covered by the sewer network. This makes it unfeasible to compare the quantified environmental effects of the 'water supply only' option with that of the 'water supply and sanitation' option. This is because more wastewater will be generated by supplying water 24 hours per day, but it is not possible to predict where that wastewater will end up, as many households are not connected to the sewer and the network has chronic leakage.

Do-nothing option

The do nothing option would see continuation of an inefficient and unreliable, often poor quality water supply system, which delivers only for around 2 hours per day. The wastewater collection system of sewer collectors serves only a part of the town and even then it suffers from chronic leakage. This bad situation is compounded by the discharge of raw wastewater into the river network, due to the defunct WWT plant, that never performed due to its incomplete state when handed over to the town.

The socially and environmentally damaging situation in and around Shamakhi town will be further exacerbated as the dilapidated infrastructure continues to deteriorate, as piece-meal maintenance is ineffective.

Water supply only option

Under this option only the potable water infrastructure will be improved, including new water abstractions and a new piped supply covering the town and its surrounding areas.

The groundwater source under the Pirsaat River will be used, which has been calculated from hydrological and hydrogeological studies in 2009 to have no significant adverse environmental effects.

The centralized water supply system coverage is currently only around 60-70% of the town's population and will be expanded to 100% coverage under this option. Water losses will be reduced and flow-meters installed as part of the project will help to save water, and accordingly electricity, and payments by people and organizations will increase. A

continuous supply of quality water will affect public health positively and reduce the risk of infection.

Potential options for water sources were considered, including surface water from the Pirsaat; groundwater and springs higher up in the catchment; or continuing to use groundwater from the Pirsaat floodplain. In view of land ownership and technical constraints higher elevation sources are unfeasible and surface water use would be constrained by supply and quality issues, hence the decision was taken to continue to use the existing water source. This groundwater source from the Pirsaat would therefore be constant for the 'water supply only' option and the 'preferred scheme'.

However, the wastewater which is in effect untreated will continue to be discharged to the environment. This scenario will further significantly exacerbate the already environmentally damaging situation, as increased water usage will increase the discharge of untreated wastewater. This presents the risk of infection to people and livestock located downstream of the discharge point.

Furthermore, the increased volumes and flows in the damaged sewer network will result in increased leakage and flooding of raw wastewater to the streets, none of which will be conducive to economic expansion and development in the area.

Preferred option

This option includes total reconstruction of the water supply and sewer systems as well as supplying water to the nearby village of Sabir town, as described in section 1 of this report.

The preferred scheme will involve a continuous supply of high quality drinking water to the residents of Shamakhi and the surrounding villages. Water losses will be within accepted standards, flow-meters will help to use water economically, payments by people and organizations will increase and power will be saved accordingly. A continuous supply of quality water (compliant to the EU Drinking Water Directive (98/83/EC) and wastewater treatment to EU UWWT Directive standards will affect public health positively and remove the risk of water borne infections. This scheme is assessed in detail in the following report.

Public consultation

Consultations with relevant Governmental organisations and the public are an important component of the EIA process. They often provide valuable insight in to the Project Area and act as a source of guidance in the scoping of the EIA study, ensuring that all the appropriate issues are addressed and that official organisations are in agreement to the scope of the study.

According to the Azerbaijan Environmental Protection Law, consultations with local communities and NGOs must be conducted and their participation should be provided in all stages of project implementation. The national legislation includes for public consultation at the stage of drafting the ToR for the EIA study and then again once the draft EIA report has been prepared. This approach was followed by the project and public consultations were held in 2008, to discuss the project as a whole, during preparation of the FS studies for the individual schemes.

Further public consultations were conducted for the Shamakhi scheme on August 14, 2009 in Shamakhi town (see Annex 4).

Representatives of local communities affected by the project and NGOs were invited to attend the consultations. Azerbaijan has joined the Convention on Access to Environmental

Information, Public Participation in Decision Making Process and Access to Justice in Environmental Matters (Aarhus, Denmark, 1998) in 1999.

The results of the public consultation showed that people viewed the project as very beneficial to the community and environment alike. Many people were interested in the degree of wastewater treatment and its environmental effects and potential usage, ie would it be suitable for downstream irrigation etc. The design of the project has been to comply with the EU drinking water and wastewater treatment Directives and as such there were no changes to project design resulting from any requirements or suggestions made during the public consultations. Drinking water sources analysed were compliant to the drinking water standard (following chlorination) and the treated wastewater will be discharged to the Zagalov River (a Pirsaat tributary).

In discussions between the Bank and AZERSU, it was agreed to hold additional public consultations and press releases will be disclosed at all stages of the project implementation in compliance with Azerbaijani laws on NGOs and Media, as well as World Bank Policy on Disclosure of Information. Information about the project will also be disclosed on internet sites of AZERSU (www.azersu.az) and Caucasus Environmental NGO Network (CENN). In addition, public meetings in the town will be held prior to the start of construction to discuss issues such as traffic disruption, access arrangements and health and safety.

Environmental Management Plan

This section of the report presents an Environmental Management Plan (EMP) for the Shamakhi scheme, which outlines the management mechanisms (i.e. working arrangements) for how the environmental and social elements of the project will be managed from detailed design and construction through operation.

The purpose of the EMP is to ensure that any potentially negative environmental impacts during construction and operation are kept at an acceptable level. It sets out to ensure that all aspects of the works comply with the relevant legislation, licence conditions and good practice, and that measures to mitigate impacts identified in the EIA are implemented. The EMP implements appropriate environmental controls and monitoring procedures during construction and after the work is completed.

The EMP contains environmental requirements which are required for the successful implementation of mitigation measures, environmental monitoring, emergency measures and environmental auditing to be carried out during the construction works on the site. The implementation of mitigation measures and emergency measures shall be the responsibility of the Contractor. He shall ensure compliance with all environmental legislation, regulations and conventions. The responsibility for environmental monitoring lies with the AZERSU and the World Bank.

The Contractor will be contractually required to conform to the requirements specified in the EIA and EMP and will be accountable to AZERSU, as the client, through its Project Implementation Unit (PIU). As the contract for the project has already been tendered, a Variation Order will be issued for these additional requirements, namely compliance to the findings of the EIA and the EMP.

It is recommended (as agreed with AZERSU) that the PIU is supported in achieving project environmental and social safeguard objectives by support from a local environmental consultant. The precise details have not yet been determined, but the consultant will advise

and support the PIU in implementation of the EIA standards during construction and into operation.

There are several mechanisms of ensuring delivery during construction of both general and site specific mitigation developed in EIAs. One mechanism involves requiring the Contractor to further develop the outline requirements in an EMP by designing individual Management Plans (MPs), such as oil and fuel storage, waste management, traffic management and pollution prevention. This approach is favoured for the project, as it encourages early evaluation of these aspects by the contractor and he produces a set of MPs that can be checked and verified on site and are auditable through the monitoring process. **Error! Reference source not found.** outlines the content of the MPs to be produced by the contractor and their development will be assisted by the Environmental Consultant from AZERSU PIU, in conjunction with Bank Environmental staff in Baku.

This approach for each individual scheme will benefit from oversight by the PIU to form a set of environmental requirements applicable to the project as a whole, which will ensure compliance of the work to both national and Bank standards. Such measures will be mandated in the bidding and contract documents, so that an overall good standard of work is achieved. This approach also has benefits of institutional capacity training, as the knowledge and capability of AZERSU will be extended to effective environmental management and as each scheme comes on stream the PIU will benefit from knowledge gained on previous schemes.

A tabulated summary of the environmental management is presented in **Error! Reference source not found.** of the main report and a brief summary of key aspects is presented below.

Construction aspects

Aspect	Mitigation	Responsibility	Monitoring
Noise, vibration and general disturbance and disruption to residents	Consultation with residents. Adherence to agreed working hours and project standards; use of mitigation techniques such as screens and good maintenance. Development and implementation of traffic management plan.	Contractor	AZERSU
Health and safety of residents and workers	Adherence to project standards, good signage, ongoing consultation with residents, including schools. All workers to use appropriate PPE and be trained at project induction. Safety fencing provided.	Contractor	AZERSU
Soil and water pollution	Project standards applied, including oil and fuel storage and management. Clean-up and emergency planning procedures developed and implemented.	Contractor	AZERSU

Aspect	Mitigation	Responsibility	Monitoring
Wastewater contamination	Project standards applied, including safe removal of wastewater during renovation works, use of appropriate PPE by workers and ongoing liaison with residents and fencing off contaminated areas.	Contractor	AZERSU
Dust and nuisance from material delivery and transport	Project standards applied, including traffic speed restrictions, agreed timing and routes and material covered and ongoing liaison with residents.	Contractor	AZERSU
Soil erosion and habitat reinstatement	Project standards applied, including soil erosion prevention by good soil practice and drainage control. Good soil conservation measures and effective reins to prevent future erosion and soil loss.	Contractor	AZERSU
Imported material	Project standards applied including purchase of materials for licensed sources; no unauthorised borrowing of material.	Contractor	AZERSU
Archaeological protection	Adherence to agreed measures for any late finds	Contractor	AZERSU
Resettlement aspects	Adherence to agreed RPF, which includes provision of replacement lands for lost access to plot of arable land.	AZERSU	World Bank

The above mitigation will be monitored by regular inspections by the contractor supervisors and the PIU of AZERSU and supplemented by supervision inspections by Bank staff.

Operational aspects

There are few mitigating measures required during the operation of the water and sanitation works, however the safe disposal and preferably effective use of the generated sludge will need to be arranged between AZERSU and the Ministry of Ecology and Natural Resources (MENR). This is typically an issue without significant adverse environmental effects, as throughout Europe in compliance with the EU UWWT Directive, sludge is routinely processed to render it a useful soil additive or source of composting material. Whilst the WWTW has not yet been subject to detailed design, the design philosophy is already fixed with the objective of producing a compliant sludge and therefore the infrastructure will be provided for such an operation. theoretically, an option exists simply to dispose of sludge in a landfill, but this will not be in keeping with the objectives of the EU UWWT Directive, which encourages recycling of the sludge bio-matter.

AZERSU as the operator of the WWT works will be required to conduct monitoring of the quality of the treated wastewater discharged, as well as that of the sludge generated, to ensure compliance to the design standards. The discharge monitoring has been developed to include downstream quality measurements, from which it will also be possible to evaluate some of the environmental benefits of the project, as hopefully the aquatic habitats will return to their previously unpolluted state.

EXECUTIVE SUMMARY GABALA

Introduction

The water supply and sewer system in Azerbaijan is characterized by old, damaged and largely defunct infrastructure, and is financially constrained and poorly operated. This results in the level and the quality of the water supply and wastewater treatment (WWT) services especially in small towns being significantly degraded. Water shortage and the use of dirty water for drinking have negatively affected health and welfare of the population accordingly. Uncontrolled flow of wastewaters to nondesignated areas has promoted the spread of various infections and caused environmental pollution.

To address this dire situation, the Government of Azerbaijan (GoA) and the World Bank are currently planning the implementation of infrastructure projects for water supply and WWT in small towns and regions. Commencing in 2007, the GoA started to develop projects for reconstruction and development of water supply and sewer system in administrative centres of 22 regions with the World Bank within the framework of the “National Water Supply and Sanitation Project”. One of these regions is Gabala.

Gabala region is located in the north of Azerbaijan, 225 km from Baku on the southern slopes of the Great Caucasus Mountain Range.

Total area of the region is 1,548.5 km² and the population is 90,200, of which 31,600 live in towns, including 11,900 in Gabala town. The water supply network of Gabala town is old, water abstracted from rivers is delivered to consumers without any processing, pipelines are in poor condition, the sewerage system is essentially dysfunctional. Only the centre of the town is connected to the sewer network, which allows removal of 20% of the generated wastewater. Wastewaters are not treated and are discharged to river valleys untreated.

This report represents an Environmental Impact Assessment (EIA) of the Water Supply and Sanitation Project in Gabala town. The EIA identifies potential impacts on the natural environment and the social situation in Gabala region during the construction and operation phases of the Project. Where potential adverse effects are predicted, mitigation has been developed and its implementation is presented in an Environmental Management Plan (EMP) and Environmental Monitoring Plan (EMP).

Project description

A Feasibility Study (FS) for the Project was conducted in 2007, and working schemes are now in detailed design phase. The client is AZERSU OJSC, and it has a Project Implementation Unit (PIU) which is responsible for project implementation.

The proposed works comprise:

Water supply

- Construction of 6 wells on the Damiraparan River for abstraction of groundwater;
- Construction of new main reservoir;
- Construction of the new water main

- Construction of 4 new water storage facilities in each pressure zone based on the relief of Gabala town;
- Installation of new water distribution network in the town (HDPE or GPR pipelines buried in roads)

Wastewater treatment

- Construction of a new sewage collector network covering entire Gabala town;
- Construction of a new WWT plant (aeration facility)

Water source options

Options for water sources were investigated during the FS and included:

- • surface and ground water resources of Damiraparan River;
- • surface water resources of Duruca River (abstraction of drinking water from infiltration areas); and
- • groundwater resources are on depths of 500-550 m, 13 km to the south from Gabala town.

The preferred scheme has adopted to use ground water of the Damiraparan River. With the confirmed average annual water flow rate being 4.59m³/sec, or 144.5 mln. m³, and estimated annual demand for the Gabala town being 2.36 mln. m³, the water abstraction would constitute 1.62 % of the flow, which is deemed to be sustainable. Also, there are no settlements, i.e. no other current or potential users located between the river and the town, Due to the altitude of the river to be higher than the one of the town, no pumping stations are required for the transportation of water, as it will be move by gravity.

The ground water sources considered under the ophther options are not preferred because they are used by the villages nearby, and the lower than Gabala altitude of those sources would require using additional equipment to pump the water to the town.

Duruca River is a small river and joins Damiraparan River above Gabala town. Average annual water flow of the River is approximately 0,07 m³/sec or 2,21 mln. m³. It is less than total volume of water consumption of Gabala town. Therefore use of this river's water will lead to an exhaustion of its resources.

Water abstracted from the water source will be accumulated in water reservoirs located at 950 m elevation. Then the water will be distributed to water supply network through 4 pressure zones located within the town. Pressure zones will be situated at elevation of 750-850m. Water main and water distribution lines in the town will probably be HDPE pipe work, buried in sidewalks.

The system is designed to provide continuous 24 hour supply of good quality water compliant to the EU Drinking Water Directive (98/83/EC).

There is no up-to-date sewer network in Gabala town. Open wastewater collecting and conveying ditches called sewage system have been constructed during 1980-1985. Total length of ditches is 13.83 km, of which 4.36 km is 500 mm outside diameter

(OD) wastewater conveying main and the rest of 9.47 km wastewater collecting trenches in streets. This old system can only connect 18.5% of the town, which means only 20% of people supplied with drinking water can make use of sewerage system. The rest of the people just have to use soaking pits, which leads to soil and groundwater pollution.

There is no WWT plant in the town and had never been. Wastewaters conveyed from the town by 500 mm OD sewerage pipe were supposed to be treated at Tobacco Factory water treatment works. However, this facility is currently dysfunctional and completely destroyed. Wastewaters are discharged to Hamzali River untreated.

