# Initial Environmental Examination

Project Number: 42408
March 2013

# Republic of Azerbaijan: Water Supply and Sanitation Investment Program – Aghjabedi Town Water Supply Subproject (Tranche 3)

Prepared by AzerSu, Government of Republic of Azerbaijan for the Asian Development Bank.

## CURRENCY EQUIVALENTS
(as of 1 April 2013)

| | | |
|---|---|---|
| Currency Unit | = | Azeri Manat (AZN) |
| AZN1.00 | = | US $ 1.16 |
| US $1.00 | = | AZN 0.86 |

## ABBREVIATIONS

| | | |
|---|---|---|
| ADB | − | Asian Development Bank |
| WSS | − | Water Supply & Sanitation |
| MFF | − | Mult-tranche Financing Facility |
| AzerSu | − | AZERSU Joint Stock Company |
| SAWMA | − | State Amelioration and Water Management Agency |
| EA | − | Executing Agency |
| EAC | − | Expert Appraisal Committee |
| EARF | − | Environmental Assessment & Review Framework |
| EIA | − | Environmental Impact Assessment |
| EMP | − | Environmental Management Plan |
| PMF | − | Program Management Facility |
| RA | − | The Republic of Azerbaijan |
| MENR | − | Ministry of Environment and Natural Resources |
| MSL | − | Mean Sea Level |
| WWTP | − | Wastewater Treatment Plant |
| IA | − | Implementing Agency |
| IEE | − | Initial Environmental Examination |
| SAIC | − | State Amelioration and Irrigation Committee |
| RF | − | Resettlement Framework |
| PVC | − | Polyvinyl Chloride |
| HDPE | − | High Density Poly Ethylene |
| EMP | − | Environmental Management Plan |
| JSC | − | Joint Stock Company |
| M&E | − | Monitoring and Evaluation |
| SES | − | Sanitary Epidemiology Service, Ministry of Health |

## NOTES

(i) The fiscal year (FY) of the Government of Azerbaijan ends on 31 December. FY before a calendar year denotes the year in which the fiscal year ends, e.g., FY2008 ends on 31 December 2008.

(ii) In this report, "$" refers to US dollars

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## Appendix

# I. EXECUTIVE SUMMARY

1. The Asian Development Bank (ADB) funded Azerbaijan Water Supply and Sanitation Investment Program is intended to optimize social and economic development in selected secondary towns through improved water and sanitation (WSS) services. This Investment Program is in continuation to the ongoing ADB assistance in WSS Sector (Loan 2119 - Azerbaijan Water and Sanitation Improvement Project), and will cover: (i) WSS infrastructure development in the towns of Agdash, Goychay, Nakhchivan, Aghjabedi, Beylagan, Balakan and other developing urban centers, and the peripheral areas of Baku; (ii) Management Improvement and Capacity Development of WSS agencies; and (iii) a Program Management Facility (PMF) that will oversee the Program development, implementation and management. This will be implemented through multi-trance financing facility of ADB over a period of 8 years (2010-2018). The Azersu Joint Stock Company (AZERSU) is the Executing Agency. PMF, created at AZERSU, is responsible for project implementation, and is supported by international and national consultants. At the field level, a Project Implementation Review Committee will review progress and ensure timely resolution of operational issues.

2. ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for Environmental Assessment are described in ADB's Safeguard Policy Statement (2009). This states that ADB requires environmental assessment of all project loans, program loans, sector loans, sector development program loans, loans involving financial intermediaries, and private sector loans. Accordingly, this Initial Environmental Examination (IEE) Report has been prepared for Agjhabedi Town Water Supply, to be implemented in Tranche 3. Components of this subproject are: (i) water supply infrastructure - eight artesian wells, water collection point, pumping systems, pumping water main, internal roads in facilities, chlorination facility water testing lab, storage reservoirs, water distribution network, and house connections, and (ii) administrative building and workshop. Subproject is currently in bid preparation stage. Construction is likely to start in November 2013 and will be completed in 18 months.

3. The subproject sites are located in existing roads right of way and government-owned lands and are clear of human habitation. There are no protected areas, wetlands, mangroves, or estuaries. Due to careful location of sites, there is no need for land acquisition and relocation of people. Trees, vegetation (mostly shrubs and grasses), and animals in the subproject site are those commonly found in built-up areas. The proposed development of groundwater source is not likely to have any adverse impacts on groundwater regime. A review of groundwater resource availability and detailed investigations concluded that there are adequate resources to meet the design demand of Aghjabedi. The geological structure of the area is stable and no potential land subsidence is foreseen. Groundwater quality is good and meets the national standards.

4. Regardless of these various actions in locating and designing infrastructure during the IEE process, there will still be impacts on the environment when the infrastructure is built and when it is operating. This is mainly because of the invasive nature of trenching; and because the pipe lines are located in an inhabited town where there are densely populated areas. Because of these factors the considerable impacts are on the physical and human environment.

5. During the construction phase, impacts mainly arise from the need to dispose of large quantities of waste soil and import a similar amount of sand to support the pipes in the trenches; from disposal of water collected in trenched while their being dug; and from the nuisance

to/disturbance of residents, businesses and traffic by the construction work. These are common impacts of construction in urban areas, and there are well developed methods for their mitigation. These include: (i) finding beneficial uses for waste material; (ii) safe disposal of water from trenches in a temporary pond and allowing only clarified water into drainage channels; (iii) covering soil and sand during transportation and when stored on site; (iv) planning work to minimize disruption of traffic and communities; and (v) Providing temporary structures to maintain access across trenches where required.

6. Once the system is operating, most facilities will operate with routine maintenance, which should not affect the environment. Leaks in the network will need to be repaired from time to time, but environmental impacts will be much less than those of the construction period as the work will be infrequent, affecting small areas only.

7. The major impacts of the implementation of water supply subproject will be beneficial to the citizens of Aghjabedi as it will provide constant supply of water and safe sewage disposal, which will serve a greater proportion of the population. This will improve the quality of life of people as well as benefiting both individual and public health as the improvements in hygiene should reduce the incidence of disease associated with poor sanitation. This should lead to economic gains as people will be away from work less and will spend less on healthcare, so their incomes should increase.

8. An Environmental Management Plan (EMP) is proposed as part of this IEE which includes (i) mitigation measures for significant environmental impacts during implementation, (ii) environmental monitoring program, and the responsible entities for mitigation, monitoring, and reporting; (iii) public consultation and information disclosure; and (iv) grievance redress mechanism. Mitigation measures have been developed to reduce all negative impacts to acceptable levels. A number of impacts and their significance have already been reduced by amending the designs. Mitigation will be assured by a program of environmental monitoring to be conducted during construction stages. The environmental monitoring program will ensure that all measures are implemented, and will determine whether the environment is protected as intended. It will include observations on- and off-site, document checks, and interviews with workers and beneficiaries. Any requirements for remedial action will be reported to the ADB.

9. The stakeholders were involved in developing the IEE through discussions on site and public consultation after which views expressed were incorporated into the IEE and the planning and development of the project. The IEE is made available at public locations and will be disclosed to a wider audience via the ADB website. The consultation process will be continued and expanded during project implementation to ensure that stakeholders are fully engaged in the project and have the opportunity to participate in its development and implementation.

10. Therefore, the components proposed under this water supply subproject in Aghjabedi are unlikely to cause significant adverse impacts. The potential impacts that are associated with design, construction, and operation can be mitigated to standard levels without much difficulty through proper engineering design and the incorporation/application of recommended mitigation measures and procedures. Based on the findings of the IEE, the classification of the Project as Category “B” is confirmed, and no further study or detailed EIA is required to comply with ADB SPS (2009). As per the Law of Environmental Protection 1999, an EIA study and approval from MNER is necessary for this subproject. Similarly, permission from MNER is required for groundwater abstraction. AzerSu is in the process of obtaining these mandatory approvals/permissions from MNER.

# II. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

## A. Azerbaijan Environmental Regulatory Framework

11. **Constitutional Provisions**. The constitution of the Republic of Azerbaijan embodies precepts and principles for environmental protection, ownership of natural resources and preservation of cultural heritage. Article 14 of Chapter III (Basic rights and liberties of a person and citizen) entails the state ownership of natural resources, without prejudice to rights and interests of any persons and legal entities. Article 39 constitutes the right to live in a healthy environment, to gain information about true ecological situation and to get compensation for damage done to his/her health and property because of violation of ecological requirements. Article 40 states the rights to practice and participate in culture and protection of historical, cultural, and spiritual inheritance and memorials. In Chapter IV (Main responsibilities of citizens), Article 77 states the responsibilities for protection of historical and cultural memorials; while Article 78 stipulates the citizen's responsibility for protection of environment.

12. Drawing from the constitutional provisions, the Government of Azerbaijan enacted various legal instruments – Parliamentary legislations that defines and establishes the State regulation of protected natural areas, and the protection and use of the environment and biodiversity; Presidential Decrees and orders, the Cabinet of Ministers resolutions, and By-laws of the executive authorities (Ministries and Committees).

13. **Laws**. The Laws/Regulations currently in force in Azerbaijan that deal with environmental protection are listed below:

(i) Environmental Protection and Utilization of Natural Resources (1992)
(ii) Environmental Protection (1999)
(iii) State Ecological Expertise (1996)
(iv) Environmental Safety (1999)
(v) Water Code of the Azerbaijan Republic (1998)
(vi) Water Supply and Wastewater (2000)
(vii) Health Protection (1999)
(viii) Sanitary-Hygienic State (1992), part of GOST
(ix) Water quality, air and noise standards: GOST (various years)
(x) Program on Strengthening Financial Discipline in the Water Sector (2002)
(xi) Improvement of Water Supply Management (2004)
(xii) Construction Norms and Regulations: SNiP
(xiii) Rule for Use, Protection and Preservation of Trees and Bushes (No 173; September, 2005)
(xiv) The Land Code (25 June 1999)
(xv) European Economic Community Directive on Wastewater 91/271/EEC (1991)

14. The fundamental legislation concerning environmental protection and conservation in Azerbaijan is the Law on Environmental Protection of 1999 (EP Law, 1999), which lays down the basis for the legal, economic, and social aspects of environment protection. The objective of this Law is to protect environmental balance thus ensuring environmental safety, prevent the hazardous impact of industry and other activities to natural ecological systems, preservation of biological diversity and proper use of natural resources. Detailed information on the most pertinent laws to be applied for this subproject are explained in Table 1:

**Table 1: Laws & Regulations on Environmental Protection in Azerbaijan**

| Legislation | Description |
|---|---|
| Law on Environment Protection, 1999 | This Law establishes the main environmental protection principles, and the rights and obligations of the State, public associations and citizens regarding environmental protection. **According to Article 54.2 of the Law, EIA is subject to SEE**. This also explains that the MENR is responsible for the review and approval of EIA reports submitted by developers. Furthermore, in Articles 81 and 82 of the Law on Environmental Protection (1999), the Law specifically provides for the application of international agreements in case an international institute or body has provisions that are different from those of the Azerbaijani legislation.<br><br>**Articles 35, 36, 37, and 38: Ecological Demands during Project Design and Implementation.** During the feasibility study, it should be confirmed that the project will comply with:<br>• the maximum permitted discharges and emissions of pollutants in the natural environment<br>• the maximum permitted noise and vibration levels, and other harmful physical influences as well as health norms and standards of hygiene<br><br>**Article 50: Ecological Expertise** requires identification of impact on environment caused by any activities, examine the results of such impacts and predict possible impacts in accordance with the environmental requirements and qualitative parameters of environment.<br><br>**Article 54: Objects of the State Ecological Expertise** defines the types of project which require compulsory "State Ecological Expertise (SEE)', i.e. to undergo the systematic EIA process. |
| State Ecological Expertise (SEE) | SEE mandates an EIA for infrastructure development projects. The objective of the SEE is to identify impacts on the environment caused by construction projects, examine the results of such impacts and propose mitigation measures to prevent adverse effects on the natural environment and people's health. It is essentially a stand-alone check of compliance of the proposed activity with the relevant environmental standards (e.g. for pollution levels, discharges, and noise). |
| Law on Ecological Safety, 1999 | This law defines legal bases of ecological safety as component safety of the state, society and population, the purpose of which is establishment of legal bases for protection of life and health of the person, society, its material and moral values, environment, including atmospheric air, space , water objects, resources of the ground, natural landscape, plants and animals from danger, arising as a result influence natural and anthropogenic action |
| Law on Sanitary-Hygienic State (GOST 17.1.3.07-82) | This law serves as a basis for drinking water quality standards and mandatory implementation of sanitary-hygienic expertise regarding chemical and biological standards for water quality. Similarly, noise standards are described in GOST 12.1.003-83. However, the GOST does not specify regulations on permitted effluent discharge levels post wastewater treatment. As such, Azerbaijan has adopted |

| | |
|---|---|
| | Directive No 91/271 from the European Environmental Commission (EEC) in GOST. This regulation identifies the allowable biological and chemical levels for sewage effluent.<br><br>Standards/maximum allowable values notified/adopted by Government of Azerbaijan are in appendices – Drinking Water Quality (**Appendix 2**); ambient air quality (**Appendix 3**) and noise levels (**Appendix 4**). |
| Water Code (1998) | The Water Code (1998) regulates legal relations concerning the protection and use of water bodies (surface, subsoil, and boundary water bodies) in Azerbaijan. The Law details the obligations of the State with respect to the use and protection of water bodies in terms of monitoring and protection schemes as well as the supervision over the use and protection of water bodies. The items most relevant to the Investment Program include the outlining of (i) the use of water bodies as potable and service water; (ii) the use of specially protected water bodies; and (iii) the use of water bodies for the discharge of wastewaters. |
| Permission for groundwater use - Decision no 133 dated June 6, 1998 of the Cabinet of Ministers | Prior approval/clearance of the Ministry of Ecology and Natural Resources is necessary for the utilization of ground waters |
| Construction Norms and Regulations | The Construction Norms and Regulations are identified in SNiP which details how to carry out noise reduction measures to assure compliance with the relevant sanitary norms (section 3.9) and it details regulations on the dumping of excess materials (section 3.12). SNIP III-4-80 also details regulations on construction worker's health and safety. Chapters 2 and 5 provide organizational procedures of construction work sites and material transport. Annex 9 contains standards on maximum concentrations of toxic substances in the air of working zones. Annex 11 specifically claims that workers need to be informed and trained about sanitation and health care issues and the specific hazards of their work. |
| Rule for Use, Protection and Preservation of Trees and Bushes (2005) | The Rule for Use, Protection and Preservation of Trees and Bushes (2005) is a regulation that details the way to protect trees and shrubs in case of necessary cutting or replanting. These trees are excluded from the Forestry Fund of the Azerbaijan Republic. |
| Land Code (1999) | Article 22 of the Land Code (1999) stipulates that the state is required to establish protection zones with a special (restrictive) regime for the purpose of construction and operation of industrial facilities |
| The European Economic Community Directive on Wastewater (1991) | The European Economic Community Directive on Wastewater (1991) regulates the collection, treatment and discharge of domestic wastewater and wastewater from industrial sectors. The directive includes requirements for monitoring the performance of treatment plants and receiving waters. Also, it mandates measures for sludge disposal and re-use as well as means to re-use treated wastewater. |

15. **International Treaties/Conventions**. Azerbaijan is signatory/party to most of the environmental-related international Treaties, Agreements and Conventions (see Table below). As stated in Article 151 (Legal value of international acts) of the Azerbaijan Constitution, agreements in International Conventions supersede national laws in case of conflict. This principle is embodied in Articles 81 and 82, Chapter 14 (International Co-Operation on Environment Protection Issues) of the Law on Environmental Protection, 1999.

**Table 2: International Conventions/Treaties Ratified by Azerbaijan**

| S. No | International Convention | Year Ratified |
|---|---|---|
| 1 | UNESCO Convention on Protection of World Cultural and Natural Heritage | 1994 |
| 2 | UN Convention for the Protection of the Ozone Layer (Vienna Convention) | 1996 |
| 3 | Agreement on Mutual Cooperation of the Commonwealth of Independent States in the area of Hydrometeorology | 1998 |
| 4 | Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and Agreement on Protection of Sturgeons | 1998 |
| 5 | UN Convention to Combat Desertification | 1998 |
| 6 | UN Convention on Environmental Impact Assessment in the Trans-boundary Context (Espoo Convention) | 1999 |
| 7 | Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) | 1999 |
| 8 | UNECE Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention) | 1999 |
| 9 | UNESCO Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention) | 2001 |
| 10 | UNECE Convention on the Protection and Use of Trans-boundary Watercourses and International Lakes (Helsinki Convention) | 2000 |
| 11 | UN Convention on Biological Diversity | 2000 |
| 12 | FAO Convention on Plant Protection | 2000 |
| 13 | Protocol on UN Framework Convention on Climate (Kyoto Protocol) | 2000 |
| 14 | Protocol on Substances that Deplete the Ozone Layer (Montreal Protocol) | 2000 |
| 15 | European Agreement about Transportation of Dangerous Goods on International Routes | 2000 |
| 16 | UN Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel Convention) | 2001 |
| 17 | UNECE Convention on Long-Range Trans-boundary Air Pollution | 2002 |

16. **Institutions.** There are four principal environmental institutions (or Ministries in Azerbaijan and the NAR) who handle water resources protection, management and operation. These include (i) MENR, (ii) the Ministry of Health, (iii) the Ministry of Emergency Situations (which implements construction safety supervision and standards and regulates safe sewage discharges and WSS operations), and (iv) AzerSu / State Amelioration and Water Management Agency (SAWMA) who will manage the WSS in their respective areas under the Investment Program:

(i) **Ministry of Ecology and Natural Resources.** Ministry of Ecology and Natural Resources1 (MENR) is the primary institution entrusted with the responsibility of environmental protection and implementation of environmental related laws. The functions and activities of the MENR are sub-divided into the following areas: (i) Environmental policy development; (ii) Environmental protection; (iii) Water monitoring and management; (iv) Protection of marine (Caspian Sea) bio-resources; (v) Forest management; and (vi) Bio-resources and protected areas management. This ministry upholds all natural resource protection laws. The

[1] A Presidential Decree in 2001 transformed the former State Committee for Ecology and Natural Resources 134Utilization (SCENRU) into the MENR. Thereon, along with its inherent mandate from SCENRU, the MENR assumed over the functions of several other state bodies such as the departments of Hydrometeorology, Geology, Forestry, and Fishery.

State Ecological Expertise (SEE) acts within this agency on the Program level in reviewing Environmental Impact Assessments (EIAs).

(ii) **Ministry of Health: (Sanitary and Epidemiology Service sub-body within Azerbaijan only).** Sanitary and hygienic safety is the responsibility of the Ministry of Health. Its main function is the implementation of control over meeting the sanitary and epidemiological rules and standards as well as hygienic standards. This entity implements anti-epidemiological measures throughout Azerbaijan and NAR by legal and physical persons through application of laboratory and sampling controls.

