Initial Environmental Examination

June 2016

AZE: Water Supply and Sanitation Investment Program – Tranche 4

Agdash Town Water Supply and Sewerage Subproject

Prepared by AzerSu Joint Stock Company for the Asian Development Bank. This is a revised version of the draft originally posted in August 2011 available on http://www.adb.org/projects/documents/water-supply-and-sanitation-investment-program-tranche-2-agdash-town-water-supply

Initial Environmental Examination

Project Number: 42408
June 2016

Republic of Azerbaijan: Water Supply and Sanitation Investment Program – Agdash Town Water Supply and Sewerage Subproject (Tranche 4)

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

CURRENCY EQUIVALENTS

(as of 10 May 2016)

Currency Unit	=	Azeri Manat (AZN)
AZN1.00	=	$0.6625
$1.00	=	AZN 1.5094

ABBREVIATIONS

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

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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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 Agdash Town Water Supply and Sewerage, to be implemented in Tranche 2. Components of this subproject are: (i) water supply infrastructure - two artesian wells, pumping main, pumping system, water distribution network, and house connections, and (ii) sewerage infrastructure - sewer network with manholes and house connections and wastewater treatment plant. Subproject is currently in detailed design stage. Construction is likely to start in July 2012 and will be completed in 18 months.

3. This IEE is updated for Beylagan components to be included in Tranche 2. Components of the sub-project of Tranche 2 are: (i) eight new artesian wells in Dehne area, water reservoir, valve chamber, chlorination building, guard house, septic tank, transformator station and generator, and transmission line, (ii) wastewater treatment plant. Subproject components are currently in detailed design stage. The entire system is scheduled for completion by middle of 2018.

4. As the intake facility Qolqeti water source was accepted initially up 2015. 3 artesian wells were opened until 2009 and a new artesian well was opened newly. Unfortunately two of the existing water wells in approved Qolgeti water source has collapsed. The water can be obtained and given to the city by using new water network is supplied only from two wells (one is remaining existing and one new opened) in total amount of 15 lt/sec. On the other hand, the possibility of collapsing of the other two working wells are high too. If that happens Qolgeti water source will be completely out of order. In order to overcome the problem, the urgent solution is to provide water from a new water source 6.5 km far from city near Dehne town. Dehne water source was existing water source. There are old existing water reservoirs in Dehne. However, not only Dehne water source and the existing reservoirs are very old and damaged. It was decided to open an exploratory artesian well one side of the river near the old reservoir. An exploratory-production well with the coordinates of (N 40041`51.71``, E 47032`29.02``, H 96 m) and in depth of 112 m was drilled between June and July of 2015 in the area the well field,

which was used to be the city's water source. Well was opened in the upper part i.e. at theoutset of the allüvial fan of Turyanchay River, the exploratory-production well has been connected to the city's water network since September, 2015 and the satisfactory results of the laboratory analysis of water samples taken from the well. Now around 25 lt/sec water has been obtained. (Explanatory report of drilled well is given in Appendix 10) In order to meet the requirement of the town eight wells should be opened. After the satisfactory analyses of the exploratory-production well, it was decided to collect water in a new reservoir and by means of a new approximately 5 km long transmission main the water can be transported to the city water network.

5. 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 augmentation of groundwater abstraction by additional boreholes is not likely to have any adverse impacts on groundwater regime. The aquifer resource evaluation carried out using a mathematical model concluded that there are adequate resources to meet the design demand of Agdash. The geological structure of the area is stable and no potential land subsidence is foreseen. Groundwater quality is good and meets the national standards.

6. It was previously decided that Wastewater Treatment Plant would be constructed on the old WWTP site on the southwestern side of the town near Qaradagli village. Later, it was decided to be shifted 2,75 km to southwest site of the oldest site. WWTP is designed to treat and dispose the wastewater meeting the disposal standards. Necessary provisions for green buffer zone within WWTP premises are considered in design. During operation of WWTP, there are chances of Odor nuisance. To minimize the impact on a house that is constructed on a government-owned land adjacent to the WWTP site, maximum distance from problematic units and green buffer zone will be maintained. If need be, other Odor control mechanisms will be implemented. OdorThe treated water will be discharged into Sorsu Channel as before and the outfall length will be about 500 m from the new WWTP site. The channel water is used for irrigation. WWTP is designed to meet the disposal standards, so no impact on receiving water body envisaged. There are some industries (mostly food based) in Agdash, which may dispose the wastewater into WWTP. A monitoring system will be put in place to ensure that the wastewater is pretreated before disposing into sewers. Aerobically stabilised sludge will be dewatered directly by using centrifuges (Decanter). Before transported to sludge drying beds, sludge will be conditioned by chemicals (Lime) to prevent odor problem and expressly improve its dewatering characteristics. Dewatered sludge from sludge drying beds will be transported to sludge disposal site adjacent to the WWTP.

7. 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/sewer network is 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.

8. 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; 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)

covering soil and sand during transportation and when stored on site; (iii) planning work to minimize disruption of traffic and communities; (iv) Providing temporary structures to maintain access across trenches where required.

9. 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. Regular monitoring will be conducted at WWTP to ensure that the treated water meets standards. Sludge will be dewatered using decanter, and further dried in sludge drying beds and finally disposed in the identified sludge disposal site, near the WWTP. There is occupational health and safety risk involved while working in WWTP; all the necessary precautionary measures are included. Adequate manpower, operation and maintenance equipment will be provided. Necessary training will also be provided to the personnel.

10. The major impacts of the implementation of water supply and sewerage subproject will be beneficial to the citizens of Agdash 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.

11. 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.

12. 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.

13. Therefore, the components proposed under this water and sewerage subproject in Agdash 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 Law of Environmental Protection, 1999, an EIA study was conducted and was duly approved by the MNER. The Executing Agency has already

obtained the permission for groundwater abstraction from the MNER. Necessary permissions for use of WWTP site are obtained.

II. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

A. Azerbaijan Environmental Regulatory Framework

14. **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.

15. 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).

16. **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)

17. 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. **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: • the maximum permitted discharges and emissions of pollutants in the natural environment • the maximum permitted noise and vibration levels, and other harmful physical influences as well as health norms and standards of hygiene **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. **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. Standards/maximum allowable values notified/adopted by Government of Azerbaijan are in appendices – Drinking Water Quality (**Appendix 2**); Wastewater Disposal Standards (**Appendix 3**); ambient air quality (**Appendix 4**) and noise levels (**Appendix 5**).
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.

18. **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

19. **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

[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.

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 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, Agdash JSC.** Agdash 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 Agdash. It also manages and operates the water and wastewater treatment plants in the town.

B. Environmental Assessment Procedure in Azerbaijan

20. **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:.

21. 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

22. **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.

23. **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.

24. 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.

25. 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.

26. **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.

27. 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.

28. 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

29. 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.

30. **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.

31. **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.

32. **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

33. Proposed water supply and sanitation project in Agdash 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.

34. The executing agency, AzerSu has conducted an Environmental Impact Assessment Study, and the EIA Report was submitted to Ministry of Environment and Natural Resources (MENR). MENR approved the EIA report and issued approval for the project. AzerSu also obtained permission from MNER for groundwater abstraction. Necessary approvals for WWTP site have been obtained.

E. Extent of IEE Study

35. The Agdash Town 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.

36. The IEE study for this subproject was first conducted in 2004 based on the feasibility study proposals. It was updated and approved ADB during the detailed engineering design stage in 2008. Subsequently, some of the proposals are implemented under the ongoing ADB assistance (Loan 2119: Azerbaijan Urban Water Supply and Sanitation Project), and the remaining components are proposed for implementation under the Investment Program. The IEE was updated again during the Investment Program preparation in 2010 and was approved by ADB. This IEE is the updated version of IEE Report approved by ADB in 2010, and deals with the proposed subproject under the Tranche-2 of the Investment Program.

37. 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

38. 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.

39. 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.

40. The Azerbaijan WSS Investment Program (the 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).

41. 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. Agdash Town Water Supply & Sanitation Subproject

1. Need

42. Agdash town is located 244 km northwest of Baku at an average elevation of 50 m above mean sea level (MSL). The population of the town is 24,220 (2010 AZE population statistics). Subproject location is Map 2. Lack of proper and reliable water supply and wastewater collection and treatment system is a major problem for Agdash and other towns in the northwestern part of the Shirvan plain, in the catchment area between the Turyanchay and Goychay Rivers.

43. Due to the dire state of the existing water supply infrastructure, Agdash will no longer utilize the existing infiltration galleries, pipelines or reservoirs. The infiltration galleries have been almost completely destroyed by the annual spring flooding and by mudflows. Also, the galleries are located in the environmentally sensitive and protected area of Turyanchay State Nature Reserve.

44. The existing water distribution network in the town is very old (~40 years). These old and damaged pipes are profusely leaking, and according to an estimate, the water losses in the network are as high as 75 percent. The existing water reservoirs are also in need of immediate replacement. The public survey conducted in the town indicates water shortages and pressure problems throughout the town. Although this system provides water supply to approximately 67 percent of town population, the quantity and quality of water supplied to consumers is not as per the standards. Water supply is irregular and not very reliable.

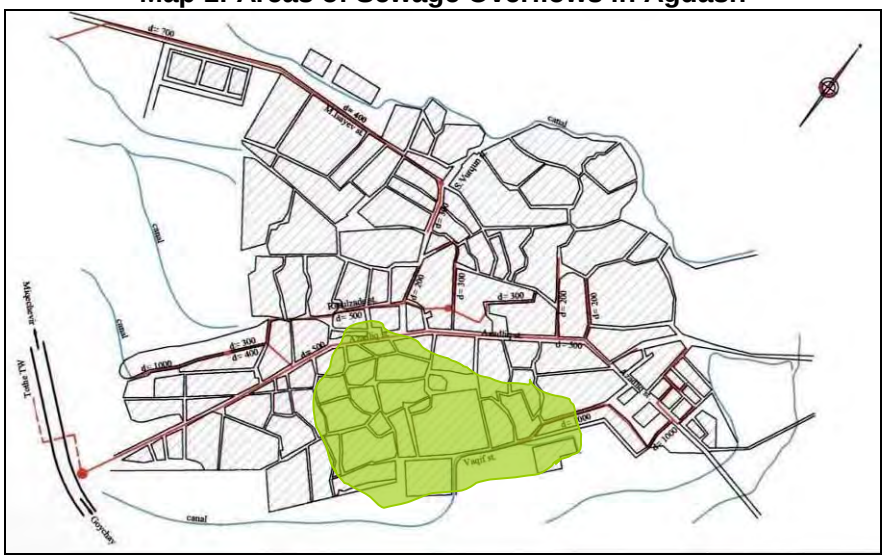
45. With growing difficulties with the operation of the galleries, the SuKanal commissioned the construction of boreholes in the vicinity of the reservoir sites. There are 6 No. 90-metre deep boreholes drilled at different times, and five of them have mains to the reservoir site, but two of the mains have missing sections. The point of delivery of the sixth is not known. In June 2003 only two had the potential to operate, but even these two are currently not operational. This is generally because the motors burn out due to operating at low voltage. Corroded and burnt out pumps were seen on site during site inspections. At the time of the worst problems in June 2003, one new pump set was obtained (listed as a new asset in SuKanal's accounts) and a boreholes was being used to deliver minimal quantities of water to the town.

46. Due to the above reasons, an entirely new water supply system has been designed under the ongoing ADB project (Loan 2119: Azerbaijan Urban Water Supply and Sanitation Project).

47. The existing sewerage system consists of approximately 18 km of asbestos cement (AC) sewers that were laid between 1960 and 1965. Because of the topography of Agdash, and poor original designs, there are four separate systems serving the town. There are several problems with each of the four systems. The sewers are oversized and have been laid at flat gradients. In effect, the flow in all the sewers is sluggish and there is not sufficient flushing velocity. The sewers thereby have significant deposits of sludge/silt. Furthermore, they have not received much maintenance over the years, since the local wastewater agency, SuKanal, does not have adequate equipment to unblock the flow.

48. In those parts of the town where frequent sewage overflows occur, the problem is compounded by shallow groundwater conditions. This prevents seepage of the rainwater into deeper soil horizons. When groundwater seeps into sewage water pipes, the sewers overflow. The worst areas are marked in the following Map 1. The record of complaints has also been wide spread in the town.

Map 1: Areas of Sewage Overflows in Agdash



49. Existing sewage treatment works are located 1.7 km to the west of the junction of Azalea Street and the main Goychay-Mingechevir road. The works are a physical/mechanical works using circular Imhoff type tanks with sludge drying beds. The final effluent discharges to the main irrigation drainage ditch that runs alongside the site. The sewage treatment works have not operated for many years and the concrete work is crumbling. The inter-connecting steel pipe work is badly corroded and in places sections have completely corroded away. Wastewater is directly disposed on to natural courses and/or on land without any treatment.

2. Ongoing/completed WSS Projects

50. With the ADB's assistance a feasibility study was conducted for the improvement of Agdash water and sewerage system in 2004, and subsequently, a comprehensive project was prepared in 2008 with a design demand of 25 years (up to 2034). This project was designed with reliable and good quality groundwater as main source of water supply. Groundwater source was suggested based on a groundwater resource evaluation study, which concluded that site can provide adequate yield and good quality of groundwater. The existing well field near Golgati is recommended for continuation with new bore holes. It was estimated that this field can meet the ultimate projected water demand of the town (years 2034 – 9,062 m3/day). Quality of groundwater meets the standards stipulated by to Azerbaijan's potable water quality regulation (Appendix 2). Water can be supplied directly without any treatment, but after disinfection.

51. With the groundwater source near Golgati, the following components (Table 3) have been constructed under the under the on-going ADB assisted Azerbaijan Urban Water Supply and Sanitation Project (Loan No. 2119-AZE). As of June 2011, all construction works are completed and ready for commissioning:

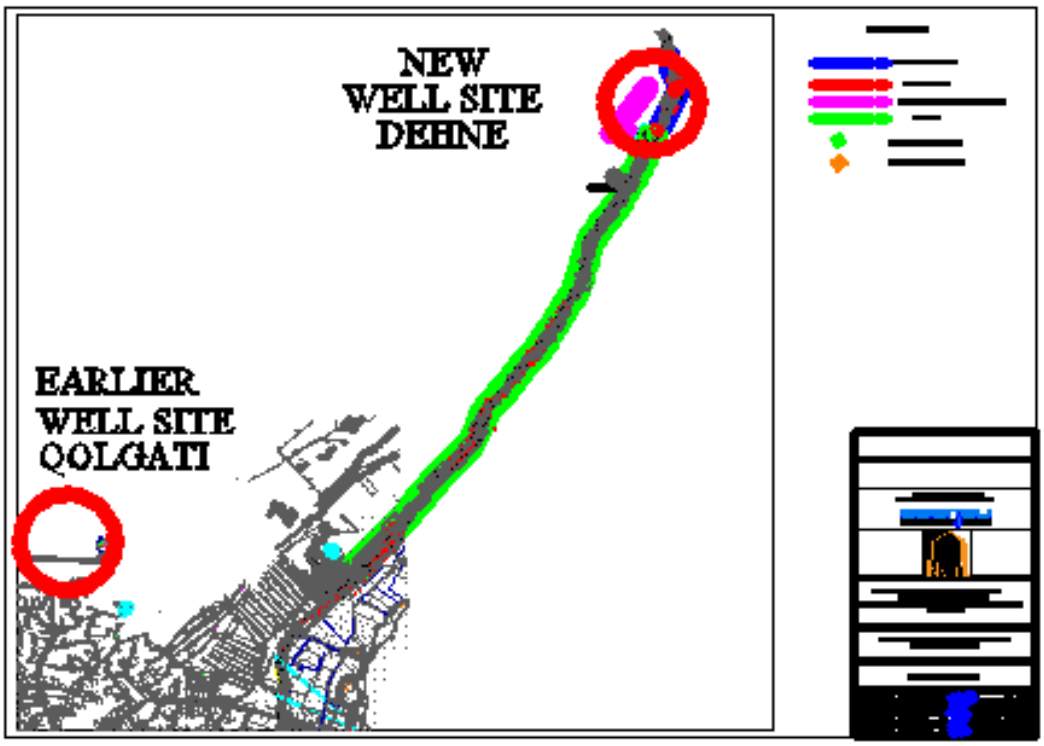
Table 3: Works Implemented under ADB Loan 2119-AZE

Item	Construction Works	Total Quantity
1	New boreholes with connecting pipes	3 No,s
2	Water intake chamber	1 unit
3	Pumping station (2 pump sets)	1 unit
4	New reservoir	1 X 2000m^3
5	Chlorination Facility	1 unit
6	Area facilities (guard room, lavatory, roads, fencing)	1 unit
7	Pipeline from intake to city network	

3. Proposed Subproject Description

52. The project consisting WSS and WWTP Works. In the WSS works, due to the lack of water in Golgati site, new water source is searched and a explanatory well is drilled in Dehne, old reservoir site. The report including the location of the explanatory well, quality and quantitiy of water, hydrodynamic parameters. According to drilled well result 8 new water wells is decided to be drilled at Dehne area. The new well site, Dehne and the earlier water well site, Golgati are marked on the below Map 2. And the WWTP site has been moved and the IEE is updated for this new location at November 2014. The new and earlier proposed locations of WWTP are marked on the following Map 3.

Map 2: The New (Dehne) and the Earlier (Qolgati) well sites



Map 3: The New and the Old WWTP site locations

53. In continuation to the above improvement works, it is proposed to implement the remaining works as per the comprehensive project designed in 2008 under this Azerbaijan Water Supply and Sanitation Investment Program in tranche-2.

54. The following Table 4 shows the subproject components selected for implementation under tranche-2 in Agdash Town, for which, according to ADB requirement, this IEE has been conducted. Proposed water supply and sewerage system and location of facilities are shown in Map 4 and Map 5. Layout plans of facilities are shown in Map 6 (Wells), Photographs of project sites are appended in Appendix 1.

55. Table 5 shows the new subproject components for implementation under tranche 2 in Agdash Town. Layout plans of new facilities are shown in Map 7 (Wells). Layout Plan of WWTP is in Map 8. Layout Plan of reservoir is in Map 8.