The Project includes construction of a new WWT facility on the Damiraparan River, downstream the water intake, designed to perform in compliance with the EU Urban Wastewater Treatment Directive (91/271/EEC), as amended. The new wastewater treatment system will incorporate mechanical and biological treatment methods. The design will include infrastructure to process the sludge so that it can readily be recycled to agricultural land or otherwise composted for soil improvement in areas such as parks or roadside planting.

Environmental baseline

The environmental baseline section of the report presents comprehensive information on the baseline environmental conditions, against which the potential impacts are assessed. The study methodology included review and use of data from the FS; site visits; data collection; and latest statistics.

Relief of Gabala region is mainly mountainous. North of the region is covered by the southern slopes of the Great Caucasus Mountain Range while central part by Alazan-Haftaran valley and south of the region by Ajinohur rolling hills. Northern border of the region is located along the watershed of Great Caucasus Mountain Range. Highest peaks are Bazardüzü (4466 m), Bazaryurd (4126 m) and Tufandagh (4206 m) which are new glaciers. A number of river cones have been formed in a zone where highly inclined foothills join Alazan-Haftaran valley. Gabala town is located at the outset of Damiraparan River cone.

Jurassic and Cretaceous deposits are widespread to the north of the region while Anthropogenic deposits dominate in central and southern parts. Clay deposits and mineral springs (Bum, Gamarvan and etc.), various rocks and construction materials in high mountainous areas are widespread. Water erosions, weathering and land slides are common in these areas. Widespread cracked rocks play great role in filtrating snow and rain waters into groundwaters. Forests extend over wide areas in mid mountainous zone which create favorable environment for formation of groundwater resources.

The region located in highly seismic zone, which corresponds to 8 magnitude scale on the seismotectonic map of Azerbaijan.

River network of the region is very dense (0,46-0,50 km/km²). Main rivers are Turyan River, Damiraparan River and their tributaries – Tikanli, Bum, Vandam, Duruca, Hamzali Rivers and et al. Surface water resources of the region are rich. Average annual surface flow rate is 187 mm or 5,92 l/sec. per km². Rivers are mainly fed by rain, snow and groundwaters.

Damiraparan River, which has rich surface runoff flows, nearby and through Gabala town. It has many small tributaries. The flow of the River and its tributaries are mainly formed by rain, snow, groundwaters, and partially by glaciers. The river is braided into several arms at the outlet. The river course is mainly comprised of big boulders, exposed alluvial gravel and detritus. Most of the flow is observed during the summer season.

Groundwater resources of the region are accumulated in deluvial and alluvial rocks. Groundwater regime depends on the amount of precipitation. Mid-Jurassic sandstone and shale formations bear the richest groundwater reserves. Debit of the springs flowing from these formations reaches 7-8 l/sec. River valleys are also rich with groundwaters. So are alluvial deposits at river outlets. Groundwaters also play significant role in feeding rivers.

Two main climatic zones dominate in Gabala region: 1) Mild-hot climate with short snowy winter (Gabala town and to the north); and 2) Mild-hot mountainside and arid mountainous climate with dry winter (to the south of Gabala town). Average annual temperature may vary from 11.5 °C to 12.4 °C. 720-950 mm of precipitation falls annually, 10% of which occurs in winter time and 68% in summer time (May- September).

Gabala is one of the ancient regions of Azerbaijan Republic exploited since old times and intensively cultivated depending on characteristics of its landscape. The following soil types are found in Gabala region: caespitose grassland; brown highland- forestland; gray highland-forestland; alluvial grassland-forestland; dark brown highland. The above-mentioned soil types are evenly distributed in the region in order of horizontal height. Therefore, various soil types expanding from low hills to highlands and mountains formed under different climate circumstances vary for their genetic, physical, chemical and mechanical characteristics, as well as for the intensity of exploitation. The amount of humus in soils comprises 3-4.0%.

Soil types found in Gabala region allow cultivation of various plants. Total area of cultivated lands is 84,600 ha, of which 48,500 ha are used as pastures for livestock. Cereal production and animal husbandry are the main agriculture sectors. Secondary areas include sheep-breeding, gardening and vegetable-growing.

Gabala region has very rich vegetation and animal life and beautiful nature. Alpine and subalpine meadows in high mountainous areas, woodlands (oak tree, beech (*Fagus*), hornbeam (*Carpinus*) and et al.) in mid-mountainous belt (200-2200 m), scrubland and sparsely forested open meadows in central areas and semidesert wormwood plants and open xerophytic bush in the south expand over wide areas. Total area of woodlands is 56,600 ha.

Fauna of the region is also rich with red deer, lynx, brown bear, European wild cat, squirrel, raccoon, wolf, fox, hare and wild pig. Various birds, such as Short-toed eagle (*Circus gallicus*) pheasant, partridge, pigeon and others live in the region. Northern mountainous part of Gabala region territory is included in Shahdag National Park which is established in 2006. Territory of the Park extends to 2-3 km north of Gabala town, which is close to the Project area. The Park has been established to protect mountainous woodland, endemic and endangered plant and animal species and to develop ecotourism. Total area of the park is 115,895 ha.

Although the project area is located near southern border of Shahdag National Park, it extends to river valleys only and no potential impact on protected areas is expected. Emissions from industrial enterprises in the region are localised. Project area is mountainous and there is no settlement or cultivated land there.

Recent renovations in the region and collecting of domestic wastes have been organized to modern standards.

Construction of a lot of tourist bases, recreation centers and restaurants in foothills and river valleys has affected natural ecosystems negatively, forests, rivers, lakes and soils in the first place. For instance, these facilities are constructed without studying local topography, and none of them have water treatment facilities.

Our observations showed that people resting in tourist centers situated in Duruca and Damiraparan River valleys, as well as local people living in the area discharge domestic, construction and other wastes into the valley. These wastes spread into river valley during water floods and pollute the environment.

As mentioned above, wastewaters from tourist centers and industrial facilities in Gabala town and surrounding areas are discharged into the sewerage line lying along the central street of the town or directly into rivers which then flow into southwest flank of the town and further to Hamzali River.

Gabala region was established on August 8, 1939 as an administrative province.

Situated in a favourable geographical position Gabala region is one of the most ancient human settlements not only in Azerbaijan, but also in entire South Caucasus region. From III century BC till VIII century AD, ancient Gabala town had been the capital of Caucasian Albania for about 1000 years. Information about Caucasian Albania and Gabala can also be found in works of Strabo and C. Ptolemy. Remnants of ancient Gabala are located to the south of modern Gabala. Overall, historical monuments found in the region are all located away from the Project area.

The region borders Russian Federation, also Ismayilli, Goychay, Agdash, Sheki and Oghuz regions of Azerbaijan. The region is one of socially and economically welldeveloped regions of Azerbaijan. Main economic activities are specialized agriculture (fruit plantations, cereal production and animal husbandry), food industry (tinned fruits, wine production) and tourism.

There are no project affected people (PAP) in sanitary protection zone as no impact on people is expected in areas where project facilities will be constructed or located, and resettlement of people is not planned. Water sources and pipeline routes are located away from settlements, to the north of Gabala town.

Environmental impacts and mitigation

Introduction

This section of the report presents the potential environmental impacts and mitigation measures associated with construction and operation phases of the water and sanitation project, and is based on the baseline information on environment compiled during the various studies, including the FS.

The potential positive and negative changes resulting from the Project activities are predicted for the project area during the construction phase and into operations.

These predicted changes (impacts) are then evaluated using a significance ranking and activities are adapted to suggested mitigation if necessary. An outline of the impact assessment procedure is as follows:

- Identification of the baseline receptors;
- Identification of the key project activities;
- Impact evaluation; and significance ranking.

There are no specific data regarding water quality or groundwater pollution resulting from the untreated wastewater discharges. Thus these impacts cannot be quantified and are rather generic in nature. However, the project is fully compliant with the precautionary principle and is of significant environmental benefit as it will remove large volumes of untreated wastewater currently discharged to the ground and ultimately the river system, replacing them with EU compliant discharges that can also be used for agricultural irrigation downstream in the flatter plains area.

Emissions

Equipment and machinery to be used within the project framework will mainly be new and compliant with up-to-date standards. Impact of emissions from supplementary (welding equipment, pumps, etc.) and construction equipment and heavy trucks on environment will be minimal. It will be the responsibility of the construction management to apply best practices for reducing fuel consumption and exhaust emissions, wherever feasible. Aspects such as reduction of idle driving, selection of new equipment where possible and maintenance of all machinery and engines should be encouraged.

The construction contractor should set 30 km/hr speed limit in dirt roads to prevent dust pollution during construction works. Areas where removal of asphalt surface, digging of trenches and backfilling using suitable excavated material are conducted should be watered, and materials that can be blown during transportation shall be covered.

Wastewaters

Possibility of spill of wastewaters contained in sewerage lines during reconstruction and restoration works is very high.

During completion of these tasks, wastewaters in every built and reconstructed site (block) will be stored in temporary pits dug in the ground in sewerage line level. Then they will be sucked out, taken away by septic vacuum trucks, and disposed of at sewage ponds. These measures will be taken in the beginning of any construction activity. People will be notified not to dispose sewage into open ditches, and these waters will be removed from households by septic vacuum trucks. Transportation and disposal of such waste will be agreed with local executive authority and regional branch of MENR, as necessary.

Solid waste

Inert, solid waste (metals, asphalt chunks, rocks, concrete, gravel, sand etc.) will be generated during drilling wells and pipeline installation operations. The replacement and installation of water distribution pipes in the town will include removal of asphalt surface and importation of suitable padding and backfill (eg sand) as well as backfilling using suitable excavated material. Repair of paved roads and walkways and asphalt surfaces will also be required. Solid wastes generated in construction sites and during the construction of pipelines and sewer drains will be transported by the construction contractor. Transportation and disposal of such waste will be agreed with local executive authority and regional department of MENR, as necessary. The construction works will generate hazardous waste, such as used oil, solvents, and other construction waste, which will be required to be disposed of. However, there is no licensed hazardous waste disposal facility in the region (and in fact this is a problem nationally) and therefore it will be necessary to arrange an appropriate containment or disposal place in agreement with MENR and regional offices. A cost allowance has therefore been made in the EMP for the municipality or AZERSU to construct a storage facility for hazardous waste generated by the project. The approach to a lack of a suitable facility has been discussed with AZERSU as part of this EIA, who have confirmed that they will work with the municipality to ensure that a suitable facility is constructed and is available for use by the project. The EMP allows for the cost of this item and it will be managed by the municipality, as per the agreement with the AZERSU.

If parts of the existing water supply and sanitation network have been constructed using asbestos containing materials (ACM), it will require careful handling during its removal. Measures compliant to good health and safety practice will need to be employed, including appropriate PPE for workers, dampening down of any material that may be abraded or otherwise generate potentially inhalable dust particles and appropriate containment prior to its storage at an approved/agree secure facility.

Soil and water

The area is susceptible to surface erosion during the excavation of trenches for water main, construction of sewerage collectors and water treatment plants and temporary use of dirt roads, especially after heavy rain, therefore efforts will be made to reduce the potential for soil erosion during construction activities. Temporary berms will be constructed where necessary to control any surface run-off to prevent rills or gulleys forming or soil wash out to surface water features. Correct ground works and compaction will be specified in the contract documentation to prevent soil erosion. The contractor is also required to design a reinstatement plan.

Spills of fuel, oil and other liquids (e.g. at the concrete batching plant or fabrication yard) have the potential to cause contamination of soil and groundwater. The Contractor shall implement measures to contain such spills and avoid contamination as much as possible. However, it is possible that some contamination may occur and the Contractor will be required to implement remediation measures in accordance with MENR requirements. The project requires that all contamination is removed down to intervention levels, i.e. deemed to be contaminant free. The MENR does not actually regulate contaminant levels in terms of contaminated land registration, but associated laws prescribe for environmental quality

objectives and therefore the contractor would be required to satisfy MENR in the event of spillage of contaminants.

Fuel and oil storage tanks will not be located within 50 m of any watercourse, well or dry river bed. Wherever possible¹, refuelling and maintenance of mobile plant within 50m of all watercourses/water bodies, dry riverbeds and within designated wetlands and aquifers will be prohibited.

All tanks will be either double-skinned design and / or placed in a bund of at least 110% of the tank's maximum capacity. If more than one tank is stored within the bund, the system must be capable of storing 110% of the biggest container's capacity or 25% of their total capacity, whichever is greater. The bund will be impermeable (e.g. concrete-lined), without drainage points or other breaches. In the case of any uncertainty, this clause supersedes any other requirement specified elsewhere.

The water intake areas, where the access will have to be upgraded as well as the reservoir areas are located in upland areas and can therefore be prone to soil erosion due to weather and rain exposure. It will therefore be necessary to ensure best practice with regard to topsoil management, to ensure soil loss is prevented and a good standard of reinstatement is achieved.

Social life and community

A construction yard will be created in the outskirts of Gabala town, for laydown of plant and material, maintenance of machinery and prefabrication of infrastructure components.

The main effects on the local community during construction are associated with the considerable disruption that the works will have within the town through excavation of defunct infrastructure and installation of new water mains and sewer pipes in the roads and connection of water supply pipes and water meters to individual properties. The proximity of the works to residents also raises the issue of health and safety, as well as traffic disruption and interference with access to houses, work places and public buildings such as hospitals and schools.

Another area of potential concern is contamination and possible spread of diseases among residents (and workers) caused by exposure to untreated wastewater during excavation and replacement of the existing sewerage network. The Contractor is responsible to ensure safety at the work site, both for workers and residents, and assure AZERSU that all works will be carried out safely applying safe working practices. All works shall be guided by existing safety regulations, sanitary rules and AZERSU work manuals.

Main water reservoirs (2 reservoirs, each with 1000 m³ capacity) will be constructed on a flat surface in Damiraparan River valley. An area of 100x100 m, including fence and a check-point will be used for the construction of reservoirs. Construction of reservoirs will have no negative impact on movement, economic activity and recreation of people. There is no populated area near the location.

¹ Certain plant and equipment may be required to be maintained in a position closer than 50m from the water course (and are not able to be relocated just for refuelling) and therefore special measures will be implemented to avoid spillage of fuels and oils, such as deployment of spill-retaining materials, mobile drip trays and the lack of specific training given to operators in this regard.

The potential resettlement issues have been addressed in a separate Resettlement Policy Framework (RPF) that has been developed for the project.

Safety at the work site, both for workers and residents has been discussed at length with AZERSU, who will ensure that contractors develop and implement safe working practices. At project induction stage the construction contractor will train its personnel on safety, environment and quality control. As well as implementation of all the safety rules. Works will be guided by existing laws, sanitary rules and AZERSU work manuals.

Analysis of alternatives

Introduction

This section presents the alternatives that were considered for the project, which includes the do-nothing option, in accordance with World Bank Policy and best practice. Three main alternatives were considered, namely do-nothing, water supply only; and the preferred scheme.

One of the key objectives in an EIA report is to analyse the environmental implications of each viable option and then compare the options to evaluate their environmental performance, which feeds into overall project design, along with cost-benefit and other factors. In this case, however, there is a general absence of site specific data on aspects such as the existing quality of wastewater discharges and their current effect on the environment. This is due to a lack of routine environmental monitoring by authorities and it should be also noted that many discharges from households are not formalised, as only a very small percentage (near 20%) of Gabala is covered by the sewer network. This makes it unfeasible to compare the quantified environmental effects of the 'water supply only' option with that of the 'water supply and sanitation' option. This is because more wastewater will be generated by supplying water more reliably for 24 hours per day, but it is not possible to predict where that wastewater will end up, as the majority of households are not connected to the sewer and use soakaways and the network has chronic leakage.