(iii) **Ministry of Emergency Situations (Commission of Emergency Situations in the NAR).** This agency implements construction safety supervision and standards. Their main involvement in this Program will be to regulate leakage from sewer lines, safe discharges from the sewage treatment system, and safe operation of the wastewater treatment plant and water treatment units.

(iv) **AzerSu, Agjhabedi JSC.** Agjhabedi Joint Stock Company (JSC) manages and operates the water and wastewater infrastructure such as the delivery of potable water and the collection of wastewater in Agjhabedi. It also manages and operates the water and wastewater treatment plants in the town.

## B. Environmental Assessment Procedure in Azerbaijan

17. **Legislation**. State Ecological Expertise (SEE) under the Law on Environmental Protection, 1999, sets out the requirement for environmental assessment in Azerbaijan. Procedures for Environmental Assessment are stipulated therein. The objective of the SEE is to identify impacts on environment caused by development activities/industrial units, examine the results of such impacts and predicting possible ones, in accordance with the environmental requirements and qualitative parameters of environment (Article 50 of EP Law). Article 52 of EP Law stipulates the Objectives and Responsibilities of the State Ecological Expertise:.

18. The activities, fields and sectors to which SEE would apply are specified in Article 54 (The units controlled by the SEE) of the EP Law as:

- The State and local programs related to development and placement of productive capacities in governmental and economical institutions;
- The documentation of technical and economical substantiation, construction (reconstruction, enlargement, and renovation technology) and destruction of economical capacities, as well as assessment of the project influence on environment;
- Documentation concerning creation of new techniques, technologies, materials, and substances, as well as import of the same from abroad;
- Draft of scientific-methodical and normative-technical documentation concerning environment protection;
- Certain ecological conditions caused by improper work of industry and extraordinary situations;
- Ecological conditions of the regions and individual (separate) natural objects and systems;
- Provisions of draft contracts stipulating use of natural resources, as specified by the relevant decrees of the concerned executive bodies

19. **Institutions**. State Ecological Expertise (SEE) Department, under the Department of Environmental Policy and Environmental Protection of MENR is responsible for the review and approval of environmental impact assessment (EIA) reports submitted by project proponents.

20. **EA Process, Review & Approval**. The SEE adopts a 2-stage approach. The first stage takes about a month and entails an initial examination of the application of the proposed activity and the expected impacts. This stage may also include preliminary consultations with other agencies, NGOs, experts and initial public inquiries on the various aspects of the project. When determined that the project or activity will likely cause only minor impacts on the environment, the application may be approved with some conditions. On the other hand, if the activity is assessed to cause in significant impacts, a full EIA is required. Subsequently in such situation, a scoping meeting of representatives of the developer/applicant, invited experts and invited members of the public will be organized and to be chaired by the MENR. Based on the outcome of this scoping meeting, the MENR will notify the developer on the required scope and depth of the investigation and public consultation during the EIA study.

21. The second stage, which takes around three months, entails a review and investigation by the MENR of the documents submitted by the developer/proponent. A group of 5-11 expert reviewers and experienced members (e.g. members of the Academy of Science, university staff, or officials from other ministries) will be convened to perform the EIA document review and which will be chaired by MENR. The composition of the review group shall be on the discretion of the MENR but will be taken from a roster of experts who can deal adequately with project-specific environmental issues. The expert group will undertake public submissions, investigations, and consultations relevant to the project impacts as deemed necessary in the review process. Consequently, at the end of this stage, a written review of documentation together with recommendations is submitted by the environmental review expert group to the MENR.

22. The MENR then decides on whether to deny the application or to approve it, with or without conditions. In the case of infrastructure construction projects specified, these conditions include construction phase measures such as site management; noise; dust, discharges to the air land, subsurface or water, solid waste management, emergency contingency plans, etc. These conditions are set to assist the proponent/developer control the environmental impacts such that they are maintained at the acceptable limits. Should the application be approved with conditions, either the activity starts with due consideration on the conditions or the proponent/developer may opt to appeal against the conditions and resolutions may be subjected to judicial proceedings.

23. **Post Approval Monitoring**. During construction of the project, the applicant/developer should ensure adherence to conditions attached to the approval and be responsible in monitoring the developments of the projects along with regular reporting to MENR. The monitoring programme of the proponent/developer should be designed to give clear indications prior to conditions being breach. Practical corrective measures should be undertaken by the proponent/developer in order to avoid breach of any conditions stipulated in the approval.

24. The MENR is authorized to issue warning to proponent/developer should it observe that conditions are being breached. In the event, the proponent/developer is obliged to stop the activity which is causing the breach. In such cases, the MENR may reconsider the approval, possibly with the participation of the Environmental Review Expert Group, and the conditions of approval may be reviewed.

25. Should project designs be altered significantly from those presented in the in the feasibility phase EIA, additional reports on the impacts of the changes may be requested by MENR.

## C. ADB Policy

26. ADB requires the consideration of environmental issues in all aspects of its operations. Superseding the previous environment and social safeguard policies, ADB's Safeguard Policy Statement, 2009 (SPS, 2009) sets out the policy objectives, scope and triggers, and principles for three key safeguard areas: (i) environmental safeguards, (ii) involuntary resettlement safeguards, and (iii) Indigenous Peoples safeguards. ADB adopts a set of specific safeguard requirements that borrowers/clients are required to meet in addressing environmental and social impacts and risks. Borrowers/clients comply with these requirements during project preparation and implementation. The environmental safeguard requirements are indicated in Appendix 1 of SPS 2009 (Safeguard Requirements 1: Environment). This states that ADB requires environmental assessment of all project loans, program loans, sector loans, sector development program loans, and loans involving financial intermediaries, and private sector loans.

27. **Screening and Categorization**. The nature of the environmental assessment required for a project depends on the significance of its environmental impacts, which are related to the type and location of the project, the sensitivity, scale, nature and magnitude of its potential impacts, and the availability of cost-effective mitigation measures. Projects are screened for their expected environmental impact are assigned to one of the following four categories:

(i) **Category A**. Projects could have significant adverse environmental impacts. An environmental impact assessment (EIA) is required to address significant impacts.
(ii) **Category B**. Projects could have some adverse environmental impacts, but of lesser degree or significance than those in category A. An IEE is required to determine whether significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.
(iii) **Category C**. Projects are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.
(iv) **Category FI**. Projects involve a credit line through a financial intermediary or an equity investment in a financial intermediary. The financial intermediary must apply an environmental management system, unless all projects will result in insignificant impacts.

28. **Environmental Management Plan**. An environmental management plan (EMP) which addresses the potential impacts and risks identified by the environmental assessment shall be prepared. The level of detail and complexity of the EMP and the priority of the identified measures and actions will be commensurate with the project's impact and risks.

29. **Public Disclosure**. ADB will post the following safeguard documents on its website so affected people, other stakeholders, and the general public can provide meaningful inputs into the project design and implementation:

(i) For environmental category A projects, draft EIA report at least 120 days before Board consideration;

(ii) Final or updated EIA and/or IEE upon receipt; and
(iii) Environmental Monitoring Reports submitted by Implementing/Executing Agencies during project implementation upon receipt

### D. Applicability of Environmental Legislations to the Subproject

30. Proposed water supply subproject in Agjhabedi will attract the provision of EP Law, State Environmental Expertise. Therefore requires Environmental Impact Assessment Study and Report and its approval from MENR. The proposed groundwater abstraction also requires permission from MNER.

31. AzerSu is presently in the process of obtaining approvals/permissions from MNER.

### E. Extent of this IEE Study

31. The Aghjabedi Town water supply subproject is classified under the ADB SPS 2009 as environment category B, requiring IEE study. This is the IEE Report of the subproject. The purpose of this IEE is to assess potential environmental, health, safety and social impacts of the proposed subproject. No significant adverse environmental impacts have been noted in this subproject assessment.

32. The IEE was prepared during the Investment Program preparation in 2010 and was approved by ADB. The subproject is currently in bid preparation stage. , and although there are major no changes in the subproject design and location of components, the IEE is updated in line with the ADB SPS 2009.

33. The IEE study is conducted based on secondary information, primary data from various sources and field observations. During the site visit the specialists had discussions with town members and local executive powers for their feedback on the proposed project. The results of the social survey with town members as well as an evaluation of the institutional framework have been incorporated into this assessment.

## III. DESCRIPTION OF THE PROJECT

### A. Azerbaijan Water Supply and Sanitation Investment Program

34. The Asian Development Bank (ADB) funded Azerbaijan Water Supply and Sanitation Investment Program is intended to optimize social and economic development in selected secondary towns through improved water and sanitation (WSS) services. Currently, the WSS sector in Azerbaijan is characterized by institutional weakness, inefficient operation, outdated and dilapidated physical infrastructure and severe financial constraints. As a result, the WSS service levels provided to customers are low and of poor quality.

35. With the improvements undertaken in WSS sector under the ongoing assistance (ADB Loan 2119 - Azerbaijan Water and Sanitation Improvement Project), the Government of Republic of Azerbaijan has requested ADB's continued assistance in developing the country's WSS sector. The Government prioritized for ADB's consideration the implementation of WSS works in a number of secondary towns. The ADB has accepted the possibility of long-term engagement in the WSS sector through the Multi-Tranche Financing Facility (MFF) lending

modality. The MFF modality is expected to comprehensively address WSS sector development through reduced forward processing time, focusing on expeditious and streamlined implementation of physical works, and addressing the much required sector and institutional reforms.

36. This Investment Program will cover: (i) WSS infrastructure development in the towns of Agdash, Goychay, Nakhchivan, Aghjabedi, Beylagan, Balakan and other developing urban centers in the Country including the peripheral areas of Baku; (ii) Management Improvement and Capacity Development of WSS agencies to manage WSS service delivery; and (iii) a Program Management Facility that will oversee the Program development, implementation and management. The Investment Program will be implemented over a period of 8 years (2010-2018).

37. The Azersu Joint Stock Company (AZERSU) will be the Executing Agency for all project activities except those in Nakhchivan Autonomous Republic, where the State Amelioration and Water Management Agency (SAWMA) will be the Executing Agency. The project management Facility (PMF) created at AZERSU and SAWMA will be responsible for supporting project implementation. Each PMF comprises international and national consultants and counterpart staff. At the field level, a Project Implementation Review Committee will be constituted to review monthly implementation progress and ensure timely resolution of operational issues.

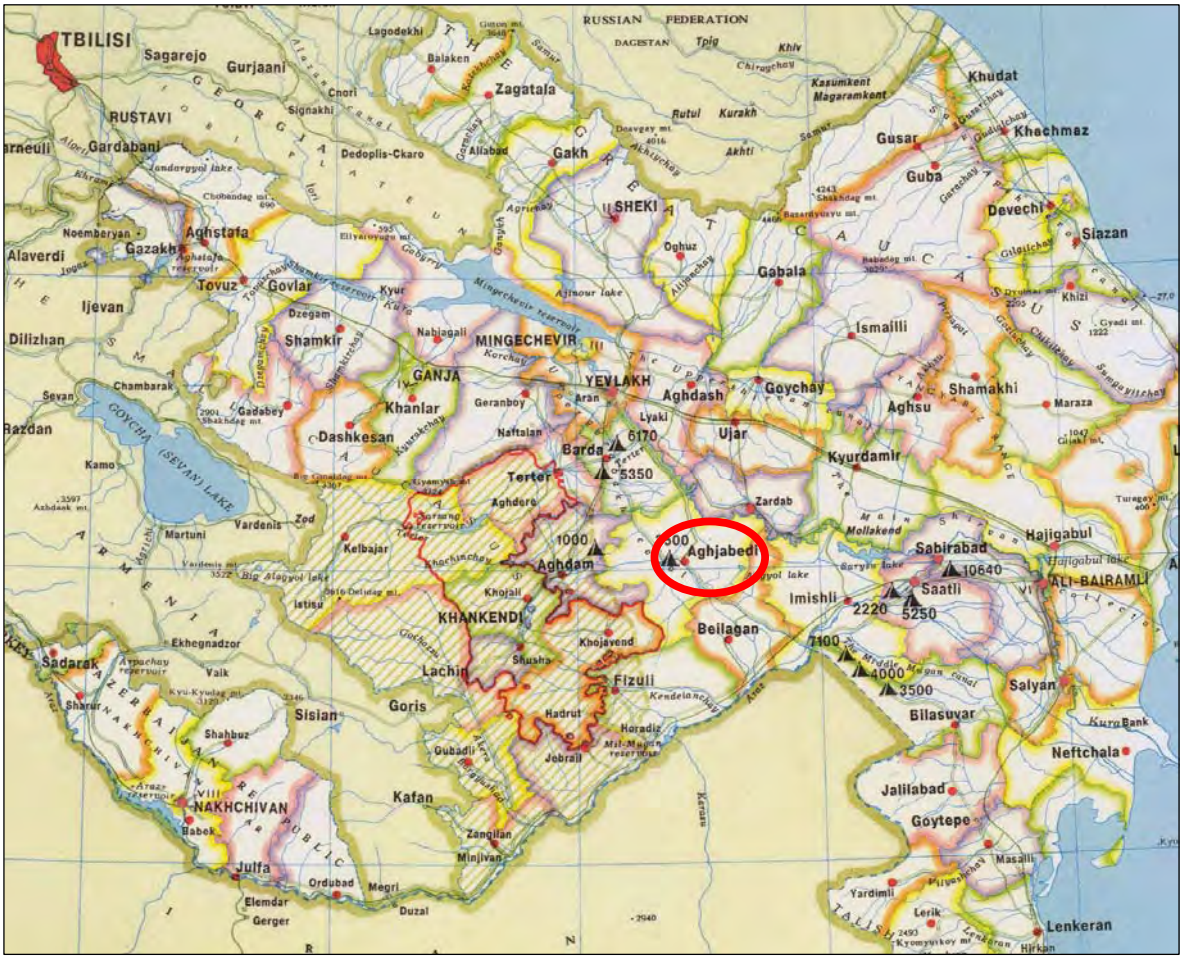
## B. Agjhabedi Town Water Supply Subproject

### 1. Need

38. Located at 363 km southwest of the Capital City Baku, Aghjabedi is an important town in the south central part of the country (Map 1).

39. Lack of water supply and wastewater collection is a major problem for Agjabedi and other towns in the Kura-Araz lowland. In Agjabedi the water supply system was laid in 1970s. The 40 year-old pipelines and storage reservoirs are in urgent need of replacement and/or repair. The existing water supply and wastewater infrastructure permit significant leakage. In addition, in Agjabedi and the surrounding rural communities, the water is only available for typically 3 hours of the day due to interrupted electricity with no back-up generator system. With the existing system, only 36.1% of the town population receives water supply.

Map 1: Project Location




40. Considering the poor water supply situation, under the Tranche-3 of the Investment program, it is proposed to implement water supply improvement subproject in Aghjabedi Town, with an objective to establish safe, reliable piped water supply and to promote a healthier environment.

## 2. Proposed Subproject Description

41. The following Table 3 shows the subproject components selected for implementation under tranche-3 in Agjhabedi Town, for which, according to ADB requirement, this IEE has been conducted. Location of proposed subproject components is shown in Map 2. Proposed water supply system and location of facilities are shown in Map 3. Layout plans of proposed facilities are shown in Map 4 (Well field), Map 5 (Reservoir Site). Layout plans of Administrative Building and Workshop Facility are presented in Map 6 and Map 7 respectively. Photographs of project sites are appended in Appendix 1.

42. **Water Source and intake**. Agjabedi town currently uses 7 boreholes at the Mughanli source area and 13 boreholes in the city for potable water. The boreholes are owned and operated by SuKanal the local branch of AzerSu, Joint Stock Company (JSC). Other boreholes in the town are managed by private institutions and organizations for their own purposes. Since 2004, volume extracted from all existing boreholes has been insufficient to cover the town's needs. There is need to improve the overall water supply system in the town by developing a centralized water supply system with adequate water intake facilities. Since the existing wells are located within the town area, it is not possible to establish sanitary zone for the group of bore wells as required by the Construction Laws and Rules. This necessitated development of new water intake. Based on the Azerbaijan Minister's Order No. 336/01/2005, the SuKanal Scientific Research and Design Institute of Azersu JSC designed Upper Karabagh canal as source of water for Aghjabedi. Since 2007 water has been extracted from this canal, however, the water quality of this surface water source is poor.

43. Under the present subproject, it is proposed develop a new well field, 15 km south-west of Aghjabedi at Village Mughanali. Site is located near the Upper Karabagh Canal. Eight new bore wells will be drilled (about 150 m deep). This source is selected considering the availability of abundance of groundwater resource and the best quality in the vicinity of Agjabedi town. According to a study completed by the Commission of State Resources in 1974 under Order No. 8041 24.03.1976 of the Soviet of Ministers in the former USSR, this groundwater region has a favorable hydro-chemical composition for potable water (Minutes 8041 24.03.1976). Also, according to a study completed by the Commission of State Resources of the Republic of Azerbaijan in 1995, this groundwater region can deliver a daily volume of 72,230 m3/day (Pr 96, 20.06 1995). Also, the quality and quantity of the underflow water is consistent with government standards for safe and reliable supply to the consumers projected through 2034. The underground water resources are more than 6 times greater than the projected water demand (11,800 m3/day) if the depth of the wells is between 100 and 150 m to exploit pressured water. Chemical analyses were taken from nearby operating wells which showed the underground waters meet the requirements of GOST 2874-82, Azerbaijan's potable water quality regulation. In effect, other than chlorination, no additional water quality measures will be required.

44. **Construction new and Rehabilitation of Existing Reservoirs**. The Program will rehabilitate two (2) existing reservoirs (1000 m3 capacity each) and construct four (4) new reservoirs (2000 m3 capacity each). The existing reservoir is currently leaking and will be rehabilitated at the same location. Chlorination facility and laboratory will be constructed at the reservoir site. Workshop facility will also be constructed at the same site. There is adequate space available for the proposed works. Land is owned by SuKanal.

45. **Gravity transmission main**. A new 9.86 km 500 mm diameter pipeline will be constructed from the new well field site to the reservoir site. The pipeline will be laid along the

Upper Karabagh canal from the well field to the town entry, and from there pipe will be laid along the town main roads up to the reservoir site

46. **Construction of New Water Networks**. The Program will include construction of 220.7 km of water network (new and replacement, 110-500 mm diameter pipe, 87% of total pipeline is of diameter 110-160 mm). The network will cover entire town, and pipes will be buried along the roads. Construction of house connections, metering is also included under the proposed works.

47. **Renovation Sukanal Office and Construction of Workshop**. The existing sukanal office of Aghjaedi will be renovated. A new workshop facility will be constructed on existing reservoir site, where there is adequate land.