Table 4: Subproject Components

Infrastructure	Function	Description	Location
1. Water Supply			
Two artesian wells with pumps at Golgati Area	To provide 3,360 m^3 of water daily	Diameter of well:400 m Depth: 140 m Water table depth: 20 m bgl Casing pipes with filter, water lifting pipes Submersible pumps 5 units of wellhead cubicles Power supply line from the	- Golgati well field, northern outskirts of the town - Wells will be constructed near the existing wells field on the land owned by AzarSu

Infrastructure	Function	Description	Location
		mainline and transformer	
Pumping water main	Convey water under pressure from artisan wells to water intake chamber	Length 271 m - 165 mm diameter steel pipe	- Golgati well field - Pipeline will be along the roads - Involves no tree cutting
Improvement of internal roads in the facilities	Provide internal access to various facilities	Construction of new gravel roads – 5,000 m2.	- Roads will be constructed in well field and pumping facility at Golgati
Pumping systems	Pump water from intake chamber to reservoir	Number of pumps: 3 sets Capacity of each pump: 90 KW and 150 m3/hour	- Pumps will be installed at existing pumping station at Chlorination facility at Golgati
Storage reservoirs	To store water for further supply	2 reservoirs of 2,000 m3 each (size 24m x 24m x 4m; RCC underground	- within the Pumping/Chlorination Facility at Golgati - Involves no tree cutting
Water distribution network	To supply water to consumers	Total length: 147 km Diameter: 110- 500 mm Material: HDPE Road surface will be rehabilitated & reinstated to original after pipe laying work (road area 145,955 m2)	- Network will cover entire town - Pipes will be buried along the roads - Involves no tree cutting
House connections	To supply water to consumers at houses	7,626 no,s	- House service connections will be laid from the distribution line to the household premises covering eastern part of the town
Water meters	To measures volume of water delivered to consumers	7,626 no,s	-Water meters will be installed at the household premises covering eastern part of the town
Fire fighting hydrants	To provide water outlet for fire related emergencies	No: 349 units Water tapping points to provide adequate water for fire accidents	- The hydrants will be placed alongside the distribution mains at appropriate locations - The hydrants will be buried underground with a opening so that they do not create obstacle to the public.
2. Sanitation			
Sewer network with manholes	To collect wastewater from house connections and convey to treatment plant	Total length: 120,861 m Diameter: 200- 800 mm Material: HDPE Manholes: RCC units Road surface will be rehabilitated & reinstated to original after sewer laying work (road area 146,404 m2)	- Network will cover eastern part of the town - Pipes will be buried along the roads on the opposite side of water pipelines - Existing underground AC sewers will be left undisturbed in the ground as it is - Involves no tree cutting

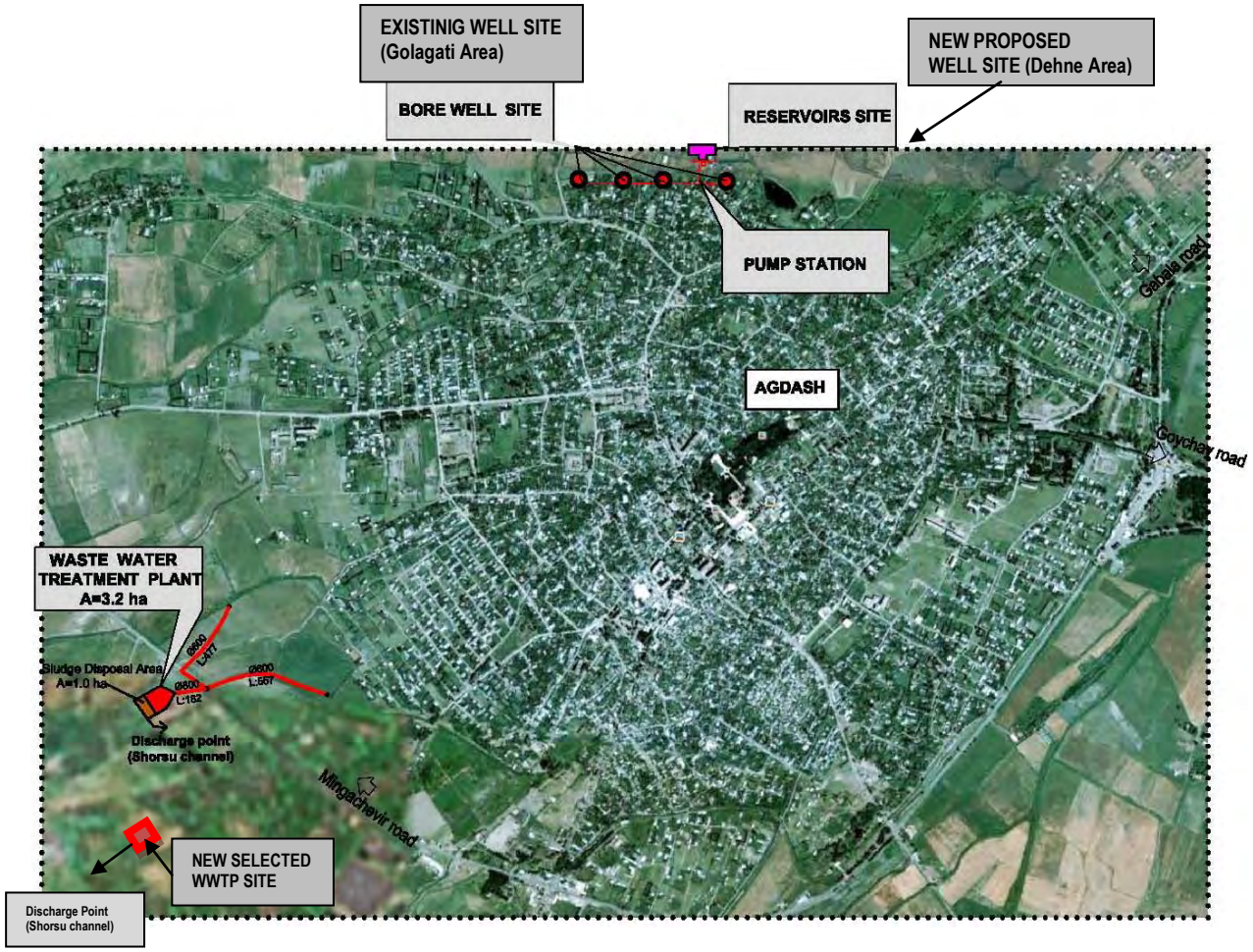
Infrastructure	Function	Description	Location
House connections	To collect wastewater from houses and convey to network	5,235 no,s	- House service connections will be laid the household premises to sewer lines covering eastern part of the town
Wastewater Treatment Plant (WWTP)	To treat wastewater to meet Azerbaijan disposal standards	Process system: Extended aeration activated sludge including The Old Capacity: 10,000 m3/day The New First Stage Capacity: 12,500 m3/day The treatment units are: • Coarse Screen • Fine Screen • Aerated Grit Chamber • Inlet Pumping Station • Anaerobic Tanks • Aeration Tanks(Biological Reactor) • Sedimentation tanks • Sand Filters • Ultraviolet Disinfection • Sludge Dewatering by using Decanter • Return &Excess sludge pumping station • Centrate pumping station Outfall of the WWTP: 300 m from WWTP to Sorsu Channel Outfall of the new WWTP: 500 m from WWTP to Sorsu Channel	<u>The Old Site :</u> -On 4 ha of old WWTP land (AzerSu-owned land), on the southwestern side of the town. WWTP will occupy an area of 3.2 ha. -site is located along a main road, and there is a house adjacent to the site -treated wastewater is disposed into Sorsu Channel, about 300 m from the site. - the dried sludge will be disposed on an adjacent site; area of the site is 1.5 ha <u>The New Selected Site:</u> On 4 ha of old WWTP land (AzerSu-owned land), on the southwestern side of the town. WWTP will occupy an area of 3.2 ha. -the new selected site is located approximately 2.75 km far through the south west direction of the old site, and the main road, and there is a house adjacent to the site -treated wastewater is disposed into Sorsu Channel, about 500 m from the site. - the dried sludge will be the same as in old site. - Access road: 600 m

Table 4: New Proposed Subproject Components

Infrastructure	Function	Description	Location
1. Water Supply			
Eight artesian wells with pumps at Dehne Area	- To provide approx..25 lt/sec/ well, 17,280 m^3 of water daily - Convey water under pressure from well	Diameter of well:400 m Depth: 140 m Water table depth: 20 m bgl Casing pipes with filter, water lifting pipes Submersible pumps 4 units of wellhead cubicles	- Dehne well field, northern outskirts of the town - Wells will be constructed near the old wells field, 4 well land d owned by AzarSu, and rest four belonging to private

Infrastructure	Function	Description	Location
	collection site to reservoirs	Power supply line from the mainline and transformer Transmission line between the wells (HDPE pipes)	- Between the wells
Water reservoir	To store water for further supply	- 2 reservoirs of 5,000 m3 each - Valve chamber - Guard house - Septic tank - Transformator and Generator	Near Dehne well field, northern outskirts of the town
Chlorination building	Disinfection of water	RC 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 Reservoir Site
Transmission		Length 5,023 m - 2 x 560 mm diameter high density polyethylene pipes	Between the reservoirs to the start point of the network

Map 3: Project Location

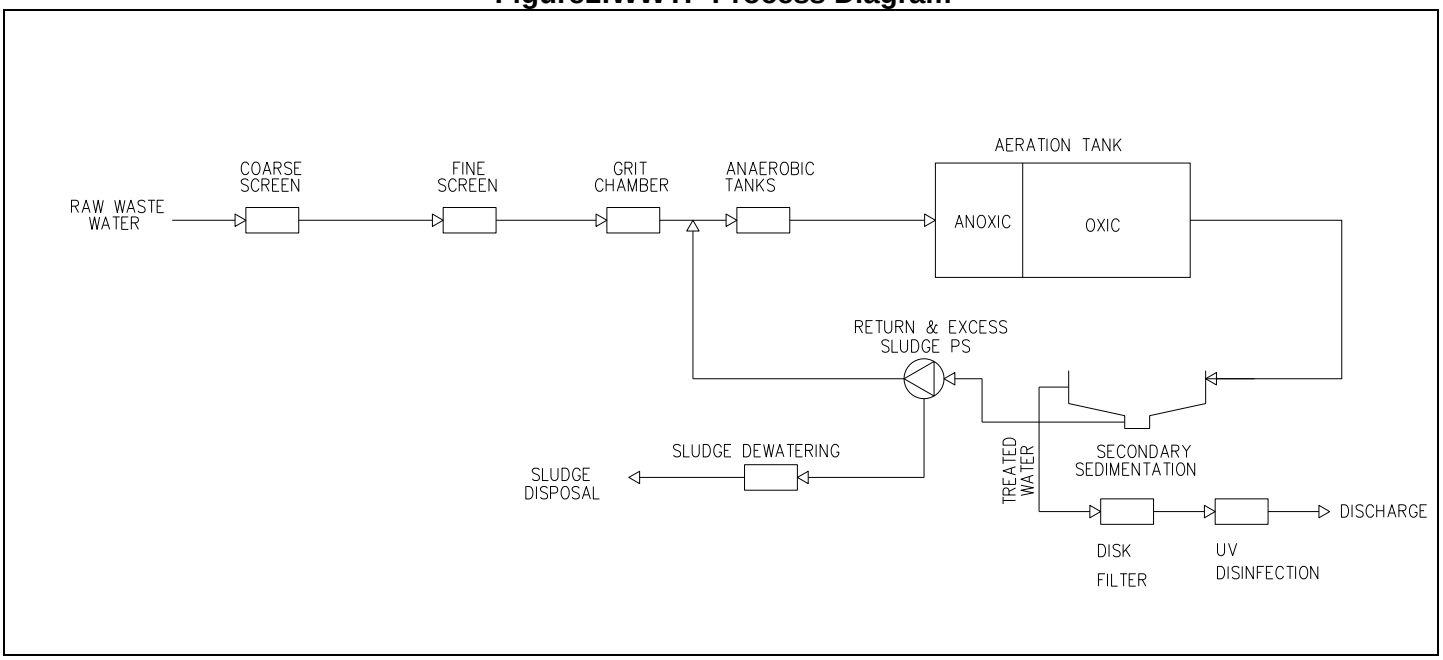


56. Project Description. Wastewater treatment plant system is biological extended aeration process with nitrogen and phosphorus removal. The treatment units are:

- Coarse Screen
- Fine Screen
- Aerated Grit Chamber
- Inlet Pumping Station
- Anaerobic Tanks
- Aeration Tanks(Biological Reactor)
- Sedimentation tanks
- Sand Filters
- Ultraviolet Disinfection
- Sludge Dewatering by using Decanter
- Return &Excess sludge pumping station
- Centrate pumping station

57. Process diagram is given in below Figure 1.

Figure1:WWTP Process Diagram



58. Pre-treatment Units. Pre-treatment removes materials that can be easily collected from the raw wastewater before they damage or clog the pumps, skimmers and the other mechanical equipment of treatment plant. (trash, tree limbs, leaves, etc.).

59. Screening. The influent wastewater is screened to remove all large objects carried in the collection system. Screens can be classified as coarse and fine screens. Coarse screens are used for pre-screening and as protective and safety device. Wastewater flows through coarse screen firstly. Particles small enough to pass the coarse screen will be hold at the fine screen. The screenings are automatically removed. Screens are operated mechanically. Mechanically operated screens are placed steeper at 45-80°with the horizontal.

60. Grit Removal. Grit chambers are designed to remove grit, consisting of sand, gravel or other heavy solids that velocities and specific gravities of these particles are greater than the organic solids in wastewater. The oldest type of grit chamber used is the rectangular, horizontal flow, velocity controlled type. This type of grit chambers are designed to maintain velocity as close to 0.3 m/s. The design velocity will carry most organic particles through the chamber and will tend to re-suspend any organic particles. Grit removal from horizontal-flow grit chambers are accomplished usually by submersible pump. In aerated grit chambers, air is introduced along one side of rectangular tank to create a spiral flow pattern perpendicular to the flow through the tank .Aerated grit chambers are nominally designed to remove 0.21 mm (65 mesh) particles. Air is supplied by using diffusers and they are located about 0.30-0.60 m above the normal plane of the bottom. Aerated type grit chamber is calculated for Agdash town.

61. Anaerobic Tanks (For Phosphorus Removal). Phosphorus removal is important as it is a limiting nutrient for algae growth in many fresh water systems. Treatment plant discharge limits have ranged from 0.1-2.0 mg/l. In Anaerobic tanks, Phosphorus can be removed biologically. In this process, specific bacteria, called polyphosphate accumulating organisms (PAOs), are selectively enriched and accumulate large quantities of phosphorus within their cells (up to 20 percent of their mass). When the biomass enriched in these bacteria is separated from the treated water. The degree of the biological phosphorus removal depends on the contact time. Minimum contact time for maximum dry weather inflow and return sludge flows are 0.5-0.75 hours. Phosphorus removal can also be achieved by chemical precipitation usually with salts of iron (e.g. ferric chloride), aluminum (e.g. alum), or lime.

62. Process Tanks (Aeration Tanks), Wastewater may contain high levels of the nutrients nitrogen and phosphorus. Excessive release to the environment can lead to a built up of nutrients, called eutrophication. The removal of nitrogen is effected through the biological oxidation of nitrogen from ammonia (nitrification) to nitrate, followed by denitrification, the reduction of nitrate to nitrogen gas. Nitrogen gas is released to the atmosphere and thus removed from the water. Nitrification itself is a two-step aerobic process, each step facilitated by a different type of bacteria. The oxidation of ammonia (NH_3) to nitrite (NO_2^-) is most often facilitated by Nitrosomonas bacteria. Nitrite oxidation to nitrate (NO_3^-), though traditionally believed to be facilitated by Nitrobacter. Denitrification requires anoxic conditions to encourage the appropriate biological communities to form. It is facilitated by a wide diversity of bacteria. Denitrification is accomplished in combined carbon oxidation, nitrification/Denitrification systems using internal and endogenous carbon sources. Biological reactor is aerated by using diffused air system consist of diffusers submerged in the wastewater. Aeration system can provide sufficient oxygen for treatment purposes: BOD removal, nitrification and endogenous sludge stabilization. For BOD removal and nitrification, typical DO levels range between 1-2 mg/l in the reactor.

63. Sedimentation Tanks. The function of the sedimentation tank is to separate the activated-sludge solids from the mixed liquor. Secondary sedimentation tanks will be constructed as center-feed circular tanks with sloping bottoms towards bottom hoppers located in the center of tanks. Activated sludge gravitated to the center of the sedimentation tanks and

distributed into the tanks below the inlet chamber. Mechanical sludge scrapers collect the settled sludge in a central sludge hopper from where it can be periodically removed. The surface overflow rate is the most important criteria for sedimentation tank design. It is ranged 0.6-1.0 m/h typically. The surface overflow rate shall not exceed 2.0 m/h for vertical flow secondary settling tanks. Sludge volume surface loading rate shall not exceed 500 l/(m2.-h). The circular sedimentation tanks are manufactured with overflow weirs (V-Notch) located the perimeter of the tank. The return-sludge flow is drawn off the bottom of the tank by using telescopic valve.

64. Disk Filter. According to EU Legislation, the amount of suspended solids concentration in treated water is 35 mg/L. Disk filter will be used to decrease the amount of suspended solids concentrations about 5 mg/L. The filter unit includes the center drum, discs with pleated filter media panels, support frame with covers over the entire filter section, backwash spray assembly with pump, backwash trough, drive mechanism, automatic control system. The filter assembly is composed of multiple and removable discs with filtering panels. This arrangement increases the filtration area meanwhile reduces the foot print. The disc filter is designed to operate on a continuous basis as well as receiving varying flows and solids.

65. Ultraviolet Disinfection. The objective of UV disinfection system, efficient, reliable and economic disinfection facilities to disinfect the final effluent from the wastewater treatment works to the required microbiological levels. The source of UV radiation is either low pressure or medium pressure lamps with low or high intensities. UV Disinfection systems should be designed by current manufacturers.

66. Sludge Dewatering and Conditioning. Dewatering is a mechanical unit operation used to reduce the moisture content of sludge because dewatered sludge is generally easier to handle than the thickened or liquid sludge. Aerobically stabilized sludge is dewatered directly by using centrifuges (Decanter). For reasons of mechanical simplicity and easy maintenance are most suggestible. The sludge will be dewatered to a dry solids content of approx. 20 – 25 centrifuges % DS. Excess sludge is pumped to the decanter centrifuges directly from pumping station. The polymer consumption for the dewatering of the sludge in is a a centrifuges are approximately 10 g polymer per kg dry solids. Removal of dewatered sludge from plant can not be possible daily. For this reason, sludge storage area is projected. Odor problem, visual problems may occur at the site. To prevent the problems sludge may be conditioned expressly to improve its dewatering characteristics. The addition of chemicals are the most common method. Conditioning is used to advance of mechanical dewatering systems. Adding conditioning chemicals to sludge, increase the dry solids content. For conditioning of dewatered sludge lime can be used. Lime can increase the dry solids by 20-30 percent. Sludge dewatering and conditioning aim to: a) Facilitate further handling of sludge b) Reduce transportation cost c) Make the sludge more suitable for composting d) Reduce the groundwater pollution at landfill.

67. **Analysis of Alternatives.** The alternatives analysis of the project in terms of project location and treatment processes have been studied and analyzed.

68. **Alternatives in Project Location.** The proposed WWTP will be located within a Municipality owned area. The selected area is approximately 4.0 ha. No significant adverse environmental impacts are found with present location of project. The proposed WWTP site location is also topographically suitable since the City is sloping towards to the proposed site. No better sites than proposed have been found. The anticipated impacts due to location of the treatment plant in environment are very small and insignificant.

69. **Alternatives in Treatment Plant Processes.** Possible alternatives have been studied within the Feasibility Study (May, 2004) on Urban Water Suppy and Sanitation in Secondary Towns. These alternatives are; i) conventional biological treatment, (ii) mechanical/physical treatment, and (iii) in waste stabilisation ponds. The relative advantages and disadvantages of the three alternatives are summarised below:

Biological treatment	**Mechanical / physical treatment**	**Waste stabilisation ponds**
Advantages		
Relatively small land area	Relatively small land area Reduced amount of mechanical and electrical equipment	Very low operation and maintenance costs No power requirement (unless mechanical screens preferred to hand raked screens) No sludge to be treated and disposed of for the first 10 years and then only from the facultative pond. The sludge produced would be highly mineralised. Requires low level of technical expertise. The final maturation ponds may be used for pisciculture The final effluent does not require chlorination and can be used for unrestricted irrigation
Disadvantages		
Requires power High operation and maintenance costs Produces relatively large amounts of sludge that have to be treated and disposed of. Requires high level of technical expertise and institutional organisation	Requires power Relatively high operation and maintenance costs Produces relatively large amounts of sludge that have to be treated and disposed of. Requires high level of technical expertise and institutional organisation	Large land area required

70. For the proposed project, the advised technology is conventional biological treatment plant, well established and does not require any new materials or equipment not used in Azerbaijan before. Also, considering the different factors including the cost of construction, operation, labor, energy and maintenance, further, environmental and health factors, it is decided that the extended aeration/aerobic treatment process with nitrogen and phosphorus removal is found as the best alternative technology for this particular location. It is very efficient and easy to operate and suits to the local conditions (climate) as well.