Do-nothing option

This option can be considered the worst-case scenario. The existing water supply system is inefficient and unreliable, often supplies poor quality water, and the wastewater collection system of sewer collectors do not exist.

The socially and environmentally damaging situation in and around Gabala town will be further exacerbated if no corrective action is taken. Lack of a sewerage system increases the potential of groundwater pollution, which, in turn, increases the risk of negative impacts on public health and welfare. Impacts on environment and water ecosystems - pollution of surface and ground water reserves, erosion and pollution of soil, degradation of vegetation - are possible. Continuation of such a situation is undesirable, especially with high growth rate of population and development of new business enterprises.

Insufficient water supply and no sewerage system will make people refusing to pay bills, and losses in water pipelines and etc. can make work of Gabala Water Canal Department economically inefficient.

Water supply only option

This option includes total reconstruction of water supply system and supplying water from a new water source – better quality groundwater resources under Damiraparan riverbed. Sewage is planned to be discharged to the Hamzali River without treatment.

According to this Option Gabala people will continuously be supplied with high quality drinking water, and it will cover 100% of the town population. Existing water supply system covers only 18-20% of the town population. Water loss will be reduced, flow meters will help to save water and electricity, and payments by people and organizations will increase. Continuous and quality water supply will have positive impact on public health and reduce the infections risks.

Improved water supply system will increase the amount of sewage produced. Lack of sewerage network in the town will lead to pollution of groundwater around the town and increase its level, as well as leakage of wastewaters into nearby rivers. Discharging wastewaters into Hamzali River without treatment will destroy the ecosystems in river valley and will pollute groundwater under the river-bed. Discharging sewage into lower reach of Hamzali River will significantly pollute river water and destroy the natural ecosystems of the river valley as the River is very small and has no self-cleansing capacity. During low surface runoff seasons (winter, summer) water flow in the river is very low. This can increase the risks of infections among people living along the river bank.

Preferred option

This option includes total reconstruction of water supply and sewerage systems. The preferred water source is Damiraparan River ground waters, as mentioned above. Sewage is planned to be treated at the wastewater treatment plant and discharged into the Damiraparan River downstream the water intake.

According to this Option, 100% of the town population in Gabala will continuously be supplied with high quality drinking water. Water loss will be within accepted standards,

flow meters will help to use water economically, payments by people and organizations will increase and power will be saved as well. Continuous and quality water supply will influence public health positively and remove the risks of water borne infections caused by wastewaters. Impacts on ground and surface waters will be minimal.

Construction of a new WWT plant compliant to the EU UWWT Directive standards is planned within the Project framework. Sewage treatment process will cover mechanical and biological stages. Sludge generated during the treatment process can be utilized for fertilizing agricultural land and ornamental planting in parks and/or trees planted in road sides.

Public consultation

Consultations with relevant Governmental organisations and the public are an important component of the EIA process. They often provide valuable insight in to the Project Area and act as a source of guidance in the scoping of the EIA study, ensuring that all the appropriate issues are addressed and that official organisations are in agreement to the scope of the study.

According to Environmental Protection Law, consultations with local communities and NGOs must be conducted and their participation should be provided in all stages of project implementation. The national legislation includes for public consultation at the stage of drafting the ToR for the EIA study and then again once the draft EIA report has been prepared. This approach was followed by the project and public consultations were held in February 2008 and August 2009. It should be noted that, while the purpose of the initial consultations undertaken by AZERSU was to discuss the TOR, the actual discussion covered a wider range of issues related to overall nature and objectives of the project. The second round of consultations was focused on the Gabala scheme itself, with details of the location and benefits (see Annex 4).

In accordance with the social surveys general conditions were as follows:

- According to survey results most of the households using central water supply system pay monthly service fees regularly.
- Those who decline payments are mainly refugees, IDPs and families with limited income. This situation is related to the economic transition status, with those better off willing to pay additional amounts for 24 hour quality water supply.
- According to respondents monthly payments are made per each household dweller (86 %). People are ready to pay more service fees for an improved water supply and sanitation system. Most of the surveyed households agree to pay service fees for a completely reconstructed system.
- Households prefer water supply and sanitation services to be managed by the state agencies.
- Payments in return for water services are mainly being made in cash (88 %) on receipt of payment by the water supply department officials. Only 2% of the households submit their payments via bank/post office transfer.

Representatives of local communities affected by the project and NGOs were invited to attend the consultations. Azerbaijan has joined the Convention on Access to Environmental Information, Public Participation in Decision Making Process and Access to Justice in Environmental Matters (Aarhus, Denmark, 1998) in 1999.

The results of the public consultation showed that people viewed the project as very beneficial to the community and environment alike. Many people were interested in the degree of wastewater treatment and its environmental effects and potential usage, ie would it be suitable for downstream irrigation etc.

In discussions between the Bank and AZERSU, it was agreed to hold additional public consultations and press releases will be disclosed at all stages of the project implementation

in compliance with Azerbaijani laws on NGOs and Media, as well World Bank Policy on Disclosure of Information. Information about the project will also be disclosed on internet sites of Azersu (www.azersu.az) and Caucasus Environmental NGO Network (CENN).

All parties involved in the project are mindful of the potential disruption to residents due to the large scale of work within the town and villages and it is planned to hold further consultation with residents prior to commencement of construction works. It has been agreed that the contractor will develop a traffic/work plan in consultation with AZERSU, the municipality and local residents, to minimise disruption caused particularly by the street works. All efforts will be made to synchronise work components, especially water and sewer networks, and to expedite sidewalk and pavement reinstatement. This approach will be included within the bidding documents, to ensure its implementation.

There is possibility of conflicts with local people during the project implementation, because construction works will cause inconvenience. If any conflicts, these will be solved through mutual discussions and in accordance with the grievance mechanism in the RPF developed for the project.

Environmental Management Plan

This section of the report presents an Environmental Management Plan (EMP) for the Gabala scheme, which outlines the management mechanisms (i.e. working arrangements)

for how the environmental and social elements of the project will be managed from construction through operation.

The purpose of the EMP is to ensure that any potentially negative environmental impacts during construction and operation are kept at an acceptable level. It sets out to ensure that all aspects of the works comply with the relevant legislation, licence conditions and good practice, and that measures to mitigate impacts identified in the EIA are implemented. The EMP implements appropriate environmental controls and monitoring procedures during construction and after the work is completed.

The EMP contains environmental requirements which are required for the successful implementation of mitigation measures, environmental monitoring, emergency measures and environmental auditing. The implementation of mitigation measures and emergency measures shall be the responsibility of the Contractor. He shall ensure compliance with all environmental legislation, regulations, and conventions ratified by Azerbaijan Republic.

The Contractor will be contractually required to conform to the requirements specified in the EIA and EMP and will be accountable to AZERSU, as the client, through its Project Implementation Unit (PIU). As the contract for the project has already been tendered, a Variation Order will be issued for these additional requirements, namely compliance to the findings of the EIA and the EMP.

It is recommended (as agreed with AZERSU) that the PIU is supported in achieving project environmental and social safeguard objectives by support from a local environmental consultant. The consultant will advise and support the PIU in implementation of the EIA standards during construction and into operation.

There are several mechanisms of ensuring delivery during construction of both general and site specific mitigation developed in EIAs. One mechanism involves requiring the Contractor to further develop the outline requirements in an EMP by designing individual Management Plans (MPs), such as oil and fuel storage, waste management, traffic management and pollution prevention. This approach is specified for the project, as it encourages early

evaluation of these aspects by the contractor and he produces a set of MPs that can be checked and verified on site and are auditable through the monitoring process. Table 7-1 outlines the context of the MPs to be produced by the contractor and their development will be assisted by the Environmental Consultant from AZERSU PIU, in conjunction with Bank Environmental staff in Baku. This approach for each individual scheme will benefit from oversight by the PIU to form a set of environmental requirements applicable to the project as a whole, which will ensure compliance of the work to both national and Bank standards. Such measures will be managed in the bidding and contract documents, so that an overall good standard of work is achieved. This approach also has benefits of institutional capacity training, as the knowledge and capability of AZERSU will be extended to effective environmental management and as each scheme comes on stream the PIU will benefit from knowledge gained on previous schemes.

A tabulated summary of the environmental management is presented in Table 7-2 of the main report and a brief summary of key aspects is presented below.

The above mitigation will be monitored by regular inspections by the contractor supervisors and the PIU of AZERSU and supplemented by supervision inspections by the World Bank Baku staff.

Operational aspects

There are few mitigating measures required during the operation of the water and sanitation works. The main problem is the safe disposal and preferably effective use of the generated sludge that will need to be arranged between AZERSU and the Ministry of Ecology and Natural Resources (MENR). This is typically an issue without significant adverse environmental effects, as throughout Europe in compliance with the EU UWWT Directive, sludge is routinely processed to render it a useful soil additive or source of composting material. Theoretically, an option exists simply to dispose of sludge in a landfill, but this will not be in keeping with the objectives of the EU UWWT Directive, which encourages recycling of the sludge bio-matter. AZERSU as the operator of the WWT works will be required to conduct regular monitoring of the quality of the treated wastewater discharged, as well as that of the sludge generated, to ensure compliance to the design standards.

Construction aspects

Aspect	Mitigation	Responsibility	Monitoring
Noise, vibration and general disturbance and disruption to residents	Consultation with residents. Adherence to agreed working hours and project standards; use of mitigation techniques such as screens and good maintenance. Development and implementation of traffic management plan.	Contractor	AZERSU
Health and safety of residents and workers	Adherence to project standards, good signage, ongoing consultation with residents, including schools. All workers to use appropriate PPE and be trained at project induction. Safety fencing provided.	Contractor	AZERSU
Soil and water pollution	Project standards applied, including oil and fuel storage and management. Clean-up and emergency planning procedures developed and implemented.	Contractor	AZERSU
Wastewater contamination	Project standards applied, including safe removal of wastewater during renovation works, use of appropriate PPE by workers and ongoing liaison with residents and fencing off contami-	Contractor	AZERSU
Dust and nuisance from material delivery and transport	Project standards applied, including traffic speed restrictions, agreed timing and routes and material covered and ongoing liaison with residents.	Contractor	AZERSU
Soil erosion and habitat reinstatement	Project standards applied, including soil erosion prevention by good soil practice and drainage control. Good soil conservation measures and effective reins to prevent future erosion and soil loss.	Contractor	AZERSU
Imported material	Project standards applied including purchase of materials for licensed sources; no unauthorised borrowing of material.	Contractor	AZERSU
Archaeological protection	Adherence to agreed measures for any late finds	Contractor	AZERSU
Resettlement aspects	Adherence to agreed RPF, which includes provision of replacement lands for lost access to plot of arable land.	AZERSU	World Bank

AZERSU as the operator of the WWT works will be required to conduct monitoring of the quality of the treated wastewater discharged, as well as that of the sludge generated, to ensure compliance to the design standards. The discharge monitoring has been developed to include downstream quality measurements, from which it will also be possible to evaluate some of the environmental benefits of the project, as hopefully the aquatic habitats will return to their previously unpolluted state.

EXECUTIVE SUMMARY SAATLI

Introduction

Azerbaijan inherited a fairly extensive Water Supply and Sanitation (WSS) system from the Soviet Union. However, most of the WSS systems are now over fifty years old, and have deteriorated significantly as a result of deferred maintenance and limited capital investments. In most secondary cities, water supply networks are characterized by frequent bursts, high losses, and intermittent services. Many existing water and wastewater treatment plants are characterized by inefficient plant and equipment, leading to high operating costs. In addition, the sector needs to improve its financial viability.

The Government of Azerbaijan is committed to improving the performance of the WSS sector through better allocation of resources, and improvement of infrastructure service provision, as part of its effort to ensure sustainable growth in the non-oil economy. Improving infrastructure is one of the intermediate objectives of the Government's poverty reduction strategy - the State Programme for Poverty Reduction and Economic Development (SPPRED). Government's vision for the WSS sector in secondary cities focuses on rehabilitation of WSS facilities in all urban centres outside Baku, to provide reliable water supply and wastewater services.

The Government of Azerbaijan is implementing the National Water Supply and Sanitation Project which is co-financed by the World Bank and the Government of Azerbaijan. The project covers water supply and sanitation facilities within 22 rayons across the country.

The strategic approach being adopted under the present Project is based on two complementary interventions: (i) rehabilitation and construction of WSS infrastructure in the Rayons' centres plus the villages located in close proximity to them, or along the transmission lines for the water supply; and (ii) implementation of a comprehensive Institutional Development Plan to strengthen the WSS sector's capacity to manage WSS services in an efficient, effective, and sustainable manner.

The urban center of Saatli is located on a coastal plain stretching to the Caspian Sea and void of significant topographic features.

Overall, the topography of the urban center ranges from about 10 metres below sea level to 12 masl (about 17 metres higher than the Caspian Sea).

The rayon is located in the southern part of Azerbaijan in the Aran Economic Geographic Region. The total rayon area is 1,180 sq.km. The total population of the rayon is 91,000 cap. according to the census at the end of the year of 2010. 17,800 cap. of the total population dwells in urban center of Saatli. The rayon comprises of one city and 43 villages.

The present water system suffers from:

- Existing storage reservoirs cannot be operated.
- Poor pipe network condition.
- Insufficient metering of production and consumption.
- Insufficient maintenance and capital repair work.
- Insufficient strategic thinking involving total management approach.
- Insufficient qualified personnel to operate the system.

Consequently, the existing water supply and distribution system is unable to ensure safe, reliable and sustainable services, the entire system should be reconstructed according to the basic frame work recommended in this report.

The objective of this EA is to address the environmental impacts and management issues associated with the proposed the water supply and sanitation systems project of Saatli town.

The EA Report, which includes an environmental management plan, addresses the needs of applicable laws and regulations of the Government of Azerbaijan including the provisions of the World Bank on the following: (1) Operational Policy on Environmental Assessment (OP 4.01, January 1999); (2) Operational Policy Note on Management of Cultural Property in Bank Financed Projects (OPN 11.03, August 1999); (3) Operational Policy on Natural Habitats (OP 4.04); and (4) The Disclosure Handbook (December 2002).

Project description

The objective of the Project is to improve the availability, quality, reliability, and sustainability of water supply and sanitation (WSS) services in Saatli rayon.

A Feasibility Study was conducted for the project in 2009 and the Saatli scheme is now in outline design stage. The client is AZERSU (state utility operator) and has a Project Implementation Unit (PIU) which is responsible for project implementation and works closely with Bank staff on project design and assessment and preparation of the bidding documents.

Considering the horizon year demand, the water in required quantity and quality will be supplied by an appropriate system. Existing reservoirs and pump stations will be abandoned and new facilities will be constructed.

The network will be renewed. Because half of the network is old but major part of it is in bad condition. In order to control water storage operations effectively and efficiently they will be installed with water level sensors. The water meters of subscribers will be renewed and the missings will be completed to record the water consumptions and to allocate the water price. The institutional organization of water and wastewater operation department will be reorganized and reinforced by qualified staff.