**Table 3: Subproject Components**

| Infrastructure | Function | Description | Location |
|---|---|---|---|
| **1. Water Supply** | | | |
| Well field development - Artesian wells – 8 no.s | To provide 11,320 $m^3$ of water daily | Diameter of well:400 mm<br>Depth: 150 m<br>Water table depth: 1.5 to 4 m below ground level<br>Casing pipes with filter, water lifting pipes<br>Collection pipes from wells to collection point within the well field (3250 m total pipe length – 165-225 mm diameter)<br>Submersible pumps<br>8 units of wellhead cubicles<br>Power supply line from the mainline and transformer<br>Area facilities: fencing, internal roads, lighting etc | - identified site is located at village Mughanali,15 km southwest of the town<br>- site is situated in Karabakh-Mil hydrogeology massive, in the central part of the Gargarchay overflow cone, in the territory of Mughanli village characterized for its high hydrodynamic and suitable hydro-chemical parameters<br>- Site owned by AzarSu<br>- wells will be drilled maintaining a 250 m distance between the nearest ones |
| Transmission water main (gravity main) | Convey water under gravity from well field to reservoir site | Length 9,864 m - 500 mm diameter polyethylene pipes | - From water collection point in the southwestern side to Reservoir Site in the centre of the town<br>- Pipeline will be buried along the Upper Karabagh canal from the well field to the town, and from there pipe will be laid along the town main roads up to the reservoir site<br>- Involves no tree cutting |
| New storage reservoir and rehabilitation of storage reservoir & other facilities | To store water for further supply | 4 reservoirs – 2000 m3 each (new)<br>2 reservoirs of 1,000 m3 each (rehabilitation)<br>Renovation of existing water tower (50 m3) | - within the existing Reservoir Site in the town<br>- Site is located in the southern part of the town |
| Renovation of | Pump water from | Civil works rehabilitation | - within the existing |

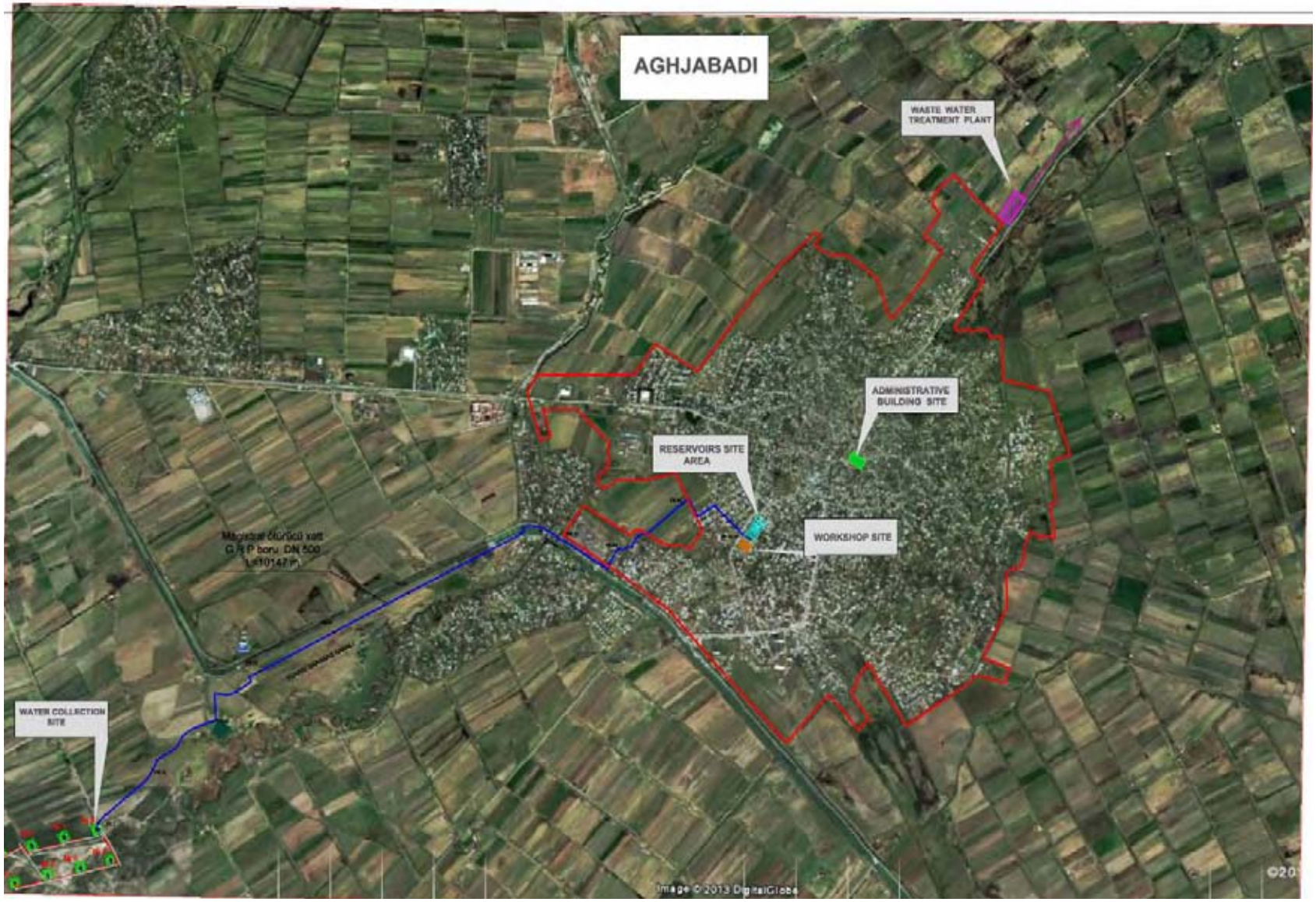
| Infrastructure | Function | Description | Location |
|---|---|---|---|
| pump station at reservoir site | reservoirs to distribution network | Installation of new pumps Transformer & generators | Reservoir Site |
| Chlorination facility | Disinfection of water | RCC building with all safety features and facilities for handling and administering chlorine in water supplies Chlorination devises – 3 units of 1 kg/hour capacity | - Within the existing Reservoir Site |
| Water testing lab | Regular monitoring of water quality | Construction of laboratory facility (25 $m^2$ building) and provision of equipment | - Within the existing Reservoir Site |
| Water distribution network | To supply water to consumers | Total length: 220.7 km<br>Diameter-wise lengths:<br>110 mm – 163.6 km<br>160 mm – 29.6 km<br>225 mm – 17.6 km<br>280 mm – 7.5 km<br>355 mm – 2.1 km<br>400 mm – 0.35 km<br>500 mm – 0.02 km<br>Material: HDPE<br>Road surface will be rehabilitated & reinstated to original after pipe laying work | - Network will cover entire town<br>- Pipes will be buried along the roads<br>- Involves no tree cutting |
| House connections | To supply water to consumers at houses | 8,500 no,s | - House service connections will be laid from the distribution line to the household premises |
| Water meters | To measures volume of water delivered to consumers | 8,500no,s | -Water meters will be installed at the household premises |
| **Administration & Support facilities** | | | |
| Administrative Office | Central administrative office for Aghjabedi JSC | • Renovation of office building<br>• Guard house<br>• Heating building<br>• Transformer<br>• Basic amenities | - Existing building is located on the Aghjabedi main road<br>-Renovation work will be within the existing foot print |
| Workshop | For maintenance and repairs of water supply and sanitation infrastructure | • Guard house<br>• Site office building<br>• Car parking area<br>• Heating building<br>• Warehouse<br>• Mechanical workshop<br>• Transformer | - on the vacant land within the existing reservoir site in the town<br>-Site is presently vacant and there are no trees |

## 3. Implementation Schedule

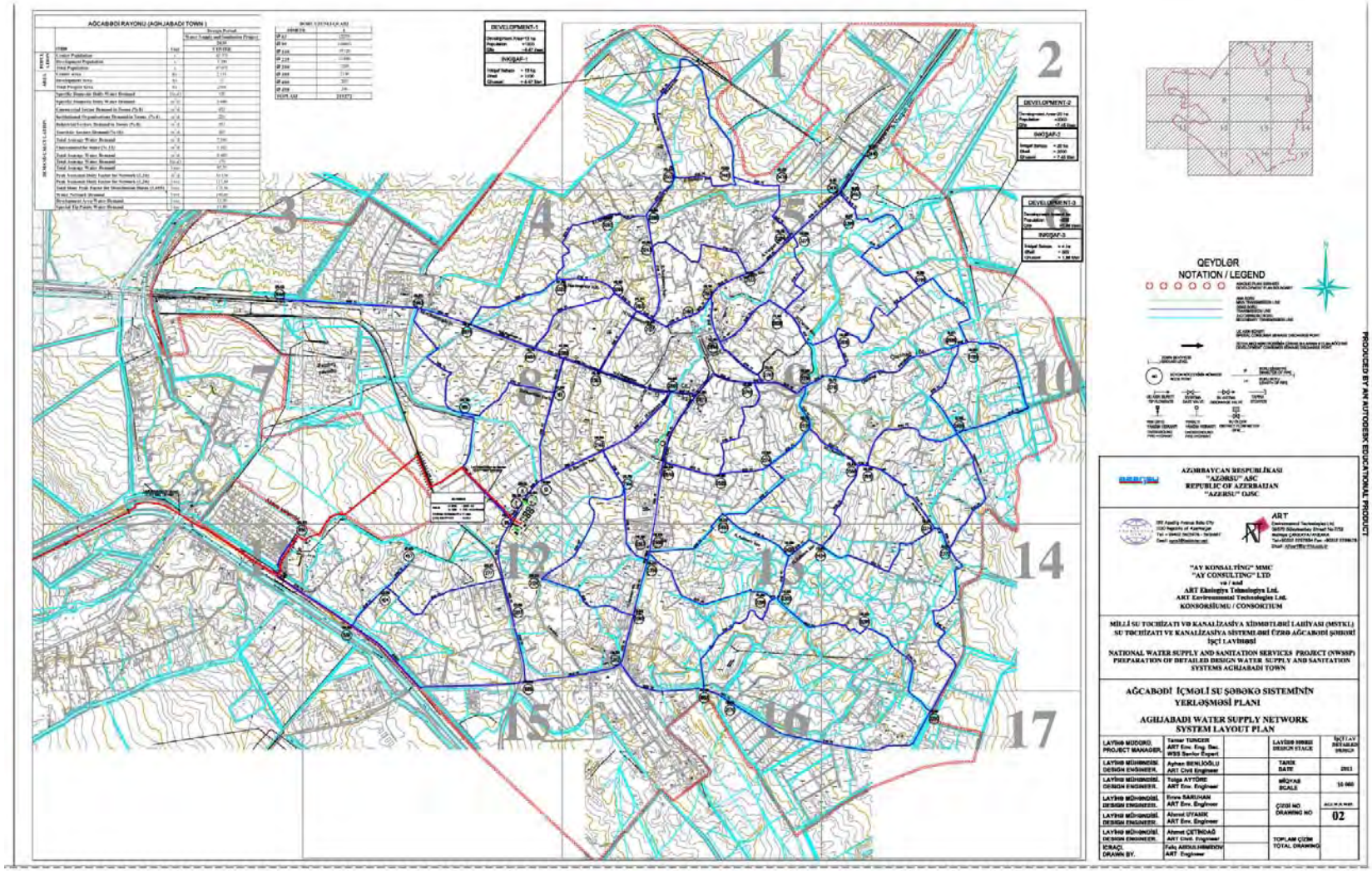
48. The construction work is to be implemented through a single packages for all the works - well field, transmission main, pumping stations, reservoirs, chlorinator, laboratory water distribution, office building, workshop and all the facilities – this will be a civil works contract.

49. Detailed design work is completed and is under approval phase. Bid preparation is underway, and the bids are likely to be invited in June 2013 and the bid process would be completed by October 2013. The construction work will commence in November 2013, and will take about 18 months, so it should complete by May 2013.

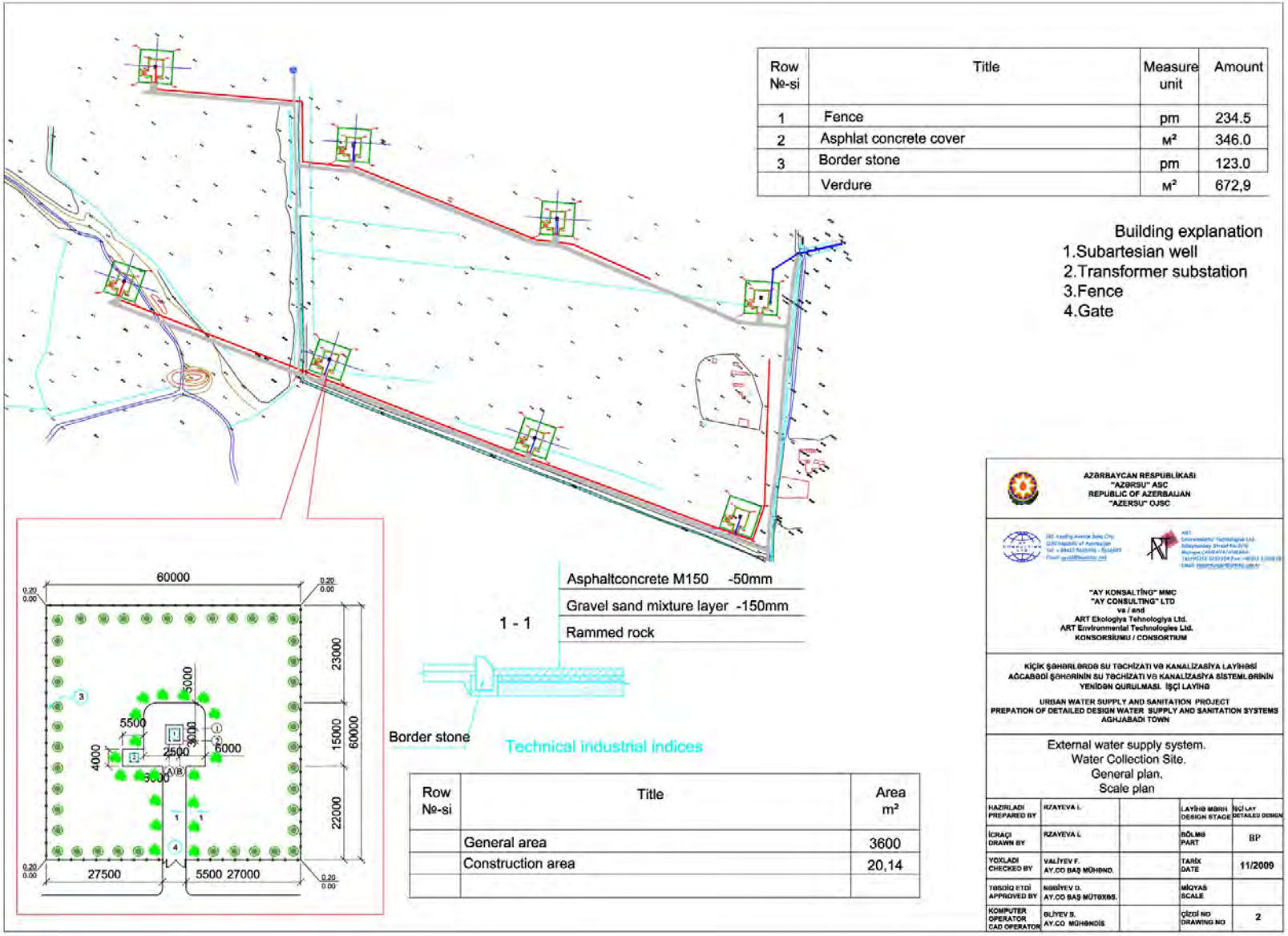
**Map 2: Location of Subproject Components**