71. **No Project Alternative.** Implementation of proposed project will create lot of positive impacts on health and hygiene of people, public environment and socio-economic status of community as well. Provision of good quality wastewater treatment facilities will help to enhance the quality of life of the people. The project will also help to create job opportunities to considerable number of people during construction and to few people during operational phase. During the implementation of the proposed project, treated effluent will be utilized for irrigation

purposes. The implementation of the proposed project will produce only negligible and insignificant environmental impacts.

72. On the other hand, if the project is not implemented, the people of the project area will still have to suffer from various problems they are facing today. There is no waste water treatment system in the existing sewerage system. Currently the untreated effluent is being discharged to canals and streams causing significant environmental and health problems. Due to polluted water bodies and unhygienic environment, the community is facing high level of related disease incidences every year.

73. There is no other project alternative would see the continued release of untreated sewage into the canals, the deterioration of the ecosystem. The Agdash Wastewater Treatment Plant is seen as a long awaited option for the treatment of sewage for the Agdash Town.

4. Implementation Schedule

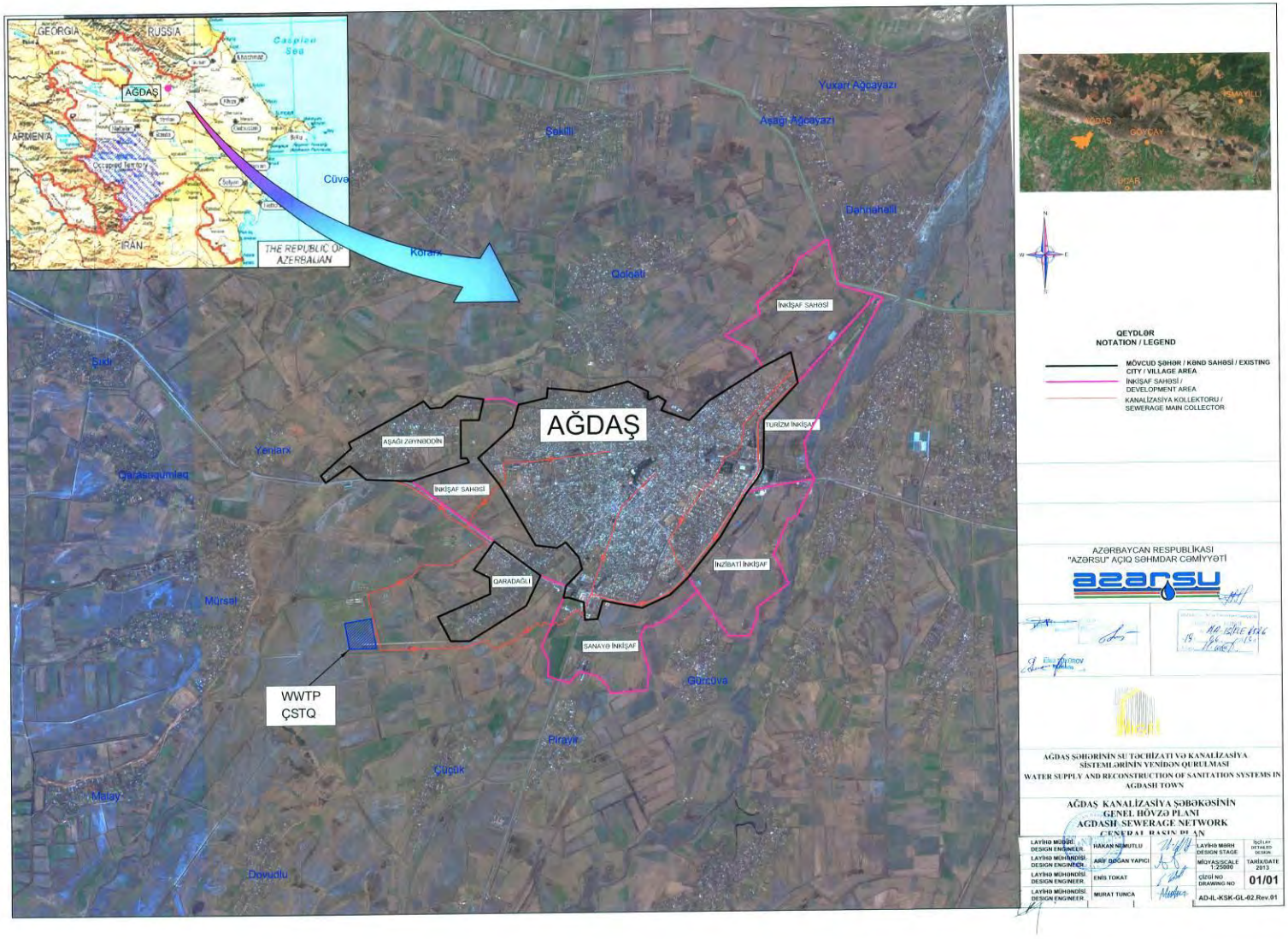
74. Detailed design work, except WWTP, has been completed. Bids are likely to be invited in 1st Quarter of 2015 and the bid process is likely to be completed by end of 2nd. The construction work will commence in July 2015, and will take about 18 months, so it should complete by June 2018.

75. Detailed design work of new wells and water reservoir will be completed at the beginning of 2017.

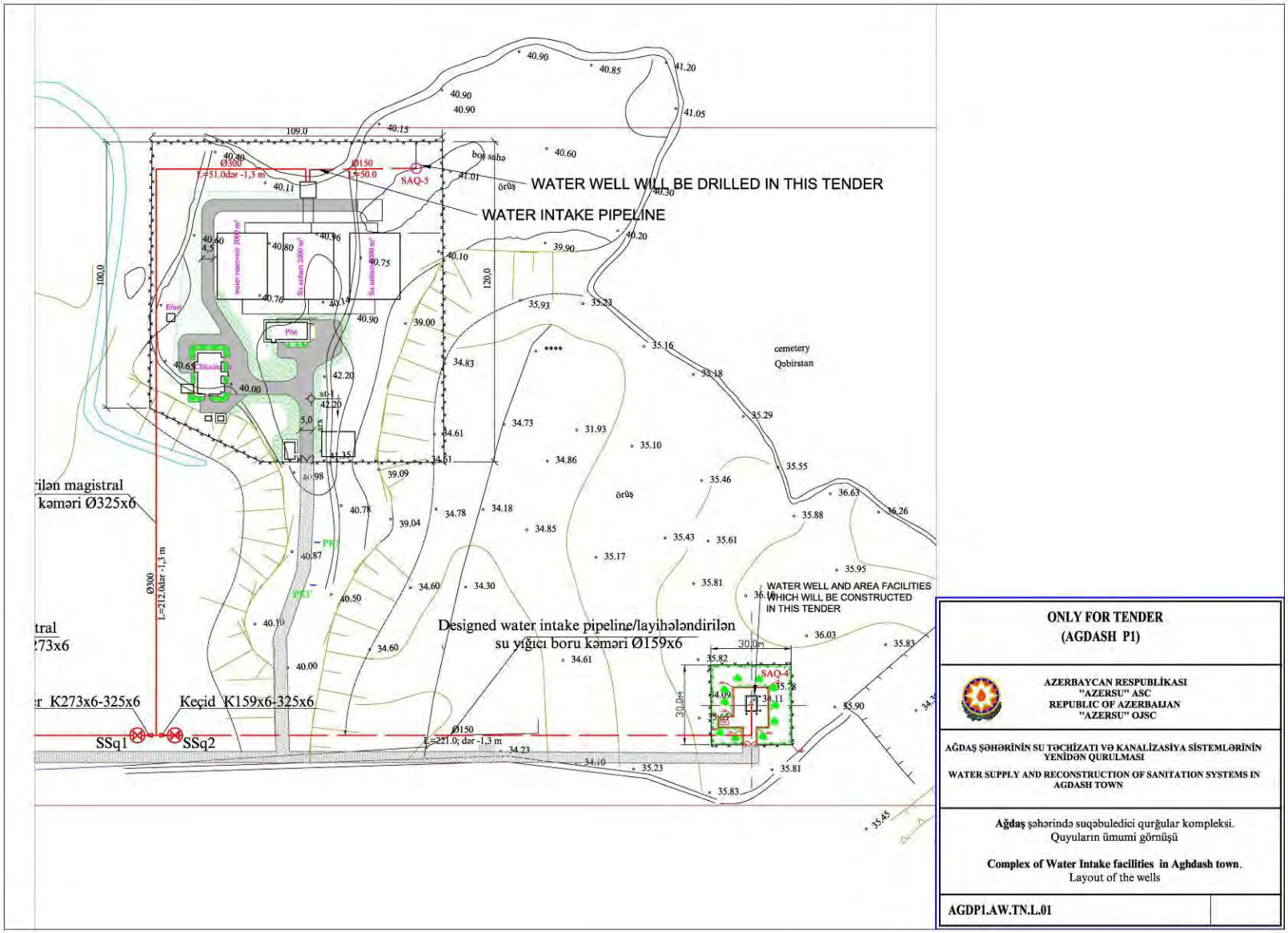
76. Detailed design work for WWTP will be completed in June 2016 and bids are likely to be invited in October 2016 and the bid process is likely to be completed by December 2017. The construction work will commence in August 2018, and will take about 18 months.

Map 4: Proposed Water Supply System

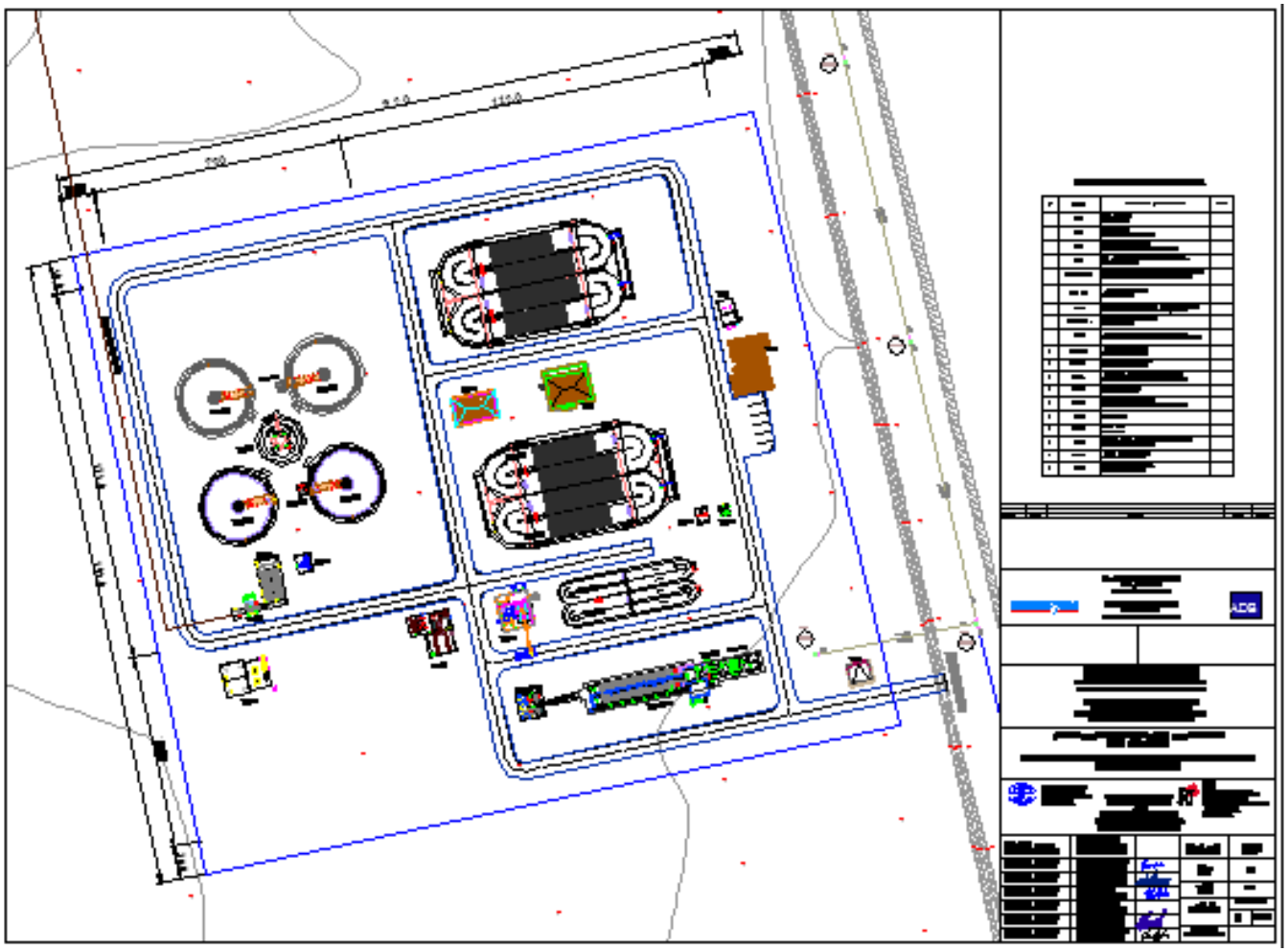
Map 5: Proposed Sewerage Systems



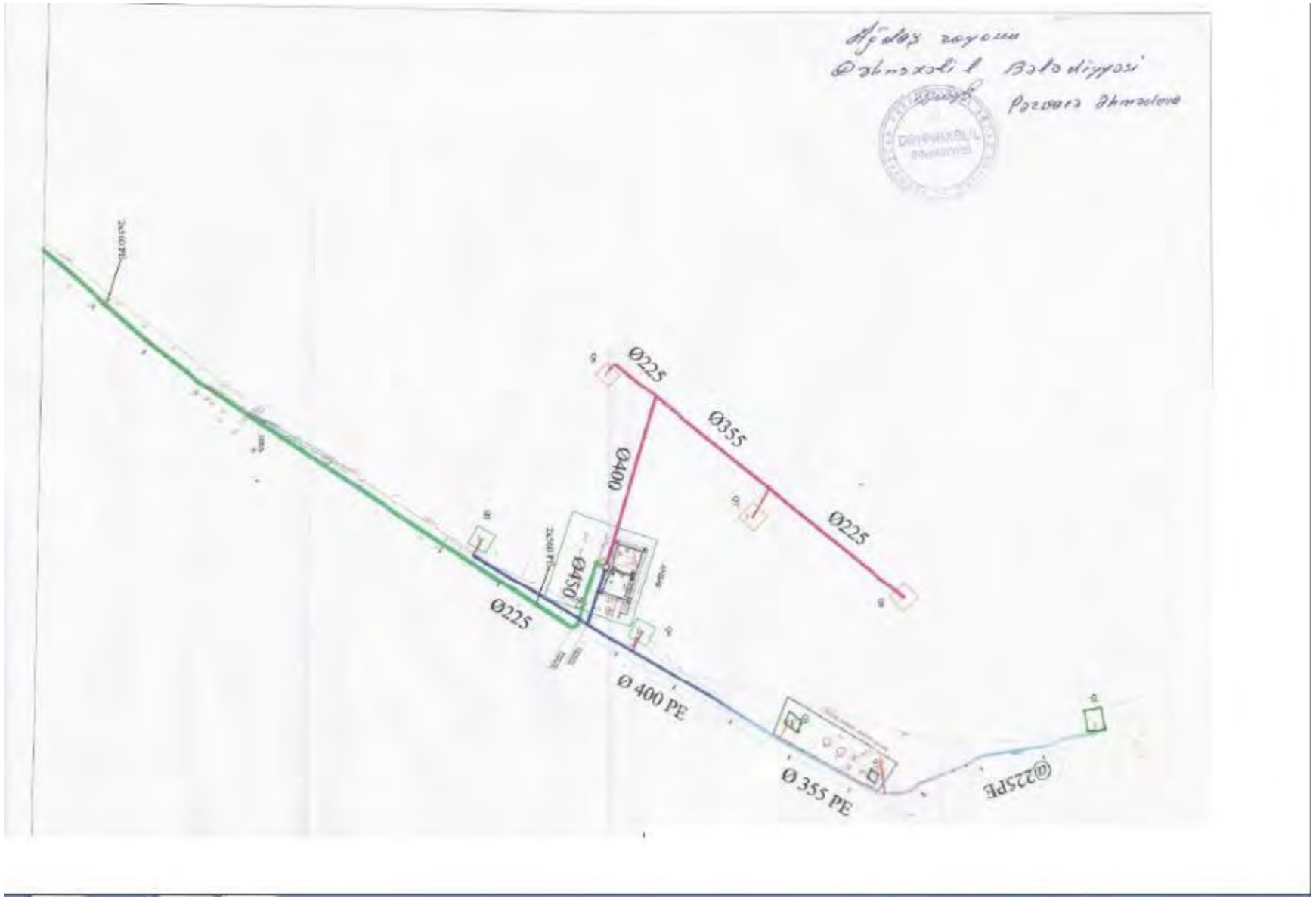
Map 6: Layout Plan of Well Field at Golgati



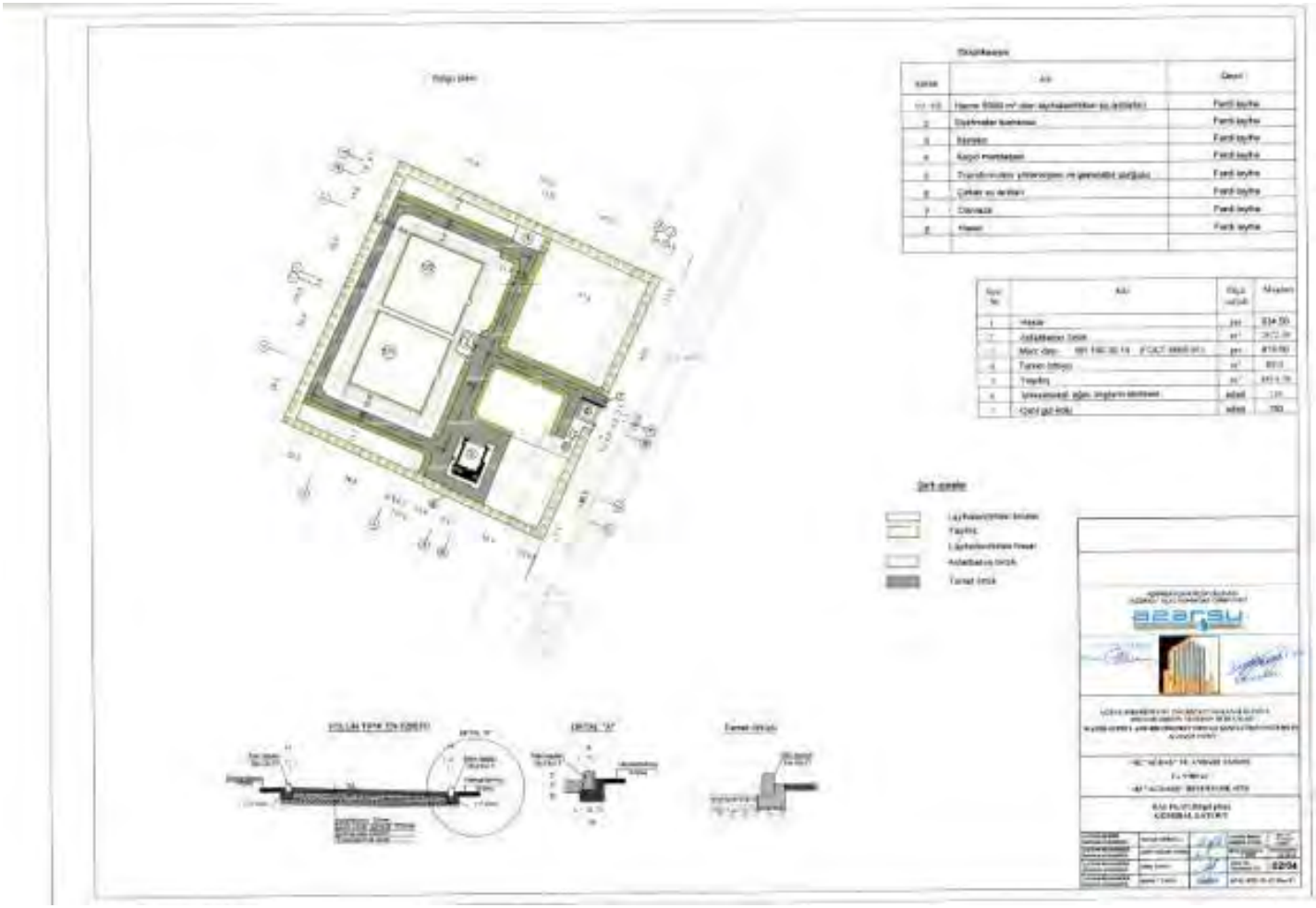
Map 7: Layout Plan of Wastewater Treatment Plant



Map 8: Layout Plan of Well Field at Dehne



Map 9: New reservoir site layout plan (Dahnakhalil village, Agdash)



5. Construction Activities

77. As indicated in Table 4, there are eight main elements in the subproject: construction of wells; installation of pumps and electrical equipment; construction of reservoirs; laying of water mains and distribution lines, laying of sewers; construction of wastewater treatment plant, construction of internal roads, and miscellaneous small scale works (laboratory, house connections, meters, etc). Construction practices of these works are briefed below:

78. **Construction of wells at Golgati Area.** Drilling of a well in Golgati area are planned within the project. Agdash 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 140 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.