In the scope of this project the urban center of Saatli and its close vicinity villages (Mustabeyli, Yeni Novrozlu, Beylik, Qıraqılı) will be served.

In the scope of this project 1 new reservoir (NR1) at the northwest of Saatli, 3 pump stations (PS1 at the water intake site, PS2 at the DWTP site and PS3 adjacent to NR1) and a DWTP at the site of Sabirabad existing DWTP are proposed.

The wastewater collection, treatment and discharge systems are not available in Saatli and new establishment of a complete wastewater system is needed. The service area for wastewater collection and treatment was determined according to the location of villages and alignment of collector transferring wastewater to the planned wastewater treatment plant locations.

Complete replacement of existing unoperational water supply and sanitation structures with new ones, and formation of new management staff to ensure long-term, sustainable maintenance of new structures and pipe system is the purpose of the project.

The objective is to supply population, industry and commercial enterprises, budget organizations (communal fields), water users and other users of whole project area with durable, quality, and pressure water.

The following principles will be followed to meet these objectives:

- The water used for general purposes should be quality and secure;
- The water will be supplied 24 hours without intervals;
- Development of water supply systems and collection of maintenance costs should be ensured;
- Water supply and sanitation costs should be minimum;
- We should remember that sources used for water supply are limited natural resources and in this case efforts must be concentrated to keep the impact of WSS project on environment at minimum level during maintenance period.

Potable water should be supplied by pressure pipe. Water shouldn't contain components which can adversely affect consumers' health. These are conditions which should be followed in the process of water supply development, construction and maintenance.

Generally, the objectives and goals of water supply management coincide at four main directions from strategic point of view:

- To provide each user of project area with reliable water supply system;
- To supply users true water requirements with sufficient amount of water;
- To supply each user with required water amounts;
- To supply each user in accordance with his water pressure demand;

In order to meet conditions the scheme can comprise the following components:

- Control of water loss at water supply systems;
- Distribute water in measured amounts within city net;

Ensure water production in required amounts and its supply to distribution system in required quality and amount.

These components correlate and form bases for Strategic Plan on water supply. Overproduced and unpaid water flows will be considered as baseless losses.

Water production and consumers supply costs should be affordable by consumers within determined service tariffs.

No waste water network is available in Saatli urban center. Waste water is collected in simple septic pits in yards, emptied and transferred to a disposal area in Nerimanken location at 4 km distance to the urban centre by vacuum trucks at due fee. Groundwater is polluted by waste water seepage into soil from septic pits.

This situation urges complete reconstruction of sanitation systems. The main objective is to minimize environmental impact by means of fundamental arrangements.

The technological scheme for wastewater purification must be elaborated with probabilities of usage of purified water for special purposes or its discharge to surface water sources. The purification level and discharge of purified water should be agreed with health departments.

Water source options in Saatli

“Sabir” earth canal, originating from the Araz River, is the existing water source which supplies both the drinking water and irrigation water. Questionnaire refers to the canal capacity of 28800m³/hr, with measured monthly flows in the range of 15,800m³/hr to 20,750m³/hr, According to Final Report of NWSSP Consultants and Consulting Engineers Salzgitter GmbH (July 2010), . “Sabir” canal will be no more utilized as water source due to its inadequate and discontinuous flow and pursuant to the decision of Client’s authorized staff. Intensive turbidity was observed in the canal during site visit. On the basis of comments of the Client, it would be appropriate to supply water from the Kur River which also supplies water to Sabirabad Rayon.

A drinking water treatment plant is available in Saatli Rayon, in northwest of the urban centre. All equipment in 500 m³/day capacity plant are worn-out. It is not possible to repair and put them in operation. Therefore, Saatli Water Canal Administration directly pumps the raw water into existing water distribution network. Plant site also accommodates 1 water reservoir and 1 pump station which were put in service in the year 1965 and now are too worn-out to operate efficiently.

Due to excessively flat topography, pumping is adopted in drinking water distribution network.

Existing population of Saatli urban center is 17,387 capita out of which 6,522 capita (37.5%) are served.

The existing water supply and distribution system is unable to ensure safe, reliable and sustainable services. Because the existing treatment plant is out of order and the surface

water is inconsistently disinfected via improvised mechanism and unhygienic water is supplied to the town. The water supply system currently in service, is in poor condition and far from providing the water supply requirement of the town. The interrupted water supply results in water shortage and hence, complaints of people.

In the scope of this project the urban center of Saatli and its close vicinity villages (Mustabeyli, Yeni Novrozlu, Beylik, Qıraqılı) will be served. Three options are formed for the water supply system of Saatli.

The most effective choice is Option 3.

In Option 3, the raw water is abstracted from Kur River and conveyed to new Centralized DWTP in Sabirabad Region. The water to be treated according to EU Council Drinking Water Directives is pumped to a new reservoir in Saatli urban center via. 15 km pipeline.

In this option the branches are kept for 4 villages on the alignment of pipeline and the treated water is also supplied to the villages. This option is completely the same with Option 1 after DWTP. The differences are joint water intake and centralized DWTP for Saatli and Sabirabad.

So, Option 1 and Option 3 have priority for implementation due to the supply drinking water to the villages also. Option 3 has priority over Option 1 because of the centralized DWTP causing lower investment.

Sanitation system

No waste water network is available in Saatli urban center. Waste water is collected in simple septic pits in yards, emptied and transferred to a disposal area in Nerimankend location at 4 km distance to the urban centre by vacuum trucks at due fee. Groundwater is polluted by waste water seepage into soil from septic pits.

The safe, reliable and sustainable water supply and sanitation services in the urban centre of Saatli and in close vicinity will be developed to have positively effect on environmental safety, economic, social development and health of population.

The provision of sanitation is primarily a dual imperative of public health and environmental protection, with improved amenity and poverty alleviation as other important factors.

An improved wastewater collection network and collector are proposed for Saatli urban center and villages for 2030 populations of over 30,845 people, is composed of an adequately designed collection network and a wastewater treatment plant (extended aeration without biological nutrient removal and with sludge stabilization) to serve the 100% of the proposed service area said above.

Environmental baseline

In this section, location of Saatli water supply and sewerage system project (project area) and condition of the environment of nearby areas are described. It's important to assess possible negative influences to environment and different components of environment at the time of carrying out of this project. Description has been carried out according to the Regulation "On evaluation process of influence to environment in Azerbaijan " on physical, biological and socio-economic environments respectively.

Description of the environment has been prepared on the basis of issued facts, reports, information basing on observation of many years by different institutions, expert assessment and on the basis of results of the field investigations carried out by expert at the stage of preparation of this document.

The Saatli rayon generally southwesterly from the flat plains in Mughan, known as the Kur-Araz Lowland of Azerbaijan. This general area is situated between the Greater Caucasus in the north and the Lesser Caucasus and Talish Mountains in the south. Plain restricted by Kur River on the north-east, by the foothills of Lesser Caucasus on the west and Iranian border on the south belonging to the Kur-Araz geographical district.

The relief of area was formed as a result of abrasion move to back of Caspian Sea that has trace nowadays without long last as Mughan lowland as well as accumulative flow of Kur and Araz rivers. The inclination is from north – west to south – east.

The sediments of third and fourth period are taking part in geological structure of the region. The thickness of the sediments is about 2000 meters.

Geologically, the entire study area is on alluvium. The alluvial plain is said to be still accreting due to the high deposition of sediments from the rivers originating from the Lesser Caucasus mountains. The Kur River's flood plains are typically underlain by mainly loose, unconsolidated sand and alluvium as well as some occurrence of mountain outwash deposits and lacustrine sediments.

The landscape in the study corridor is predominantly flat and covered with young sediments of holocene, and quaternary age, and which consist primarily terrestrial and marine clays, sand and gravel deposits

From geomorphologic point of view the area belongs to Mughan – Salyan lowland semi region of Kur – Araz lowland semi region.

Morphology of Mughan lowland has become much complicated as a result of replacement of the river bed of Araz river. The basic forms of relief are consisted of ancient and old river beds, dams and blocs along the river bed, holes and hollows, ancient delta lowlands.

The alluvial sediments of Araz river are represented with all types of rocks starting from gravels up to clays.

According to the seismic division map Saatli is included to the zone of MSK magnitude 8 earthquake on the basis of the Construction Standards and Rules (SNIPII – 7-81) adopted in 1991 and letter (№ HH-02/3-16/1991) dating to 17.09.1991 of the Construction and

Architecture Committee of Azerbaijan Republic. Moreover, each construction area's seismic indication is determined on the basis of geological research works. Type of the soil and position of underground rocks in the construction area may influence the seismic level by ascending or descending it a magnitude 1 earthquake.

Description of the Natural Environment

Fauna

The Saatli rayon the fauna biodiversity is not particularly high as the area quite built-up and with settlements with intensive agriculture as the predominant landuse, such that wildlife tends to avoid the place. While some threatened animal species (of both national and international importance) have their natural habitat in the wider parts of the region, such as two internationally important sites– Mugan Steppe and Sarisu Lake(Important Bird Areas – IBA).

The following commentaries on the fauna of the region are mainly based on the Red Data Book of Azerbaijan, IUCN Red Data List, and publications of BirdLife International.

Within the project area, the common mammals and considered as resident species of this area are the Golden Jackal (*Canis aureus*) and Wolf (*Canis lupus*), that prey on sheep, and the Red Fox (*Vulpes vulpes*). The other common mammals include the Eared Hedgehog (*Hemiehinus auritus*), bat (*Pipistrellus kuhlii*, *Barbastella barbastellab*), hare (*Lepus europaeus*), and rodents (*Mus muscus*, *Meriones erythrourus* and *Microfus socialis*). The African Wildcat (*Felis libyca*), and marbled polecat (*Vomela peregusna*) are quite rare in the area. One of the most typical mammals inhabiting the water canals is the American Nutria.

The avifauna is characterized by the presence of the Common Kestrel (*Falco tinnunculus*) as resident species; Rock Dove (*Columba livia*), Turtle Dove (*Streptopelia turtur*), Little Owl (*Athene noctua*), Hoopoe (*Upupa epops*), Crested Lark (*Galerida cristata*) and Isabelline Wheatear (*Oenanthe isabellina*). During summertime, breeding species also inhabit the area such as the Lesser Kestrel (*Falco naumannib*), European (Merops apiaster) and Blue-Cheeked Bee-Eaters (*Merops superciliosus*), Black-bellied Sandgrouse (*Pterocles orientalis*), Rufous Bushchat (*Cercotrichas galactotes*), Penduline Tit (*Remiz pendulinus*), Red-Backed (*Lanius collurio*) and Lesser Grey Shrikes (*Lanius minor*), Goldfinch (*Carduelis carduelis*) and many others. The Spanish Sparrow (*Passer hispaniolensis*) is a typical breeding species in this area which uses the White Stock nests and form big colonies inside the lower part of nest among twigs. Birds such as the Little White Egret (*Egretta garzetta*) and Cattle Egrets (*Bubulcus ibis*) are also reported to be present on the study area during breeding season, but these species have their core habitats and breeding sites in different areas.

Reptiles that were found to commonly inhabit the area consist of the venomous Blunt Nosed Viper (*Vipera lebetina*), which are active during the warm seasons of the year, with peak acitivity observed in May. Othe reptiles found in this area are lizards such as the Caspian

Gecko (*Cyrtopodion caspius*), Grozny Lacerta (*Lacerta stingata*), European Glass Lizard (*Pseudopodus apodus*), the Greek Tortoise (*Testudo graecac*), and the Caspian (*Mauremys caspica*). The European Pond (*Emys orbicularis*) is among the numerous inhabitants of natural and artificial streams, ponds, and marshes that abound in the area.

The characteristic amphibian species that can be found in this area are the Green Toad (*Bufo viridis*), the Tree Frog (*Hyla savigni*) and the Common Frog (*Rana ridibunda*), which are found in the vicinity of canals, marshes and ponds.

The most common fish species that can be found here are mainly Elox lucius, Rutilus, Alburnus charusini, Scardinius erythrophthalmus, Barbus cyri, B. capito, Cobitis caspia etc., which inhabit the rivers and channels of this region. In the relatively small channels the local population is reported to do some fishing. However this is mainly for sports and not for livelihood.

Flora

The study area runs in a typical semi-desert area where typical species are saltwort (*Salsola* sp.), *Salicornia europaea*, and various species of wormwood (*Artemisia* sp.). The predominance of *Tamarix ramosissima* or *Poa bulbosa* indicates that the area is drier. *Halocnemum strobilaceum* and *Halostachys caspia* are thriving especially in saline soils. Numerous agricultural fields had already replaced natural vegetation in most places along the project.

The original semi-desert areas are also under strong pressure of overgrazing in wintertime. The area is generally criss-crossed by network of irrigation channels where there is abundance of reeds (*Phragmites communis*, *Typha* sp., *Scirpus acutus*) as demarcation of courses of channels and fringes of some shallow artificial ponds. Alongside the road narrow strips of trees and shrubs occur mainly within the territories of villages. Most of them are artificially planted but some trees may also have been natural. The species planted consist of Quince, Apple, Pear, Fig, Mulberry, Pomegranate, and others. The naturally occurring flora in the project are Elm (*Caragana arborescens*), Loester (*Salix* sp.), Tamarisk (*Tamarix ramosissima*), Willow (*Salix alba*) and other trees (*Eleagnus caspica*, *Morus* sp., *Populus alba*, *Quercus longipes*, *Acacia* sp., etc.). Blackberry bushes are among those that are preferred by local population for food and as green hedges.

Protected Areas and Other Ecologically Significant Sites

Within the Saatli project, there are two internationally important sites – Mugan Steppe and Sarisu Lake (Important Bird Areas – IBA), but do not have local protection status.

The Mugan Steppe (IBA 44) is quite a large site with total area of 100,000 ha. This is a semidesert plain, traversed by numerous irrigation channels, with pasturelands and some agricultural fields. The area is frequented by unique huge flocks of wintering Little Bustard, which is IUCN listed. In addition, a number of rare bird species can also be observed in

Mugan Steppe such as the Great Bustard, Black Francolin, Demoiselle Crane, etc. This area is too far to be affected by the project.

The Sarisu Lake (IBA 32) is one of most important sites for waterfowl in the country. It was said that prior to the lowering of its water level, huge number of rare birds had been wintering in the area. In summertime huge colonies of cormorants, egrets and ibises can be observed. Such rare species as Pygmy Cormorant, Dalmatian Pelican, Marbled Teal, Ferruginous Duck, Osprey, Purple Swamphen, White-tailed Lapwing, etc., can be observed in various seasons of the year. This area is located around 20 km from the project road, far enough to be affected by the road rehabilitation project.

Human Environment

In Saatli rayon agriculture is the primary activity, while service related, commercial and industrial activities are found in the urban centers. Electricity is widely available in the districts along with the rest of the other basic utilities (gas, heating system, piped water, sewerage, telephone), which are somewhat provided also.

Environmental impacts and mitigation

Introduction

This section of the report presents the potential environmental impacts and mitigation associated with construction and operation of the water and sanitation project and is based on „superimposing“ the project components onto the baseline compiled during the various studies, which include the FS and the individual EIA report for the Saatli scheme. Mechanisms for implementing the mitigation are presented in Section 7, EMP.