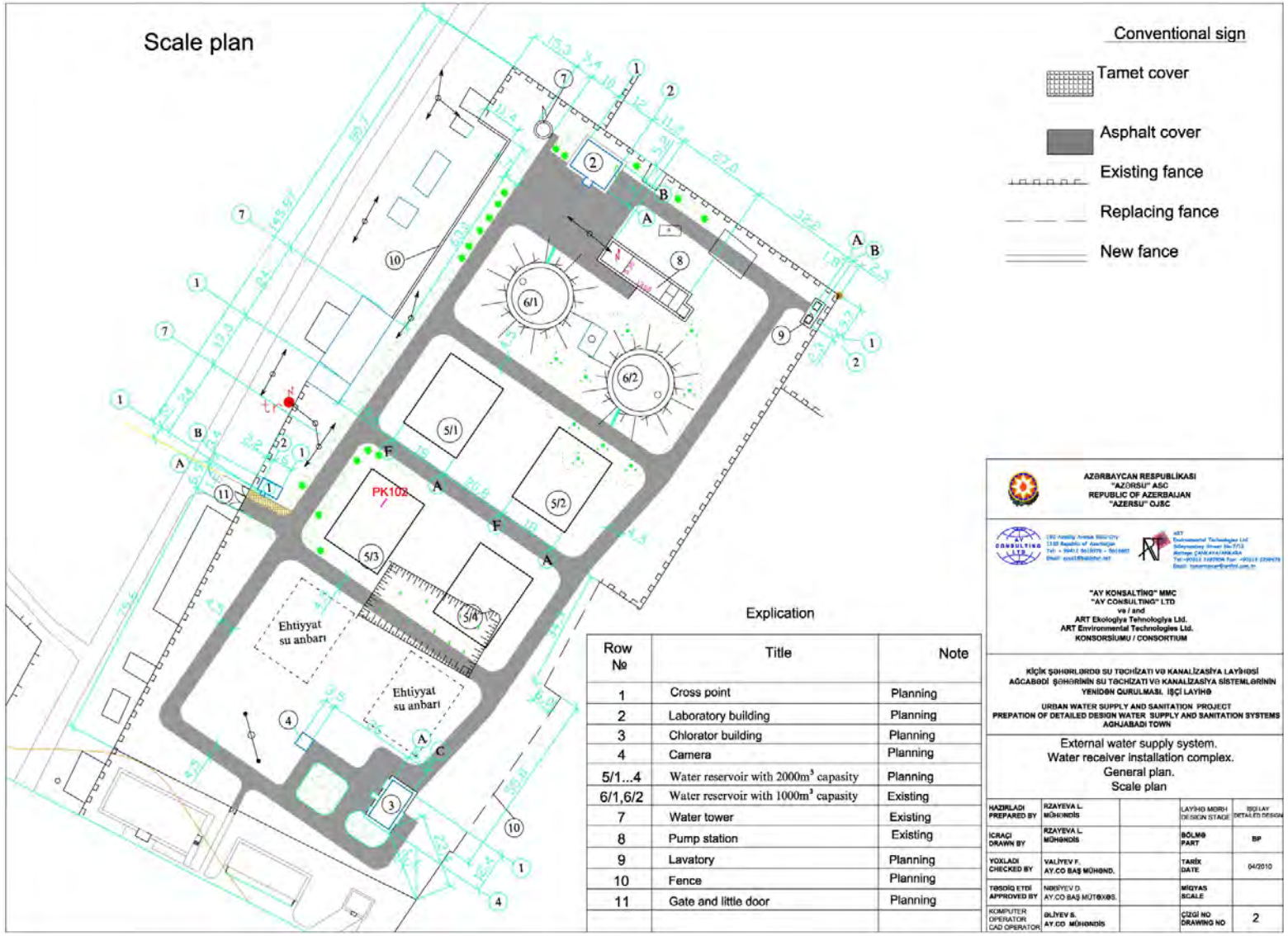
**Map 3: Proposed Water Supply System**



**Map 4: Layout Plan of Well Field**



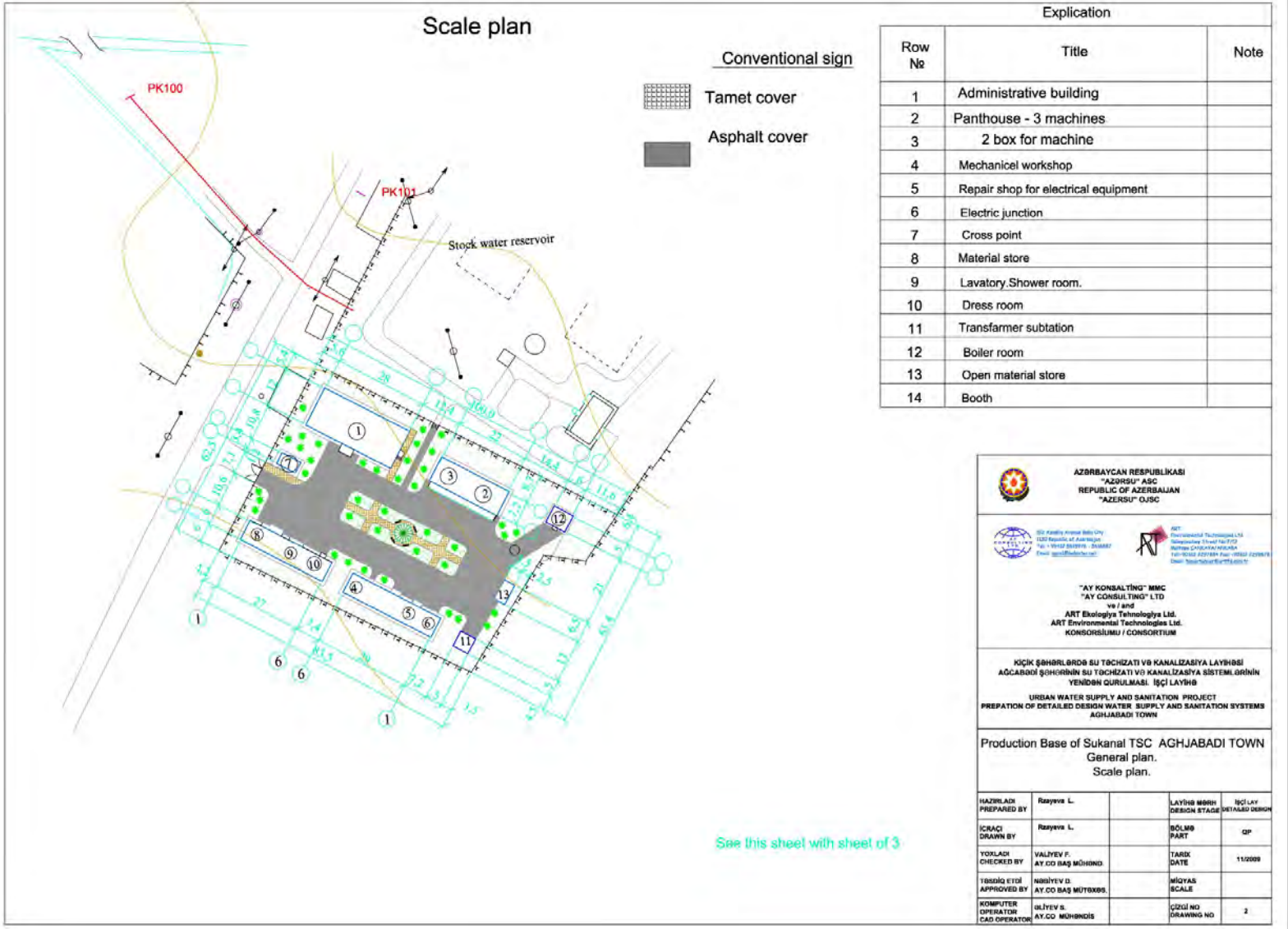
**Map 5: Layout Plan of Reservoir Site**




| Row № | Title | Note |
|---|---|---|
| 1 | Cross point | Planning |
| 2 | Laboratory building | Planning |
| 3 | Chlorator building | Planning |
| 4 | Camera | Planning |
| 5/1...4 | Water reservoir with 2000m³ capasity | Planning |
| 6/1,6/2 | Water reservoir with 1000m³ capasity | Existing |
| 7 | Water tower | Existing |
| 8 | Pump station | Existing |
| 9 | Lavatory | Planning |
| 10 | Fence | Planning |
| 11 | Gate and little door | Planning |
| | | |

| | | | | |
|---|---|---|---|---|
| HAZIRLADI PREPARED BY | RZAYEVA L. MÜHƏNDİS | | LAYİHƏ MƏRHƏLƏSİ DESIGN STAGE | İŞÇİ LAY DETAILED DESIGN |
| İCRAÇI DRAWN BY | RZAYEVA L. MÜHƏNDİS | | BÖLMƏ PART | BP |
| YOXLADI CHECKED BY | VALİYEV F. AY.CO BAŞ MÜHƏND. | | TARİX DATE | 04/2010 |
| TƏSDİQ ETDİ APPROVED BY | NƏBİYEV D. AY.CO BAŞ MÜT.ÖXƏS. | | MİQYAS SCALE | |
| KOMPUTER OPERATOR CAD OPERATOR | ƏLİYEV S. AY.CO MÜHƏNDİS | | ÇİZGİ NO DRAWING NO | 2 |

**Map 6: Layout Plan of Administrative Office**




Explication

| Row № | Title | Note |
|---|---|---|
| 1 | Administrative building | |
| 2 | Panthouse - 3 machines | |
| 3 | 2 box for machine | |
| 4 | Mechanicel workshop | |
| 5 | Repair shop for electrical equipment | |
| 6 | Electric junction | |
| 7 | Cross point | |
| 8 | Material store | |
| 9 | Lavatory.Shower room. | |
| 10 | Dress room | |
| 11 | Transfarmer subtation | |
| 12 | Boiler room | |
| 13 | Open material store | |
| 14 | Booth | |

AZƏRBAYCAN RESPUBLİKASI
"AZƏRSU" ASC
REPUBLIC OF AZERBAIJAN
"AZERSU" OJSC

"AY KONSALTİNG" MMC
"AY CONSULTING" LTD
və / and
ART Ekologiya Texnologiya Ltd.
ART Environmental Technologies Ltd.
KONSORSİUMU / CONSORTIUM

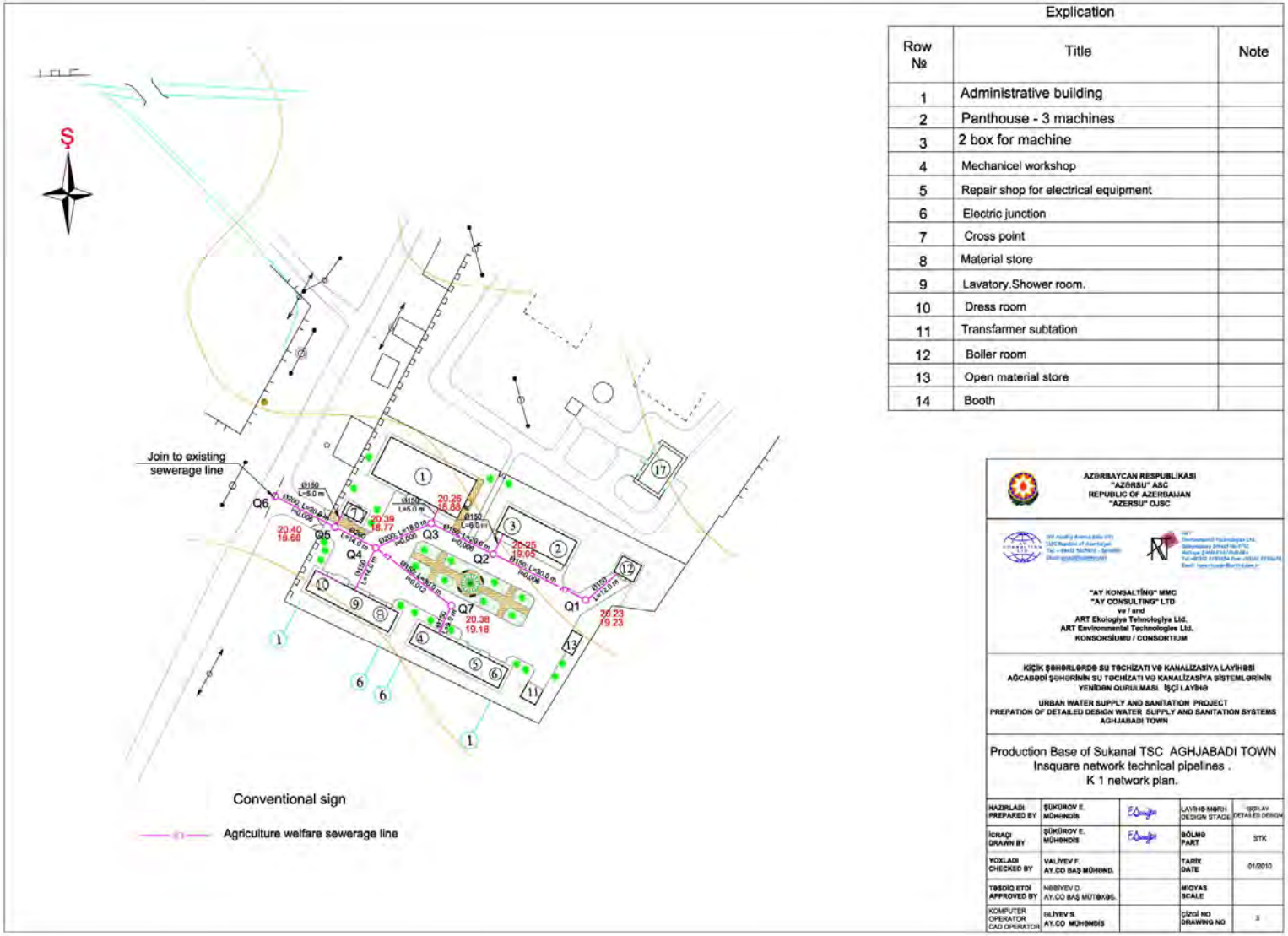
KİÇİK ŞƏHƏRLƏRDƏ SU TƏCHİZATI VƏ KANALİZASİYA LAYİHƏSİ
AĞCABƏDİ ŞƏHƏRİNİN SU TƏCHİZATI VƏ KANALİZASİYA SİSTEMLƏRİNİN YENİDƏN QURULMASI. İŞÇİ LAYİHƏ

URBAN WATER SUPPLY AND SANITATION PROJECT
PREPATION OF DETAILED DESIGN WATER SUPPLY AND SANITATION SYSTEMS AGHJABADI TOWN

Production Base of Sukanal TSC AGHJABADI TOWN
General plan.
Scale plan.

| | | | | |
|---|---|---|---|---|
| HAZIRLADI PREPARED BY | Rzayeva L. | | LAYİHƏ MƏRHƏLƏSİ DESIGN STAGE | İŞÇİ LAY DETAILED DESIGN |
| İCRAÇI DRAWN BY | Rzayeva L. | | BÖLMƏ PART | QP |
| YOXLADI CHECKED BY | VALİYEV F. AY.CO BAŞ MÜHƏND. | | TARİX DATE | 11/2009 |
| TƏSDİQ ETDİ APPROVED BY | NƏSİYEV D. AY.CO BAŞ MÜTƏX. | | MİQYAS SCALE | |
| KOMPUTER OPERATOR CAD OPERATOR | ƏLİYEV S. AY.CO MÜHƏNDİS | | ÇİZGİ NO DRAWING NO | 2 |

## Map 7: Layout Plan of Workshop Site



## 4. Construction Activities

50. As indicated in Table 3, there are six main elements in the subproject: construction of artesian wells; installation of pumps and electrical equipment; construction of reservoirs; laying of water pumping mains and distribution lines; construction administrative building & workshop; construction of area facilities at various sites such as internal roads, fencing, lavatory, guard room, etc, including miscellaneous small scale works (laboratory, house connections, meters, etc). Construction practices of these works are briefed below:

51. **Construction of wells.** Wells (400 mm diameter) will be drilled by using a hydraulic rig/drilling machine, a casing pipe (perforated pipe) will be lowered as the drilling progress till a depth of 150 m. The drilling activity will generate slurry material (water mixed with silt/soil material), which will be disposed in a low-lying area near the site.

52. **Installation of Pumps and Electrical Equipments**. New pumps and a transformer will be brought to site on trucks, and installed using small pulley or hydraulic crane. New power supply line will be laid from the main power line near the sites via overhead cables carried on metal/concrete poles. This line will provide power supply to new well field.

53. **Construction of Reservoirs**. Four new reservoirs of 2000 m3 will be constructed at the existing reservoir site. The two existing reservoirs, at the same site, will be rehabilitated. The new reservoir construction work involves excavation for foundations, placing of reinforcement rods in wooden shutters and pouring of concrete in voids to form foundations, floor, walls and roof. Cement mortar plaster will be applied to walls (outside and inside), floor and roof for a smooth finish. Inlet and outlet pipes and fixers/valves will be installed. The excavated earth will be refilled around the foundations and excess soil will be used for construction roads or transported to a disposal site. Excavation for foundation will be done by backhoe digger or manually, where required. Concrete will be mixed in a mixer and a needle (pen) vibrator will be used for compaction of concrete around the reinforcement. The rehabilitation work will involve structural strengthening, surface finishing, replacement of fixtures etc.

54. **Laying of Water Mains and Distribution Network.** Gravity main (500 mm diameter HDPE pipe, 9,864 m length) will be laid from the new well field to the existing reservoir site in centre of the town. This will be laid along the Upper Karabagh canal from the well field to the town entry, and from there pipe will be laid along the town main roads up to the reservoir site. Distribution network (220.7 km diameter 110-500 mm HDPE) will be laid along the roads in the town, within the available roads right of way (RoW). All the pipelines (mains and distribution) will be laid in the vacant land available between the tarmac and the building line. In locations where there is no vacant land beside the tarmac or it is occupied by trees, pipeline will be laid into the tarmac to avoid any private land acquisition or tree cutting. Trenches will be dug using a backhoe digger, supplemented by manual digging where necessary. A sand bed of 10 cm thick will be prepared on the bottom and pipes will be placed in the trench manually. Pipes will be joined, after which sand procured from local quarries will be placed alongside and a top of about 10 cm thick. The remaining depth of trench on top will refilled with the excavated soil and compacted manually. Road surface will be restored upon completion of work. The width of trench will be 1.1 m for 500 mm pipes and minimum will be 0.40m for 110 mm pipelines. Similarly, the depth of excavation will range from 1.3 m to 1.8 m. After construction, part of trench will be occupied by pipe and sand beneath, top and side, and trench is refilled with the excavated material. This activity is expected to generate about 17,300 m3 of waste/surplus soil. The proposed alignment of gravity main pipeline, from well field to the town that is to be laid adjacent the Upper Karabagh canal, passes through areas with high water table, and there is

likely hood of groundwater seeping into the trench during the excavation. This water needs to be pumped out. All trench excavations will be provided by wooden bracing to avoid collapse and also to avoid any structural damage to nearby houses.

55. **Construction of Administrative and Workshop Buildings.** These are typical reinforce cement concrete buildings involving construction of foundations, walls, roof, flooring, etc. Administrative building will also be provided with a centralized heating system.

56. **Miscellaneous Works**. These works include, construction of a laboratory building (50 m2 area), area facilities at various sites (fencing, guard room and lavatory), provision of fire hydrants, water connections, and fixing of water meters. These works are very minor and simple, and not expected to generated significant waste/debris.

57. **Source of construction materials and Waste Disposal**. In Aghjabedi, construction material such as gravel, sand and aggregate is sourced from existing quarry sites available locally. The material will be procured from government approved quarries only. Surplus/waste soil will be mostly utilized for beneficial purposes and any leftover will disposed off at a suitable site. A disposal site will be identified for this purpose before the start of construction.

## 5. Operation Activities

58. Regular operation of improved water supply system in Aghjabedi involves groundwater abstraction, water transmission by gravity from well field to the reservoirs in the city, and distribution from reservoirs to the consumers. Operation will also involve chlorination, laboratory analysis of water supplies. The daily water abstraction from the eight artesian wells will be 11,320 m3 per day (design demand of 2034).

59. The improved water supply system will service entire town population. Water supply infrastructure will require repair and maintenance activities like detection and repair of leaks. Since good quality pipes are being use breaks are very rare, and leaks will be mainly limited to joints between pipes. Repair work will be conducted in the same way as the pipe was laid, after locating the leaking section. The pumping equipment will require regular maintenance for efficient operation. Disinfection of water will be done by administering chlorine into water supplies. Chorine cylinders sufficient for 1 month will be stored at the site. All necessary measures are included in the design for safe handling of chlorine.

60. **Operation of administrative and workshop and other facilities**. Administrative office functioning is that of any modern office. Small quantities of solid waste (office waste like papers) and liquid waste from toilets will be generated. These will be collected and disposed via city waste disposal system, therefore no impacts envisaged. At workshop, the routine and minor maintenance work of mechanical and electrical equipment of water and sewerage system will be carried out. The design of workshop included provisions for collection of oil spills, grease and other waste to avoid pollution.

# IV. DESCRIPTION OF THE ENVIRONMENT

## A. Physical Resources

### 1. Location

61. Agjabedi is located close to the centre of the south border of Azerbaijan, 363 km south-west from Baku, encompassing an area of 1,765 hectares. The district is part of the Kura-Araz lowland and lies on the Mil Plain enclosed between the Kura and Araz rivers. Agjabedi town is completely surrounded by rural lands including mainly arable fields.

### 2. Topography

62. The Agjabedi district is uniformly flat with a small gradient. The ground elevation ranges between 0 m and 16 m (average 7 m MSL elevation) and the slope is approximately 0.0005. The relief of the region peaks at the Lesser Caucasus foothills at 180 m MSL and descends to a flat alluvial steppe at -7 m MSL at the Aghgol National Park lake.

### 3. Geology and soils

63. The Agjabedi region contains two dominant types of soil: sierozem and meadow. The meadow soils are located from lowland semi-dry areas up to arid steppe areas. The soil has a light, loamy structure and a medium degree of salinity. The sierozem soil is very similar to the meadow soil with the exception that is has a higher quantity of salinity. Both soil types are not that susceptible to erosion processes and they contain the necessary nutrients to cultivate crops. The soils in the region are typically used as pastures in the winter and arable lands in the warmer months.