79. **Construction of wells at Dehne Area.** Drilling of eight wells in Dehne area are planned within the project. Agdash 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 140 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.

80. **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 site via overhead cables carried on metal/concrete poles. This line will provide power supply to new wells.

81. **Construction of Reservoirs.** Two new reservoirs will be constructed within the existing Chlorination and Pumping Facility at Golgati. These will be constructed below the ground, with a small projection (about 0.5 m) above the ground. This work will involve excavation for foundations (4.5 m deep), 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.

82. **Laying of Water Mains and Distribution Network.** Pipes will be buries underground. Distribution network (134.50 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 26,200 m3 of waste/surplus soil from all over the town.

83. **Laying of Sewers.** Sewer network (127.9 km diameter 200-450 mm HDPE- 5.023 km diameter 2x560 mm collector pipeline) will be laid along the roads in the town, within the available roads right of way (RoW). Sewers 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. The sewer pipes will be laid on the opposite side of the water pipes, in separate trenches to prevent any likely contamination of treated water supplies due to leakages. The existing Asbestos Cement (AC) sewers will be abandoned in the ground and left undisturbed considering the environmental and health risks of working with asbestos2. The AC sewers will be marked on the inventory drawings. Trenches will be dug using a backhoe digger, supplemented by manual digging where necessary. Excavated soil will be placed alongside, and the pipes will be placed in the trench manually. A sand bed of 10 cm think will be prepared on the bottom and sewers will be placed in the trench manually. Sewers 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 1.4 m for 560 mm sewers and minimum will be 0.60m for 200 mm sewers. Similarly, the depth of excavation will range from 1.5 m to 6 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 28,000 m3 of waste/surplus soil from all over the town.

84. **Construction of Reservoirs.** 2x5000 m3 new reservoir, valve chamber, chlorination building, guard house, septic tank, transformator station and generator will be constructed at Dehne area reservoir site. These will be constructed below the ground, with a small projection (about 0.5 m) above the ground. This work will involve excavation for foundations (4.5 m deep), 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.

85. **Laying of Water Mains From Dehne Area To Network connection point.** Pipes will be buries underground. Main line (Approx.5 km, diameter 2 parallel line 560 mm HDPE) will be laid along the roads toward the town. There will be no 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 1.2 m for 560 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

[2] Asbestos piping is dangerous to handle due to the risks of exposure to airborne asbestos fibers which may lead to diseases such as mesothelioma, asbestosis and lung cancer. Working with asbestos piping requires wearing disposable masks and suits, wetting worksites frequently, and using only manual tools for cutting pipes to prevent the formation of high quantities of asbestos particulates in the air. (National Asbestos Management Plan, 2006, Australia)

side, and trench is refilled with the excavated material. This activity is expected to generate about 9,000 m3 of waste/surplus soil.

86. **WWTP Construction.** This includes construction of following items (Table 5). WWTP involves considerable construction including both civil and mechanical structures, although construction activities will be conducted within the site. Civil construction will be of reinforced cement concrete. Mechanical structures will mostly be of cast iron or steel, and will be imported in the ready-to-install form. The major components - anaerobic tanks, aeration tanks, sedimentation tanks and filtration tanks, will be constructed in partly below and partly above the ground level and fitted with necessary mechanical equipment. For these tanks, a cavity will be created in the ground using back hoe for, and the soil will be used for raising the WWTP ground level and for internal roads. Metal reinforcing rods will be placed and concrete will be tipped into the cavity to create floor of the tanks. To create the walls, metal reinforcing rods will be incased in wooden/steel shuttering and concrete will be poured in, and this process is repeated gradually till required height is attained. Inside surface will be smoothened and finished. Mechanical, equipments like shafts, aerators, diffusers will be brought to site on truck, and installed using cranes or manually.

Table 5: WWTP Components

WWTP Component	Details
Coarse Screen	Coarse screen – iron mesh – fixed in an open concrete channel
Fine Screen	Particles small enough to pass the coarse screen will be hold at the fine screen. The screenings are automatically removed. Screens are operated mechanically and are placed steeper at 45-80°with the horizontal
Aerated Grit Chamber	Aerated grit chamber – rectangular tank with diffused aeration arrangement
Inlet Pumping Station	Pumping arrangement for lifting the incoming wastewater into WWTP inlet
Anaerobic Tanks	Rectangular tanks to hold the wastewater for some fixed period (0.5 – 0.75 hours). In this, specific bacteria (polyphosphate accumulating organisms, PAOs), are added to wastewater to enrich the bacteria thereby removing the phosphorous from wastewater
Aeration Tanks(Biological Reactor)	Rectangular tanks with aeration system - diffused air system consist of diffusers submerged in the wastewater
Sedimentation tanks	These are concrete tanks constructed as center-feed circular tanks with sloping bottoms towards bottom hoppers located in the centre of tanks. Activated sludge gravitated to the centre of the sedimentation tanks and distributed into the tanks below the inlet chamber. Mechanical sludge scrapers collect the settled sludge in a central sludge hopper from where it can be periodically removed.
Sand Filters	Rapid sand filter consists of circular concrete tank with filter media (sand and gravel), under drainage system and back wash system.
Ultraviolet Disinfection	The source of UV radiation is either low pressure or medium pressure lamps with low or high intensities.
Sludge Dewatering by using Decanter	Dewatering is a mechanical unit operation used to reduce the moisture content of sludge because dewatered sludge is generally easier to handle than the thickened or liquid sludge.

	Aerobically stabilised sludge is dewatered directly by using centrifuges (Decanter).
Return &Excess sludge pumping station	Rectangular room for installation of pumps and motors
Sludge Treatment & Disposal	Removal of dewatered sludge from plant can not be possible daily. For this reason, sludge storage area is projected. Odor problem, visual problems may occur at this site. To prevent the problems sludge may be conditioned expressly to improve its dewatering characteristics. The addition of chemicals is the most common method. Conditioning is used to advance of mechanical dewatering systems. Adding conditioning chemicals to sludge increase the dry solids content. For conditioning of dewatered sludge lime can be used. Lime can increase the dry solids by 20-30 percent. Sludge dewatering and conditioning aim to: • Facilitate further handling of sludge • Reduce transportation cost • Make the sludge more suitable for composting • Reduce the groundwater pollution at landfill
Access Road	The old WWTP site is located along the main road. And there is a secondary road separated from the main road through the new WWTP site. However to arrive to the new selected WWTP site, it is necessary to construct a new access road approximately 600 m length and 4 m wide, this can be seen in Map 2

87. **Construction/Improvement of internal Roads.** The internal roads in the Golgati Water Facility and the Dehne area will be constructed, strengthened and improved with improvement of sub-base, base and top layers. Material will be procured from nearest licensed mines. Site will be cleared, sub base and base will be constructed either using earth moving equipment or manually, after which a bitumen layer will be laid to provide smooth surface. The surplus soil from the other activities (pipelines, reservoir construction) will be used in road construction.

88. **Source of construction materials and Waste Disposal.** In Agdash, construction material such as gravel, sand and aggregate is sourced from existing quarry sites along the Rivers Goy-chay and Taruna-chay. 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.

6. Operation Activities

89. Regular operation of improved water supply system in Agdash involves groundwater abstraction, pumping to reservoirs in city, and distribution from reservoirs by gravity to the consumers. Operation will also involve chlorination, laboratory analysis of water supplies. As disinfection (chlorination) facility already exists, no interventions are proposed under this subproject.

90. The daily water abstraction from the new facilities will be 3,360 m3 per day, and with the existing boreholes (5,040 m3 per day), the total abstraction from the well field will be 8,400 m3 per day. Pumps will be operated continuously, 24 hours a day.

91. The improved water supply system will serve entire population of the town. 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.

92. The new sewerage system provided through this subproject will collect domestic wastewater and sewage produced by entire town population. The WWTP facility will be designed to treat the sewage to acceptable wastewater disposal limits3. The treated water will be disposed in Sorsu Channel. Alternatively, the treated wastewater can be used for irrigating the fields around the WWTP.

93. **WWTP Operation.** Extended aeration activated sludge including nitrogen and phosphorus removal (advanced treatment) technology is the most commonly used technology in the world which is very efficient and easy to operate and suits to the local conditions (climate) as well. The influent wastewater is screened to remove all large objects carried in the collection system. Screens can be classified as coarse and fine screens. After screening, grit chambers are used to remove grit, consisting of sand, gravel or other heavy solids that velocities and specific gravities of these particles are greater than the organic solids in the wastewater. In anaerobic tanks, phosphorus can be removed biologically. The degree of the biological phosphorus removal depends on the contact time. Minimum contact time for maximum dry weather inflow and return sludge flows is 0.5-0.75 hours. Phosphorus removal can also be achieved by chemical precipitation, usually with salts of iron aluminum or lime. For total nitrogen removal, nitrification and denitrification occur in biological reactor. Sludge age is the most important criteria. Biological reactor is aerated by using diffused air system consist of diffusers submerged in the wastewater. Sedimentation tank is used to separate the activated-sludge solids from the mixed liquor. Dewatering is a mechanical unit operation used to reduce the moisture content of sludge because dewatered sludge is generally easier to handle than the thickened or liquid sludge. Aerobically stabilized sludge is dewatered directly by using centrifuges (decanter). Removal of dewatered sludge from plant can not be possible daily. For this reason, sludge storage area is projected. Odor problem, visual problems may occur at this site. To prevent the problems sludge may be conditioned expressly to improve its dewatering characteristics. The addition of chemicals are the most common method. Adding conditioning chemicals to sludge increase the dry solid content. For conditioning of dewatered sludge lime can be used. Lime can increase the quantity of dry solids by 20-30 percent. The capacity of this treatment plant is 20,000 m3/day and will generate 2,458 kg/day of sludge. The treatment and drying processes kill enteric bacteria and pathogens. The dried sludge will be disposed off at an adjacent identified for the purpose. Also, because of its high content of nitrates, phosphates and other plant nutrients, the sludge is an excellent organic fertilizer and may be the local farmers can be allowed to use the dry material for application to their land.

94. The sewer pipes will not function without maintenance, as silt inevitably collects in areas of low flow over time. The project will therefore provide equipment for cleaning the sewers and other maintenance activity. Piped sewers are not 100% watertight and leaks can occur at joints. Any repairs will be conducted by sealing off the affected sewer, after which the faulty section will be exposed and repaired following the same basic procedure as when the sewer was built.

[3] As there are no specific wastewater discharge limits set under Azerbaijan's regulations, the Ministry of Health (MOH) adopted the European Economic Community Directive (Directive No 91/271/EEC) to regulate urban wastewater treatment in Azerbaijan.

Trenches will be dug around the faulty section and the leaking joint will be re-sealed, or the pipe will be removed and replaced.

95. **Emergency Design Features to Handle Plant Failure.** The probable plant failures can be listed and explained as follows in accordance to the frequency of the possible occurrence;

96. Power (electricity) cut. In order to handle this problem, a diesel engine generator which can provide electric energy enough to operate all treatments units and lighting of the plant. The generator will be in operation automatically when any power cut from external power source. In addition to that all units are controlled by SCADA system.

97. Mechanical equipment failures. This failure can also frequently happen. In order to handle this failure problem, the equipment, such as; screens, grid chamber blowers, inlet pumps, aeration tanks blowers, return sludge pumps, scum pumps, excess sludge pumps, sludge dewatering machines, UV disinfection units, all have spares. In case of any failure of the equipment, immediately the spare one can be in operation without causing any decrease on the performance of the plant.

98. Failure of the structures. Similar to having spares of the equipment, the structures which are on the flow line, have also spares. For example, screens, grit removal unit, anaerobic tanks, aeration tanks, settlement tanks, all have spares. In case of any repairing requirements on the structure or on the diffusers, the structure can be temporarily out of service and during repairing period the spare one continues operation. In this case a little decrease in the performance of the plant can be expected.

99. Force majeure failure. Force majeure means an exceptional event or circumstance which is beyond the control and can be described as the danger of over loading of the plant due to the high inflow possibly caused by penetration of rainwater to the sewer system during high flood. In order to handle this problem, a by-pass line is provided between entrance of the screens and outlet pipe of the plant. If the amount of the incoming flow is more than the maximum design flow, the excess water will be diverted to the by-pass line and discharged directly to the outlet pipe.

IV. DESCRIPTION OF THE ENVIRONMENT

A. Physical Resources

1. Location

100. Agdash is located close to the southern border of Azerbaijan 244 km southwest from Baku, encompassing an area of 400 hectares. The town lies at the junction of the Shirvan plains and the foothills of the Caucuses. It occupies the right bank of the river Turanchay, a typical fast flowing, snow melt fed mountainous stream. The town is semi-urban and includes rural agricultural regions in the surrounding vicinity.

2. Topography

101. The Agdash district topography ranges from 29 m at the former wastewater treatment site to 250 m at the former water intake site about 14 km from Agdash town upstream along the Turyanchay River. The boreholes are located at 53 m and the existing water reservoir site is located at 100 m. There are two pockets of low lying land. The ground slopes down to the northwest to 29 m and down to the south east to 30 m as noted in Map 10.

Map 10: Drainage Direction in Agdash

3. Geology and soils

102. The Agdash region contains three dominant types of soil: chestnut, sierozem and meadow. The chestnut soils are located on the hills at altitudes between 300 and 500 m and have a loamy texture and low degree of salinity. The meadow soils are located at 100 m elevation from the lowland semi-dry areas up to the arid steppe areas. The soil has a light, loamy structure and a medium degree of salinity. The sierozem soil is located predominately at 150 m and is very similar to the meadow soil with the exception that is has a higher quantity of salinity. All soil types present are not that susceptible to erosion and they contain the necessary nutrients to cultivate crops. The soils in the region are used as pastures in the winter and arable lands in the warmer months.

4. Climate

103. This region has a moderate - semi arid climate with dry winters. The average annual temperature is +14oC and the annual precipitation level is between 200 and 400 mm. August is the driest month receiving on average 10 mm of rain while April is the wettest month with an average monthly rainfall of 50 mm. The absolute temperature maximum and minimum were

recorded as +42oC and -18oC respectively. The average humidity is 51 %. The main wind directions are northwest in the wintertime and southeast in the summer.

104. As the information provided by the meteorological station, the multi-annual mean wind velocity is 2.7 m/s. The prevailing wind direction is north. Wind rose is given in Figure 2 and the data of it is given in Table 6.

Figure 2:Wind Rose

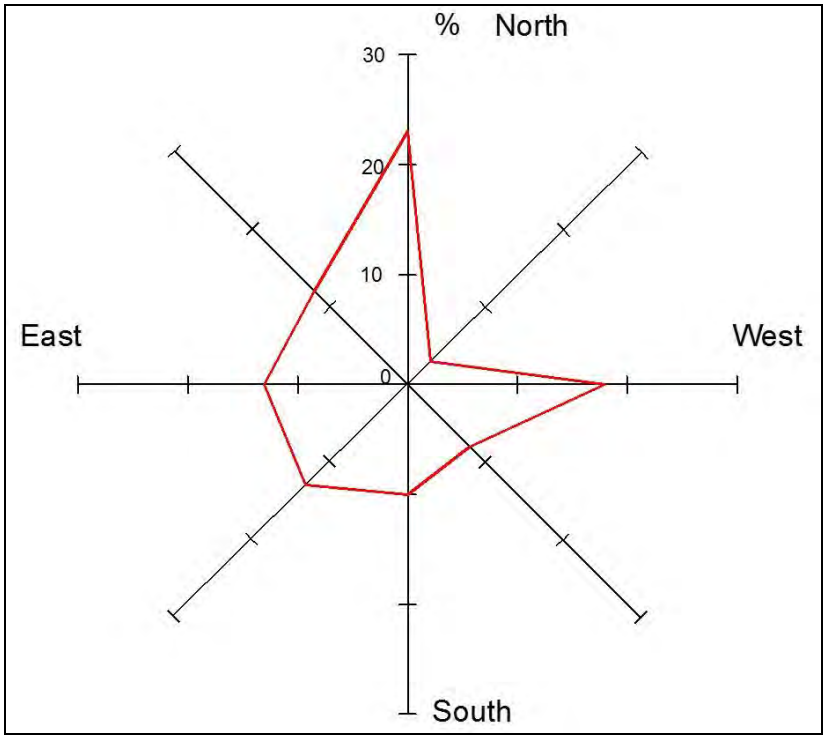


Table 6: Wind Rose Data

Wind Directions	North	North-East	East	South-East	South	South-West	West	North-West
Blow Percentages (%)	23	12	13	13	10	8	18	3

5. Water Quality

105. One water quality sample was taken from 3 Golgati site wells on the 3rd of June 2008. The samples were analyzed by the National Geological Exploring Service Unit of the Ministry of Ecology and Natural Resources (MENR). The chemical analysis showed that the groundwater meets the requirements of GOST 2874-82, Azerbaijan's potable water quality regulation as shown in Table 6. The investigation concluded that the subterranean waters are sweet and the

mineralization rate is approximately 460 mg/l, typical of a groundwater under pressure. General hardness of the water is 4.2 mg-eqv/l. 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.

106. Additional water samples will be taken during well development of the first three wells constructed under the first loan. Microbiological tests and additional chemical tests will be conducted and analyzed by the MENR. Results must adhere to the limits listed in Appendix 2.

Table 7: Water Quality Chemical Results

No	Water Quality Indicator	Agdash, Golgati borehole 1	Agdash, Golgati borehole 2	Agdash, Golgati borehole 3	Maximum Allowable Level, (mg/l or indicated units)
1.	Color	5	3	5	<20 color units
2.	Turbidity	0.5	0.5	0.3	<1.5 NTU
3.	pH	6.4	6.4	6.4	6-9
4.	HCO_3^-	305	342	342	>3
5.	SO_4^{2-}	114	110	118	<500
6.	Cl^-	12	12	10	350
7.	Ca^{2+}	60	60	60	180
8.	Mg^{2+}	15	16	14	40
9.	Na+k	80	91	97	170
10.	NO_2^-	0.03	0.03	0.03	<0.1
11.	NO_3^-	0.00	0.00	0.00	<10
12.	NH_4^+	0.00	0.00	0.00	<2.0
13.	Fe^{3+}	0.00	0.00	0.00	0.3
14.	Hardness	4.22	4.30	4.14	7.0 mg-eqv
15.	Mineralization	436	465	473	<1000 (1500)
16.	Total Dissolved Solids	445	477	480	<1000 (1500)
17.	Smell at 20°C temperature	0	0	0	<2 threshold odor number

* GOST Drinking Water Standards, 1992.