Overall, the project is designed to be very beneficial to the residents of Saatli, through provision of a reliable water supply and to bring benefits to both residents and the riverine environment due to discharge of treated wastewater, compared to today“s untreated wastewater. Thus the majority of potential adverse impacts are associated with the disruption during construction of the infrastructure, especially the replacement piped water supply and sewer network within the town.

Section 3 of the report provides a description of environmental baseline conditions in the project area. This baseline knowledge permits identification of environmental parameters that may be affected by the proposed project.

The potential positive and negative changes resulting from the Project activities are predicted for the project area during the construction phase and into operations. These predicted changes (impacts) are then evaluated using a significance ranking. An outline of the impact assessment procedure is as follows:

- Identification of the baseline receptors;
- Identification of the key project activities;
- Impact evaluation; and significance ranking.

During the EIA study no data were available regarding the water quality of the untreated wastewater discharges and the receiving waters. Thus the effects of changing from untreated to treated wastewater discharges cannot be predicted and quantified and are thus rather generic in nature.

Soil and water

Spills of fuel, oil and other liquids have the potential to cause contamination of soil and groundwater. The Contractor shall implement measures to contain such spills and avoid contamination as much as possible. However, it is possible that some contamination may occur and the Contractor will be required to implement remediation measures in accordance with project and MENR requirements.

Fuel and oil storage tanks will not be located within 50m of any watercourse, well or dry river bed. Wherever possible, refuelling and maintenance of mobile plant within 50m of all watercourses/water bodies, dry riverbeds and within designated wetlands and aquifers will be prohibited.

All tanks will be either double-skinned design and / or placed in a bund of at least 110% of the tank's maximum capacity. If more than one tank is stored within the bund, the system must be capable of storing 110% of the biggest container's capacity or 25% of their total capacity, whichever is greater. The bund will be impermeable (e.g. concrete-lined and painted with epoxy), without drainage points or other breaches. In the case of any uncertainty, this clause supersedes any other requirement specified elsewhere.

The area is susceptible to surface erosion, especially after heavy rain, therefore efforts will be made to reduce the potential for soil erosion during construction activities. Temporary berms will be constructed where necessary to control any run-off to prevent rills or gulleys forming or soil wash out to surface water features. Correct groundworks and compaction will be specified in the contract documentation to prevent soil erosion. The contractor is also required to design a reinstatement plan.

Waste

Inert, solid waste (metals, asphalt chunks, rocks, concrete, gravel, sand etc.) will be generated during drilling wells and pipeline installation operations. The replacement and installation of water distribution pipes in the town will include removal of asphalt surface and importation of suitable padding and backfill (eg sand) as well as backfilling using suitable excavated material. Repair of paved roads and walkways and asphalt surfaces will also be required.

Solid wastes generated in construction sites and during the construction of pipelines and sewer drains will be transported by the construction contractor. Transportation and disposal of such waste will be agreed with local executive authority and regional department of MENR, as necessary.

Environmental impacts on protected areas

Within the Saatlı project, there are two internationally important sites – Mugan Steppe and Sarisu Lake (Important Bird Areas – IBA), which, however, do not have local protection status (see Figure 3.1).

The lake Sarisu is situated in 10 km distance to the project area. The main source of water of the Lake Sarisu is Kura River. Besides, the drainage water channels are regularly supplying the Lake Sarisu with water through pumps.

It should be mentioned that as the quality of water treated in River Water Purification Device is much better than the quality of drainage water the Sarisu Lake will have only positive influence to environment.

Social and community

A construction yard (no worker accommodation) will be created to the south-west of Saatlı town, near the existing pumping station for laydown of plant and material, maintenance of machinery and prefabrication of infrastructure components.

The main effects on the local community during construction are associated with the considerable disruption that the works will have within the town through excavation of defunct infrastructure and installation of new water mains and sewer pipes in the roads and connection of water supply pipes and water meters to individual properties. The proximity of the works to residents also raises the issue of health and safety, as well as traffic disruption and interference with access to houses, work places and public buildings such as hospitals and schools.

Another area of potential concern is contamination and possible disease spread to residents (and workers) caused by exposure to untreated wastewater during excavation and replacement of the sewer network.

The potential resettlement issues have been addressed in a separate Resettlement Policy Framework (RPF) that has been developed for the project. In summary, the two households that are affected by loss of access to farm land will be compensated by additional lands as alternatives, as agreed with AZERSU.

Safety at the work site, both for workers and residents has been discussed at length with AZERSU, who will ensure that contractors develop and implement safe working practices. At project induction stage the construction contractor will train its personnel on safety, environment and quality control, as well as implementation of all the safety rules. Works will be guided by existing laws, sanitary rules and AZERSU work manuals.

Analysis of alternatives

Introduction

This section presents the alternatives that were considered for the project, which includes the do-nothing option, in accordance with World Bank Policy and best practice. Three main alternatives were considered, namely do-nothing, water supply only; and the preferred

scheme. Two were some alternative aspects within the water supply source considerations and these have been presented in this EIA report within the water supply only option.

One of the key objectives in an EIA report is to analyse the environmental implications of each viable option and then compare the options to evaluate their environmental performance, which feeds into overall project design, along with cost-benefit and other factors. In this case however, there is a general absence of site specific data on aspects such as the existing quality of wastewater discharges and their current effect on the environment.

Do-nothing option

“No project” option is not desirable neither economically, nor ecologically and socially. This alternative shall even worse the current systems, increase unnecessary construction and service expenses. As it is described in 3 sections, these will cause worsening of water supply in the region, as a result of increase of environment deterioration natural resources (land, water, flora and fauna), public health shall be affected. This will cause additional financial losses; higher service expenses for construction of additional water provision, increase of the public health expenses, losses because of the degradation of earth surface and water climate, decrease of the land and property prices because of the worse water supply, worsening of demographic indicators etc. In fact, it is not possible to observe the standards of environment at the moment.

Therefore, the proposed project has ecologically, economically, socially beneficial in comparison with non-existing project alternative.

The water pipeline and sewer network increases the risks of flooding of the streets and houses, consequently negatively affecting public health and welfare. Impacts on the wider environment especially the water ecosystems; pollution of surface and ground water reserves, erosion and pollution of soil and degradation of vegetation will continue. This situation is very undesirable, especially with the ongoing high growth rate of the population and development of new business enterprises in the region.

As the levels of service continue to decline, there will be an increase in consumers refusing to pay their utility bills, which will mean less money in the system for Saatli Water Canal Department to maintain the failing system.

Water Supply Only

Selection of the Water Supply Sources

The main alternatives for water provision system are proposed out of such factors as subsistence of sources supplying potable water, in required quantity and quality; technology of water production, water pipelines, territorial surface geometry and scope of project.

Surface Water Resources

The hydrographic network of the region is basically represented with Araz and Kur Rivers. The Kur river is the most suitable alternative water source for this Rayon because it is more reliable from the point of capacity. The water will be supplied from the intake point where Sabirabad Rayon Water Canal Administration I Qaldirici-Uzen Pump Station is available and the coordinates of the water intake point are 48 26 02.4 at east and 40 01 07.1 at north. Kur is a long river and the settlements are located along the river. So, the pollution risk exists for the river and the water quality of it requires water treatment according to the present analysis results.

The total catchment area of Kur River is 188000 km², average perennial stream is 445 m³/s and annual precipitation at catchment is 663 mm. According to the project daily peak water demands including Saatli's urban centre and its villages are 80.74 l/s.

Groundwater Resources

The most spread areas are the places where depth of ground water is 1.0 – 2.0 meters.

The supply of ground water is mainly formed as a result of water saturated from Araz river, floods, as well as atmosphere water. It is also possible to mention water saturated from irrigation channels and artificial channels as a way of artificial supply.

The amplitude of annual hesitation of ground water is 2 meters in irrigated areas and 1 meter in non irrigated areas.

Any other ground water resource has not been proposed by the related water authority for drinking purpose.

Identification and Comparison of Alternatives

In the scope of this project the urban center of Saatli and its close vicinity villages (Mustabeyli, Yeni Novrozlu, Beylik, Qıraqılı) will be served. Three options are formed for the water supply system of Saatli.

In Option 1; the raw water is abstracted from Kur River and conveyed to new Decentralized DWTP in Sabirabad Region. The water to be treated according to EU Council Drinking Water Directives is pumped to a new reservoir in Saatli urban center via. 15 km pipeline. In this option the branches are kept for 4 villages on the alignment of pipeline and the treated water is also supplied to the villages.

In Option 2; the raw water is abstracted from Kur River and pumped to a DWTP via. 17 km pipeline. In this option DWTP is constructed in Saatli and the branches for the villages are kept on the pipeline carrying raw water from Kur River.

In Option 3; the raw water is abstracted from Kur River and conveyed to new Centralized DWTP in Sabirabad Region. The water to be treated according to EU Council Drinking Water Directives is pumped to a new reservoir in Saatli urban center via. 15 km pipeline.

In this option the branches are kept for 4 villages on the alignment of pipeline and the treated water is also supplied to the villages. This option is completely the same with Option 1 after DWTP. The differences are joint water intake and centralized DWTP for Saatli and Sabirabad.

So, Option 1 and Option 3 have priority for implementation due to the supply healthy water to the villages also. Option 3 has priority over Option 1 because of the centralized DWTP causing lower investment.

Water Supply and Sanitation Option

This option consists from water supply system as described in Option 3 and sanitation System. The water source is Kur River as in Option3.

The safe, reliable and sustainable water supply and sanitation services in the urban centre of Saatli and in close vicinity will be developed to have positively effect on environmental safety, economic, social development and health of population.

The provision of sanitation is primarily a dual imperative of public health and environmental protection, with improved amenity and poverty alleviation as other important factors.

An improved wastewater collection network and collector are proposed for Saatli urban center and villages for 2030 populations of over 30,845 people, is composed of an adequately designed collection network and a wastewater treatment plant (extended aeration without biological nutrient removal and with sludge stabilization) to serve the 100% of the proposed service area said above.

Considering the relevant project design criteria, the on-site topographical conditions were planned. The following villages are planned to discharge their wastewaters to the SPS2:

- Mustafabeyli, Yeni Novrozlu, Beyliq, Qıraqlı.

The sewerage network will be the gravity flow type and it has been sized to flow 90% full of peak hour flowrates.

The collector sewer will be terminated at the inlet pumping station of the selected treatment plant site. The dimensioning of the sewers is determined in consideration of the settlements and the respective wastewater flows. 121,029 km sewerage network including 18,701 km collector will be designed.

Public Consultation Summary and Information Disclosure

Consultations with relevant Governmental organisations and the public are an important component of the EIA process. They often provide valuable insight in to the Project Area and act as a source of guidance in the scoping of the EIA study, ensuring that all the appropriate issues are addressed and that official organisations are in agreement to the scope of the study.

According to the Azerbaijan Environmental Protection Law, consultations with local communities and NGOs must be conducted and their participation should be provided in all

stages of project implementation. The national legislation includes for public consultation at the stage of drafting the ToR for the EIA study and then again once the draft EIA report has been prepared.

During the EIA document preparation the consultant held meeting with residents of Saatli town on 15 March 2011 on water supply system and sewage services and suggestions on the project and knew their opinions. Second meeting had been conducted in Sabirabad city on April 29, 2011 with the participation of representatives of population of 4 regions (Bilasuvar, Saatly, Sabirabad, Hajigabul). The “Sukanal” branch office of Sabirabad had organized public hearings in collaboration with the “Azersu” JSC and local residents, officials of villages/village representatives, local NGOs and other interested parties had been invited to this event (Annex 3).

Taking into the consideration water shortage in the region, most of the specialists also supported the treatment of waste waters and turbid according to the standards to be used in agriculture.

In discussions between the Bank and AZERSU, it was agreed to hold additional public consultations and press releases will be disclosed at all stages of the project implementation in compliance with Azerbaijani laws on NGOs and Media, as well World Bank Policy on Disclosure of Information. Information about the project will also be disclosed on internet sites of Azersu (www.azersu.az) and Caucasus Environmental NGO Network (CENN).

All parties involved in the project are mindful of the potential disruption to residents due to the large scale of work within the town and villages and it is planned to hold further consultation with residents prior to commencement of construction works. It has been agreed that the contractor will develop a traffic/work plan in consultation with AZERSU, the municipality and local residents, to minimise disruption caused particularly by the street works. All efforts will be made to synchronise work components, especially water and sewer networks, and to expedite sidewalk and pavement reinstatement. This approach will be included within the bidding documents, to ensure its implementation.

There is possibility of conflicts with local people during the project implementation, because construction works will cause inconvenience. If any conflicts, these will be solved through mutual discussions and in accordance with the grievance mechanism in the RPF developed for the project.

After the completion of the draft EIA report the copies of the report are going to be submitted to the Government of Azerbaijan and the World Bank with the aim to get concerns or proposals. The WB will be creating conditions for availability of the Environmental Impact Assessment Report (in Azerbaijani language) by the groups affected with the implementation of the project and by non – governmental organizations. After the official adoption of the Final Report on Environmental Impact Assessment it will be disclosed for the wide public on the infoshop system of the WB.

Environmental Management Plan

This section of the report presents an Environmental Management Plan (EMP) for the Saatli scheme, which outlines the management mechanisms (i.e. working arrangements) for how the environmental and social elements of the project will be managed from detailed design and construction through operation.

The purpose of the EMP is to ensure that any potentially negative environmental impacts during construction and operation are kept at an acceptable level. It sets out to ensure that all aspects of the works comply with the relevant legislation, licence conditions and good practice, and that measures to mitigate impacts identified in the EIA are implemented. The EMP implements appropriate environmental controls and monitoring procedures during construction and after the work is completed.

The EMP contains environmental requirements which are required for the successful implementation of mitigation measures, environmental monitoring, emergency measures and environmental auditing to be carried out during the construction works on the site. The implementation of mitigation measures and emergency measures shall be the responsibility of the Contractor. He shall ensure compliance with all environmental legislation, regulations and conventions. The responsibility for environmental monitoring lies with the AZERSU and the World Bank.

The Contractor will be contractually required to conform to the requirements specified in the EIA and EMP and will be accountable to AZERSU, as the client, through its Project Implementation Unit (PIU). As the contract for the project has already been tendered, a Variation Order will be issued for these additional requirements, namely compliance to the findings of the EIA and the EMP.

It is recommended (as agreed with AZERSU) that the PIU is supported in achieving project environmental and social safeguard objectives by support from a local environmental consultant. The precise details have not yet been determined, but the consultant will advise and support the PIU in implementation of the EIA standards during construction and into operation.

There are several mechanisms of ensuring delivery during construction of both general and site specific mitigation developed in EIAs. One mechanism involves requiring the Contractor to further develop the outline requirements in an EMP by designing individual Management Plans (MPs), such as oil and fuel storage, waste management, traffic management and pollution prevention. This approach is favoured for the project, as it encourages early evaluation of these aspects by the contractor and he produces a set of MPs that can be checked and verified on site and are auditable through the monitoring process. Table 7-1 outlines the content of the MPs to be produced by the contractor and their development will be assisted by the Environmental Consultant from AZERSU PIU, in conjunction with Bank Environmental staff in Baku.

This approach for each individual scheme will benefit from oversight by the PIU to form a set of environmental requirements applicable to the project as a whole, which will ensure compliance of the work to both national and Bank standards. Such measures will be

mandated in the bidding and contract documents, so that an overall good standard of work is achieved. This approach also has benefits of institutional capacity training, as the knowledge and capability of AZERSU will be extended to effective environmental management and as each scheme comes on stream the PIU will benefit from knowledge gained on previous schemes.