### 4. Climate

64. This region has a dry sub-tropical climate with a moderate winter and a dry, hot summer. The average annual temperature is +14$^{o}$C and the annual average precipitation level is 360 mm. The absolute temperature maximum and minimum were recorded as +42$^{o}$C and -21$^{o}$C respectively. The highest temperatures are usually registered during July and August and the lowest temperatures occur in January. August is the driest month receiving on average of 25 mm of rain while March-May is the wettest season with an average monthly rainfall of 40 mm. The main wind directions are northwest in the wintertime and southeast in the summer (see wind rose).

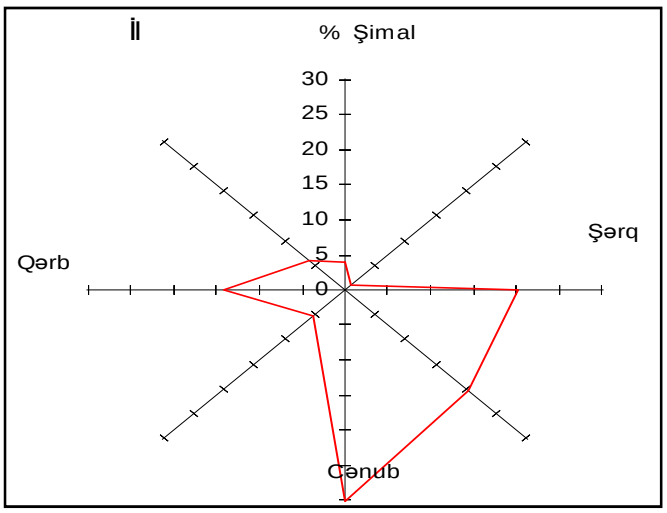


**Table 3: Climatic Characteristics (Aghjabedi meteorological station, H=14m)**

| Name | I | II | III | IV | V | VI | VII | VIII | IX | X | XI | XII | Avg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average temperature (oC) | 1.8 | 3.8 | 7.0 | 12.6 | 19.1 | 23.3 | 26.0 | 25.6 | 20.8 | 15.1 | 8.8 | 3.7 | **14.0** |
| Absolute maximum (oC) | 22 | 27 | 34 | 34 | 38 | 40 | 41 | 40 | 37 | 35 | 28 | 26 | **41** |
| Average maximum (oC) | 6.8 | 9.4 | 13.2 | 19.8 | 25.9 | 30.7 | 33.0 | 32.6 | 27.9 | 21.8 | 14.3 | 8.7 | **20.4** |
| Absolute minimum (oC) | -24 | -18 | -12 | -3 | 2 | 8 | 11 | 9 | 2 | -4 | -11 | -22 | **-24** |
| Average minimum (oC) | -2.0 | -0.5 | 1.9 | 6.7 | 12.5 | 16.0 | 18.7 | 18.0 | 14.6 | 9.8 | 4.3 | -1.2 | **8.2** |
| Rainfall, mm | 27 | 27 | 37 | 32 | 36 | 29 | 16 | 13 | 29 | 32 | 32 | 22 | **332** |
| Wind velocity m/s | 2.0 | 2.3 | 2.6 | 2.5 | 2.4 | 2.5 | 2.3 | 2.2 | 2.2 | 2.0 | 1.6 | 1.7 | **2.2** |
| Relative humidity, % | 84 | 80 | 77 | 72 | 68 | 62 | 60 | 64 | 71 | 79 | 82 | 82 | **73** |
| Absolute humidity, mb | 5.8 | 6.4 | 7.5 | 10.4 | 14.8 | 17.6 | 20.3 | 20.4 | 17.4 | 13.5 | 9.6 | 6.8 | **12.5** |
| Humidity insufficiency, mb | 1.4 | 2.0 | 3.0 | 5.3 | 8.5 | 13.0 | 16.5 | 14.0 | 9.0 | 4.5 | 2.5 | 1.8 | **6.8** |

Avg = average

## 5. Surface Water

65. Aghjabedi is orographically located in south-east of Garabagh plain which is part of Kura Araks lowland. Relief of the area reflects flat alluvial-prolluvial-dealluvial plan stretched from foothill of the small Caucasus to Kura River. Ground elevation ranges from 7 to 16 m, and gently sloping. There are some isolated hills dotting the plain. There are four main natural streams flowing through the Agjabedi district including the Kura River, one of the longest and largest rivers in Azerbaijan and three of its eventual tributaries. All the rivers originate in the Lesser Caucasus mountains. Gargarchay River flows adjacently to Aghjabedi Town. This river is formed by merger of Khalfali and Zarislichay River which flow through east foothill of Garabagh ranage of Small Caucuses. Originally, Gargarchay River was a feeder for Ag-gol Lake in the Ag-gol National Part in the northern side of the town. However, the river was diversted to Kura River by an artificial channel in 1950s. The lake now fed by two artificial canals - Yuhari-Garabag canal and Bash Mil-Garabag collector.

66. The important artificial sources of water in the region include 1) the Yuhari-Garabag canal which was constructed in the 1950's after the creation of the Mingachevir water reservoir and 2) the Bash Mil-Garabag collector which will collect the wastewater discharge after treatment and provide irrigation water to the town. The Bash Mil-Garabag collector is the main source of water for the lake in nearby Ag-gol National Park.

## 6. Groundwater

67. Aghjabedi is geologically characterized by sediments by III and IV periods. Geomorphologically, Aghjabedi is part of Kura-Araks lowland. Groundwater is widely available in modern period alluvial sediments, sands, loamy sands and clayey sands. The depth of groundwater in the studies area ranges between 1.2 to 4 m. Thickness of impervious stratum through the area is 15-17 m. Seasonal variation in groundwater level 0.5 – 1m. Maximum value of the groundwater level is usually observed in April-June while minimum drop-down levels in December – February months. Water permeability of the impervious stratum various from 8.84 m2/day to 15.62 m2/day while the filtration coefficient is respectively from 1.17 m/day to 1.99 m/day. Confined aquifer ground waters are widely spread in the study area. First confined aquifer is spread in the sediments of Khazar-Khvalin stratum.

68. **Springs and Groundwater Water Quality.** Table 3 indicates that the Mughanli source has good water quality. The source water will be extracted and disinfected at the reservoir site. No other water treatment is necessary. Mitigation measures are discussed in Section IV to prevent contamination of the Mughanli source water.

69. Water quality samples were taken at the Mughanli source site on 31 January 2009. The sample was analyzed by the National Geological Exploring Service Unit of the Ministry of Ecology and Natural Resources (MENR). Chemical analyses were taken from two wells in Mughanli which showed that the groundwater meets the requirements of GOST 2874-82, Azerbaijan's potable water quality regulation as shown in Table 3. The investigations concluded that the subterranean waters are sweet and the mineralization degree is within the range of 1.0 g/l. In terms of chemical structure, the subterranean waters contain hydrocarbonate-sulphate, a type of salt. General hardness of the water is approximately 6.0 mg-eqv/l. The results of bacterial analysis indicated that the quantity of micro-organisms is below GOST 2874-82 "potable water" limits. No groundwater pollution was identified in the territory, so the sanitary condition of the area is considered satisfactory. More frequent water quality testing will be recommended for the well site in the Environmental Monitoring and Management Plan.

**Table 3: Water Quality Chemical Results**

| No | Water Quality Indicator | Mughanli well No1 | Mughanli well No2 | Max Allowable Level, mg/l * |
|---|---|---|---|---|
| 1. | Smell at 20$^{o}$C temperature | 0.00 | 0.00 | **<2** |
| 2. | Color | 0.80 | 1.30 | **<20** |
| 3. | Turbidity | 0.00 | 0.00 | **<1.5** |
| 4. | ph | 6.7 | 6.9 | **6-9** |
| 5. | $HCO_3^-$ | 274 | 274 | **>3** |
| 6. | $SO_4^{2-}$ | 139 | 141 | **<500** |
| 7. | $Cl^-$ | 73.0 | 52.0 | **350** |
| 8. | $Ca^{2+}$ | 101 | 102 | **180** |
| 9. | $Mg^{2+}$ | 20 | 23 | **40** |
| 10. | Na+k | 64 | 44 | **170** |
| 11. | $NO_2^-$ | 0.03 | 0.03 | **<0.1** |
| 12. | $NO_3^-$ | 0.00 | 0.00 | **<10** |
| 13. | $NH_4^+$ | 0.00 | 0.00 | **<2.0** |
| 14. | $Fe^{3+}$ | 0.00 | 0.00 | **0.3** |
| 15. | Hardness | 6.68 | 6.98 | **7.0** |
| 16. | Mineralization | 534 | 499 | **<1000 (1500)** |
| 17. | Solid residue | 550 | 520 | **<1000 (1500)** |

* GOST Drinking Water Standards, 1992.

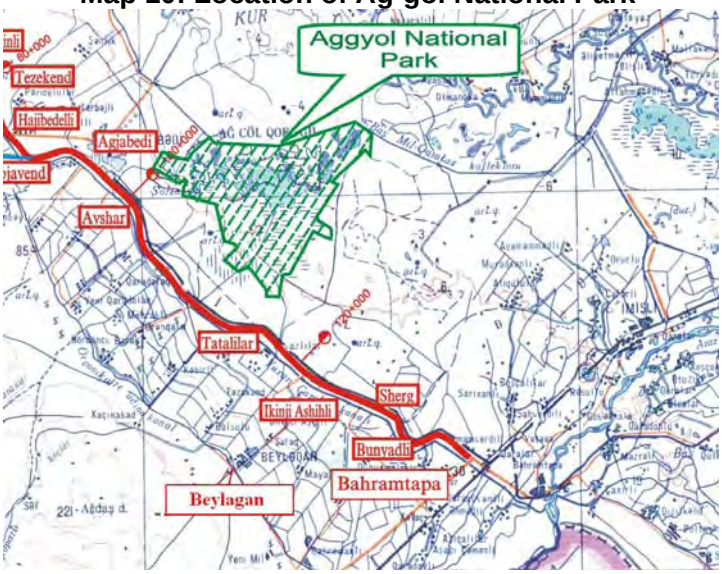
## B. Ecological Resources and Items of Archaeological Significance

70. Agjabedi town itself is fully urbanized and surrounding settlements have intensive agriculture as the predominant land use. Three green parks exist and many houses have small private gardens. However, apart from the parks and green centers, there are no significant ecological resources, nor rare or endangered flora or fauna within the town boundaries.

71. Historical and archeological sites include remainders of the Bronze Age, which are located in Agjabedi town. (These are named Kultepe, Saribashtepe, Uchtepe, and Shakhtepe). Also, there is a mosque of local importance, a memorial monument for the Agjabedians who died in the Second World War, and a town cemetery. All designs avoid these cultural and historical sites.

72. No national reserve is located within Agjabedi town. Aghgol National Park is the closest reserve, located 5 km to the southeast. Attachment 3 shows the proximity of the town to the National Park. The park is semi-desert covered by dense ephemeral vegetation. It includes a lake fed by the two artificial canals aforementioned, the Yuhari-Garabag canal and the Bash Mil-Garabag collector. The Park was created to protect the breeding areas for important species of birds.

**Map 10: Location of Ag-gol National Park**




## C. Human and Economic Development

73. **Occupations.** The base of the district economy is agriculture. The total area of the lands suitable for agricultural use in the region is 529 $km^2$. Crops include grains, vegetables, and cotton. Animal husbandry is the most developed sector of agriculture (387 $km^2$). Due to some limited opportunities in the town, 3% of men work abroad to bring home money to their families. Also, women work in the public services such as in teaching, medicine, and nursing.

74. **Health Care.** There is a relatively decent representation of health care facilities within the Agjabedi region. Twelve hospitals and medical institutions exist.

75. **Education.** There are 35 pre-school institutions and 62 educational schools in the Agjabedi region. Two technical/vocational schools exist and one university. Overall, the literacy rate for Agjabedi is approximately 99.5%.

76. **Roads and Bridges.** 18 miles of roads are paved in Agjabedi and the remaining 23 miles are covered with gravel. Bridges exist over the irrigation and combined sewage/storm water channels. A major highway of importance to Azerbaijan is located close to the town; The Mingachevir-Bahramtepe highway was built to connect the southern part of the country with roads to the western borders.

77. **Disadvantaged.** 13% of the town population is considered poor (2008 Speech of the Chairman of the State Statistic Committee). Unemployed people in Agjabedi suffer the most

with the water supply because of their difficulty in paying for the water. Women and children of households not located close to the distribution systems taps or water trucks hold the burden of having to manually obtain potable water from the closest tap or truck. However, with the expansion of the distribution system under this subproject, there will be less disadvantaged women and children.

### D. Socio-Cultural Resources

78. **Population.** Agjabedi has a gender ratio (male: female) of 0.49 for the overall district. A detailed assessment of the socio-economic profile of the Agjabedi sub-project is provided in the accompanying Poverty and Social Analysis documents which accompany this IEE appendix.

79. **Ethnic Groups –** Of the 36,000 people living in Agjabedi, the majority are ethnic Azeris. Approximately, 3,700 refugees are located in the town of Agjabedi. There are no indigenous peoples in the region.

## V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

80. This section of the IEE reviews possible subproject-related impacts, in order to identify issues requiring further attention and screen out issues of no relevance. ADB Environmental Policy requires that impacts and risks shall be analyzed during pre-construction, construction, and operational stages in the context of the subproject's area of influence. As defined previously, the primary impact areas are (i) well field/water collection site (ii) reservoir site (iii) WWTP site, (iii) pipelines sites; (iv) main routes and/or intersections which will be traversed by construction vehicles; and (v) quarries and borrow pits as sources of construction materials. The secondary impact areas are: (i) entire Aghjabedi area outside of the delineated primary impact area; and (ii) entire Aghjabedi Rayon in terms of over-all environmental improvement.

81. The screening process carried out for the IEE has identified minor possible adverse environmental impacts likely to be caused by the Project. Most potential negative impacts may occur during construction. However, they will be temporary and can be mitigated to acceptable levels. Effort are made to (i) limit specific impacts related to the pipeline routes; (ii) mitigate source contamination, and (iii) minimize construction pollution and waste.

### A. Pre-Construction (Design & Location) Impacts and Mitigation Measures

82. **Groundwater Source Sustainability.** The proposed subproject will provide water supply from groundwater source. The eight boreholes proposed under this subproject will abstract 11,320 m3/day of water to meet the design demand of Aghjabedi Town water supply. The hydrology and hydrogeology of the area around the town of Aghjabdei have been studied in considerable detail as part of the feasibility study in 2009. The new wells will be an area in the south-west of Aghjabedi at Mughanali village. This source is selected because of its good water quality and most plentiful potential source in the vicinity of Aghjabedi Town. According to a study completed by the Commission of State Resources in 1974 under Order No. 8041, 24.03.1976 of the Soviet of Ministers in the former USSR, this groundwater region has a favorable hydro-chemical composition for potable water (Minutes 8041. 24.03.1976). Also, according to a study completed by the by the Commission of Resources of the Republic of Azerbaijan in 1995 (Order no.96, June 20,1995), this groundwater region can deliver 72,230 m3/day. Furthermore, the quality and quantity of the underflow water is consistent with government standards for safe and reliable supply to the consumers projected through 2034. The underground water resources are

many times greater than the projected water demand (11,320 m3/day) if the depth of the wells is between 100 and 150 m to exploit pressured water. The State Commission analyzed the recharge to the reservoir which comes from the undisturbed Mil foothills located approximately 10 kilometers away from the proposed borehole source area. The Commission's study concluded that the infiltration occurs at a distance where the groundwater can be naturally filtered by pristine land and trapped in the confined aquifer. As such, there is no need for a catchment management plan as long as the 30 meter protection radius surrounding the boreholes is put into place. Detailed investigations were further carried out during the detailed design of the subproject in 2010. Water pumping tests were carried out using a groundwater exploratory well (72 hours continuous pumping) to check the draw down and yield. Yield of one well is estimated 18.71 liters/second. Recovery of the water level was observed after water pumping is finished. Comprehensive geological investigations indicated the water bearing layers (aquifers) at the following depths: 56-60 m; 65 – 69 m; 101- 104 m; 119-122 m; and 139 – 143 m. The Hydro geological investigation report confirmed the water availability with appropriate quality at the proposed well field in Mughanali or Aghjabedi water supply.

83. The geological structure of the area is stable and no potential land subsidence is foreseen. Groundwater quality is good and meets the national standards. There are no source of pollution; the sewerage system proposed under this Investment Program will collect, treat and dispose the wastewater safely. Thus avoids any potential pollution due to leaching of contaminants into the ground. Nevertheless, the withdrawal of groundwater from confined deep aquifer means that the source is free from pollution due to surface leaching.

84. **Source Protection.** The risks at Mughanli include (i) unauthorized access and contamination if a fence and defined buffer zone are not installed; and (ii) water and soil contamination as a result of drilling operations and the transport of materials along the access road. The buffer zone will be defined with a 30 m radius around each borehole in accordance with Article 22 of the Land Code (1999). The access road will be similarly defined with a 5 m right-of-way RoW. Construction mitigation measures will be undertaken throughout all proposed works. The source protection measures suggested by the "**Report on Results of Additional Hydrogeological Investigations Executed in the Territory of Mughanali Village of Aghjabedi Rayon for Water Supply of Aghjabedi Town, 2010** (prepared by ZEMF company for Azersu)" should be included in the design. These measures are appended at Appendix 5.

85. **Damage to Soil, Crops, and Sensitive Areas.** There are no endangered species or sites of historical significance recognized in the alignments or within the land plots designated for proposed works. The only protected area is Ag-gol National Park located approximately 5 km from the town. As this Park is relatively removed from the town, there is no risk for the pipeline routes to be located in this nationally protected area. Also, the environmental assessment safeguards include a Detailed Measurement Survey to ensure that no designs will cross culturally sensitive areas such as the cemetery, bronze age archeological sites, the mosque or the museum (see Resettlement Framework). The Resettlement study will also ensure that any damage to crops or agricultural areas will be compensated appropriately, according to ADB standards.

86. **Resettlement.** There are no foreseen Resettlement issues, except WWTP site; all the other facilities and pipelines sites are located within the government owned lands. WWTP site is privately owned, the Resettlement Plan of this subproject addresses this issue. In the event emergence of any new issues during implementation, for instance for new pipeline routes, a

Resettlement Framework (RF) has been prepared to guide the program management facility (PMF) during detailed design and subproject implementation.

87. **Treated Water Quality.** Quality of water meets the standards stipulated by Azerbaijan's potable water quality regulation. Water can be supplied directly after disinfection with chlorine. A disinfection facility and a laboratory is proposed in the subproject to enable chlorination and regular water quality monitoring. Chlorine residual level and water turbidity will be analyzed on a regular basis. To ensure raw water quality, the JSC will test the Aghjabedi water source monthly and seasonally and determine whether MOH parameters are met.