107. **Springs and Groundwater Water Quality.** Table 6 indicates that the central part of the alluvial cone of the Turyanchay source has good water quality. Boreholes will be extracted from the second or third confined aquifer horizon. 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 Turyanchay source water.

108. **Surface water.** There are two main water sources in the project area, the Goychay and Turyanchay Rivers. The larger of the two rivers is the Turyanchay which has an average-annual long-term flow of 15.9 m3/s. In the upper catchments the rivers Turyanchay and Gochay merge. The Turyanchay and Goychay rivers infiltrate into the alluvium layer in the upper catchment area and contribute to the recharge of the aquifer. Apart from these two natural rivers, another important water source is the Yuhari Shirvan canal used for irrigation.

B. Ecological Resources and Items of Archaeological Significance

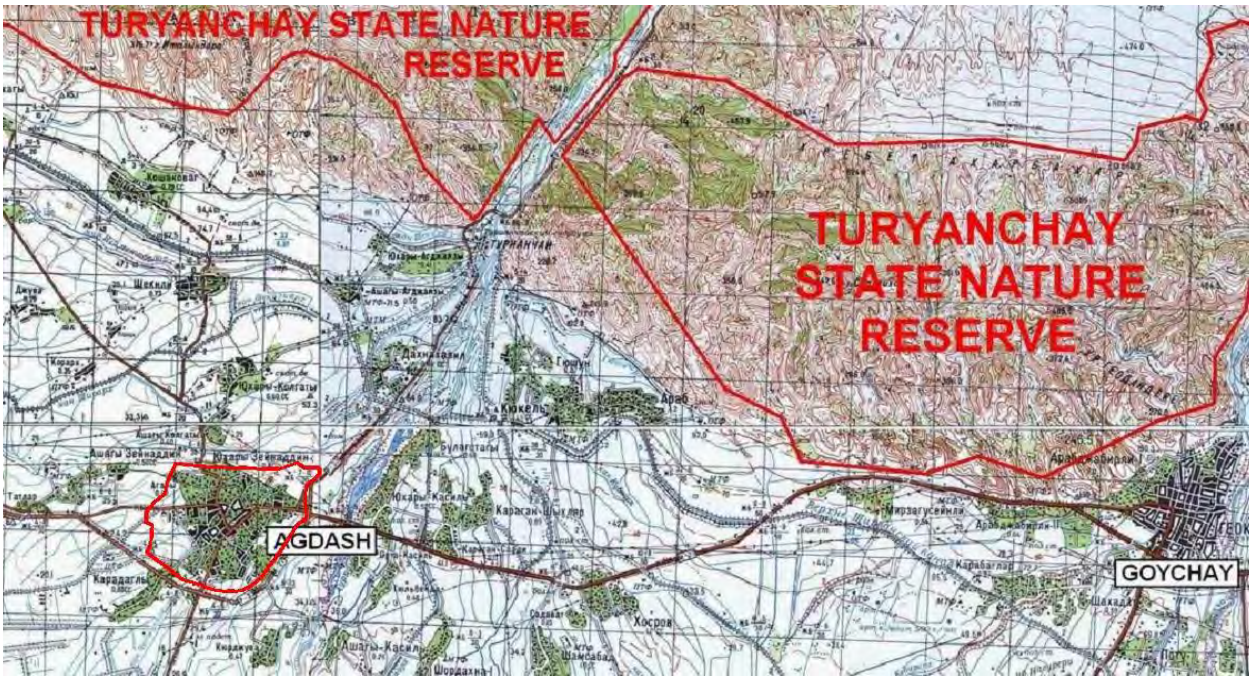
109. Agdash town is semi urbanised with surrounding settlements which have intensive agriculture as the predominant land use. Several recreational parks exist on the northern edge

of the town. Within the town there are a very significant number of chinar trees. Apart from the recreational parks, and several garden squares within the town, there are no significant ecological features that may be impacted by the Program. No rare or endangered flora or fauna are known to inhabit the town area.

110. Several libraries, cemeteries and museums exist within Agdash. No other historical and archeological sites are located in Agdash town. All preliminary designs avoid these cultural and historical sites. In the event that historical and archeological sites are discovered during trenching or digging, the water or wastewater component will be rerouted or moved to an appropriate distance away from the site according to the Ministry of Culture requirements.

111. No national reserve is located within the Agdash town. Turyanchay State National Park is the closest reserve, located 9 km to the north. Map 11 shows the proximity of the town to the National Park. The Turyanchay and Goychay rivers originate from the National Park. The Park was originally created to protect forests and now protects various species of birds such as the Lesser Kestrel and mammals such as the Greek Tortoise.

Map 11: Location of Turyanchay State National Park



C. Human and Economic Development

112. **Population.** Agdash has a gender ratio (male: female) of 0.99 for the overall district. A detailed assessment of the socio-economic profile of the Agdash sub-project is provided in the accompanying Poverty and Social Analysis documents which accompany this IEE.

113. **Occupations.** The base of the district economy is agriculture. The total area of the lands suitable for agricultural use in the region is 544 km2. In Agdash, the major produce is cereals and cotton and some areas are devoted to vegetable and cattle breeding. 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.

114. **Ethnic Groups.** Of the 24,200 people living in Agdash (2010), the majority are ethnic Azeris. There are no refugees located in the town of Agdash, however there are 551 displaced persons. There are no indigenous peoples in the region.

115. **Health Care.** There is a relatively decent representation of health care facilities within the Agdash region. Three hospitals serve the town with 580 beds and 145 doctors are located in the region.

116. **Education.** There are 9 schools with just over 6000 students, with a teacher/student ratio of 0.16 in the town. Overall, the literacy rate for Agdash is approximately 99.5%.

117. **Roads and Bridges**. A major highway of importance to Azerbaijan is located close to the town leading to Azerbaijan's capital, Baku. Bridges exist over the irrigation and combined storm water/sewage channels.

118. **Disadvantaged.** 50 percent of the town population is considered poor. Unemployed people in Agdash 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.

119. **Infrastructure.** The feasibility study has shown that the main water source of the town is artesian wells. The quality of water is very poor. Water distribution system covers approximately 68% of the town but 20% of those connected do not to get water due to blockages. Existing sewerage system consists of approximately 18 km of asbestos cement sewers that were laid between in 1960 and 1965. Sewerage system is poorly operated sewage The existing treatment plat is located 1.7 km to the west of the junction of Azalea Street and the main Goychay-Mingechevir road and is 100m south of the road. The works were a physical/mechanical works using circular Imhoff type tanks with sludge drying beds. The final effluent discharges to the main irrigation drainage ditch that runs along side the site. The sewage treatment units has not operated for many years.

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

120. 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 site (ii) pipelines and sewer network sites; (iii) main routes and/or intersections which will be traversed by construction vehicles; and (iv) quarries and borrow pits as sources of construction materials. The secondary impact areas are: (i) entire Agdash area outside of the delineated primary impact area; and (ii) entire Agdash Rayon in terms of over-all environmental improvement.

121. 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, (iii) eliminate risks of sewer system leakage and (iv) minimize construction pollution and waste.

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

122. **Groundwater Source Sustainability.** The proposed subproject will augment the water supply the groundwater source by additional boreholes. The two boreholes proposed under this subproject will abstract 3,360 m3/day and with the existing boreholes, the abstraction will increase to 8,400 m3/day. The hydrology and hydrogeology of the area around the towns of Agdash and Goychay have been studied in considerable detail as part of the feasibility study in 2004. Aquifer resource evaluation has been carried out using a mathematical model to evaluate the long term availability of water and to check whether all the existing uses, plus the future demand of Agdash for the next 20 years could be met from the aquifer. A groundwater model was created to analyze the recharge to the Turyanchay alluvial cone. ISOAQX modeling software was used to calculate the analytical drawdown in the boreholes. The study assumed homogeneity and isotropy in the aquifer for the Goychay & Agdash alluvial fans. Hydrogeological assessment was of the alluvial fan aquifer derived from the erosion of the upper catchments of the Gochay and Turyanchay river system which underlies the towns of Goychay & Agdash. The study concluded that there are adequate resources to provide for water supply.

123. The study also demonstrated that the infiltration occurs over an alluvial fan with a great distance from the well site. At such a distance, the groundwater can be naturally filtered by the river alluvial soil media and trapped at the first confined aquifer level. In effect, these alluvial fans provide good quality water, recharged from the beds of rivers that arise in the upper catchments. Therefore, there is no need for a catchment management plan as long as the 30 meter protection radius surrounding the boreholes is put into place. The existing boreholes are self-flowing under the confined conditions.

124. 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 (water table depth is 20 m and is under confined condition, overlain by clay layer on the top) means that the source is free from pollution due to surface leaching.

125. **Source Protection.** The risks at Turyanchay include unauthorized access and contamination if a fence and defined buffer zone are not installed. The upper catchment source areas are either native lands or pastoral in nature where no fertilizer or herbicides are used. As such, no groundwater contamination is expected from the surface source areas. A catchment

management plan is not necessary. A buffer zone will be defined with a 30 m radius around each borehole in accordance with Article 22 of the Land Code (1999). Also, the design of the wells will incorporate a raised concrete platform over the well to serve as a floor for the pump station. This platform will eliminate the risk of any surface runoff entering the wells. Furthermore, the wells will be equipped with full monitoring devices for consistent monitoring of water quality and draw-down effects during the operational phase. An access road will also be defined with a 5 m right-of-way (RoW), and waste will be properly disposed including oil and grease which will be placed on sealed surfaces in order to protect the source during construction.

126. **Disposal of Sewage, Impairment of Quality of Receiving Water Body and Land Pollution.** The proposed sewerage system will collect 3,359m3/day of sewage from western part of the town, covering 100 % of total population. The WWTP developed under this subproject will treat the sewage generated from the entire town. This will treat the sewage to desirable standards (Appendix 3). A suitable site for WWTP site has been identified in the southwest side of the town, where the sewage from the town can flow under gravity. The treated water will be disposed in Sorsu Channel. Outfall sewer will be laid from the WWTP outlet to the stream for discharge of treated effluent. Alternatively, the treated wastewater can be used for irrigating the fields around the WWTP. Current pollution loads into the receiving water body will be tested again during operation. The designers have determined that receiving water body can assimilate the expected pollution load from the wastewater treatment plant. There are no endangered species or sites of historical significance recognized along the alignments or within the land plots designated for proposed works. Also, the environmental assessment safeguards include a Detailed Measurement Survey to ensure that no designs will cross culturally sensitive areas such as the cemeteries (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. A suitable site for WWTP site has been identified in the southwest side of the town.

127. **Odor Nuisance.** In the proposed wastewater treatment process is potential to generate Odor from the inlet, from decanter and sludge drying beds. However, under normal operating conditions, the Odor will not be very offensive. The process upset due to any of the operational problems may increase the Odor generation. So therefore it is essential that the plant is operated with standard operating procedures, and for this it is necessary to have an operational manual, and well trained staff to follow the standard procedures in regular operation and maintenance. The proposed green zone around the site will act as a buffer. To minimize the impact on a house that is constructed on a government-owned land adjacent to the WWTP site, maximum distance from problematic units providing buffer zone will be maintained. If need be, other Odor control mechanisms will be implemented.

128. **Pollution due to Sludge Disposal.** Aerobically stabilised sludge will be dewatered directly by using centrifuges (Decanter), and conditioned using lime and will be dried in sludge drying beds. After drying, the material will be transported to the sludge disposal site adjacent to the WWTP. This treatment and drying processes kill enteric bacteria and pathogens, and therefore no impacts envisaged. Because of its high content of nitrates, phosphates and other plant nutrients the sludge is an excellent organic fertilizer and the local farmers may be allowed to remove the dry material for application to their land.

129. **Damage to Soil, Crops, and Sensitive Areas.** There are no endangered species or sites of historical significance recognized along the alignments or within the land plots designated for proposed works. The only protected area is Turyanchay State National Park located approximately 9 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. No trees are likely to be cut for the subproject. None of the components will cross/damage/encroach into culturally sensitive areas such as the cemeteries. There is no damage to crops envisaged.

130. **Resettlement.** There are no foreseen Resettlement issues; all the facilities and pipelines sites are located within the government owned lands.

131. **Treated Water Quality.** In Agdash, a new water treatment station is already constructed under the previous ADB loan (Loan No. 2771) to enable chlorination and water quality monitoring in the new laboratory. The environmental monitoring plan will observe the water flow capacity, chlorine residual level and water turbidity on a regular basis. Testing will be conducted as per the requirements of the Ministry of Health (MOH) described in next Section. To ensure water quality, SuKanal regional water authority will test the Turyanchay water source monthly and seasonally and test all parameters required by the MOH.

132. **Sewer and Water Pipeline Design.** In the town, new water and sewage lines will be constructed. The pipelines will have enough capacity to receive the 2035 projected flow rates and in the case of the sewage pipelines, the pipes will have enough grade to provide appropriate flushing velocities. In the case of leaking, the contractors will construct the new sewer pipelines in different trenches than the water pipelines. 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 or with steel. If they are constructed with steel, anticorrosion protection will be implemented on the pipeline. Additionally, sewer collectors will be constructed in PVC.

133. **Delivery of Unsafe Water.** In the case of deviations from the water quality standards, the town of Agdash 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.

134. **Increased Sewage Generation.** The overall improvement to the water supplies will result in an inherent increase in the generation of wastewater due to the use of more water for domestic purposes. The biological load is expected to increase as the standards of living improve, the population increases and as more people have access to the wastewater collection system. The sewerage system in the town is being improved along with the water supply system. Wastewater treatment facility of adequate capacity to treat the sewage to Azerbaijan standards will also be constructed under the subproject.

B. Construction Impacts and Mitigation Measures

135. **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; (vii) Safety risk due to presence of underground AC sewers, and (viii) workers safety and impacts due to import of workers and temporary labour camps.

136. 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.

137. Construction of WWTP will also involve considerable excavation/earthwork for tanks and foundations, although exact quantity is not yet known. The typical impacts of earthwork and surplus disposal are minimal due to the fact that the site is located away from the town with no major activities nearby, and the surplus soil will be utilized within the site for raising the ground level and/or for construction.

138. 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 10). This EMP will be part of the contract document and it will be binding on the contractor for implementation.

139. Construction of access road will also involve negligible amount of excavation/earthwork, although exact quantity is not yet known. The typical impacts of earthwork is minimal due to the fact that the site is located away from the town with no major activities nearby, and the surplus soil will be utilized within the WWTP site for raising the ground level and/or for construction

C. Operation Impacts and Mitigation Measures

140. Regular operation of water supply system in Agdash involves groundwater abstraction, disinfection with chlorine, pumping to reservoirs in city, 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 used, 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. Chlorination facility already exists, no new interventions are proposed under this subproject.

141. There are also certain environmental risks from the operating sewerage system, most notably from leaking sewer pipes as untreated fecal material can damage human health and contaminate both soil and groundwater. The sewer pipes will not function without maintenance, as silt inevitably collects in areas of low flow over time. It will be imperative therefore that the agency responsible for operating the sewerage system establishes a procedure to routinely check the operation of the sewers, and to implement rapid and effective repairs where necessary. If trenches are dug to locate and repair leaks or remove and replace lengths of pipe, the work will follow the same procedure as occurred when the infrastructure was provided. The

project will also provide equipment for cleaning the sewers to avoid blocking, overflowing and other maintenance activity.

142. 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.

143. Regular monitoring will be conducted at WWTP to ensure that the treated water meets standards. There is occupational health and safety risk involved while working in STP however all the necessary precautionary measures are included. Adequate manpower, operation and maintenance equipment will be provided. Necessary training will also be provided to the personnel. No impacts due to disposal of sludge envisaged as the sludge will be dried before its disposal. The treatment and drying processes kill enteric bacteria and pathogens.

144. Potential source of odor in WWTP's is scum that is collected on tanks etc of conventional treatment plants and the Hidrogen sulfide (H2S) gases from sewerage lines. Maximum and daily allowable concentrations of H2S is given as 0.008 mg/m3 in Appendix 4 (National Ambiant Air Quality Standarts).

145. Residents within a radius of 750 m (Sources: Bradley, R, "Buffer Zones; 1987, Sacremento Metropolitan Air Quality Management District, CEQA Guide, 2009) may get affected with odor issue. In Agdash town, the nearest resident distance to the wastewater treatment plant is 1000 m.

146. The proposed WWTP will utilize extended aeration system type treatment where scum prevention systems will take place leading to fewer odors. In addition, no residential area exists within a radius of 800m of the site. Hence this impact's magnitude will come into being in low level. Also, town is located on the north east and the treatment plant is on the south west, the prevailing wind direction is west. However, mitigation measures identified in the following paragraphs should take place to minimize and/or avoid the potential negative effects of odor problems.

147. Whereas one of the main sources causing odor is scum, overloading of the tanks will also result in odor problems because the treatment capacity will have been exceeded. The design of the proposed WWTP will be for the 2035 demands of the town. Hence no overloading is expected.

148. If scum does accumulate at a particular time for process reasons or others, scum removal systems will be in place, high-pressure water spray to break up the scum so that it will set

VI. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

149. 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.

150. 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.

151. Public consultation was conducted during this IEE preparation to inform locals of the Program components and to encourage input to identify overlooked environmental issues. A stakeholder consultation workshop was conducted in Agdash Town on May 2, 2008. Salient features of the project and its impacts, benefits were presented of Town Water Users Association (TWUA). Numerous questions of participants had been satisfactorily answered. It has been further agreed that more concrete information about the timing and details of the constructions will be given in further meetings before the start of constructions. It was also stipulated that members of the TWUA NGO will distribute obtained information among local people and thus prepared population to the further meeting.

152. Direct public involvement has been an ongoing element in the preparation of the Project since beginning. As part of the Project's preparation a Social Assessment (SA) was undertaken between April to June 2003, to provide a picture of the existing user behavior and needs, and to develop a participatory framework to ensure a sustainable water supply and sanitation project. The SA process included 200 project household surveys; focus group meetings4; stakeholder consultations5, and informal interviews with vulnerable groups and other members of the community in Azeri. Information gathered included: (i) the frequency of delivery of water and collection of wastewater; (ii) water and wastewater tariffs charged to consumers currently; (iii) the community's willingness to pay for water and wastewater services; (iv) the status of water delivery to local companies; and (v) the companies' willingness to pay for water and wastewater services. Environmental concerns were noted during the public consultations. The primary concerns were continued water shortages and pressure problems. Also, the public complained most about chronic problems with unsanitary sewage overflows in public and private areas. Photographs of public consultation conducted in Agdash in May 2010.

153. Representatives of Agdash SuKanal, IPMC and Contractor conducted consultations with affected three persons and other stakeholders, such as local municipality, rayon Sukanal office, on 7 May, 2016. The consultation took place in Dahnakhalil village of Agdash rayon. Officials of rayon and village municipality were informed about the Project Representative of IPMC gave general information on the planned sub-project and asked people to give questions and recommendations. She also showed the project design to the participants. didn't ask any questions, however noted that they agree to give part of their land for state needs. Public consultation photographs and list of participants are provided in Appendix 9.

[4] List of participants for Agdash Focus group meetings is available upon request.
[5] Stakeholders included Local Executive Bodies, SuKanal (the current institution responsible for water management), and Municipality members.

154. 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.

155. 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.

156. 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. The MENR issued Environmental Permission for the project (permission letter is enclosed at Appendix 7).

VII. GRIEVANCE REDRESS MECHANISM

157. 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.

158. 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 Agdash JSC for necessary action. For this purpose Agdash 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

159. An Environmental Management Plan, consisting of a mitigation measures and a 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 during detailed engineering design and 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.