A tabulated summary of the environmental management is presented in Table 7.2 of the main report and a brief summary of key aspects is presented below.

Construction aspects

Aspect	Mitigation	Responsibility	Monitoring
Noise, vibration and general disturbance and disruption to residents	Consultation with residents. Adherence to agreed working hours and project standards; use of mitigation techniques such as screens and good maintenance. Development and implementation of traffic management plan.	Contractor	AZERSU
Health and safety of residents and workers	Adherence to project standards, good signage, ongoing consultation with residents, including schools. All workers to use appropriate PPE and be trained at project induction. Safety fencing provided.	Contractor	AZERSU
Soil and water pollution	Project standards applied, including oil and fuel storage and management. Clean-up and emergency planning procedures developed and implemented.	Contractor	AZERSU
Wastewater contamination	Project standards applied, including safe removal of wastewater during renovation works, use of appropriate PPE by workers and ongoing liaison with residents and fencing off contaminated areas.	Contractor	AZERSU
Dust and nuisance from material delivery	Project standards applied, including traffic speed restrictions, agreed timing and routes and material covered and ongoing liaison with residents.	Contractor	AZERSU

Aspect	Mitigation	Responsibility	Monitoring
and transport			
Soil erosion and habitat reinstatement	Project standards applied, including soil erosion prevention by good soil practice and drainage control. Good soil conservation measures and effective reins to prevent future erosion and soil loss.	Contractor	AZERSU
Imported material	Project standards applied including purchase of materials for licensed sources; no unauthorised borrowing of material. Lisenziya almış mənbələr üçün materialların alınması daxil olmaqla layihə standartları tətbiq olunmalıdır; heç bir mənşəyi olmayan materialın alınması olmamalıdır.	Contractor	AZERSU
Archaeological protection	Adherence to agreed measures for any late finds	Contractor	AZERSU
Resettlement aspects	Adherence to agreed RPF, which includes provision of replacement lands for lost access to plot of arable land.	AZERSU	World Bank

The above mitigation will be monitored by regular inspections by the contractor supervisors and the PIU of AZERSU and supplemented by supervision inspections by Bank staff.

Operational aspects

There are few mitigating measures required during the operation of the water and sanitation works, however the safe disposal and preferably effective use of the generated sludge will need to be arranged between AZERSU and the Ministry of Ecology and Natural Resources (MENR). This is typically an issue without significant adverse environmental effects, as throughout Europe in compliance with the EU UWWT Directive, sludge is routinely processed to render it a useful soil additive or source of composting material. Whilst the WWTW has not yet been subject to detailed design, the design philosophy is already fixed with the objective of producing a compliant sludge and therefore the infrastructure will be

provided for such an operation theoretically, an option exists simply to dispose of sludge in a landfill, but this will not be in keeping with the objectives of the EU UWWT Directive, which encourages recycling of the sludge bio-matter.

AZERSU as the operator of the WWT works will be required to conduct monitoring of the quality of the treated wastewater discharged, as well as that of the sludge generated, to ensure compliance to the design standards. The discharge monitoring has been developed to include downstream quality measurements, from which it will also be possible to evaluate some of the environmental benefits of the project, as hopefully the aquatic habitats will return to their previously unpolluted state.

EXECUTIVE SUMMARY SABIRABAD

Introduction

Azerbaijan inherited a fairly extensive Water Supply and Sanitation (WSS) system from the Soviet Union. However, most of the WSS systems are now over fifty years old, and have deteriorated significantly as a result of deferred maintenance and limited capital investments. In most secondary cities, water supply networks are characterized by frequent bursts, high losses, and intermittent services. Many existing water and wastewater treatment plants are characterized by inefficient plant and equipment, leading to high operating costs. In addition, the sector needs to improve its financial viability.

The Government of Azerbaijan is committed to improving the performance of the WSS sector through better allocation of resources, and improvement of infrastructure service provision, as part of its effort to ensure sustainable growth in the non-oil economy. Improving infrastructure is one of the intermediate objectives of the Government's poverty reduction strategy - the State Programme for Poverty Reduction and Economic Development (SPPRED). Government's vision for the WSS sector in secondary cities focuses on rehabilitation of WSS facilities in all urban centres outside Baku, to provide reliable water supply and wastewater services.

The Government of Azerbaijan is implementing the National Water Supply and Sanitation Project which is co-financed by the World Bank and the Government of Azerbaijan. The project covers water supply and sanitation facilities within 22 rayons across the country.

The strategic approach being adopted under the present Project is based on two complementary interventions: (i) rehabilitation and construction of WSS infrastructure in the Rayons' centres plus the villages located in close proximity to them, or along the transmission lines for the water supply; and (ii) implementation of a comprehensive Institutional Development Plan to strengthen the WSS sector's capacity to manage WSS services in an efficient, effective, and sustainable manner.

The Sabirabad rayon is located on a part of Kur-Araz lowland in the territory of Shirvan of the Republic of Azerbaijan.

The rayon is located in the southern portion of Azerbaijan in the Aran Economic Geographic Region. The rayon settles in the low inclined area and between the elevations of -12 masl and -16 masl.

The rayon is located in the southern part of Azerbaijan in the Aran Economic Geographic Region. The total rayon area is 1,469 sq.km. The total population of the rayon is 143,000 cap. according to the census at the end of the year of 2008. 20% cap. of the total population dwells in urban center of Sabirabad. The rayon comprises of one city and 74 villages.

The present water system suffers from:

- Existing storage reservoirs cannot be operated.
- Poor pipe network condition.
- Insufficient metering of production and consumption.
- Insufficient maintenance and capital repair work.
- Insufficient strategic thinking involving total management approach.
- Insufficient qualified personnel to operate the system.

Consequently, the existing water supply and distribution system is unable to ensure safe, reliable and sustainable services, the entire system should be reconstructed according to the basic frame work recommended in this report.

The objective of this EA is to address the environmental impacts and management issues associated with the proposed the water supply and sanitation systems project of Sabirabad town.

The EA Report, which includes an environmental management plan, addresses the needs of applicable laws and regulations of the Government of Azerbaijan including the provisions of the World Bank on the following: (1) Operational Policy on Environmental Assessment (OP 4.01, January 1999); (2) Operational Policy Note on Management of Cultural Property in Bank Financed Projects (OPN 11.03, August 1999); (3) Operational Policy on Natural Habitats (OP 4.04); and (4) The Disclosure Handbook (December 2002).

Project description

The objective of the Project is to improve the availability, quality, reliability, and sustainability of water supply and sanitation (WSS) services in Saatli rayon.

A Feasibility Study was conducted for the project in 2009 and the Saatli scheme is now in outline design stage. The client is AZERSU (state utility operator) and has a Project Implementation Unit (PIU) which is responsible for project implementation and works closely with Bank staff on project design and assessment and preparation of the bidding documents.

Considering the horizon year demand, the water in required quantity and quality will be supplied by an appropriate system. Existing reservoirs and pump stations will be abandoned and new facilities will be constructed.

The network will be renewed. In order to control water storage operations effectively and efficiently they will be installed with water level sensors. The water meters of subscribers will be renewed and the missings will be completed to record the water consumptions and to allocate the water price. The institutional organization of water and wastewater operation department will be reorganized and reinforced by qualified staff.

In the scope of this project the urban center of Sabirabad and its close vicinity villages (Qalagaym, Kurkendi, Suqavuşan, Qafarli, Qaralar, Asadli, Bulaqlı, Balakent) will be served.

The designed new centralized DWTP will supply the drinking water to the urban center of Saatli and Sabirabad as well as the villages along the transmission lines.

In the scope of this project 1 new reservoir (NR1) within new centralized DWTP, 2 pump stations (PS1 at the water intake site, PS2 at the DWTP site and adjacent to NR1) and a DWTP at the site of Sabirabad existing DWTP are proposed.

Complete replacement of existing unoperational water supply and sanitation structures with new ones, and formation of new management staff to ensure long-term, sustainable maintenance of new structures and pipe system is the purpose of the project.

The objective is to supply population, industry and commercial enterprises, budget organizations (communal fields), water users and other users of whole project area with durable, quality, and pressure water.

The following principles will be followed to meet these objectives:

- The water used for general purposes should be quality and secure;
- The water will be supplied 24 hours without intervals;
- Development of water supply systems and collection of maintenance costs should be ensured;
- Water supply and sanitation costs should be minimum;

We should remember that sources used for water supply are limited natural resources and in this case efforts must be concentrated to keep the impact of WSS project on environment at minimum level during maintenance period.

Potable water should be supplied by pressure pipe. Water shouldn't contain components which can adversely affect consumers' health.

These are conditions which should be followed in the process of water supply development, construction and maintenance.

Generally, the objectives and goals of water supply management coincide at four main directions from strategic point of view:

- To provide each user of project area with reliable water supply system;
- To supply users true water requirements with sufficient amount of water;
- To supply each user with required water amounts;
- To supply each user in accordance with his water pressure demand;

In order to meet conditions the scheme can comprise the following components:

- Control of water loss at water supply systems;
- Distribute water in measured amounts within city net;

Ensure water production in required amounts and its supply to distribution system in required quality and amount.

These components correlate and form bases for Strategic Plan on water supply. Overproduced and unpaid water flows will be considered as baseless losses.

Water production and consumers supply costs should be affordable by consumers within determined service tariffs.

Destructed purification structures of sanitation systems and problems existing in maintenance of main collector (there are cases where such collectors are managed by different enterprises and units) cause environmental pollution and especially pollution of water sources. This situation urges complete reconstruction of sanitation systems. The main objective is to minimize environmental impact by means of fundamental arrangements.

The technological scheme for wastewater purification must be elaborated with probabilities of usage of purified water for special purposes or its discharge to surface water sources. The purification level and discharge of purified water should be agreed with health departments.

Water source options in Sabirabad

The water from the Kur River, which is the available water source, is conveyed to DWTP via Qaldirici-Uzen Pump Station No.1 (floating pump station) equipped with 2 nos. pumps each 100 m³/h and 800 m³/h in capacity.

Qaldirici-Uzen PS no.1, put in operation in the year 1980, is on the Kur River. The PS and associated structures are accommodated on 2.5 ha site within Sabirabad Rayon boundaries and owned by Sabirabad Sukanal Office. This pump station is in poor condition and needs to be reconstructed. Distance between PS and WTP is 3,506 m. The area is flooded from time to time when water level in the Kur River is high. Flood water level shall be taken into account in design studies, and all structures to be constructed shall be above the elevation of existing bridge.

The water from the Kur River is conveyed to WTP via forced main initially Ø 400 mm steel pipe at the outlet of Qaldirici-Uzen PS no.1 and continuing to be Ø 530 mm steel pipe. The forced main is in poor condition and hence, fails to provide the required conveyance capacity.

The WTP site on 9 ha in the northwest of the town accommodates the administration building, drinking water treatment plant, 4 nos reservoirs, 2 nos pump stations, laboratory building, vehicle garage and workshop building. Laboratory building, garage and workshop building need to be reconstructed.

50,000 m³/day-capacity WTP, put in operation in the year 1980, is functional except for pre-settling function. Perpendicular strains and filters, which have become unfunctional, are to be replaced. The structures within the DWTP area are to be re-constructed. The water, untreated due to unfunctional treatment plant, is conveyed to water reservoirs.

Pumps are utilized in distribution network because of the extremely flat topography.

3 nos. pump stations serve Sabirabad urban centre and villages. In addition to these pump stations, 5 nos. pump stations on irrigation canal, originating from the Kur River, pump the untreated water directly into network in the eastern zones of the town. The pumps are in poor condition, resulting in frequent failures.

Two options have been formed for the water supply system of Sabirabad. From the views of investment and operational costs the both options seem similar. But option-2 is most feasible because of the joint water intake, pump main and centralized DWTP for Saatli and Sabirabad to be constructed at the site in boundary of Sabirabad.

Sanitation system

A waste water collection system is available in Sabirabad, but it serves only 20% of the urban centre. Existing waste water system is in poor condition and unfunctional. In residential areas which are not served by waste water system, waste water is collected in simple septic pits in gardens, and the waste water collected in these pits is emptied and transported for disposal in salt ditches near urban centre by vacuum trucks. Groundwater is contaminated by waste water seeping into soil from the pits.

The existing WW system, consisting of steel and cast iron pipes, is combined with storm water drainage system.

Pumping is adopted to convey the waste water due to flat topography. Pumps in 3 nos. pump stations do not operated on continuous basis. The following table summarizes characteristics of these pumps.

The waste water collected by WW pumps is pumped via Ø 530 mm cast-iron pipe into a channel near WWTP and then, the raw waste water is conveyed to salt ditches.

Existing WWTP site is in Qalagayın rural area in the South of urban center. The WWTP, put in operation in 1990, has been surrounded by housing units built in the course of time. Currently, it is within residential area. The plant, having been built in extremely low quality of workmanship and concrete, is in poor condition and out of service. The plant was constructed on backfill which has caved in the course of time since the backfill was not compacted properly.

In Sabirabad rayon, sewers 27.4 km in total length, comprising 6.2 km-long collectors and 21.2 km-long network, are available.

Current population of Sadirabad is 28,400 persons whose 5,896 are served by waste water network. Major part of the network is in poor condition, and is to be reconstructed. Existing waste water collection and treatment system fails to provide safe, reliable and sustainable service.

The provision of sanitation is primarily a dual imperative of public health and environmental protection, with improved amenity and poverty alleviation as other important factors.

The urban center of Sabirabad settles in the low inclined area. This condition causes laying of collection pipelines in deep to transfer the wastewater in gravity or establishing intermediate pump stations. In the feasibility study the wastewater treatment plant (WWTP) location have been determined during site visit. it is more than 4 km far away from urban center and at the southeast of urban.

Flowrates (Qalagayın, Kurkendi, Suqavuşan, Qafarli, Qaralar, Asadli, Bulaqlı, Balakent) discharge to network separate points . All wastewater is collected at the SPS8 and then pumped to the WWTP. and finally the treated wastewater will be pumped to salty water drainage chanal as near As possible.

Existing WWTP has been surrounded by residential area in the course of time. Therefore, the new WWTP will be constructed, as agreed with the Client' s authorized staff, on a state-owned land at 400 m distance to Saricalar village and 1600 m toward the south of right bank of Sabir Canal route.

An improved wastewater collection network and collector are proposed for Sabirabad urban center and villages for 2030 populations of over 52,344 people, is composed of an adequately designed collection network and a wastewater treatment plant (extended aeration without biological nutrient removal and with sludge stabilization) to serve the 100% of the proposed service area said above.

The long-term strategy is to establish a wastewater system, which can serve urban centre of sabirabad and the villages along the interceptor sewer. Considering the long-lasting durability of the sewers (often 50 – 100 years, which extend beyond the NWSS project design horizon of 20 years), interceptor sewer, collector sewers shall be developed for compatibility with future systems. Therefore, in order to provide additional buffer for future collection capacity, interceptor sewer and collector sewers are designed for the hydraulic load of the maximum service area.