88. **Water Pipeline Design.** In the town, new water lines will be constructed. The pipelines will have enough capacity to receive the 2034 projected flow rates. The water and sewer pipes will be placed on opposite sides of the street. Also, water pipes will be constructed with PVC or HDPE on a sand bed.

89. **Delivery of Unsafe Water.** Regular water quality tests will be conducted as per the government regulations (specified in the next section), for which a water testing laboratory is being developed under this subproject. In the case of deviations from the water quality standards, the town of Aghjabedi has a procedure in place to verify and then aid the region where bad water quality measurements were taken. At first, the sample is collected again to ensure that the operators have not made any operational errors. If the sample has exceeded or gone below the allowable Ministry of Health approved standards, the region is localized by stopping water supply to the customers. The pipelines are disinfected with chlorine and the water is further disinfected with chlorine. Final samples are taken until good water quality is achieved before distributing.

### B. Construction Impacts and Mitigation Measures

90. **Construction Risks, Pollution and Wastes.** Since the work will be conducted in an urban area congested with people and activities, it is likely to have considerable impacts. Most of the likely impacts are associated with the construction process, and are produced because that process is invasive, involving trenching and other ground disturbance. Impacts mainly arise from (i) generation of waste soil/debris and their disposal; (ii) mining of construction materials; (iii) soil erosion from excavated areas and silting/pollution of water courses, rivers; (iv) generation of dust and emissions from construction activity; (v) inconvenience/disturbance to public due to construction activity such as impediment of access to houses and business, noise, dust, traffic blockages and public safety; (v) disruption of services like water supply, power, telephone, gas; (vi) safety risk to public and traffic; and (vii) workers safety and impacts due to import of workers and temporary labour camps.

91. However the routine nature of the impacts means that most can be easily mitigated. These are common impacts of construction in urban areas, and there are well developed methods available for their mitigation. These effects can be mitigated via wetting water surfaces, proper scheduling installing silencers, constructing shoring in the trenches, and redirecting runoff. There will also be provisions for solid waste and used oil collection containers, with further removal to specially allocated disposal and reclamation sites. Sanitation facilities will be constructed at the work sites. After completion of construction works, all job sites will be cleaned.

92. The proposed alignment of gravity main pipeline, from well field to the town that is to be laid adjacent the Upper Karabagh canal, passes through areas with high water table, and there is likely hood of groundwater seeping into the trench during the excavation. This water needs to be pumped out for dewatering. The water will contain high silt load, and therefore director disposal into water body will pollute and will lead to silting and overflowing. Temporary ponds should be created using the excavated soil as bunds, and water should be stored temporarily and only clarified water should be disposed into nearby drainage channels.

93. Trench protection measures (wooden bracing, sheet piling, etc) should be implemented on all trenches of over 1.2 m depth or as required considering the site condition.

94. All the construction impacts and appropriate mitigation measures, monitoring measures and the agencies responsible for mitigation are presented in the Construction-stage Environmental Management Plan (Table 7) and Environmental Monitoring Plan (Table 9). This EMP will be part of the contract document and it will be binding on the contractor for implementation.

### C. Operation Impacts and Mitigation Measures

95. Regular operation of water supply system in Aghjabedi involves groundwater abstraction, transmission of water from source to reservoirs in city by gravity, disinfection with chlorine, and distribution from reservoirs by gravity to the consumers. Operation will also involve laboratory analysis of water supplies. Water supply infrastructure will require repair and maintenance activities like detection and repair of leaks. Since good quality pipes are being use breaks are very rare, and leaks will be mainly limited to joints between pipes. Repair work will be conducted in the same way as the pipe was laid, after locating the leaking section. So no major impacts envisaged during the operation. There is invariably a safety risk when chlorine is handled and administered. Considering that inclusion of all necessary safety measures are included in the design of chlorination facility and provision of training to the operating staff is part of the project, and therefore no impacts envisaged.

96. As these repairs and maintenance work will be infrequent, and will affect individual small locations for short periods only, the impacts should be much less significant thus be negligible.

## VI. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

97. According to Azerbaijan regulation, public consultation for any Project has to be carried out twice – first at the detailed design stage (to address all important comments) and secondly at the end of the project when presenting Project results. All Project stakeholders as well as any affected persons (APs) have to be present at the second public consultation. Results of the first public consultation have to be documented in the Environmental Impact Assessment. Azerbaijan mandated the Public Participation in Decision-Making and Access to Justice in Environmental Matters at the UNECE Aarhus Convention in 1999. Since that time, the Aarhus Centre had been open to the public in the office of MENR. All Project documents related with environmental questions have to be stored in Baku's Aarhus Centre for easy access by the public and NGOs' representatives. A copy of the Environmental and Social Assessment

documents also has to be filed at the public library (or any other relevant organization) of the Project town and must be accessible in Azeri.

98. ADB also requires public consultation in the environmental assessment process. For category-B projects, the borrower must consult with groups affected by the proposed Program and with local nongovernmental organizations (NGOs) if possible. The consultation needs to be carried out as early as possible in the Program cycle so that views of affected groups are taken into account in the design of the Program and within the mitigation measures proposed. Any grievance redress issues will be resolved according to the Program's Resettlement Framework.

99. In accordance with ADB's Public Communications Policy (2005), consultations were held in 2009 and the proposed Program components and timeline of construction was disclosed to the public and local authorities. Public consultation has played an important role in the preparation process to screen design options to minimize social and environmental impacts. Issues raised in these consultations have been incorporated in the proposed mitigation measures. On March 2, 2009, information on the Program was disclosed to the public through a town meeting in Aghjabedi. The day before the meeting, the local social specialist, a native of Azerbaijan, randomly sampled and invited locals on the street to join this meeting and give input on their water supply and wastewater collection experiences as well as to learn about the Program and provide recommendations. The social specialist then organized a meeting with the town mayor, other local executive powers, the Program engineer, and the local and international environmental specialists. This team of specialists, the Program engineer, and the mayor then met with 39 randomly sampled town members, both men and women (approximately 55% were women) at the town hall. In the beginning of the town meeting, the engineer explained the proposed improvements the Program would provide to the existing water supply and wastewater collection systems. The locals then answered the questions indicated in Attachment 5. To ensure understanding of the Program and the questions, the social specialist explained each question and allowed for open communication including questions and comments during the meeting. The social specialist noted the environmental and health concerns raised by the town members. He also noted contact information of the town members and who amongst the town members would be interested in participating in a Town Water User's Association to be created under the Program.

100. Additional interviews with the affected people including land owners were conducted in accordance with the Resettlement Framework. To see the results of public consultation with the affected persons, please see the Resettlement Plans for the Program.

101. According to the discussions with 39 members of the town, the following water and wastewater statistics were obtained:

(i) 51% of respondents said that they get water from water trucks, while only 20% of respondents get water from the tap.
(ii) 18% of respondents must walk to their water source. The maximum distance to the water source was noted to be 3 km, taking one hour, while the minimum distance was noted as 300 m.
(iii) 69% are dissatisfied with the water quality, while 26% of respondents are always satisfied.
(iv) 72% of respondents either always lack water supply or lack supply during some days or hours.
(v) 62% of respondents are dissatisfied with the water pressure. 20% are satisfied.
(vi) 18% have fallen ill because of poor water quality.

(vii) 46% of people are willing to pay for water supply and sewage collection.
(viii) 85% of respondents have sewage problems on their property.
(ix) 64% and 79% stated that they work for industries which would be eager to connect with the Azersu water supply network and wastewater collection network respectively.
(x) 72% of respondents stated that they would like to join a local 'Town Water Users Association'.

102. According to the discussions with the town community, overall the town members expressed willingness to participate in the Program in the Town Water Users Association in the following manners:

(i) Be consulted about design plans
(ii) Participate in the monitoring of the activities
(iii) Obtain contacts of the organizations in charge of implementation and quality control of the work
(iv) Provide labor (which will also bring economic benefit to the town)

103. Primary environmental concerns for the town include:
(i) Continuing limited supply of potable water due to interruptions in electricity
(ii) Higher electricity costs and water and wastewater tariffs imposed by the new 24 hour water supply and wastewater treatment

104. Issues raised in these consultations have been incorporated in the proposed mitigation measures. Continuous dialogue with the town and relevant governments will be carried out during the implementation period. During implementation, the social and environmental specialists will coordinate with the JSC and Rayon administration and will ensure that any concerns and issues raised by the Town Water User's Association will be addressed and adequate feedback to the town will be provided.

105. The draft IEE reports were disclosed to public, made available (in Azeri language) available in public places for the project-affected and local NGOs. All the comments have been addressed and the report finalized.

## VII. GRIEVANCE REDRESS MECHANISM

106. As the work is being done in an inhabited area, most of the impacts are construction-related, and therefore it is anticipated that improper or inadequate implementation of Environmental Management Plan may lead to disturbance and inconvenience to local people. In order to provide a direct channel to the affected persons for approaching project authorities and have their grievance recorded and redressed in an appropriate time frame, PMF will establish a Grievance Redress Mechanism, which will be functioned throughout the construction period.

107. A complaint register will be made available at the site office of the contractor, with a display board indicating availability of such facility. This will accept complaints regarding the environment safeguard issues in implementation of the subproject. The grievances received and actions taken will be included into the environmental monitoring reports submitted to ADB. The following process will be followed in grievance redress: Complaints received (written or oral communication) will be registered in Complaint Register assigning complaint number with date of receipt. Supervision Consultant (SC) will review the complaint and direct the contractor for necessary action. In case of no satisfactory action, the complainant can approach Aghjabedi

JSC for necessary action. For this purpose Aghjabedi JSC will open a facility to receive complaints with the support of Town Water Users Association. JSC will coordinate with the SC and PMF to resolve the issue.

## VIII. ENVIRONMENTAL MANAGEMENT PLAN

### A. Environmental Impact Mitigation and Monitoring

108. An Environmental Management Plan, consisting of impact mitigation and monitoring plan, is prepared as part of this IEE. The EMP is designed to follow the general template established during the preparation of the candidate subprojects, but adapted to the specific requirements of the subproject in question. The EMP has been updated and expanded and will be appended to the tender documents (particular conditions of contract). As part of the environmental management, the procedures for: workers' health and safety; public safety and reduce inconvenience and disposal of construction wastes, etc are developed.

109. A program of monitoring will be required to ensure that all concerned agencies take the specified action to provide the required mitigation, to assess whether the action has adequately protected the environment, and to determine whether any additional measures may be necessary. Regular monitoring of implementation measures by Civil Contractors will be conducted by the PMF, and overseen by AzerSu. Monitoring during operation stage will be conducted by the Operating Agency, Aghjabedi JSC.

110. During construction, most of the mitigation measures are fairly standard methods of minimizing disturbance from building in urban areas (maintaining access, planning work to minimize public inconvenience and traffic disruptions, finding uses for waste material, etc). Monitoring of such measures normally involves making observations in the course of site visits, although some require more formal checking of records and other aspects. During the construction, the air quality and noise must remain below specified concentrations and levels. The maximum allowable concentrations of air quality toxins are specified in Appendix 4 and the maximum allowable noise levels are specified in Appendix 4. The monitoring of ambient air quality and noise levels during construction is the responsibility of Contractor. The Program Consultant will supervise and monitor the contractor's performance during the construction

111. **Environmental Monitoring during Operation- Water.** Candidate subproject analysis and analysis of the Sanitary-Hygienic State regulations indicated that according to GOST 17.1.3.07-82 there are at least three points where water samples have to be taken – one is 1 km upstream and two are 0.5 and 1.5 km downstream from the point of intake. Each borehole will be sampled during operation and the raw water quality will be monitored continuously. The outlet of the treatment plant and reservoir will also be sampled. Under the Program it is required to test for both free and residual chlorine and perform chemical and microbiological tests. Control on water quality has to be conducted daily and commence at least 3 months before construction to establish a baseline. During operation, intermediate points as well as the extremities of the network will be sampled periodically. The PMF's Safeguard Specialist will be responsible for conducting periodic monitoring. All potable water samples must adhere to the Ministry of Health's water quality guidelines as listed in Appendix 2.

112. The following Tables 6 to 8 show Environmental Management Plans respectively for various stages – preconstruction, construction and operation. These show mitigation activities, methods, project agencies responsible for implementation and monitoring of mitigation

measures. The following Table 9 shows the proposed Environmental Monitoring Plan for this subproject, which specifies various monitoring activities to be conducted. It describes: (i) mitigation measures, (ii) location, (iii) measurement method, (iv) frequency of monitoring and (v) responsibility for monitoring.

## Table 6: Environmental Management Plan - Preconstruction

| Anticipated Impacts | Proposed Mitigation Measures | Responsible for Mitigation | Monitoring of Mitigation |
|---|---|---|---|
| Source Protection<br>• Inadequate protection of intake works, leading to pollution of raw water supply | • Implement source protection measures suggested by the "Report on Results of Additional Hydrogeological Investigations Executed in the Territory of Mughanali Village of Aghjabedi Rayon for Water Supply of Aghjabedi Town, 2010 (prepared by ZEMF company for Azersu)". These measures are appended at Appendix 5.<br>• Construct raised concrete platforms over the wells to serve as a floor for the pump stations and eliminate the risk of surface runoff contamination<br>• Equip wells with full water quality and drawdown monitoring devices<br>• Provide a protection buffer zone of at least 30m surrounding boreholes, Article 22 of the Land Code (1999)<br>• Restrict access to intakes or boreholes with a fence or barrier<br>• Undertake baseline water quality tests 3 months prior to scheme construction<br>• Monitor and control activities in upstream catchment | PMF, JSC, SES | Inspection of detailed design documents, and contract documents. |
| Damage to Soil, Land, Ecology, Heritage<br>• Soil erosion, land instability and damage to forests or vegetation | • Mainly confine subproject works to previously disturbed areas, access roads and tracks<br>• Avoid environmentally sensitive sites and those that would have negative impact on cultural heritage such as cemeteries<br>• Improve drainage where necessary<br>• Avoid constructing new access roads for water intakes, pipelines and reservoirs, but provide small access tracks for light vehicle access during construction and walking tracks for O&M of completed facilities | PMF and JSC | Inspection of detailed design documents, and contract documents. |
| Damage to Crops and Tree Plantations<br>• Damage to tree plantations and crops | • Avoid or minimize resettlement and damage to crops or plantations by adopting suitable locations and alignments for Program facilities and pipelines<br>• No trees shall be cut for laying pipelines; pipeline shall be laid into the tarmac if there is no vacant land between the building and road; use flexible pipes such as HDPE/PVC, so that it allows a small/local alignment change where required to avoid tree cutting<br>• Replace all vegetation destroyed accordingly if categorized under the Rule for Use, Protection and Preservation of Trees and Bushes (2005) | PMF and JSC | Inspection of detailed design documents/drawings, and contract documents. |
| Resettlement<br>• Dislocation or involuntary resettlement of residents and businesses<br>• Program effects on land and environment | • Install water pipelines in existing roads, footpaths or rights of way (ROW) wherever possible<br>• Restrict road and drain upgrading to existing ROW where possible<br>• Consult affected persons, prepare Resettlement Plans and provide adequate compensation and grievance redress mechanisms in line with ADB and Government resettlement policies enumerated in the Resettlement Framework<br>• Provide information disclosure and public consultations in accordance with ADB's Public Communications Policy (2005)<br>• | PMF and JSC | Inspection of detailed design documents/drawings, and resettlement plan report |

| Anticipated Impacts | Proposed Mitigation Measures | Responsible for Mitigation | Monitoring of Mitigation |
|---|---|---|---|
| Treated Water Quality<br>• Safeguard quality of water supply and wastewater discharge | • Cover, ventilate and fence all treated water reservoirs<br>• Design distribution network for minimum residual pressure of at least 10 m to prevent entry to mains of contaminated groundwater or backflow<br>• Provide adequate spare parts | JSC | Inspection of detailed design documents, and contract documents. |
| Design of Water Pipelines<br>• Sewage leakage into potable water | • New water pipelines must be constructed at a higher elevation than the sewer pipelines and in different trenches than the water pipelines to prevent leakage of sewage water into the water supply.<br>• Water r pipes should be constructed with uPVC or HDPE on a sand bed | Construction contractor, PMF and JSC | Inspection of detailed design documents, and contract documents. |
| Delivery of Unsafe Water<br>• Water quality violation | • In the event that poor quality water is delivered to the consumers due to insufficient treatment, the PIU must put into effect a mitigation plan. At first, the sample must be collected again to ensure that the operators have not made any operational errors. If the sample has exceeded or gone below the allowable SES approved standards, the region is localized by stopping water supply to the customers. The pipelines are disinfected with chlorine and the water is further disinfected with chlorine. The water will be distributed to the region once tests demonstrate good water quality results and sufficient disinfection. | JSC, SES | Inspection of detailed design documents, and contract documents. |
| Increased sewage and impacts due to its disposal | • Improvement to water supplies will result in an inherit increase in the generation of wastewater. Detailed design calculations must account for the potential impacts of increased sewage generation in each community to verify that channels and infiltration rates can accept increased flow.<br>• Develop a treatment facility to treat the wastewater to desirable standards and with a safe final disposal<br>• | PMF, JSC | Inspections of project components and implementation schedule |