160. 1A 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, Agdash JSC.

161. 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 5. 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

162. **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. Under the EMMP for the Program, 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.

163. The following Tables 8 to 10 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 11 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.

164. Implementation Arrangements

(i) Azersu , Executing Agency : Azersu will employ a full time environmental specialist to see the implementation of environmental safety guards. azersu will submit bi annual environmental monitoring reports.

(ii) DSC , Design and Monitoring Implementation on EMP : The DSC will hire a national and international environmental specialist who will be responsible for the implementation of the EMP. The DSC will prepare and submit quarterly environmental report to Azersu and will support Azersu in all technical matters related to EMP implementations.

(iii) Contractor, Construction the works : The Contractor will hire a full time environmental specialist who will design the site specific EMP (SSEMP) that will be implemented at the site for the WWTP. The Contractor will report on SSEMP and EMP implementation to DSC on a monthly basis.

(iv) SSEMP: The SSEMP will be based on the EMP provided in the IEE that will be detailed and will cover all impacts specific to the location and the civil works.

Table 8: Environmental Management Plan - Preconstruction

Anticipated Impacts	Proposed Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
Source Protection • Inadequate protection of intake works, leading to pollution of raw water supply	• Construct raised concrete platforms over the wells to serve as a floor for the pump stations and eliminate the risk of surface runoff contamination • Equip wells with full water quality and drawdown monitoring devices • Provide a protection buffer zone of at least 30m surrounding boreholes, Article 22 of the Land Code (1999) • Restrict access to intakes or boreholes with a fence or barrier • Undertake baseline water quality tests 3 months prior to scheme construction • Monitor and control activities in upstream catchment	PMF, JSC, SES	Inspection of Feasibility Studies, IEEs, water quality test results, Program designs and contract documents.
Source sustainability	• Perform pumping test during dry season to see downstream effects particularly on downstream ecosystems • Implement an agreement with State Amelioration and Irrigation Committee (SAIC) to avoid any upstream river water diversions, and in unavoidable case a proper assessment on affect of such diversion on the groundwater resource at Potu well field	PMF, JSC, SES	Inspection of Feasibility Studies, IEEs, water quality test results, Program designs.
Receiving Water Body Protection. and Odor nuisance	• Take water quality samples of receiving water body to see if water body can accept proposed biological load from the wastewater treatment plant • Perform daily testing of wastewater effluent at outlet and downstream • Develop a green buffer zone around the site • Maintain maximum distance to problematic units (inlet, decanter, sludge drying beds etc) from the nearest house • Provide Odor control measures in case of need • Develop Standard Operating Manual for regular operation, and periodic and preventive maintenance. • Provide necessary training to the operating staff	PMF and JSC	Inspection of Feasibility Studies, IEEs, water quality test results, Program designs.
Damage to Soil, Land, Ecology, Heritage • Soil erosion, land instability and damage to forests or vegetation	• Mainly confine subproject works to previously disturbed areas, access roads and tracks • Avoid environmentally sensitive sites and those that would have negative impact on cultural heritage such as cemeteries • Improve drainage where necessary • 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 Feasibility Studies, IEEs, Program designs and contract documents.
Damage to Crops and Tree Plantations • Damage to tree plantations and crops	• Avoid resettlement and damage to crops or plantations by adopting suitable locations and alignments for Program facilities and pipelines • 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	PMF and JSC	Inspection of Feasibility Studies, IEEs, Program designs and contract documents.
Resettlement	• Install water and wastewater pipelines in existing roads, footpaths or rights of way (ROW)	PMF and JSC	Inspection of

Anticipated Impacts	Proposed Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
• Dislocation or involuntary resettlement of residents and businesses • Program effects on land and environment	wherever possible • Restrict road and drain upgrading to existing ROW where possible • 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 • Provide information disclosure and public consultations in accordance with ADB's Public Communications Policy (2005)		Feasibility Studies, IEEs, Program designs, RPs and contract documents.
Treated Water Quality • Safeguard quality of water supply and wastewater discharge	• Cover, ventilate and fence all treated water reservoirs • Design distribution network for minimum residual pressure of at least 10 m to prevent entry to mains of contaminated groundwater or backflow • Provide adequate spare parts	JSC	Inspection of Feasibility Studies, IEEs, Program designs and contract documents.
Design of Sewer and Water Pipelines • 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. • Water and wastewater pipes should be constructed with uPVC or HDPE on a sand bed	Construction contractor, PMF and JSC	Inspection of Feasibility Studies, IEEs, Program designs and contract
Delivery of Unsafe Water • 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 Feasibility Studies, IEEs, Program designs and contract
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. • Develop a treatment facility to treat the wastewater to desirable standards and with a safe final disposal	PMF, JSC	Inspection of Feasibility Studies, IEEs, Program designs and contract

Table 9: 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 • Use flexible pipes such as HDPE/PVC allows a small/local alignment change where required to avoid tree cutting • 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 • 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 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 • In unavoidable cases, identify the services to be affected in each area and coordinate with respective agencies for alternative arrangement • Provide prior public information about the likely disruption of services • 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 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 • Dispose the surplus soil /debris that could not be put to beneficial use at designated site (site should be approved by local authority/MENR) • Identify the disposal site prior to start of construction; site shall be approved by PMF/JSC • Surplus soil/debris shall not be disposed in water courses or along the roads • Asphalt waste from road cutting shall be transported to bitumen plants for reuse, where possible • Maintain a log book for waste soil/debris disposal at the site indicating material, source and quantity	Construction Contractor	Site inspections 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 • Minimize extraction of construction materials from rivers and stream	Construction Contractor	Log book inspection

Anticipated Impacts	Proposed Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
	beds • Maintain a material entry log book at the site indicating material, source and quantity		
Soil erosion from excavated/refilled areas and likely impacts on surface water bodies due to construction activities	• Avoid scheduling of excavation work during the rainy season • In unavoidable circumstances, protect open trenches from entry of rain water by raising earthen bunds with proper compaction • Confine construction area including the material storage (sand and aggregate) so that runoff from upland areas will not enter the site • Construct silt ponds and install silt retention barriers near the site to prevent the entry of silt laden runoff into drains • Ensure that drains are not blocked with excavated soil • Minimize vegetation clearance as far as possible • Minimize the time during which excavations/trenches are open • 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 • Rehabilitate disturbed surfaces as soon as possible after completion of construction activity • 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	Construction Contractor	Site inspections; verify construction schedule; interviews with people and workers
Collection of groundwater in trenches as their being dung and its disposal 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 • Create a temporary pond at the site and dewater into pond • Dispose the clarified water from pond into natural courses • 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 • Dispose clarified water from pond to nearest water course • Level the pond area and restore to original position once the work is completed	Construction Contractor	Site inspections

Anticipated Impacts	Proposed Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
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 • Apply water prior to leveling or any other earth moving activity to keep the soil moist throughout the process • Bring the material (aggregate and sand) as and when required; • Don't allow access in the work area except workers to limit soil disturbance and prevent access by fencing • Ensure proper consolidation/stabilization of top surface when un-surfaced/ /earthen roads are used for construction activity; sprinkle water on road surface to arrest dust generation • 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 • Clean wheels and undercarriage of haul trucks prior to leaving construction site • Ensure that all equipment & vehicles used for construction activity are in good condition • Ensure that all equipment & vehicles confirms to government emission and noise norms	Construction Contractor	Site inspections; interviews with people and workers; verify vehicle emission permit records

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 • Inform local people about the nature and duration of work well in advance so that they can make necessary preparations; • Provide wooden planks across trenches for pedestrians and metal sheets where vehicle access is required	Construction Contractor	Site observations 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 • Intimate the sensitive establishments near the construction site (hospitals/schools/religious places/cemetery/burial ground/parks etc) about the nature and schedule of works; • Schedule noisy activities in consultation and put in place a complaint receiving mechanism • 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 • Use less noise generating equipment; inform the local community prior to any noisy works such as cutting of roads using pneumatic drills • Educate drivers: speed limits; avoid use of horn; parking at designated places; no idling on roads etc. • Sites shall be barricaded, guarded and public entry restricted; provide solid barricades where required to stop persons/vehicles falling into the trenches • Provide road signs and flag persons to warn public of dangerous conditions Provide reflective barricades for easy visibility and identification of construction area • The work area including material, waste storage is isolated within the barricaded site	Construction Contractor	Verify construction schedule and records; site observations 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 • Plan works in important roads in consultation with traffic police and municipality; • Provide information, direction and warning boards, provide traffic guards with danger flags • Provide prior public information about the work, traffic disruptions/diversions • Plan vehicle (material & waste) transport routes & schedules avoiding narrow/sensitive roads and peak traffic timings	Construction Contractor	Site observations interviews with local people and traffic police

Anticipated Impacts	Proposed Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
	• Heavy vehicles should not enter narrow local roads and sensitive areas of the town, except in the immediate vicinity of delivery sites • 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 • Prohibit unauthorized entry into work site • 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; • Ensure that workers follow documented procedures for all site activities; • Provide qualified first-aid at all times and equipped first-aid stations shall be easily accessible • Provide medical insurance coverage for workers; • Provide supplies of potable drinking water • Ensure the visibility of workers through their use of high visibility vests when working on roads or walking through heavy equipment operating areas; • 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 • Appoint a Environment, Health and Safety (EHS) manager; prepare a construction site layout plan • 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 • Shoring should erected, altered, dismantled only by a competent worker under strict supervision • Excavation and installation shoring should proceed by stages till it reaches the required depth • 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
Safety risk – public and worker, due to existing underground AC sewers	• Existing AC sewers shall be not be disturbed and left as it is in the ground	Construction Contractor	Verify inventory drawings and proposed alignment drawings

Anticipated Impacts	Proposed Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
	• Mark on inventory drawing and identify on site before start of excavation for new lines and instruct the workers involved in excavation so that they will not accidentally damage the pipes • Ensure proper supervision by a trained person • In the event that AC sewers must be removed in narrow lanes, working with asbestos pipe requires wearing disposable masks and suits, wetting worksites frequently, and using only manual tools for cutting pipes to prevent the formation of high quantities of asbestos particulates in the air. Waste AC pipe must be removed as intact as possible and placed in designated containers in a wet state for appropriate toxic disposal		Site verifications
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 • In unavoidable case: o Establish the camp in consultation with the local authority o Camp site shall be located away from water bodies o No clearance of trees vegetation shall be allowed for establishment of camp o Provide appropriate & adequate accommodation o Provide water in good quality & adequate quantity o Provide sufficient and suitable washing facilities including soap & towels o Provide sufficient lavatories; and separate lavatories for men and women workers. o Provide cooking fuel and no worker shall be allowed to cut any tree o Ensure regular and clean maintenance of the camp o Ensure proper wastewater collection & disposal facilities; septic tanks and soak pits shall be provided for wastewater disposal o Provide solid waste collection bins and dispose waste through municipal system; ensure that solid waste is not burnt at the site o Conduct awareness programs on HIV/AIDS and other communicable diseases • Restore camp site to original status after completion of work	Construction Contractor	Site observations;; interviews with workers
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: o Provide training to the construction supervisors to identify any suspicious objects	Construction Contractor	Interview with site supervisors; verify construction records for any chance finds detected

Anticipated Impacts	Proposed Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
	○ Stop work immediately to allow further investigation if any finds are suspected; • 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.		

Table 10: Environmental Management Plan - Operation

Anticipated Impacts	Proposed Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
<u>Health and Safety</u> • Hazards for AzerSu Workers and the public	• Ongoing training programs for first aid and Occupational Health and Safety training to AzerSu • Undertake periodic inspections of electrical equipment by qualified staff and periodic safety audits	JSC	Monthly inspection of complaints register and safety records Periodic health check up
<u>Sustainability of Infrastructure Systems</u> • Efficiency and reliability of water supply and drainage systems	• Provide training for water and wastewater network and metering repair training • Provide O&M training for water and sewer distribution networks; maintaining pressures and detecting leaks • Provide adequate budgets and undertake planned maintenance programs in accordance with specific O&M plans • Provide vocational training for AzerSu staff • Undertake planned cleaning of town drains and dispose of sludge to designated disposal sites	JSC	Training programs conducted Preventive maintenance activities Time taken for leak repair
<u>Odor control</u>	• High-pressure water spray to break up any scum so that it will settle • Remove dewatered sludge from the site	JSC	Visual assessment

Table 11: 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
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
• Influent and effluent wastewater quality at WWTP	As per the government regulations	At the inlet and outlet of WWTP	Comparison with the disposal standards (Appendix 3)	Daily/ monthly/quarterly as required	JSC
• Odor	As per related regulations	Wastewater Treatment Plant Site	Visual Assessment	Continual during operational phase	JSC

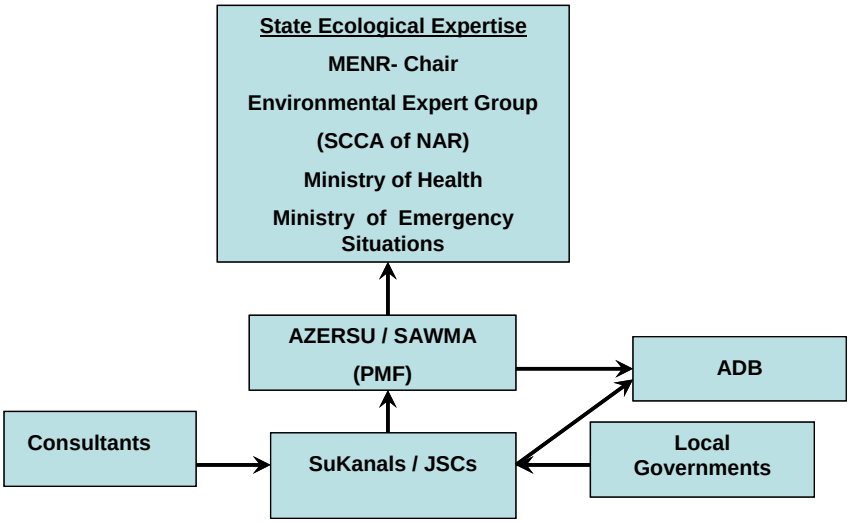
165. **Environmental Reporting.** The contractor will submit monthly progress reports, which include a section on implementation status of environmental management measures. The environmental monitoring and management reports will be prepared by the PMF's Safeguard Specialist with assistance from the 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 Framework

1. Responsibilities and Authorities

166. Figure 3 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 12. The Program will be implemented by AzerSu's Program Management Facility (PMF) and the agency responsible for operation of improved infrastructure will be Agdash 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 3: Institutional Arrangement



167. 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.

168. 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. Post-construction and during the operation they will take sewage samples prior to the inflow to the wastewater treatment plants and also at a discharge point after treatment. The quality of drinking water supply will be monitored according to international and local standards.

169. 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 EMMP will be undertaken by the Safeguards Specialist at the PMF as part of his/her technical supervisory duties.

170. 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.

171. 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.

172. 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 12: Institutional Responsibilities

Organization		Responsibilities
JSC	JSC, Program Consultant Social and Environ-mental Specialists, and PMF	• Preparing Env. Management and Monitoring Programs (EMMPs) for SEE review • Periodic submission of environmental monitoring report to ADB for public disclosure • Establishing environmental classifications under ADB regulations & determining need for Subproject (Sp) IEEs • Screening & preparation of SpIEEs including cost estimates for mitigation measures & monitoring plans

Organization		Responsibilities
		• 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 • Preparing SpIEEs for SEE and obtaining IEE clearance (development consent approval) from SEE • Submitting to ADB first IEE and all IEEs over $2 million • Ensuring tender documents will be updated with any changes to the EMMP • Ensuring contract document including environmental clearance certificate & conditions and ensuring ADB gets copies of these documents • Implementing and updating environmental mitigation and monitoring measures • Incorporating environmental requirements in civil work contracts • Performing water quality monitoring and reporting to the SEE and local governments • Performing civil work surveys • Ensuring the Contractors have access to the IEE reports • Ensuring that Contractors have fully implemented and completed the detailed EMMP and have submitted this to SEE for approval • Providing environmental training • Undertaking remedial action when unexpected environmental impacts occur during implementation • 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 • 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 • Approval of the management contract • Submission of IEEs for SEE approval • Monitoring and evaluation of the Program
Environment Expert Group	SEE (within MENR)	• Review of environmental clearance • Providing guidance for upholding environmental policy requirements
ADB	Social and Environ-mental Sector Specialists	• Reviewing first IEE and all IEEs over $2million • Disclosing reports over ADBs website (Responsibility of ADB Project Leader) • Reviewing all statutory environmental clearances granted by SEE • Reviewing quarterly reports & taking necessary actions • Monitoring EMMP implementation and due diligence
Local Govts and TWUAs		• Coordination with JSC and making key decisions on behalf of the community

2. Institutional Assessment

173. 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.

174. Similarly, the Agdash JSC (hitherto 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 aid and guidance with the required environment, resettlement and public consultation requirements of ADB and the SEE.

C. Environmental Management Budget and Resources

175. 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.

176. 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.

177. 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.

178. Following Table 13 shows the environmental management costs of this subproject.

Table 13: Environmental Management Costs

Item	Quantity	Unit Cost	Total Cost
Implementation of EMP (1.5 years)		***US $***	***US $***
International Environmental Specialist (Supervision Consultant)	0.25 months	22,000	5,500
National Environmental Specialist (Supervision Consultant)	1.50	6,000	9,000
Environmental Management Specialist (AzerSu-PMF)	0.50 months	3,000	1,500
Ambient air quality monitoring	3x7	200	4,200
Noise	3x7	70	1,470
Total			***21,670***
Water Quality Monitoring (long-term)			
Source water quality, treated water supplied in the town –	Samples as required	-	Part of laboratory operational

			costs
Influent and effluent waste quality at WWTP	Samples as required	-	
Total			***21,670***

IX. CONCLUSION AND RECOMMENDATION

A. Findings and Recommendation

179. The environmental impacts of the all infrastructure elements proposed in the water supply and sewerage subproject in Agdash 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.

180. According to this assessment, the proposed Agdash Project is unlikely to cause any adverse environmental impacts because: (i) proposed Project 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.

181. 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 treatment system, availability of adequate manpower, O&M equipment, green buffer zone and operation manual and training is considering in the design of the project.

B. Conclusion

182. 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 Agdash subproject will have significant positive impacts on the quality of life for community members through providing a safe, reliable water supply, an improved water distribution network and improvements to the sewage collection system. 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 Agdash.

183. 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 has already obtained both these permits (copies of permits are attached at Appendix 7 and Appendix 8), so other environment related permissions or approvals required from government agencies, and the project can proceed for implementation.

Appendix 1: Photographs

Photo 1: Existing Artisan Bore Well

Photo 4: Proposed Bore Well site 1

Photo 2: Existing Water Facility near Golgati

Photo 5: Proposed Bore Well Site 2 (outside Complex)

Phot 3: Proposed Reservoir Site

Photo 6: Existing Sewage Treatment Plant (dilapidated & non-functional)

Photo 7: Wide main roads with trees in the town

Photo 8: Narrow Roads

Photo 9: Narrow Streets with utilities

Photo 10: WWTP Site

Photo 11: House near WWTP Site

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 @ 37°C	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.

istry of Health's water quality guidelines

Appendix 3: Wastewater Disposal Limits

Maximum Allowable Wastewater Influent and Effluent Levels

Parameter (at rated temperature 15˚C	MAC at entry (mg/l)	MAC at exit (mg/l)	World Bank (MAC at exit)
COD (chemical oxygen demand)	620	125	125
BOD (biological oxygen demand)	375	35*	30
N (general nitrogen)	35	15	10
P (general phosphorus)	8	2	2
Suspended matters	310	35	50
pH			6 – 9 pH
Oil and grease			10 mg/l
Total coliform bacteria			400 MPN / 100 ml

Source: Directive No 91/271/EEC, European Economic Community

* This is incorrect. In the Directive, this number is 25 mg/l.