Environmental baseline

In this section, location of Sabirabad water supply and sewerage system project (project area) and condition of the environment of nearby areas are described. It's important to assess possible negative influences to environment and different components of environment at the time of carrying out of this project. Description has been carried out according to the Regulation "On evaluation process of influence to environment in Azerbaijan " on physical, biological and socio-economic environments respectively.

Description of the environment has been prepared on the basis of issued facts, reports, information basing on observation of many years by different institutions, expert assessment and on the basis of results of the field investigations carried out by expert at the stage of preparation of this document.

The Sabirabad rayon generally southwesterly from the flat plains in Mughan area, known as the Kur-Araz Lowland of Azerbaijan. This general area is situated between the Greater Caucasus in the north and the Lesser Caucasus and Talish Mountains in the south. Plain restricted by Kur River on the north-east, by the foothills of Lesser Caucasus on the west and Iranian border on the south belonging to the Kur-Araz geographical district.

The relief of Sabirabad district was formed as a result of abrasion move to back of Caspian Sea that has trace nowadays without long last as Mughan lowland as well as accumulative flow of Kura and Arax rivers. The study area is situated within the limits of the alluvial lowland with a delta and weak density and is characterized with figures 12 – 14,15 meter absolute height.

The sediments of the third and fourth ages are taking part in geological structure of the district where thickness of the layer is 2000 meters. The continental sediments of modern period are consisted of various clay sands, dust clays often switching each other and mixing through lenses and layers.

Geologically, the entire study area is on alluvium. The alluvial plain is said to be still accreting due to the high deposition of sediments from the rivers originating from the Lesser Caucasus mountains. The Kur River's flood plains are typically underlain by mainly loose,

unconsolidated sand and alluvium as well as some occurrence of mountain outwash deposits and lacustrine sediments.

The landscape in the study corridor is predominantly flat and covered with young sediments of holocene, and quaternary age, and which consist primarily terrestrial and marine clays, sand and gravel deposits

Tectonically the territory of the region is situated in the center of the Lower Kura basin. In new stage this basin faced declination and was compensated with full collection of sediments.

Kura – Arax lowland is a big morphologic structure situated in genetically intensively declining field of Kura megasynclinerium. This territory with 3 – 4 km thickness is filled in with marine and alluvial sediments of Pliocene and Anthropogenic era.

On its origin it is consisted of alluvial, delluvial – proluvial lowlands. The lowland occurred as a result of movement of accumulated areas of deltas of Kura and Arax rivers to eastern direction along with regression of Caspian Sea.

According to the seismic division map Sabirabad is included to the zone of MSK magnitude 8 earthquake on the basis of the Construction Standards and Rules (SNIPII – 7-81) adopted in 1991 and letter (№ HH-02/3-16/1991) dating to 17.09.1991 of the Construction and Architecture Committee of Azerbaijan Republic. Moreover, each construction area's seismic indication is determined on the basis of geological research works. Type of the soil and position of underground rocks in the construction area may influence the seismic level by ascending or descending it a magnitude 1 earthquake.

Description of the Natural Environment

Fauna

The Sabirabad rayon the fauna biodiversity is not particularly high as the area is quite built-up and with settlements with intensive agriculture as the predominant landuse, such that wildlife tends to avoid the place. While some threatened animal species (of both national and international importance) have their natural habitat in the wider parts of the region, such as two internationally important sites (Important Bird Areas – IBA) – Sarisu and Hajigabul Lakes.

The following commentaries on the fauna of the region are mainly based on the Red Data Book of Azerbaijan, IUCN Red Data List, and publications of BirdLife International.

Within the project area, the common mammals and considered as resident species of this area are the Golden Jackal (*Canis aureus*) and Wolf (*Canis lupus*), that prey on sheep, and the Red Fox (*Vulpes vulpes*). The other common mammals include the Eared Hedgehog (*Hemiehinus auritus*), bat (*Pipistrellus kuhlii*, *Barbastella barbastellab*), hare (*Lepus europaeus*), and rodents (*Mus muscus*, *Meriones erythrourus* and *Microfus socialis*). The African Wildcat (*Felis libyca*), and marbled polecart (*Vomela peregusna*) are quite rare in the area. One of the most typical mammals inhabiting the water canals is the American Nutria.

The avifauna is characterized by the presence of the Common Kestrel (*Falco tinnunculus*) as resident species; Rock Dove (*Columba livia*), Turtle Dove (*Streptopelia turtur*), Little Owl (*Athene noctua*), Hoopoe (*Upupa epops*), Crested Lark (*Galerida cristata*) and Isabelline

Wheatear (*Oenanthe isabellina*). During summertime, breeding species also inhabit the area such as the Lesser Kestrel (*Falco naumanni*), European (Merops *apiaster*) and Blue-Cheeked Bee-Eaters (*Merops superciliosus*), Black-bellied Sandgrouse (*Pterocles orientalis*), Rufous Bushchat (*Cercotrichas galactotes*), Penduline Tit (*Remiz pendulinus*), Red-Backed (*Lanius collurio*) and Lesser Grey Shrikes (*Lanius minor*), Goldfinch (*Carduelis carduelis*) and many others. The Spanish Sparrow (*Passer hispaniolensis*) is a typical breeding species in this area which uses the White Stock nests and form big colonies inside the lower part of nest among twigs. Birds such as the Little White Egret (*Egretta garzetta*) and Cattle Egrets (*Bubulcus ibis*) are also reported to be present on the study area during breeding season, but these species have their core habitats and breeding sites in different areas.

Reptiles that were found to commonly inhabit the area consist of the venomous Blunt Nosed Viper (*Vipera lebetina*), which are active during the warm seasons of the year, with peak activity observed in May. Other reptiles found in this area are lizards such as the Caspian Gecko (*Cyrtopodion caspius*), Grozny Lacerta (*Lacerta stingata*), European Glass Lizard (*Pseudopodius apodus*), the Greek Tortoise (*Testudo graeca*), and the Caspian (*Mauremys caspica*). The European Pond (*Emys orbicularis*) is among the numerous inhabitants of natural and artificial streams, ponds, and marshes that abound in the area.

The characteristic amphibian species that can be found in this area are the Green Toad (*Bufo viridis*), the Tree Frog (*Hyla savignii*) and the Common Frog (*Rana ridibunda*), which are found in the vicinity of canals, marshes and ponds.

The most common fish species that can be found here are mainly Elox lucius, Rutilus, Alburnus charusini, Scardinius erythrophthalmus, Barbus cyri, B. capito, Cobitis caspia etc., which inhabit the rivers and channels of this region. In the relatively small channels the local population is reported to do some fishing. However this is mainly for sports and not for livelihood.

Flora

The study area runs in a typical semi-desert area where typical species are saltwort (*Salsola* sp.), *Salicornia europaea*, and various species of wormwood (*Artemisia* sp.). The predominance of *Tamarix ramosissima* or *Poa bulbosa* indicates that the area is drier. *Halocnemum strobilaceum* and *Halostachys caspia* are thriving especially in saline soils. Numerous agricultural fields had already replaced natural vegetation in most places along the project.

The original semi-desert areas are also under strong pressure of overgrazing in wintertime. The area is generally criss-crossed by network of irrigation channels where there is abundance of reeds (*Phragmites communis*, *Typha* sp., *Scirpus acutus*) as demarcation of courses of channels and fringes of some shallow artificial ponds. Alongside the road narrow strips of trees and shrubs occur mainly within the territories of villages. Most of them are artificially planted but some trees may also have been natural. The species planted consist of Quince, Apple, Pear, Fig, Mulberry, Pomegranate, and others. The naturally occurring flora in the project are Elm (*Caragana arborescens*), Loester (*Salix* sp.), Tamarisk (*Tamarix ramosissima*), Willow (*Salix alba*) and other trees (*Eleagnus caspica*, *Morus* sp., *Populus alba*, *Quercus longipes*, *Acacia* sp., etc.). Blackberry bushes are among those that are preferred by local population for food and as green hedges.

Protected Areas and Other Ecologically Significant Sites

Within the Sabirabad project, there are two internationally important sites (Important Bird Areas – IBA) – Sarisu and Hajigabul Lakes, but do not have local protection status.

Human Environment

In Sabirabad rayon agriculture is the primary activity, while service related, commercial and industrial activities are found in the urban centers. Electricity is widely available in the districts along with the rest of the other basic utilities (gas, heating system, piped water, sewerage, telephone), which are somewhat provided also.

Environmental impacts and mitigation

Introduction

This section of the report presents the potential environmental impacts and mitigation associated with construction and operation of the water and sanitation project and is based on „superimposing“ the project components onto the baseline compiled during the various studies, which include the FS and the individual EIA report for the Sabirabad scheme. Mechanisms for implementing the mitigation are presented in Section 7, EMP.

Overall, the project is designed to be very beneficial to the residents of Sabirabad, through provision of a reliable water supply and to bring benefits to both residents and the riverine environment due to discharge of treated wastewater, compared to today’s untreated wastewater. Thus the majority of potential adverse impacts are associated with the disruption during construction of the infrastructure, especially the replacement piped water supply and sewer network within the town.

Section 3 of the report provides a description of environmental baseline conditions in the project area. This baseline knowledge permits identification of environmental parameters that may be affected by the proposed project.

The potential positive and negative changes resulting from the Project activities are predicted for the project area during the construction phase and into operations. These predicted changes (impacts) are then evaluated using a significance ranking. An outline of the impact assessment procedure is as follows:

- Identification of the baseline receptors;
- Identification of the key project activities;
- Impact evaluation; and significance ranking.

During the EIA study no data were available regarding the water quality of the untreated wastewater discharges and the receiving waters. Thus the effects of changing from untreated to treated wastewater discharges cannot be predicted and quantified and are thus rather generic in nature.

Soil and water

Spills of fuel, oil and other liquids have the potential to cause contamination of soil and groundwater. The Contractor shall implement measures to contain such spills and avoid contamination as much as possible. However, it is possible that some contamination may occur and the Contractor will be required to implement remediation measures in accordance with project and MENR requirements.

Fuel and oil storage tanks will not be located within 50m of any watercourse, well or dry river bed. Wherever possible, refuelling and maintenance of mobile plant within 50m of all watercourses/water bodies, dry riverbeds and within designated wetlands and aquifers will be prohibited.

All tanks will be either double-skinned design and / or placed in a bund of at least 110% of the tank's maximum capacity. If more than one tank is stored within the bund, the system must be capable of storing 110% of the biggest container's capacity or 25% of their total capacity, whichever is greater. The bund will be impermeable (e.g. concrete-lined and painted with epoxy), without drainage points or other breaches. In the case of any uncertainty, this clause supersedes any other requirement specified elsewhere.

The area is susceptible to surface erosion, especially after heavy rain, therefore efforts will be made to reduce the potential for soil erosion during construction activities. Temporary berms will be constructed where necessary to control any run-off to prevent rills or gulleys forming or soil wash out to surface water features. Correct groundworks and compaction will be specified in the contract documentation to prevent soil erosion. The contractor is also required to design a reinstatement plan.

Waste

Inert, solid waste (metals, asphalt chunks, rocks, concrete, gravel, sand etc.) will be generated during drilling wells and pipeline installation operations. The replacement and installation of water distribution pipes in the town will include removal of asphalt surface and importation of suitable padding and backfill (eg sand) as well as backfilling using suitable excavated material. Repair of paved roads and walkways and asphalt surfaces will also be required.

Solid wastes generated in construction sites and during the construction of pipelines and sewer drains will be transported by the construction contractor. Transportation and disposal of such waste will be agreed with local executive authority and regional department of MENR, as necessary.

Environmental impacts on protected areas

Within the Sabirabad project, there are two internationally important sites (Important Bird Areas – IBA) – Sarisu and Hajigabul Lakes, but do not have local protection status (see Figure 3.1).

The lakes Sarisu and Hajigabul is in a distance of 15 – 20 km from the project area there will not be observed any negative impact to these environmentally vulnerable zones.

Social and community

A construction yard (no worker accommodation) will be created to the south-west of Sabirabad town, near the existing pumping station for laydown of plant and material, maintenance of machinery and prefabrication of infrastructure components.

The main effects on the local community during construction are associated with the considerable disruption that the works will have within the town through excavation of defunct infrastructure and installation of new water mains and sewer pipes in the roads and connection of water supply pipes and water meters to individual properties. The proximity of the works to residents also raises the issue of health and safety, as well as traffic disruption and interference with access to houses, work places and public buildings such as hospitals and schools.

Another area of potential concern is contamination and possible disease spread to residents (and workers) caused by exposure to untreated wastewater during excavation and replacement of the sewer network.

The potential resettlement issues have been addressed in a separate Resettlement Policy Framework (RPF) that has been developed for the project. In summary, the two households that are affected by loss of access to farm land will be compensated by additional lands as alternatives, as agreed with AZERSU.

Safety at the work site, both for workers and residents has been discussed at length with AZERSU, who will ensure that contractors develop and implement safe working practices. At project induction stage the construction contractor will train its personnel on safety, environment and quality control, as well as implementation of all the safety rules. Works will be guided by existing laws, sanitary rules and AZERSU work manuals.

Analysis of alternatives

Introduction

This section presents the alternatives that were considered for the project, which includes the do-nothing option, in accordance with World Bank Policy and best practice. Three main alternatives were considered, namely do-nothing, water supply only; and the preferred scheme. Two were some alternative aspects within the water supply source considerations and these have been presented in this EIA report within the water supply only option.

One of the key objectives in an EIA report is to analyse the environmental implications of each viable option and then compare the options to evaluate their environmental performance, which feeds into overall project design, along with cost-benefit and other factors. In this case however, there is a general absence of site specific data on aspects such as the existing quality of wastewater discharges and their current effect on the environment.

Do-nothing option

“No project” option is not desirable neither economically, nor ecologically and socially. This alternative shall even worse the current systems, increase unnecessary construction and service expenses. As it is described in 3 sections, these will cause worsening of water supply in the region, as a result of increase of environment deterioration natural resources (land,

water, flora and fauna), public health shall be affected. This will cause additional financial losses; higher service expenses for construction of additional water provision, increase of the public health expenses, losses because of the degradation of earth surface and water climate, decrease of the land and property prices because of the worse water supply, worsening of demographic indicators etc. In fact, it is not possible to observe the standards of environment at the moment.

Therefore, the proposed project has ecologically, economically, socially beneficial in comparison with non-existing project alternative.

The water pipeline and sewer network increases the risks of flooding of the streets and houses, consequently negatively affecting public health and welfare. Impacts on the wider environment especially the water ecosystems; pollution of surface and ground water reserves, erosion and pollution of soil and degradation of vegetation will continue. This situation is very undesirable, especially with the ongoing high growth rate of the population and development of new business enterprises in the region.

As the levels of service continue to decline, there will be an increase in consumers refusing to pay their utility bills, which will mean less money in the system for Sabirabad Water Canal Department to maintain the failing system.

Water Supply Only

Surface Water Resources

The hydrographic network of the region is represented basically with Kur and Araz rivers. These rivers are considered as biggest hydrographic units not only in Mughan – Salyan lowland but also in all the Caucasus. Kur river flows up to Caspian Sea from the point where it Araz falls to it near Sabirabad, Araz river flows up to the point where it falls to Kur in Sabirabad taking start from the border with Iran.

The length of Kur river in Mughan – Salyan lowland is 220 km and it has sinusoid river bed. Turbidity of water is extremely high. The highest turbidity was 7590 g/m³ during the floods of 1958.