**Table 7: Environmental Management Plan - Construction**

| Anticipated Impacts | Proposed Mitigation Measures | Responsible for Mitigation | Monitoring of Mitigation |
|---|---|---|---|
| Removal of vegetation/trees for construction | • Pipelines along the roads shall be laid into the roads or vacant space; no road side trees shall be removed for this purpose<br>• Use flexible pipes such as HDPE/PVC allows a small/local alignment change where required to avoid tree cutting<br>• Bushes and grasses shall be cleared only in actual construction area all other preparatory works (material storage, mixing, etc) shall be conducted on barren lands where there is no vegetation<br>• Minimize tree cutting at Reservoir Site No.1 by better site layout; plant two trees of same specie for each tree that is cut for construction. | Construction Contractor | Review construction drawings prior to start of construction<br><br>Site inspections and construction records |
| Excavation could damage utilities existing infrastructure along the roads | • Avoid disruption of existing infrastructure lines (power supply, telephone, gas etc) by a proper pipeline alignment<br>• In unavoidable cases, identify the services to be affected in each area and coordinate with respective agencies for alternative arrangement<br>• Provide prior public information about the likely disruption of services<br>• In the event of water supply disruption beyond reasonable time , provide water supply through alternative means, for instance, through tankers | JSC in assistance of Contractor | Review construction drawings prior to start of construction<br><br>Site inspections and construction records; interview with local people |
| Impacts due to excavation and generation of waste soil/debris (soil/) | • Utilize waste/surplus soil for beneficial purposes - in construction activities or to raise the level of land prior to construction of roads, buildings, etc, or to fill previously excavated areas<br>• Dispose the surplus soil /debris that could not be put to beneficial use at designated site (site should be approved by local authority/MENR)<br>• Identify the disposal site prior to start of construction; site shall be approved by PMF/JSC<br>• Surplus soil/debris shall not be disposed in water courses or along the roads<br>• Asphalt waste from road cutting shall be transported to bitumen plants for reuse, where possible<br>• Maintain a log book for waste soil/debris disposal at the site indicating material, source and quantity | Construction Contractor | Site inspections<br><br>Log book/records inspection |
| Impacts due to mining of construction materials | • Procure construction material (sand, gravel, aggregate, etc) only from government approved existing quarry sites<br>• Minimize extraction of construction materials from rivers and stream beds<br>• Maintain a material entry log book at the site indicating material, source and quantity | Construction Contractor | Log book inspection |
| Soil erosion from | • Avoid scheduling of excavation work during the rainy season | Construction | Site inspections; verify construction |

| Anticipated Impacts | Proposed Mitigation Measures | Responsible for Mitigation | Monitoring of Mitigation |
|---|---|---|---|
| excavated/refilled areas and likely impacts on surface water bodies due to construction activities | • In unavoidable circumstances, protect open trenches from entry of rain water by raising earthen bunds with proper compaction<br>• Confine construction area including the material storage (sand and aggregate) so that runoff from upland areas will not enter the site<br>• Construct silt ponds and install silt retention barriers near the site to prevent the entry of silt laden runoff into drains<br>• Ensure that drains are not blocked with excavated soil<br>• Minimize vegetation clearance as far as possible<br>• Minimize the time during which excavations/trenches are open<br>• Ensure proper compaction of refilled soil and there shall not be any loose soil particles on the top ; the material shall be refilled in layers and compacted properly layer by layer<br>• Rehabilitate disturbed surfaces as soon as possible after completion of construction activity<br>• No vehicle/equipment repair/maintenance activities shall be conducted on site; if necessary, the works shall be conducted on impervious surface; there shall be no spillage of oils/grease on ground | Contractor | schedule;<br>interviews with people and workers |
| Collection of groundwater in trenches as their being dung and its disposal<br>This is most unlikely because the water table is deeper than the excavations | • Do not dispose the water directly into the water courses/ drains, which may lead to silting<br>• Create a temporary pond at the site and dewater into pond<br>• Dispose the clarified water from pond into natural courses<br>• Ensure the receiving water body has free flowing course and it will to lead to overflowing or flooding of surroundings | Construction Contractor | Site inspection |
| Silting of drains and water courses due to disposal of slurry from bore hole drilling | • Construct a temporary silt pond to hold slurry water produced from bore well drilling<br>• Dispose clarified water from pond to nearest water course<br>• Level the pond area and restore to original position once the work is completed | Construction Contractor | Site inspections |
| Impact on ambient air quality due to dust generation and vehicle emissions | • Cover or damp down by water spray on the excavated mounds of soil to control dust<br>• Apply water prior to leveling or any other earth moving activity to keep the soil moist throughout the process<br>• Bring the material (aggregate and sand) as and when required;<br>• Don't allow access in the work area except workers to limit soil disturbance and prevent access by fencing<br>• Ensure proper consolidation/stabilization of top surface when un-surfaced/ /earthen roads are used for construction activity; sprinkle water on road | Construction Contractor | Site inspections;<br>interviews with people and workers;<br>verify vehicle emission permit records |

| Anticipated Impacts | Proposed Mitigation Measures | Responsible for Mitigation | Monitoring of Mitigation |
|---|---|---|---|
| | surface to arrest dust generation<br>• Use tarpaulins to cover loose material that is transported to and from the site by truck Control dust generation while unloading the loose material (particularly aggregate and sand) at the site by sprinkling water or unloading inside barricaded area<br>• Clean wheels and undercarriage of haul trucks prior to leaving construction site<br>• Ensure that all equipment & vehicles used for construction activity are in good condition<br>• Ensure that all equipment & vehicles confirms to government emission and noise norms | | |

| Anticipated Impacts | Proposed Mitigation Measures | Responsible for Mitigation | Monitoring of Mitigation |
|---|---|---|---|
| Impediment of access to houses and business establishments due to laying of pipelines | • Do not close/obstruct any road/path for construction purpose; if unavoidable alternative temporary access should be made available<br>• Inform local people about the nature and duration of work well in advance so that they can make necessary preparations;<br>• Provide wooden planks across trenches for pedestrians and metal sheets where vehicle access is required | Construction Contractor | Site observations<br>interviews with local people and business |
| Disturbance/nuisance due to construction activities and public/community safety | • Provide prior public information about nature, schedule of work, and likely disturbances during the construction through local mass media<br>• Intimate the sensitive establishments near the construction site (hospitals/schools/religious places/cemetery/burial ground/parks etc) about the nature and schedule of works;<br>• Schedule noisy activities in consultation and put in place a complaint receiving mechanism<br>• No nighttime construction activities including material haulage near (500 m) any settlement area; sensitivity to noise increases during the nighttime hours in residential neighborhoods – work hours shall be limited to daylight hours 06:00 – 21:00 Hrs<br>• Use less noise generating equipment; inform the local community prior to any noisy works such as cutting of roads using pneumatic drills<br>• Educate drivers: speed limits; avoid use of horn; parking at designated places; no idling on roads etc.<br>• Sites shall be barricaded, guarded and public entry restricted; provide solid barricades where required to stop persons/vehicles falling into the trenches<br>• Provide road signs and flag persons to warn public of dangerous conditions Provide reflective barricades for easy visibility and identification of construction area<br>• The work area including material, waste storage is isolated within the barricaded site | Construction Contractor | Verify construction schedule and records; site observations<br>interviews with workers and local people |
| Traffic disturbances during construction along the roads | • Identify important roads that are to be affected by construction work and provide prior intimation to the public<br>• Plan works in important roads in consultation with traffic police and municipality;<br>• Provide information, direction and warning boards, provide traffic guards with danger flags<br>• Provide prior public information about the work, traffic disruptions/diversions<br>• Plan vehicle (material & waste) transport routes & schedules avoiding | Construction Contractor | Site observations<br>interviews with local people and traffic police |

| Anticipated Impacts | Proposed Mitigation Measures | Responsible for Mitigation | Monitoring of Mitigation |
|---|---|---|---|
| | narrow/sensitive roads and peak traffic timings<br>• Heavy vehicles should not enter narrow local roads and sensitive areas of the town, except in the immediate vicinity of delivery sites<br>• Carry out construction in sections, give adequate notice of construction activities, provide effective road signs, diversions or barricades | | |
| Occupational Health and Safety of workers | • Provide all workers appropriate personal protection equipment (such as helmet, gum boots, safety belts, gloves, and ear plugs; etc) and ensure their usage<br>• Prohibit unauthorized entry into work site<br>• Provide health and safety orientation training to all workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuries to fellow workers;<br>• Ensure that workers follow documented procedures for all site activities;<br>• Provide qualified first-aid at all times and equipped first-aid stations shall be easily accessible<br>• Provide medical insurance coverage for workers;<br>• Provide supplies of potable drinking water<br>• Ensure the visibility of workers through their use of high visibility vests when working on roads or walking through heavy equipment operating areas;<br>• Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively<br>• Appoint a Environment, Health and Safety (EHS) manager; prepare a construction site layout plan<br>• Document and report work-related accidents | Construction Contractor | Site observations; verify contractor records; interviews with workers; verify accident reports |
| Risk due to deep excavations, collapse of trench and damage to adjacent structures | • Provide shoring in all trenches/excavations deeper that 1.2 m<br>• Shoring should erected, altered, dismantled only by a competent worker under strict supervision<br>• Excavation and installation shoring should proceed by stages till it reaches the required depth<br>• As far as possible, deep excavations shall not be conducted close to buildings; in unavoidable case provide necessary measuring such as shoring to prevent collapse of fall when the stability of structure may be affected by excavation work | Construction Contractor | Site observations and review of final alignment drawings of sewers |
| Impacts due to import of labor and establishment of temporary labor camps | • Avoid/minimize temporary worker camps by employing local people as far as possible | Construction Contractor | Site observations;; interviews with workers |

| Anticipated Impacts | Proposed Mitigation Measures | Responsible for Mitigation | Monitoring of Mitigation |
|---|---|---|---|
| | • In unavoidable case:<br>o Establish the camp in consultation with the local authority<br>o Camp site shall be located away from water bodies<br>o No clearance of trees vegetation shall be allowed for establishment of camp<br>o Provide appropriate & adequate accommodation<br>o Provide water in good quality & adequate quantity<br>o Provide sufficient and suitable washing facilities including soap & towels<br>o Provide sufficient lavatories; and separate lavatories for men and women workers.<br>o Provide cooking fuel and no worker shall be allowed to cut any tree<br>o Ensure regular and clean maintenance of the camp<br>o Ensure proper wastewater collection & disposal facilities; septic tanks and soak pits shall be provided for wastewater disposal<br>o Provide solid waste collection bins and dispose waste through municipal system; ensure that solid waste is not burnt at the site<br>o Conduct awareness programs on HIV/AIDS and other communicable diseases<br>• Restore camp site to original status after completion of work | | |
| Historical, archeological chance finds during excavation | • Contractor shall put in place a protocol in conducting any excavation work, to ensure that any chance finds are recognized and measures are taken to ensure they are protected and conserved. This should involve:<br>o Provide training to the construction supervisors to identify any suspicious objects<br>o Stop work immediately to allow further investigation if any finds are suspected;<br>• Call in the state archaeological authority if a find is suspected, and taking any action they require to ensure its removal or protection in situ. | Construction Contractor | Interview with site supervisors; verify construction records for any chance finds detected |

**Table 8: Environmental Management Plan – Operation**

| Anticipated Impacts | Proposed Mitigation Measures | Responsible for Mitigation | Monitoring of Mitigation |
|---|---|---|---|
| Health and Safety<br>• Hazards for AzerSu Workers and the public | • Ongoing training programs for first aid and Occupational Health and Safety training to AzerSu<br>• Undertake periodic inspections of electrical equipment by qualified staff and periodic safety audits | JSC | Monthly inspection of complaints register and safety records<br>Periodic health check up |
| Sustainability of Infrastructure Systems<br>• Efficiency and reliability of water supply system | • Provide training for water network and metering repair training<br>• Provide O&M training for water and sewer distribution networks; maintaining pressures and detecting leaks<br>• Provide adequate budgets and undertake planned maintenance programs in accordance with specific O&M plans<br>• Provide vocational training for AzerSu staff<br>• | JSC | Training programs conducted<br>Preventive maintenance activities<br>Time taken for leak repair |

**Table 9: Environmental Monitoring Plan**

| Mitigation measures | Parameters to be Monitored | Location | Measurements | Frequency | Responsibility |
|---|---|---|---|---|---|
| **Pre-Construction Phase** | | | | | |
| All design related mitigation measures | Inclusion in the project design | - | Design review | As needed before tendering | PMF |
| **Construction Phase** | | | | | |
| All construction related mitigation measures | Implementation on site | All construction sites | Observations on/off site; construction records; review of site layout & safety plan; vehicle log records of construction material and waste transport; interviews with people and workers | Bi-weekly during construction | PMF through supervision consultant |
| Dust and emission control from construction activities | Ambient air quality (SPM, RSPM, CO, SO2) | Three sampling locations covering subproject area | Comparison with base values | Once before start of construction; quarterly (4 times a year) during construction | Construction Contractor |
| Noise generation | Ambient noise levels (day, night levels), dB(A) | Three locations as above | Comparison with base values | Once before start of construction; quarterly (4 times a year) during construction | Construction Contractor |
| Water quality monitoring | Physio-chemical parameters | Two locations on Upper Karabagh canal – (i) upstream of well field, and (ii) downstream of transmission water main work | Comparison with base values | Once before start of construction; monthly once during the construction of transmission main work | Construction Contractor |
| **Long Term Surveys** | | | | | |
| • Conduct source quality monitoring | As per the government regulations | 1 sample from each bore hole | Comparison with the base values and standards as per government regulations (Appendix 2) | Monthly | JSC |
| • Treated water quality monitoring | As per the government regulations | At the outlet of chlorination plant; at reservoir sites; and at extreme points of network in various locations in town | Comparison with the standards as per government regulations (Appendix 2) | Daily/ monthly/quarterly as required | JSC |

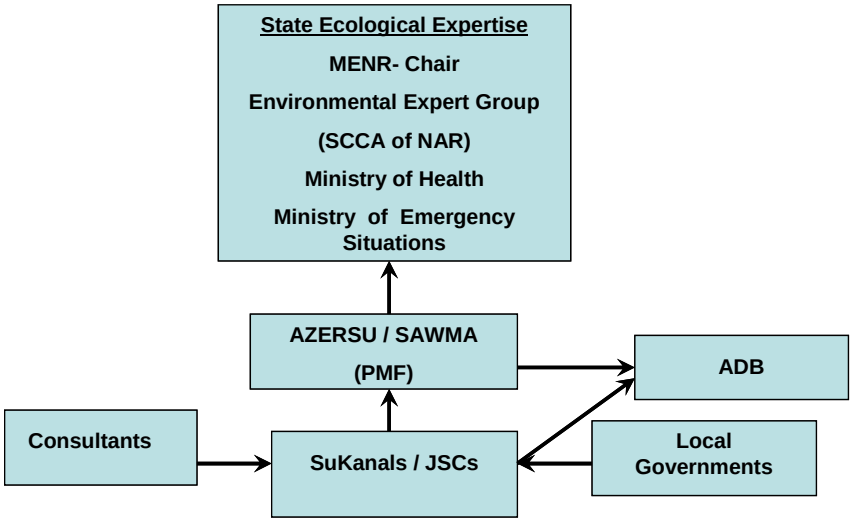
113. **Environmental Reporting.** The contractor will submit monthly progress reports, which include a section on implementation status of environmental management measures. The environmental monitoring and management reports will be prepared by the PMF's Safeguard Specialist with assistance from the Program Consultant. The reports will be submitted biannually to ADB who will disclose it to the public on receipt. The monitoring report will include the following: (i) compliance with ADB loan covenants and government regulations; (ii) significant issues or changes in scope; (iii) summary of monitoring report findings; (iv) required follow-up actions; and (v) conclusions

## B. Implementation Arrangements

### 1. Responsibilities and Authorities

114. Figure 1 provides a schematic representation of the institutional arrangements for implementing the EMP. A summary of the Environmental Assessment and Review Procedures and respective responsibilities are summarized in Table 10. The Program will be implemented by AzerSu's Program Management Facility (PMF) and the agency responsible for operation of improved infrastructure will be Aghjabedi Joint Stock Company. The PMF will provide guidance on environmental issues, and will be the first level of internal monitoring. AzerSu has a significant experience in implementing donor-funded projects, and the necessary technical expertise in monitoring environmental management plans. During the operations phase, the Program will be implemented by the JSC.

**Figure 1: Institutional Arrangement**




115. The JSC will establish laboratories for chemical analysis and monitoring of water quality at the reservoir sites in each town. Biological and epidemiological monitoring of water will be carried out by the JSC, in accordance with the Ministry of Health, Sanitary Epidemiology Service (SES) and their relevant administrative procedures.

116. The SESs are responsible for health and water quality-related issues. Under the Program, such agreements will be worked out between the JSC and the SESs. The SESs, acting under the approved schedule of the Ministry of Health, will conduct regular tests of water quality, and will be taking supervisory charge in monitoring water quality. Within the town, they will have responsibility to take potable water samples from key locations in the distribution system to ensure compliance with the health regulations. The quality of drinking water supply will be monitored according to international and local standards.

117. The overall responsibility for environmental protection lies with the Ministry of Ecology and Natural Resources (MENR). At the rayon level they are represented by the rayon agency, which is located within or near the towns. The MENR is charged with a task of providing national monitoring services that includes a monitoring network of baseline information on water sources. Compliance with the EMP will be undertaken by the Safeguards Specialist at the PMF as part of his/her technical supervisory duties.

118. The responsibility for construction standards is with the Ministry of Emergency Situations. Their standards together with ADB's environmental requirements will be incorporated into the Program design. There are no significant environmental management issues relating to the post construction and operation of the Program. The major ones relate to control of leakage from the sewer lines, the safe discharge of sewage to the sewerage system, the safe operation of the wastewater treatment plants and safe discharge of the treated sewage. Environmental management will be regulated through the existing legislation as well as specific clauses with the Contractor. Daily control and monitoring of construction works will be part of the Contractor's responsibilities.

119. The Program's environmental impacts will be closely monitored. Specifically, the monitoring and evaluation (M&E) activities by the PMU will include (i) collecting, collating, and analyzing monitoring data related to the environmental conditions in the Program towns; (ii) environmental gains as a consequence of Program implementation, and (iii) evaluating environmental impacts within the selected systems. (AzerSu's internal monitoring department is called the Ecology and Monitoring Section.) The M&E activities at the JSC-level will also have site inspectors, who will work with the responsible Rayon agencies. For environmental monitoring, they will collect and analyze information on quality of water supplied, sewage discharged, and minimization of construction impact within the towns. The Program performance, monitoring, and evaluation will be done in accordance with ADB's guidelines on its program performance management system.

120. Existing Town Water User's Association (TWUA) will act as advocacy groups to represent the interests of consumers, and will be recognized by the JSC as important partners in ensuring that WSS services achieve consumer satisfaction.

**Table 10: Institutional Responsibilities**

| Organization | | Responsibilities |
|---|---|---|
| JSC | JSC, Program Consultant Social and Environ-mental Specialists, and PMF | • Preparing Env. Management Plan (EMP) for SEE review<br>• Periodic submission of environmental monitoring report to ADB for public disclosure<br>• Establishing environmental classifications under ADB regulations & determining need for Subproject (Sp) IEEs<br>• Screening & preparation of Sp EEs including cost estimates for mitigation measures & monitoring plans<br>• Conducting public consultations: Informing affected people and community focus groups before or during consultation in the early stage of IEE preparation and conducting continuing consultation during implementation in accordance with ADB and government requirements<br>• Preparing SpIEEs for SEE and obtaining IEE clearance (development consent approval) from SEE<br>• Submitting to ADB first IEE and all IEEs over $2 million<br>• Ensuring tender documents will be updated with any changes to the EMP<br>• Ensuring contract document including environmental clearance certificate & conditions and ensuring ADB gets copies of these documents<br>• Implementing and updating environmental mitigation and monitoring |

| Organization | | Responsibilities |
|---|---|---|
| | | measures<br>• Incorporating environmental requirements in civil work contracts<br>• Performing water quality monitoring and reporting to the SEE and local governments<br>• Performing civil work surveys<br>• Ensuring the Contractors have access to the IEE reports<br>• Ensuring that Contractors have fully implemented and completed the detailed EMP and have submitted this to SEE for approval<br>• Providing environmental training<br>• Undertaking remedial action when unexpected environmental impacts occur during implementation<br>• Preparation and submission of quarterly reports to the SEE and ADB including i) compliance with ADB loan covenants and government regulations, ii) significant issues or changes in scope, iii) summary of monitoring report findings, and iv) required follow-up actions<br>• Undertaking monitoring of operation and preparing monitoring reports every year for 4 years after construction |
| PMF | Safeguards Specialist | • Overall coordination with government entities and supervision responsibilities<br>• Approval of the management contract<br>• Submission of IEEs for SEE approval<br>• Monitoring and evaluation of the Program |
| Environment Expert Group | SEE (within MENR) | • Review of environmental clearance<br>• Providing guidance for upholding environmental policy requirements |
| ADB | Social and Environ-mental Sector Specialists | • Reviewing first IEE and all IEEs over $2million<br>• Disclosing reports over ADBs website (Responsibility of ADB Project Leader)<br>• Reviewing all statutory environmental clearances granted by SEE<br>• Reviewing quarterly reports & taking necessary actions<br>• Monitoring EMP implementation and due diligence |
| Local Govts and TWUAs | | • Coordination with JSC and making key decisions on behalf of the community |

### 2. Institutional Assessment

121. AzerSu acting as the PMF has significant experience with managing water and wastewater treatment systems. The organization has accumulated WSS management and mitigation experience through current and completed water and wastewater improvement and construction works throughout the country.

122. Similarly, the Aghjabedi JSC (SuKanal), the local branch of AzerSu has been operating the existing systems for many years. They are experienced with chlorination, distribution systems and wastewater treatment. The Program Consultant's environmental specialist will provide significant support and guidance with the required environment, resettlement and public consultation requirements of ADB and the SEE.

## C. Environmental Management Budget and Resources

123. Most of the mitigation measures require the contractors to adopt good site practice, which should be part of their normal construction contract, so there are no additional costs to be included in the EMP. Costs of design-related mitigation measures are included in the budgets for the civil works.

124. The cost for hiring a Program Consultant covering social and environmental issues for the periods before, during and after construction are already included in the project implementation costs . The budget needed for the Safeguard Specialist and support staff has also been included in the Program costs as these employees will come from within the PMF/AzerSu.

125. The ambient air quality monitoring and noise monitoring to be conducted by the contractor during construction will be additional and therefore shown here. Long-term surveys such as source water quality and treated water quality supplies to consumers will be conducted by in-house laboratory and as per the government regulations. So no budget is provided here for this purpose. AzerSu has capacity and knowledge to perform water quality tests. Extensive training must be provided in the subproject due to the risks of construction, chemical handling, and specific water and wastewater network operations and maintenance tasks. These costs already included in the program part of capacity building.

126. Following Table 11 shows the environmental management costs of this subproject.

**Table 11: Environmental Management Costs**

| Item | Quantity | Unit Cost | Total Cost |
|---|---|---|---|
| **Implementation of EMP (1.5 years)** | | *US $* | *US $* |
| National Environmental Specialist (Supervision Consultant) | 0.75 | 6,000 | 4,500 |
| Environmental Management Specialist (AzerSu-PMF) | 0.25 months | 3,000 | 750 |
| Ambient air quality monitoring | 3 x7 | 200 | 4,200 |
| Noise | 3x7 | 70 | 1,470 |
| Upper Karabagh canal water quality | 2x6 | 200 | 2,400 |
| *Total* | | | *13,320* |
| **Water Quality Monitoring (long-term)** | | | |
| Source water quality, treated water supplied in the town – | Samples as required | - | Part of laboratory operational costs |
| *Total* | | | *13,320* |

## IX. CONCLUSION AND RECOMMENDATION

### A. Findings and Recommendation

127. The environmental impacts of the all infrastructure elements proposed in the water supply subproject in Aghjabedi has been assessed and described in the previous sections of this document. Potential negative impacts were identified in relation to design, location, construction and operation of the improved infrastructure. Mitigation measures have been developed to reduce all negative impacts to acceptable levels.

128. According to this assessment, the proposed Aghjabedi subproject is unlikely to cause any adverse environmental impacts because: (i) proposed subproject activities are designed primarily to improve the quality of life and quality of environment of the town; (ii) potential negative impacts associated with the design, construction and operation of the proposed Project activities will be temporary, minor, and localized in extent and can be mitigated to acceptable levels; (iii) no Project activities will involve permanent or temporary loss of income and/or livelihood; (iv) the institutional framework has been developed to specify the procedural requirements and responsibilities to ensure environmentally sustainable

implementation; and (v) all construction and operation activities will be monitored and reported by the PMF in accordance with the Environmental Monitoring Plan**.**

129. The construction stage Environmental Management Plan (Table 8) and the monitoring to be conducted by the Contractor (Construction phase monitoring indicated in Table 10) should form part of the contract documents. All the measures such as designing a robust system, availability of adequate manpower, O&M equipment and manual, and training is considering in the design of the project.

## B. Conclusion

130. The level of environmental assessment within this IEE is sufficient to indicate the subproject's impacts and to outline the necessary mitigation measures for the subproject. No additional studies, such as an EIA, are required. The proposed Aghjabedi subproject will have significant positive impacts on the quality of life for community members through providing a safe, reliable water supply, and improved water distribution network. The proposed Environmental Management and Monitoring Plans in this IEE will ensure that proper water quality monitoring and environmental management is conducted. The IEE was disclosed to the public, and the stakeholder concerns were incorporated into the IEE. The proposed subproject these components will contribute to the overall sustainability of the water supply as well as environmental conditions in Aghjabedi.

131. As per the Republic of Azerbaijan's (RA) Law, the proposed subproject requires following permissions from the government regulatory agencies: Environmental permit and groundwater abstraction permit. AzerSu is in the process of obtaining both these permits before the award of contract for civil works.

## Appendix 1: Photographs

Photo 1: Uppar Karabagh Canal

Photo 4: Existing Pumping Station – to be rehabilitated

Photo 2: Site for new reservoirs, chlorination facility, laboratory & workshop building

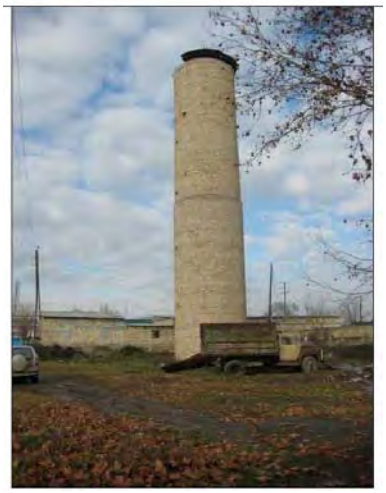


Photo 5: Existing water tower – to be rehabilitated

Photo 3: Existing Reservoirs - to be rehabilitated

Photo 6: Existing Bore Well Site

Photo 7: Condition of Existing Water Tower

Photo 9: Existing pumping station

Photo 8: Existing Reservoir

Photo 10: Existing Chlorination Plant

Photo 11: Narrow Streets with utilities

Photo 13: Narrow Roads in the Town

Photo 12: Drainage channel near WWTP site

Photo 14: Wide Roads in the Town

## Appendix 2: Maximum Allowable Concentrations (MAC) In Drinking Water

| o | Substances | MAC Limits (mg/l) |
|---|---|---|
| 1. | Smell at 20°C temperature | <2 threshold odor number |
| 2. | Color | <20 color units |
| 3. | Turbidity | <1.5 NTU |
| 4. | Ph | 6-9 |
| 5. | HCO3- | >3 |
| 6. | Ca2+ | 180 |
| 7. | Mg2+ | 40 |
| 8. | Na+ | 170 |
| 9. | Polyphosphate residual (PO4-) | 3,5 |
| 10. | Hardness | 7.0 mg – eqv |
| 11. | Mineralization | <1000 (1500) |
| 12. | Total dissolved solids | 1000.0 |
| 13. | $N_2O_5$ | 29.0 |
| 14. | $NO_2$ | Traces |
| 15. | $NO_3$ | 10.0 |
| 16. | $NH_4$ | Traces |
| 17. | Cl- (chlorine) | 25 – 50 |
| 18. | $Cl_2$ (chloride) | 350 |
| 19. | $SO_4^{2-}$ | 100 |
| 20. | both iron oxides $Fe^{2+}$ and $Fe^{3+}$ | 0.3 |
| 21. | total content of Fe+ and Mn | 0.5-1.0 |
| 22. | Oxidation $O_2$ | 2.5-3.0 |
| | $KMnO_4$ | 10.0 |
| 23. | Pb (lead) | 0.03 |
| 24. | As (arsenic) | 0.05 |
| 25. | Cu (copper) | 1.0 |
| 26. | F- (fluoride) | 1.5 |
| 27. | Al (aluminum) | 0.5 |
| 28. | Be (beryllium) | 0.0002 |
| 29. | Mo (molybdenum) | 0.25 |
| 30. | Se (selenium) | 0.001 |
| 31. | Sr (strontium) | 7.0 |
| 32. | Zn (zinc) | 5.0 |
| 33. | $H_2S$ | 0.0 |
| 34. | Hg, Ba, hexavalent Cl- and other poison contaminations | 0.0 |
| 35. | TVC @ 37ºC | 100 in 1 $cm^3$ |
| 36. | Total Coliforms in 1000 ml water (E coli-index) (MPN) | 3 |

Source: Maximum Allowable Concentrations, GOST 2874-8, MOH

Note: There are some exclusions for drought regions: content of total dissolved solids can be up to 2,500-3,000 mg/l; $Cl_2$ up to 400-800 mg/l; $SO_4^{2-}$ up to 1,000-1,500 mg/l; and general water hardness up to 21-40 mg·eqv.

Ministry of Health's water quality guidelines

## Appendix 3: National Ambient Air Quality Standards

| Pollutants | Maximum allowed concentrations ($mg/m^3$) | |
|---|---|---|
| | **Maximal concentration for a given moment** | **Average daily concentration** |
| Carbonic Oxides | 3.0 | 1.0 |
| Sulfur Dioxide ($SO_2$) | 0.5 | 0.03 |
| Nitrogen Oxides | 0.085 | 0.085 |
| Benzole | 1.5 | 0.8 |
| Fluoride Compounds | 0.02 | 0.005 |
| Phenol | 0.01 | 0.01 |
| Non-toxic Dust | 0.5 | 0.15 |
| Soot | 0.15 | 0.05 |
| Formaldehyde | 0.035 | 0.012 |
| Chlorine | 0.1 | 0.03 |
| Hydrogen Sulfide | 0.008 | 0.008 |
| Nitrobenzene | 0.008 | 0.008 |
| Ammonia | 0.2 | 0.2 |
| Acetone | 0.35 | 0.35 |
| Methanol | 1.0 | 0.5 |
| Ozone ($O_3$) | 0.16 | 0.03 |
| Hydrocarbon (HC) | 1.0 | - |
| Lead and its compounds (except tetraethyl lead) | 0.0010 | 0.0002 |

Source: Maximum allowable concentrations of toxic elements in the working area GOST 12.1.005-88; Ministry of Ecology and Natural Resources, 2003

## Appendix 4: Maximum Allowable Noise Levels

| Land use | Noise standard (max) in decibel (dBA) | |
|---|---|---|
| | **Daytime (07:00-23:00)** | **Nighttime (23:00-07:00)** |
| Residential Areas | 40 | 30 |
| Commercial Areas | 55-60 | 55-60 |
| Hotels and dormitories | 45 | 35 |
| Industrial areas:<br>a) highly qualified workplaces | 50 | 50 |
| b) permanent workplaces within territory or buildings of plants | 80 | 80 |
| c) workplaces of track drivers and service | 70 | 70 |
| d) workplaces of drivers and service for tractors and other equivalent agricultural and melioration mechanisms | 80 | 80 |
| Sensitive areas: a) hospitals and sanatoriums | 35 | 25 |
| b) schools, libraries and conference halls | 40 | 40 |

Source: Noise Standards GOST 12.1.003-83 UDK 534.835.46:658.382.3:006.354; GOST 12.1.036-81 ST SEV 2834-80

**Appendix 5: Sanitary Protection Norms for Wells as per the "Report on Results of Additional Hydrogeological Investigations Executed in the Territory of Mughanali Village of Aghjabedi Rayon for Water Supply of Aghjabedi Town, 2010**

## 6. Safety engineering

It is highly important to follow sanitary rules in order to provide long term exploitation of ground water resources. Protection of water sources against external pollution has crucial importance. Thus for each water intake site it is required to establish two strictly protected zones comprised by two protective strips. First strictly protected regime is usually covers production well sites. This type of strictly protective regime is usually realized in operation of first unconfined aquifer horizon. Second strictly protective regime is applied for water basins with water resources existing in deeper layers and for operation of confined artesian aquifer basins.

In first case pollution of ground waters bears more intensive character. Depending on geological and hydro geological composition of the area the radius of well location site should not be less than 50 meter in first case and 30 meter in second case respectively. Considering that designed wells in the project is related to exploitation of first unconfined aquifer basin, thus following rules to be observed in the well field site for protection of ground waters against pollution:

1. Circular radius of the well site should not be less than 50 meter in well field as the first strictly protective regime zone.
2. In order to prevent creation of swamp around of well site the well head area to be concrete paved in 4 $m^2$ size.
3. Back of drive pipe to be strengthened by concrete mortar up to 6 meter depth.
4. Second strip protective zone to be established around the well in order to provide protection of the well. Dimension of fence of the second protective strip should be 8x12 m in order to provide execution of service and maintenance works in the well. Fence that will surround the

well should be meshwire supported by concrete or steel made poles. The site to be paved with asphalt cover or 15 cm gravel layer.

5. Entrance to the protection zone around the well is forbidden for the persons not engaged with operation of the well.
6. Pasture of cattle in well surrounding areas is forbidden.
7. Planting of trees, garden plants, as well as use of chemicals and fertilizers in the well surrounding areas is forbidden.
8. In order to avoid waste of water the well to be operated in strict regime while permanently controlled by water service operator.
9. Regular chemical analysis has to be conducted in order to control water quality and long term operation of water resources.
10. Drilling of exploitation wells to be agreed with respective authorities responsible for protection of underground resources and their purposeful use. During drilling works special attention to be given that the cases such as violation of geo-ecological balance of the area, drying of forests, sucking of ground waters not conforming with surrounding condition to be avoided. Besides, salinization of soil, generation of swampy areas, settlement or other exogenous geological process to be avoided during drilling activities

## Appendix 6: Rapid Environmental Assessment (REA)Checklists

**Instructions:**

(i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (RSES) for endorsement by the Director, RSES and for approval by the Chief Compliance Officer.

(ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.

(iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

**Country/Project Title:** AZE: Water Supply and sanitation Investment Programme-Water Supply Subproject in Aghjabedi Town (T3).

**Sector Division:** CWUW

| Screening Questions | Yes | No | Remarks |
|---|---|---|---|
| **A. PROJECT SITING**<br>IS THE PROJECT AREA… | | | |
| ▪ DENSELY POPULATED? | **X** | | Some parts of the town are densely populated |
| ▪ HEAVY WITH DEVELOPMENT ACTIVITIES? | | **X** | |
| ▪ ADJACENT TO OR WITHIN ANY ENVIRONMENTALLY SENSITIVE AREAS? | | **X** | |
| • CULTURAL HERITAGE SITE | | **X** | |
| • PROTECTED AREA | | **X** | Ag-gol National Part is located about 5 km east of the town. No components are located near the town. None of the subproject components are situated in or near the park |
| • WETLAND | | **X** | |
| • MANGROVE | | **X** | |
| • ESTUARINE | | **X** | |
| • BUFFER ZONE OF PROTECTED AREA | | X | |
| • SPECIAL AREA FOR PROTECTING BIODIVERSITY | | **X** | |
| • BAY | | **X** | |

| Screening Questions | Yes | No | Remarks |
|---|---|---|---|
| **B. POTENTIAL ENVIRONMENTAL IMPACTS**<br>Will the Project cause… | | | |
| ▪ pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff? | | **X** | |
| ▪ impairment of historical/cultural monuments/areas and loss/damage to these sites? | | **X** | |
| ▪ hazard of land subsidence caused by excessive ground water pumping? | | **X** | Groundwater resource review and detailed investigations concluded that there are adequate resources in the area, so no impacts envisaged. No land subsistence problem foreseen considering the local geology |
| ▪ social conflicts arising from displacement of communities ? | | **X** | Communities will not be displaced |
| ▪ conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters? | | **X** | |
| ▪ unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)? | | **X** | |
| ▪ delivery of unsafe water to distribution system? | | **X** | |
| ▪ inadequate protection of intake works or wells, leading to pollution of water supply? | | **X** | Adequate protected measures planned |
| ▪ over pumping of ground water, leading to salinization and ground subsidence? | | **X** | |
| ▪ excessive algal growth in storage reservoir? | | **X** | |
| ▪ increase in production of sewage beyond capabilities of community facilities? | | **X** | |
| ▪ inadequate disposal of sludge from water treatment plants? | | **X** | No water treatment plant included in the subproject |
| ▪ inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities? | | **X** | |
| ▪ impairments associated with transmission lines and access roads? | | **X** | |
| ▪ health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals. | | **X** | |
| ▪ health and safety hazards to workers from handling and management of chlorine used for disinfection, other contaminants, and biological and physical hazards during project construction and operation? | | **X** | All necessary safety measures are included in the subproject design |
| ▪ dislocation or involuntary resettlement of people? | | **X** | |

| Screening Questions | Yes | No | Remarks |
|---|---|---|---|
| ▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups? | | X | |
| ▪ noise and dust from construction activities? | X | | Limited to the construction period, but will be addressed by designing appropriate mitigation measures |
| ▪ increased road traffic due to interference of construction activities? | X | | Limited to the construction period, but will be addressed by designing appropriate mitigation measures |
| ▪ continuing soil erosion/silt runoff from construction operations? | X | | Limited to the construction period, but will be addressed by designing appropriate mitigation measures |
| ▪ delivery of unsafe water due to poor O&M treatment processes (especially mud accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems? | | X | |
| ▪ delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals? | | X | |
| ▪ accidental leakage of chlorine gas? | | X | All necessary protection measures are planned |
| ▪ excessive abstraction of water affecting downstream water users? | | X | |
| ▪ competing uses of water? | | X | |
| ▪ increased sewage flow due to increased water supply | X | | Adequate sewage collection and treatment facility is being constructed under the subproject |
| ▪ increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant | | X | Adequate sewage collection and treatment facility is being constructed under the subproject |
| ▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)? | | X | |
| ▪ social conflicts if workers from other regions or countries are hired? | | x | |
| ▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during operation and construction? | | X | |
| ▪ community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning? | | X | |

| **Climate Change and Disaster Risk Questions**<br>The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks. | **Yes** | **No** | **Remarks** |
|---|---|---|---|
| • Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes | | **X** | |
| ▪ Could changes in temperature, precipitation, or extreme events patterns over the Project lifespan affect technical or financial sustainability (e.g., changes in rainfall patterns disrupt reliability of water supply; sea level rise creates salinity intrusion into proposed water supply source)? | | **X** | |
| ▪ Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g.,high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)? | | **X** | |
| ▪ Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., by using water from a vulnerable source that is relied upon by many user groups, or encouraging settlement in earthquake zones)? | | **X** | |

* Hazards are potentially damaging physical events.