It takes its source from Anatolia (Turkey) being right tributary of Araz. It has close to 60 km length in Mughan – Salyan lowland. The speed of the river is higher in comparison to Kur and reaching to 4m/second.

The artificially made channels, collectors and drainage facilities are also very developed in hydrographic network of the region along with natural water arteries.

The Kur River is the most suitable alternative water source for this Rayon because it is more reliable from the point of capacity. The water will be supplied from the intake point where Sabirabad Rayon Water Canal Administration I Qaldirici-Uzen Pump Station is available and the coordinates of the water intake point are 480 26', at east and 400 01' at north. Because the existing water source Sabir channel remains insufficient to supply water continuously and has intensive turbidity. Kur is a long river and the settlements are located along the river. So, the pollution risk exists for the river and the water quality of it requires water treatment according to the present analysis results.

Groundwater Resources

The ground water and water resources with high pressure have been distributed widely. Ground water resources are persistent to all lithologic cuttings. The depth of ground water aquifers is changing between 1 – 5 meters. The thickness of ground water horizon is about 20 meters. Ground water resources on their chemical composition are basically of chlorine – sulphate – sodium type. The amount of dry surplus is 2,8 – 4,5 g/l.

The first water horizon with high pressure is in the depth of 30 meters and separated from ground water horizon with non saturating clay layer of 10 meters thickness. Water with high pressure is salty their chemical composition is chlorine – sulphate – sodium – magnesium.

Any other ground water resource has not been proposed by the related water authority for drinking purpose.

Selection of the Water Supply Sources

The main alternatives for water provision system are proposed out of such factors as subsistence of sources supplying potable water, in required quantity and quality; technology of water production, water pipelines, territorial surface geometry and scope of project. The main alternatives for water provision system are proposed out of such factors as subsistence of sources supplying potable water, in required quantity and quality; technology of water production, water pipelines, territorial surface geometry and scope of project.

Considering the horizon year demand, the water in required quantity and quality will be supplied by an appropriate system. Existing reservoirs and pump stations will be abandoned and new facilities will be constructed. Qaldirici-Uzen PS no.1, put in operation in the year 1980, is on the Kur River. This pump station is in poor condition and needs to be reconstructed. The area is flooded from time to time when water level in the Kur River is high. Flood water level shall be taken into account in design studies, and all structures to be constructed shall be above the elevation of existing bridge.

The existing 2 nos. 3000 m³-capacity, 2 nos. 2000 m³ capacity and 2 nos. 1000 m³ capacity, total 6 nos. water reservoirs, put in operation in the years 1980 and 1981 in Sabirabad are in poor condition and fail to provide efficient operation. 3 nos. pump stations serve Sabirabad urban centre and villages. In addition to these pump stations, 5 nos. pump stations on irrigation canal, originating from the Kur River, pump the untreated water directly into network in the eastern zones of the town. The pumps are in poor condition, resulting in frequent failures.

The network will be renewed. A major part of the network is old and in poor condition. So, the pipelines which are younger than 10 years have been also proposed to be changed because of their bad physical conditions. The most important factor is bad workmanship and their destructions due to the various construction activities. In order to control water storage operations effectively and efficiently they will be installed with water level sensors.

The water meters of subscribers will be renewed and the missings will be completed to record the water consumptions and to allocate the water price. The institutional organization of water and wastewater operation department will be reorganized and reinforced by qualified staff.

In the scope of this project the urban center of Sabirabad and its close vicinity villages (Qalagayn, Kurkendi, Suqavuşan, Qafarli, Qaralar, Asadli, Bulaqlı, Balakent) will be served. Two options have been formed for the water supply system of Sabirabad. From the views of investment and operational costs the both options seem similar. But option-2 is most feasible because of the joint water intake, pump main and centralized DWTP for Sabirabad and Sabirabad to be constructed at the site in boundary of Sabirabad.

Identification and Comparison of Options

In the scope of this project the urban center of Sabirabad and its close vicinity villages (Qalagayn, Kurkendi, Suqavuşan, Qafarli, Qaralar, Asadli, Bulaqlı, Balakent) will be served. Two options are formed for the water supply system of Sabirabad.

In Option 1; the raw water is abstracted from Kur River. In this option pump station PS1 to be constructed at the location of existing water intake structure will include 2 compartments to supply water demand of Sabirabad and Sabirabad separately. The water demand of Sabirabad and its villages will be conveyed to new DWTP at the north of Sabirabad via pump main in 450 mm dia. and 3000 m length. The water will be treated according to EU Council Drinking Water Directives and stored in new reservoir (NR1) in DWTP site. The water will be pumped to the network.

In Option 2 the raw water is abstracted from Kur River. In this option a centralized pump station for Sabirabad and Saatli (PS1) will be constructed at the location of existing water intake structure. The water demands of Sabirabad and Saatli in total will be conveyed to new Centralized DWTP at the north of Sabirabad via pump main in 560 mm dia. and 3000 m length. The water will be treated according to EU Council Drinking Water Directives and stored in new reservoir (NR1) of Sabirabad in DWTP site. This option is completely the same with Option 1 after DWTP. The water will be pumped to the network. The difference is joint water intake, pump main and centralized DWTP for Sabirabad and Saatli.

So, Option 2 has priority over Option 1 because of the joint water intake, pump main and centralized DWTP causing lower investment.

Water Supply and Sanitation Option

This option consists from water supply system as described in Option 2 and sanitation System. The water source is Kur River as in Option 2. In this option a centralized pump station for Sabirabad and Saatli (PS1) will be constructed at the location of existing water intake structure.

In the feasibility study the wastewater treatment plant (WWTP) location have been determined during site visit. it is more than 4 km far away from urban center and at the southeast of urban.

Flowrates (Qalagayn, Kurkendi, Suqavuşan, Qafarli, Qaralar, Asadli, Bulaqlı, Balakent) discharge to network seperate points . All wastewater is collected at the SPS8 and then pumped to the WWTP. and finanly the treated wastewater will be pumped to salty water drantage chanal as near As possible.

The long-term strategy is to establish a wastewater system, which can serve urban centre of sabirabad and the villages along the interceptor sewer. Considering the long-lasting durability

of the sewers (often 50 – 100 years, which extend beyond the NWSS project design horizon of 20 years), interceptor sewer, collector sewers shall be developed for compatibility with future systems. Therefore, in order to provide additional buffer for future collection capacity, interceptor sewer and collector sewers are designed for the hydraulic load of the maximum service area.

The population equivalents and raw wastewater flows applied for the design of the treatment plants for a design horizon of 20 years, i.e. for year 2030. With regard to the population equivalent figures it is to be mentioned that they include the serviced inhabitants as well as surcharges for industries, commercial and budget organizations and other specific needs.

The sewerage service area and collection network will include only the rayon centre of Sabirabad with its close proximity, and the villages along the interceptor sewer.

96,746 km sewerage network including 16,856 km collectors will be designed.

Location for WWTP have been determined during the site visits and the network and collection system have been formed according to the location of WWTP. The daily average waste waters to WWTP are 10,919 m³/day.

Public Consultation Summary and Information Disclosure

Consultations with relevant Governmental organisations and the public are an important component of the EIA process. They often provide valuable insight in to the Project Area and act as a source of guidance in the scoping of the EIA study, ensuring that all the appropriate issues are addressed and that official organisations are in agreement to the scope of the study.

According to the Azerbaijan Environmental Protection Law, consultations with local communities and NGOs must be conducted and their participation should be provided in all stages of project implementation. The national legislation includes for public consultation at the stage of drafting the ToR for the EIA study and then again once the draft EIA report has been prepared.

During the EIA document preparation the consultant held meeting with residents of Sabirabad town on 15 March 2011 on water supply system and sewage services and suggestions on the project and knew their opinions. Second meeting had been conducted in Sabirabad town on April 29, 2011 with the participation of representatives of population of 4 regions (Bilasuvar, Saatly, Sabirabad, Hajigabul). The “Sukanal” branch office of Sabirabad had organized public hearings in collaboration with the “Azersu” JSC and local residents, officials of villages/village representatives, local NGOs ad other interested parties had been invited to this event (Annex 3).

Taking into the consideration water shortage in the region, most of the specialists also supported the treatment of waste waters and turbid according to the standards to be used in agriculture.

In discussions between the Bank and AZERSU, it was agreed to hold additional public consultations and press releases will be disclosed at all stages of the project implementation in compliance with Azerbaijani laws on NGOs and Media, as well World Bank Policy on

Disclosure of Information. Information about the project will also be disclosed on internet sites of Azersu (www.azersu.az) and Caucasus Environmental NGO Network (CENN).

All parties involved in the project are mindful of the potential disruption to residents due to the large scale of work within the town and villages and it is planned to hold further consultation with residents prior to commencement of construction works. It has been agreed that the contractor will develop a traffic/work plan in consultation with AZERSU, the municipality and local residents, to minimise disruption caused particularly by the street works. All efforts will be made to synchronise work components, especially water and sewer networks, and to expedite sidewalk and pavement reinstatement. This approach will be included within the bidding documents, to ensure its implementation.

There is possibility of conflicts with local people during the project implementation, because construction works will cause inconvenience. If any conflicts, these will be solved through mutual discussions and in accordance with the grievance mechanism in the RPF developed for the project.

After the completion of the draft EIA report the copies of the report are going to be submitted to the Government of Azerbaijan and the World Bank with the aim to get concerns or proposals. The WB will be creating conditions for availability of the Environmental Impact Assessment Report (in Azerbaijani language) by the groups affected with the implementation of the project and by non – governmental organizations. After the official adoption of the Final Report on Environmental Impact Assessment it will be disclosed for the wide public on the infoshop system of the WB.

Environmental Management Plan

This section of the report presents an Environmental Management Plan (EMP) for the Sabirabad scheme, which outlines the management mechanisms (i.e. working arrangements) for how the environmental and social elements of the project will be managed from detailed design and construction through operation.

The purpose of the EMP is to ensure that any potentially negative environmental impacts during construction and operation are kept at an acceptable level. It sets out to ensure that all aspects of the works comply with the relevant legislation, licence conditions and good practice, and that measures to mitigate impacts identified in the EIA are implemented. The EMP implements appropriate environmental controls and monitoring procedures during construction and after the work is completed.

The EMP contains environmental requirements which are required for the successful implementation of mitigation measures, environmental monitoring, emergency measures and environmental auditing to be carried out during the construction works on the site. The implementation of mitigation measures and emergency measures shall be the responsibility of the Contractor. He shall ensure compliance with all environmental legislation, regulations and conventions. The responsibility for environmental monitoring lies with the AZERSU and the World Bank.

The Contractor will be contractually required to conform to the requirements specified in the EIA and EMP and will be accountable to AZERSU, as the client, through its Project Implementation Unit (PIU). As the contract for the project has already been tendered, a

Variation Order will be issued for these additional requirements, namely compliance to the findings of the EIA and the EMP.

It is recommended (as agreed with AZERSU) that the PIU is supported in achieving project environmental and social safeguard objectives by support from a local environmental consultant. The precise details have not yet been determined, but the consultant will advise and support the PIU in implementation of the EIA standards during construction and into operation.

There are several mechanisms of ensuring delivery during construction of both general and site specific mitigation developed in EIAs. One mechanism involves requiring the Contractor to further develop the outline requirements in an EMP by designing individual Management Plans (MPs), such as oil and fuel storage, waste management, traffic management and pollution prevention. This approach is favoured for the project, as it encourages early evaluation of these aspects by the contractor and he produces a set of MPs that can be checked and verified on site and are auditable through the monitoring process. Table 7-1 outlines the content of the MPs to be produced by the contractor and their development will be assisted by the Environmental Consultant from AZERSU PIU, in conjunction with Bank Environmental staff in Baku.

This approach for each individual scheme will benefit from oversight by the PIU to form a set of environmental requirements applicable to the project as a whole, which will ensure compliance of the work to both national and Bank standards. Such measures will be mandated in the bidding and contract documents, so that an overall good standard of work is achieved. This approach also has benefits of institutional capacity training, as the knowledge and capability of AZERSU will be extended to effective environmental management and as each scheme comes on stream the PIU will benefit from knowledge gained on previous schemes.

A tabulated summary of the environmental management is presented in Table 7.2 of the main report and a brief summary of key aspects is presented below.

Construction aspects

Aspect	Mitigation	Responsibility	Monitoring
Noise, vibration and general disturbance and disruption to residents	Consultation with residents. Adherence to agreed working hours and project standards; use of mitigation techniques such as screens and good maintenance. Development and implementation of traffic management plan.	Contractor	AZERSU
Health and safety of residents and workers	Adherence to project standards, good signage, ongoing consultation with residents, including schools. All workers to use appropriate PPE	Contractor	AZERSU

Aspect	Mitigation	Responsibility	Monitoring
	and be trained at project induction. Safety fencing provided.		
Soil and water pollution	Project standards applied, including oil and fuel storage and management. Clean-up and emergency planning procedures developed and implemented.	Contractor	AZERSU
Wastewater contamination	Project standards applied, including safe removal of wastewater during renovation works, use of appropriate PPE by workers and ongoing liaison with residents and fencing off contaminated areas.	Contractor	AZERSU
Dust and nuisance from material delivery and transport	Project standards applied, including traffic speed restrictions, agreed timing and routes and material covered and ongoing liaison with residents.	Contractor	AZERSU
Soil erosion and habitat reinstatement	Project standards applied, including soil erosion prevention by good soil practice and drainage control. Good soil conservation measures and effective reins to prevent future erosion and soil loss.	Contractor	AZERSU
Imported material	Project standards applied including purchase of materials for licensed sources; no unauthorised borrowing of material. Lisenziya almış mənbələr üçün materialların alınması daxil olmaqla layihə standartları tətbiq olunmalıdır; heç bir mənşəyi olmayan materialın alınması olmamalıdır.	Contractor	AZERSU
Archaeological protection	Adherence to agreed measures for any late finds	Contractor	AZERSU
Resettlement aspects	Adherence to agreed RPF, which includes provision of replacement lands for lost access to plot of arable land.	AZERSU	World Bank

The above mitigation will be monitored by regular inspections by the contractor supervisors and the PIU of AZERSU and supplemented by supervision inspections by Bank staff.

Operational aspects

There are few mitigating measures required during the operation of the water and sanitation works, however the safe disposal and preferably effective use of the generated sludge will need to be arranged between AZERSU and the Ministry of Ecology and Natural Resources (MENR). This is typically an issue without significant adverse environmental effects, as throughout Europe in compliance with the EU UWWT Directive, sludge is routinely processed to render it a useful soil additive or source of composting material. Whilst the WWTW has not yet been subject to detailed design, the design philosophy is already fixed with the objective of producing a compliant sludge and therefore the infrastructure will be provided for such an operation theoretically, an option exists simply to dispose of sludge in a landfill, but this will not be in keeping with the objectives of the EU UWWT Directive, which encourages recycling of the sludge bio-matter.

AZERSU as the operator of the WWT works will be required to conduct monitoring of the quality of the treated wastewater discharged, as well as that of the sludge generated, to ensure compliance to the design standards. The discharge monitoring has been developed to include downstream quality measurements, from which it will also be possible to evaluate some of the environmental benefits of the project, as hopefully the aquatic habitats will return to their previously unpolluted state.