Maximum Allowable Concentrations for Water Bodies Used for Fishing

Parameter	MAC (mg/l)
COD (chemical oxygen demand)	3.0
BOD (biological oxygen demand)	20.0
Ammonium	0.5
Potassium	50.0
Calcium	180.0
Magnesium	40.0
Sodium	120.0
Nitrate-ion	40.0
Sulphate-ion	100.0
Chloride-ion	300.0
Fluorine-ion	0.75
Phosphorous	0.3

Source: European Economic Community Directive (No 91/271/EEC) adopted by Government of Azerbaijain

Appendix 4: 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 5: 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: 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 6: Photographs of Public Consultation, May 2010, Agdash

Appendix 7: Copy of Environmental Permit Issued by MENR

AZƏRBAYCAN RESPUBLİKASI
EKOLOGİYA VƏ TƏBİİ SƏRVƏTLƏR
NAZİRLİYİ

DÖVLƏT EKSPERTİZA
İDARƏSİ

MINISTRY OF ECOLOGY AND
NATURAL RESOURCES OF
REPUBLIC OF AZERBAIJAN

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DES № 1611

«18» noyabr 2008 il

«AY Konsaltinq LTD» MMC-nin
İcraçı direktoru

cənab A.Feyzullayevə

Sizin 24.10.2008-ci il tarixli
AY\WSS\2-83 saylı məktubunuza

Azərbaycan Respublikası Ekologiya və Təbii Sərvətlər Nazirliyi, «AY Konsaltinq LTD» MMC tərəfindən Göyçay və Ağdaş rayonlarının su təchizatı və kanalizasiya sistemlərinin işinin yaxşılaşdırılması məqsədilə nəzərdə tutulmuş tikinti-yenidənqurma işlərinin Dövlət ekoloji ekspertizasına II mərhələ üzrə təqdim olunmuş layihə sənədlərini nəzərdən keçirərək bildirir:

İşlərin yerinə yetirilməsi Azərbaycan Respublikası ilə Asiya İnkişaf Bankı arasında 29.11.2005-ci il tarixdə imzalanmış kredit sazişinə əsasən həyata keçirilir.

II mərhələ üzrə təqdim olunmuş layihə sənədlərinə əsasən Göyçay və Ağdaş rayonlarının «Xarici su təchizatı obyektləri, qurğuları və boru kəmərləri» layihələri üzrə işlər yerinə yetiriləcəkdir.

Göyçay və Ağdaş rayonlarının su təchizatı mənbələri olaraq yeraltı sular qəbul edilmişdir. Sü təchizatı üzrə hesabatlar 2022 və 2034-cü illər üzrə əhalinin və sənayenin inkişaf tempi nəzərə alınaraq hazırlanmışdır. Su mənbələri Ekologiya və Təbii Sərvətlər Nazirliyinin fond məlumatları nəzərə alınaraq müəyyənləşdirilmişdir.

Göyçay şəhərinin su mənbəyi olaraq rayonun Potu kəndi ərazisində, Bakı-Qazax avtomobil yolunun cənub hissəsində, Göyçay çayının qərbində yerləşən ərazi, Ağdaş şəhərinin su mənbəyi olaraq isə rayonun Qolqatı kəndi ərazisində yerləşən sahə müəyyən olunmuşdur. Qeyd olunan ərazilərin ayrılması aidiyyatı üzrə bələdiyyələrin qərarları əsasında rəsmiləşdirilmişdir. Bu məqsədlə Göyçay rayonu üzrə 0,88 ha Ağdaş rayonu üzrə isə 1,9 ha torpaq sahələri ayrılmışdır.

Tikinti işləri məqsədilə torpaq sahələrinin ayrılması Azərbaycan Respublikasının mövcud qanunvericiliyinə müvafiq olaraq aidiyyatı maraqlı təşkilatlarla razılaşdırılaraq rəsmiləşdirilmişdir.

Nəzərdə tutulmuş tikinti işlərinin layihə sənədləri «Azərsu» SC-nin sifarişi əsasında «Ay Konsaltinq LTD» MMC tərəfindən hazırlanmışdır.

Tərtib olunmuş layihə sənədlərinə əsasən ayrılmış ərazilərdə quyuların debiti nəzərə alınmaqla Göyçay rayonu üzrə I mərhələ üzrə dərinlikləri 80 metr

olan 6 ədəd, II mərhələ üzrə isə 8 ədəd, Ağdaş rayonu üzrə isə müvafiq olraq 5 və 6 ədəd subartezian quyularının qazılması nəzərdə tutulmuşdur.

Subartezian quyularından dərinlik nasosları vasitəsilə vurulan suyun su qəbuledici qurğular meydançasına ötürülməsi üçün polad borulardan yeratı variantda boru kəmərləri layihələndirilmişdir.

Su qəbuledici kameralar dəmir-betondan istifadə olunmaqla iki kameralı layihələndirilmişdir. Polad borular vasitəsilə qəbul olunmuş sular birinci kameraya axıdılaraq lil və digər qarışıqlardan təmizləndikdən sonra ikinci kameraya daxil oluur. Xlorator binasından daxil olmuş xlor tənzimlənərək ikinci kamerpaya verilir.

Təmizlənmiş sular ərazidə müvafiq olraq dəmir-betondan inşa olunmuş 2 ədəd 500 m^3 və 3 ədəd 2000 m^3 -lik tutumlara veriləcəkdir.

Layihəyə əsasən ərazidə tutumlarda olan suyun şəhərin yüksək nöqtəsinə qaldırılaraq şəhərin su təminatının ödənilməsi məqsədilə anbarlara vurulmasının təmin olunması üçün su qaldırıcı nasos stansiyası, laboratoriya binası, xlorator binası inşa olunacaq, ərazi hasarlanaraq ciddi mühafizə olunacaqdır. Layihə üzrə sahədaxili yollar inşa olunacaq, ərazidə yaşıllaşdırma işləri yerinə yetiriləcəkdir.

Layihə üzrə həmçinin şəhərlərin mövcud su anbarlarının yenidənqurulması və bərpası işlərinin yerinə yetirilməsi nəzərdə tutulmuşdur.

Tikinti işlərində əsasən yerli inşaat materiallarından istifadə olunacaqdır.

Zəlzələ təhlükəsizliyinə görə ərazilərin hesabi seysmikliyi 8 bal qiymətləndirilmişdir.

Ekologiya və Təbii Sərvətlər Nazirliyi göstərilənləri nəzərə alaraq təqdim olunmuş sənədlərə ekoloji baxımdan aşağıdakı şərtlər daxilində etirazı olmadığını bildirir:

-tikinti altında qalacaq torpağın üst münbit qatının sıyrılaraq sonradan ərazilərin bərpası məqsədilə səmərəli istifadə olunması;

-ərazidə bünövrə qazıntıları zamanı əmələ gələn artıq qruntun və tikinti tullantılarının aidiyyatı icra orqanının razılığına əsasən müəyyən olunmuş ərazilərə daşınması;

-tikinti müddətində sanitar-ekoloji tələblərin təmin olunması üçün xüsusi qoruyucu tədbirlərin həyata keçirilməsi;

-sahənin yaxınlığından magistral kommunikasiya xəttlərinin qanunvericiliklə müəyyən olunmuş mühafizə zonası tələblərinə riayət edilməsi və zərurət yarandıqda yerdəyişdirilməsi;

-inşaat işləri müddətində tikinti norma və qaydalarına ciddi riayət edilməsi, ətrafda olan yaşıllıqların mühafizə olunması;

-inşaat işləri başa çatdıqdan sonra ərazilərdə yaşıllaşdırma və abadlaşdırma işlərinin aparılması.

Rəis Q.Xəlilov

Appendix 8: Copy of Groundwater Permit Issued

AZƏRBAYCAN RESPUBLİKASININ
EKOLOGİYA VƏ TƏBİİ
SƏRVƏTLƏR NAZİRLİYİ

AZ1073 Azərbaycan,
Bakı, B.Ağayev Küç. 100 A
Tel: (99412) 492-59-07,
Faks (99412) 492-59-07

№ 4/2409-01
«28» 11 2008-ci il

«AZƏRSU» Açıq Səhmdar
Cəmiyyətinin Vitse-Prezidenti
cənab F.Məmmədova

Hörmətli Fərid müəllim!

Sizin Ekologiya və Təbii Sərvətlər Nazirliyinə 5/2369 saylı 10.11.2008-ci il tarixli məktubla ünvanladığınız «Ağdaş, Göyçay və Naxçıvan şəhərlərində yeraltı sugötürücü qurğuların hidrogeoloji əsaslandırma materiallarına» Nazirliyin mütəxəssisləri tərəfindən baxılmışdır.

Müvafiq hazırlanmış rəyi Sizə göndəririk.

Hörmətlə,

Nazir müavini F.Əliyev

Ağdaş, Göyçay və Naxçıvan şəhərlərinin su təchizatını yaxşılaşdırmaq məqsədi ilə «AZƏRSU» Səhmdar Cəmiyyəti tərəfindən hazırlanmış hidrogeoloji əsaslandırma materialına

R Ə Y

Azərbaycan Respublikası ilə Asiya İnkişaf Bankı arasında Kredit Sazişinə əsasən Ağdaş, Göyçay və Naxçıvan şəhərlərinin su təchizatı və kanalizasiya sistemlərinin yenidənqurulması layihələri çərçivəsində həmin şəhərlərin su təchizatını yaxşılaşdırmaq məqsədi ilə yeraltı su mənbələrindən istifadə olunmasını təqdirəlayiq hal kimi qiymətləndiririk.

«AZƏRSU» Səhmdar Cəmiyyətinin Ağdaş, Göyçay, Şəki və Gəncə şəhərlərinin su təchizatı mənbələri haqqında Ekologiya və Təbii Sərvətlər Nazirliyinə ünvanlanmış 27 avqust 2004-cü il tarixli 5/752 saylı məktuba cavab olaraq Nazirliyin mütəxəssisləri tərəfindən hazırlanmış arayışda Ağdaş və Göyçay şəhərlərinin su təchizatını yaxşılaşdırmaq üçün uyğun olaraq Türyançay və Göyçay çaylarının gətirmə konuslarının yeraltı suları təklif olunmuşdur.

Ekologiya və Təbii Sərvətlər Nazirliyinin mütəxəssislərinin təklifləri nəzərə alınaraq Türyançay və Göyçay çaylarının gətirmə konuslarında yeraltı suların ehtiyatlarının təsdiq olunmuş bazası əsasında perspektiv sahələr seçilmişdir və həmin sahələrdə əlavə hidrogeoloji tədqiqatlar aparılmışdır.

Ağdaş şəhərinin su təchizatını yaxşılaşdırmaq məqsədi ilə qazılacaq istismar quyuları Türyançay çayının gətirmə konusunun «Qolqatı» sahəsində yerləşdirilir.

1978-ci ildə aparılmış hidrogeoloji tədqiqatların nəticəsində çayın gətirmə konusunda təsdiq olunmuş ehtiyatlar 17,8 min m^3/gün təşkil edir.

Mövcud layihə çərçivəsində yeni hidrogeoloji məlumatlar əsasında sahədə 4 (2022-ci ilə) və 5 (2034-cü ilə) quyudan ibarət xətti sugötürücünün tikilməsi nəzərdə tutulur. Suya olan tələbat 2022-ci ilə 6796 m^3/gün, 2034-cü ilə 9063 m^3/gün təşkil edir.

Göyçay şəhərinin su təchizatını yaxşılaşdırmaq məqsədi ilə qazılacaq istismar quyuları Göyçay çayının gətirmə konusunda əlverişli hidrogeoloji şəraitə malik «Potu» sahəsində yerləşdirilir.

1978-ci ildə aparılmış hidrogeoloji tədqiqatların nəticələrinə əsasən çayın gətirmə konusunda təsdiq olunmuş ehtiyatlar 98,2 min m^3/gün təşkil edir.

Hazırlanmış layihə çərçivəsində yeni hidrogeoloji məlumatlar əsasında sahədə 6 (2022-ci ilə) və 8 (2034-cü ilə) quyudan ibarət sahəvi sugötürücünün tikilməsi nəzərdə tutulur. Suya olan tələbat 2022-ci ilə 10507 m^3/gün 2034-cü ilə 13457 m^3/gün təşkil edir.

Sugötürücü qurğular yerləşdiyi «Qolqatı» və «Potu» sahələrinin hər ikisində layihə çərçivəsində 1 ədəd kəşfiyyat-istismar quyusu qazılmışdır. Metodiki cəhətdən düzgün olaraq sugötğürücü xətti üzərində qazılmış quyunun dərinliyi və konstruksiyası istismar olunacaq işçi quyuların parametrlərinə uyğun götürülmüşdür.

Quyuda kompleks geofiziki tədqiqatlar (standart elektrik karotajı) aparılmışdır. Karotajın materialları nəzərə alınmaqla quyunun divarı süzgəcli borularla bərkidilmişdir. Qüvvədə olan metodik göstərişlərin tələblərinə uyğun olaraq quyularda təcrübi suçəkmə işləri aparılmışdır. Suçəkmənin nəticələri sahədə yayılmış Dördüncü dövr yaşlı susaxlayan qumlu çaqıl və çınqılların real hidrogeolji parametrlərini təyin etməyə əsas olmuşdur.

Hər iki sahə üçün yeraltı suların istismar ehtiyatlarının qiymətləhndirilməsi üçün qəbul edilmiş hidrogeoloji parametrlər və hesablanmış yeraltı su ehtiyatlarına irad yoxdur.

Naxçıvan şəhəri. Su təchizatını yaxşılaşdırmaq məqsədi ilə layihələndirilən Sugötürücü Naxçıvançay çayının sağ sahilində yüksək hidrodinamiki və əlverişli hidrokimyəvi göstəriciləri ilə səciyyələnən «Xalxal» sahəsində çayın məcraltı sularının istismarına hesablanmış Üfqi dren sistemindən ibarətdir. Əsaslandırma materialında qeyd olunduğu kimi Azərbaycan Respublikası ərazisində çay dərələrinin yeraltı sularından uzun illərdə etibarlı su mənbəyi kimi istifadə olunur.

Naxçıvançay çayının dərəsində «Xalxal» sahəsində kifayət qədər qalınlığa (12-15 m bəzi yerlərdə daha çox) malik allüvial çöküntülərdə formalaşan yeraltı su

Appendix 9: Photographs of Public Consultation, May 2016, Agdash

Dəlməxəlil kəndi.

List of Participants

İştirakçıların siyahısı

Place/Ərazi: Ağdaş r-nu. Date/Tarix: 07.05.2016

N	Surname and name (ad və soyad)	Rayon/village (rayon/kənd)	Signature (imza)
1	Həsənov İlham	Ağdaş D/k	Həsənov
2			razılaşdım
3	İzizova Ziyafət	Ağdaş ş. D/k	ATB
4			nəzarətçi,
5	İzizova Təranə	Ağdaş D/k	Ziyafət
6			Kazımova
7			
8			
9			
10	Əhmədova Pərvanə	Ağdaş D/k.	Bələdiyyə. S. ATB
11			
12			təsdiqləyirəm.
13			
14			
15			
16			
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18			
19			
20			
21			
22			
23			
24			
25			

DƏHNƏXƏLİL BƏLƏDİYYƏSİ

Appendix 10: Explanatory Report of Drilled Well at Dehne Area

"AZERSU" OPEN JOINT STOCK COMPANY

"SUKANAL" SCIENTIFIC RESEARCH AND DESIGN INSTITUTE

WATER SOURCES INVESTIGATION AND DEVELOPMENT DIVISION

R E P O R T

ON EXPLORATORY-PRODUCTION WELL DRILLED IN THEWATER SOURCE OF AGDASH CITY (IN THE AREA OF OLD RESERVOIR)

Head of Division: **Elkin Rustamov**

Chief Design Engineer **Saleh Seyfullayev**

BAKU – 2015

Table of Contents

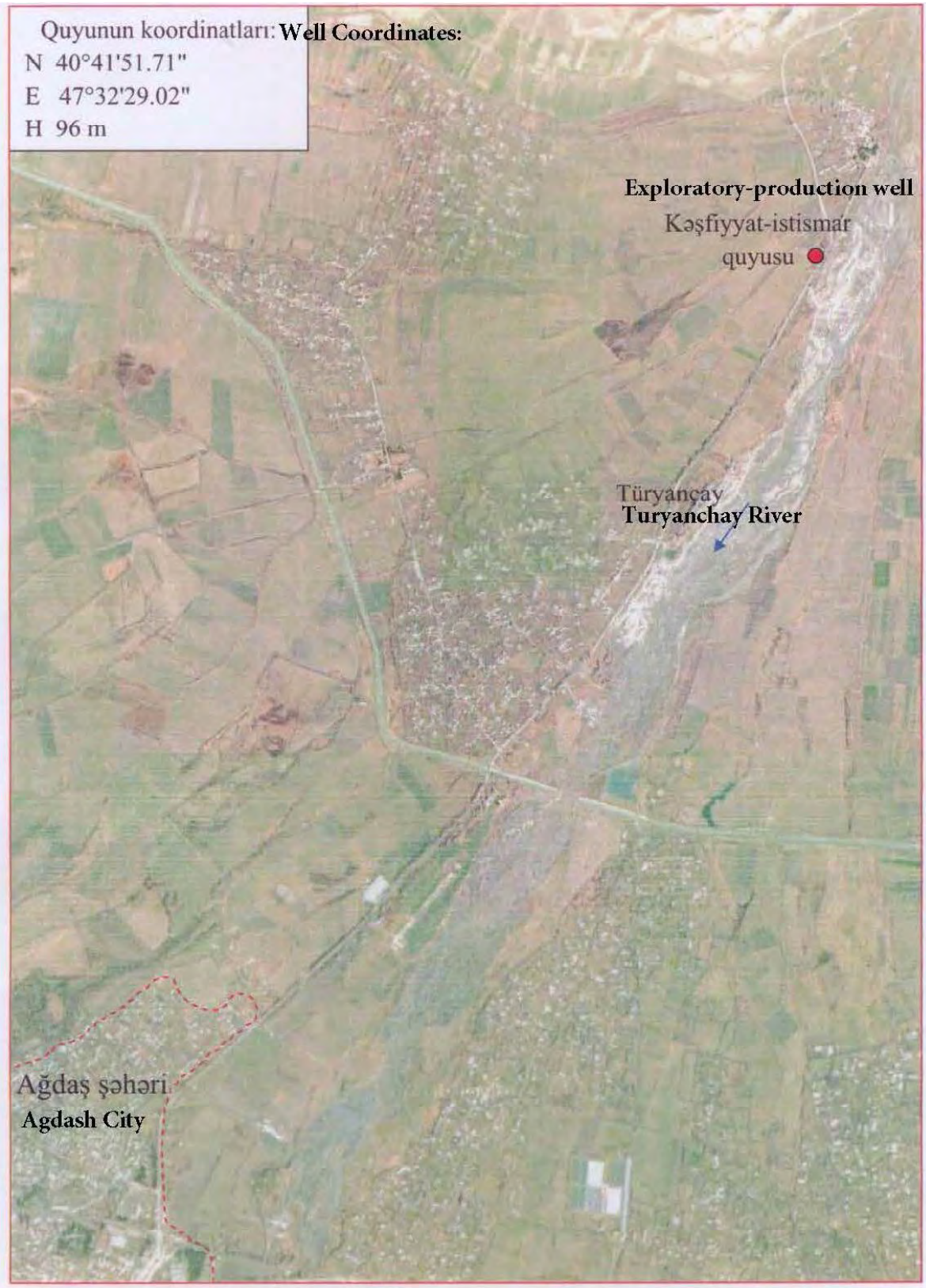
Appendix:

Introduction

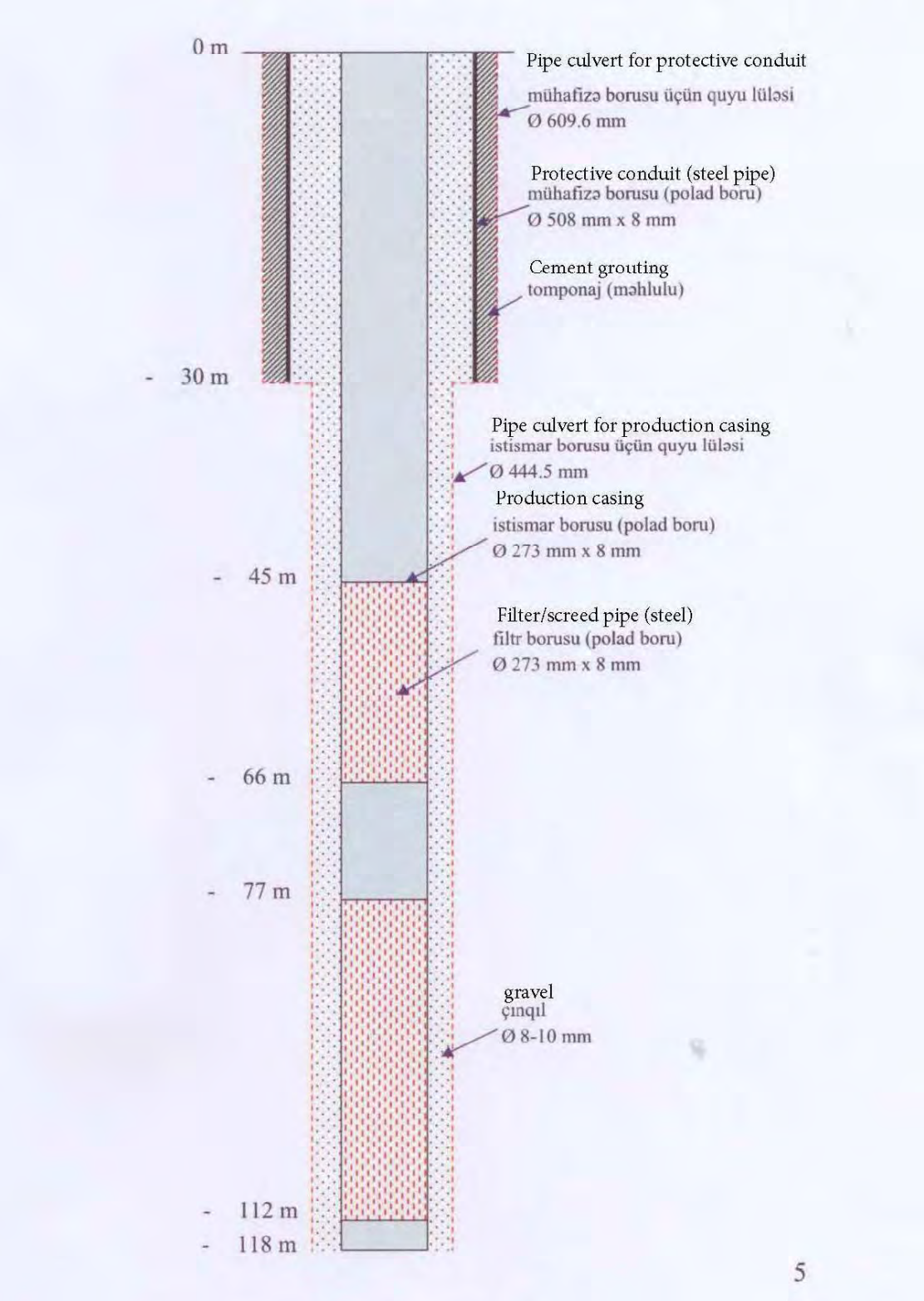
For the purposes of improvement of water supply sysem in Agdash city, an exploratory-production well in depth of 112 m was drilled between June and July of 2015 in the area the wellfield, which used to be the city's water source. Drilled in upper part i.e. at theoutset of the allüvial fan of Turyanchay River, the exploratory-production has been connected to the city's water network since September, 2015 following the satisfactory results of the laboratory analysis of water samples taken form the well.

The well is currently under operaion. No changes have been observed in quantity and quality indicators.

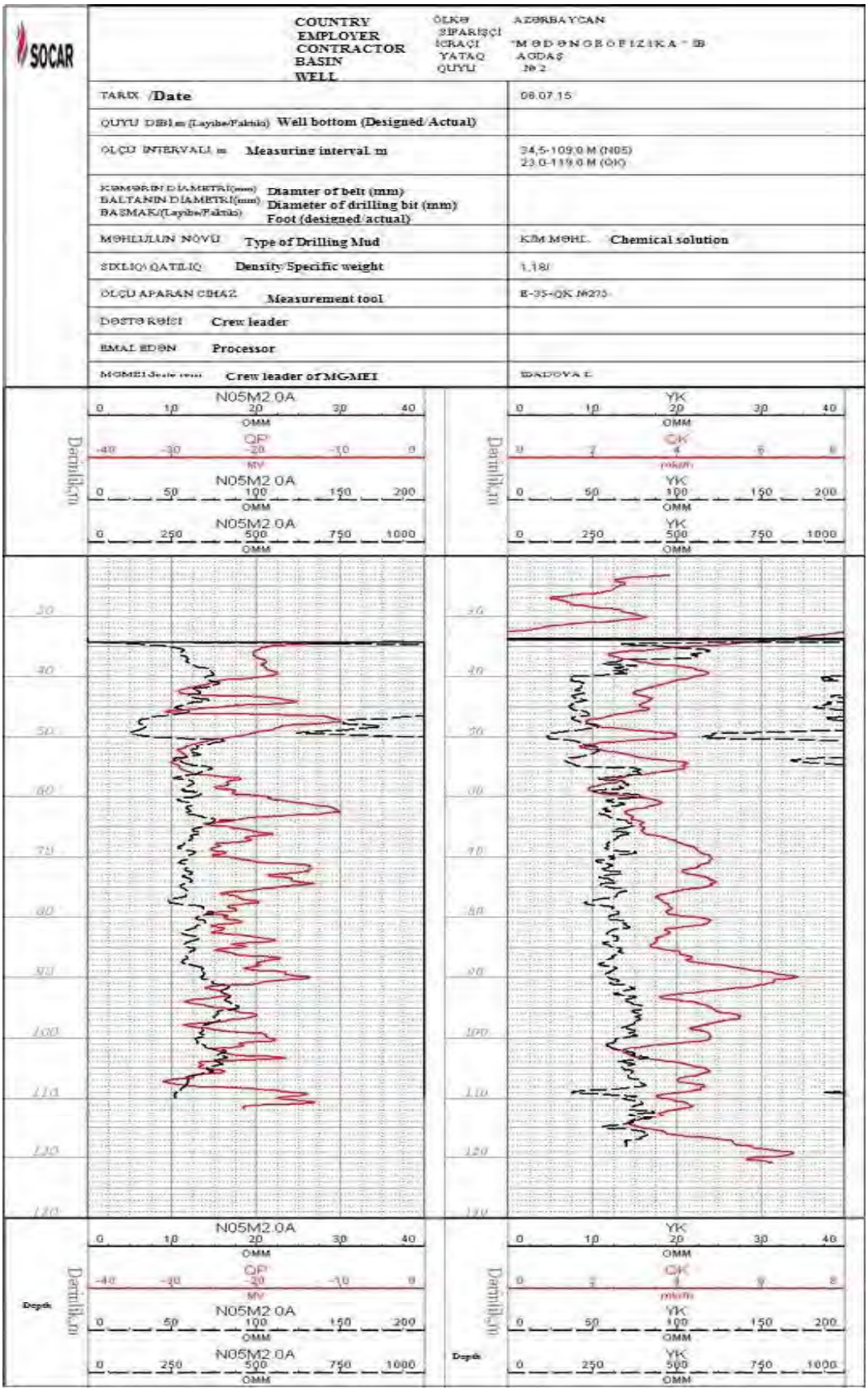
1. Layout of Well



2. Well Structure



3. Graphic description of well logging



4. Screen/filter intervals

No	Interval, m
1	35.6-38.5
2	40.03-46.5
3	50.6-60.4
4	63.2-71.1
5	75.1-89.1
6	91.5-95.3
7	97.0-99.0
8	101.0-103.0
9	103.0-108.0

5. Lithological profile of well

No	Description	Interval, m		Total, m
		from	to	
1	Silty clay	0	1.5	1.5
2	Silty clay with gravel fragments	1.5	4	2.05
3	Gravel and cobble with silty clay fill	4.0	8.0	4.0
4	Grey sand with cobble fragments	8.0	11.0	3.0
5	Gravel and cobble with sand fill	11.0	18.0	7.0
6	Grey silty clay with cobble fragments	18.0	20.0	2.0
7	Greyish silty clay	20.0	26.0	6.0
8	Greyish silty sand with cobble fragments	26.0	32.0	6.0
9	Gravel and cobble with silty sand fill	32.0	36.0	4.0
10	Gravel and cobble with silty clay fill	36.0	39.0	3.0
11	Gravel and cobble with sand fill	39.0	46.0	7.0
12	Silty clay with cobble fragments	46.0	49.0	3.0
13	Cobble and gravel with boulders and sand fill	49.0	51.0	2.0
14	Cobble and gravel with boulders and silty clay fill	51.0	53.0	2.0
15	Cobble and gravel with boulders and sand fill	53.0	60.0	7.0
16	Silty clay with cobble	60.0	62.0	2.0
17	Cobble and gravel with boulders and sand fill	62.0	66.0	4.0
18	Grey sand with cobble fragments	66.0	73.0	7.0
19	Cobble and gravel with boulders and sand fill	73.0	81.0	8.0
20	Cobble and gravel with boulders and silty clay fill	81.0	85.0	4.0
21	Gravel and cobble with sand fill	85.0	97.0	12.0
22	Silty clay with cobble	97.0	98.0	1.0
23	Gravel and cobble with sand fill	98.0	107.0	9.0
24	Silty clay with cobble	107.0	118.0	11.0

6. Hydrodymamic parameters of well

Well depth:	112 m
Diameter of pipe culvert for protective conduit:	Ø 609.6
Diameter of pipe culvert for production casing:	Ø 444.5
Diameter and installation depth of protective conduit:	Ø 508 mm x 8 mm, 30 m
Diameter and installation depth of production casing (including filter/screen length):	Ø 273 mm x 8 mm, 118 m
Screen/filter intervals:	45-66 m, 77-112 m
Hydrodynamic indicators:	
Static water level:	33.0 m
Dynamic water level:	36.4 m
Drawdown:	3.4 m
Flow rate:	27 l/s
Specific flow rate:	7.94 l/s *m

Conclusion

Exploratory-production well drilled in the territory of the driking water source of Agdash (i.e. the area of old reservoir) has been in operation since August, 2015. Based upon analysis of the parameters determined during well drilling and completion as well as data obtained during operation (stable flow and level indicators were observed in the exploratory-production well, which has been under operation for over four months), it was determined that it is feasible to extract groundwater from Quaternary aquifers, predominantly composed of gravel and cobble sediments with sand fill, and integrated hydrogeological surveys shall be carried out to define number, location and parameters of other potential wells in the source.

It is considered appropriate to launch integrated hydrogeological surveys concurrently with drilling of another well. It is highly recommended to analyse data to be obtained during drilling and development of a new well and refine the parameters of other production wells.

In general, it is considered more appropriate to proceed with well drilling process working by shifts.

"AZERSU" OPEN JOINT STOCK COMPANY

"SUKANAL" SCIENTIFIC RESEARCH AND DESIGN INSTITUTE

Soil and Water Examinations Division

67, Moscow Avenue, 1012, Baku

Licence No 065913, FHN/52-00179 issued on: 25.04.2011

PROTOCOL OF WATER SAMPLE ANALYSIS

Ref. No. 454 **Date: 07 October 2015**

Sampling location: Agdash region, Turyanchay, Reservoir Area, Well No 4 (new)

Sampling date and time: 04.10.2015, 18:15

Sample received by the division: 05.10.2015, 14:02

Sample tested: 05.10.2015, 14:15 – 07.10.2015

Results of Laboratory Analysis for Water Quality

ID	Description	Unit	GOST 2874-82 "drinking water"	Results
1	Odor under 20^0C	points	≤ 2	0
2	Color	Degree	≤ 20	0
3	Turbidity	mg/l	≤ 1,5 (2)	0
4	Hydrogen, pH	pH	6-9	7,72
5	Electric conductivity, 25^0C	µs/m	≤ 1500	502
6	Total hardness	mmol/l	≤ 7 (10)	4,6
7	Carbonate hardness	mmol/l	≤ 7	3,7
8	Mineral content ($\sum_i$)	mg/l	≤ 1000	426,5
9	Solid residue	mg/l	≤ 1000 (1500)	314
10	Calcium (Ca^{2+})	mg/l	≤ 100	70,1
11	Magnesium (Mg^{2+})	mg/l	≤ 50	13,4

12	Natrium *(Na^+)*	mg/l	≤ 200 (*Na*)	28,2
13	Calium *(K^+)*	mg/l	≤ 12	3,1
14	Hydrocarbonate *(HCO_3^-)*	mg/l	30-400	225,7
15	Sulphates *(SO_4^{2-})*	mg/l	≤ 500	78,0
16	Chlorides *(Cl^-)*	mg/l	≤ 350	4,75
17	Nitrogen Ammonia *($N\text{-}NH_4^+$)*	mg/l	≤ 2	0,01
18	Nitrates *(NO_3^-)*	mg/l	≤ 45	3,23
19	Nitrites *(NO_2^-)*	mg/l	≤ 0,1	0,001
20	Fluoride *(F^-)*	mg/l	≤ 0,7	0,12
21	Ferrum *(Fe)*	mg/l	≤ 0,3 (1)	0,05
22	Manganin *(Mn)*	mg/l	≤ 0,1 (0,5)	0,031
23	Cuprum *(Cu)*	mg/l	≤ 1,0	< 0,01
24	Nickel *(Ni)*	mg/l	≤ 0,1	< 0,001
25	Chrome *(Cr* VI*)*	mg/l	≤ 0,05	0,014
26	Zink *(Zn)*	mg/l	≤ 5,0	0,08
27	Cobalt *(Co)*	mg/l	< 0,1	< 0,001
28	Phosphates *(PO_4^{3-})*	mg/l	≤ 3,5	0,1
29	Molybdenum *(Mo)*	mg/l	≤ 0,25	< 0,01
30	Aluminium	mg/l	0,5	0,005

Head of Division Shamsaddin Abdullayev

"AZƏRSU" AÇIQ SƏHMDAR CƏMİYYƏTİ

"SUKANAL" ELMİ-TƏDQİQAT VƏ LAYİHƏ İNSTİTUTU

SU MƏNBƏLƏRİNİN TƏDQİQİ VƏ İŞLƏNMƏSİ ŞÖBƏSİ

AĞDAŞ ŞƏHƏRİNİN İÇMƏLİ SU MƏNBƏYİNDƏ (KÖHNƏ ANBAR SAHƏSİNDƏ) QAZILMIŞ KƏŞFİYYAT-İSTİSMAR QUYUSUNUN NƏTİCƏSİ BARƏDƏ

H E S A B A T

Şöbə rəisi: Elkin Rüstəmov

Layihə baş mühəndisi: Saleh Seyfullayev

B A K I – 2015

MÜNDƏRİCAT

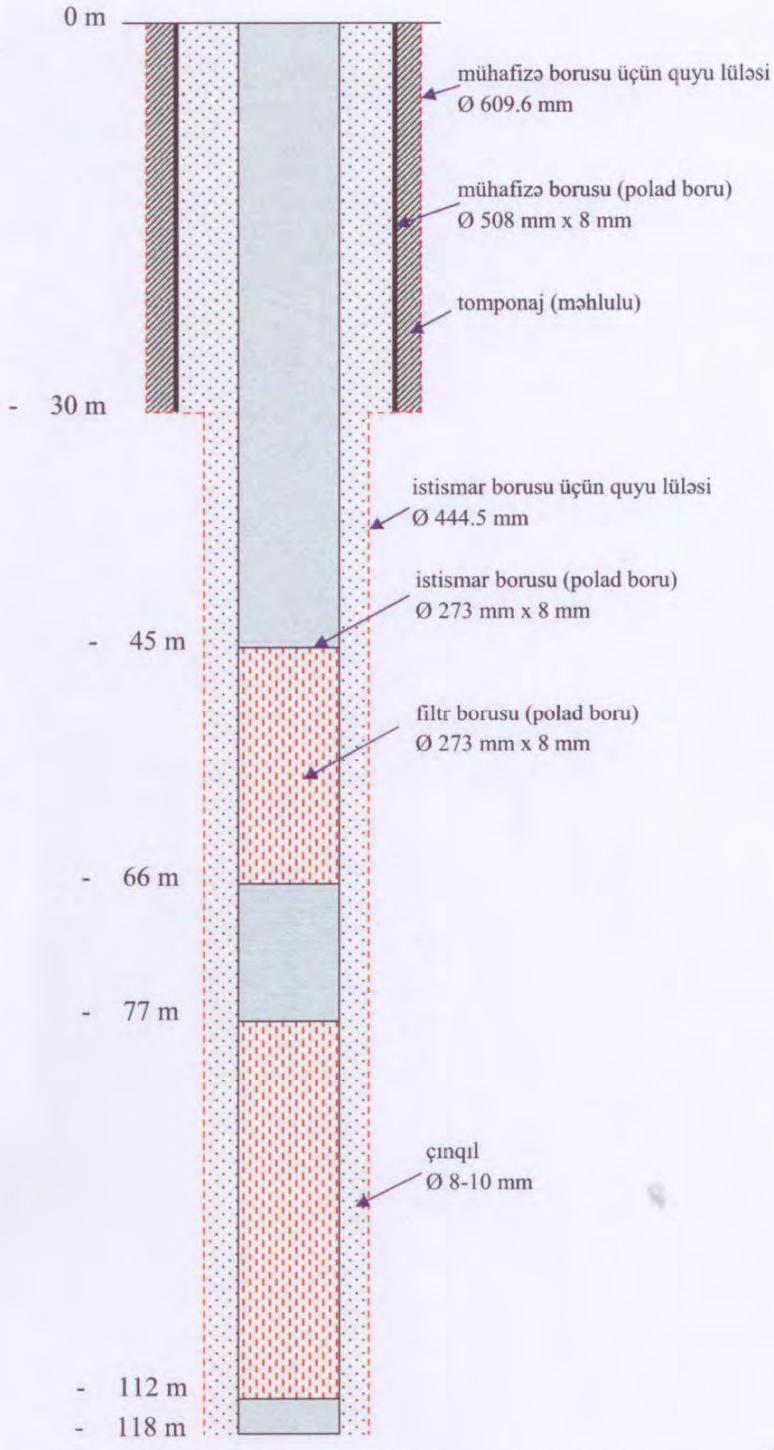
Giriş

Ağdaş şəhərinin içməli su təchizatının yaxşılaşdırılması məqsədi ilə yaranmış vəziyyət nəzərə alınaraq şəhərin əvvələr su mənbəyi olmuş quyular sahəsində (köhnə anbar sahəsində) 2015-ci ilin iyun-iyul aylarında bir ədəd 112 m dərinliyində kəşfiyyat-istismar quyusu qazılmışdır. Türyançayın gətirmə konusunun yuxarı (başlanğıc hissəsində) qazılmış kəşfiyyat-istismar quyusundan hasil olan su laborator analiz etdirildikdən sonra 2015-ci ilin sentyabr ayından mövcud su təchizatı sistemlərinə qoşulmaqla şəhərin içməli su təchizatına yönləndirilmişdir.

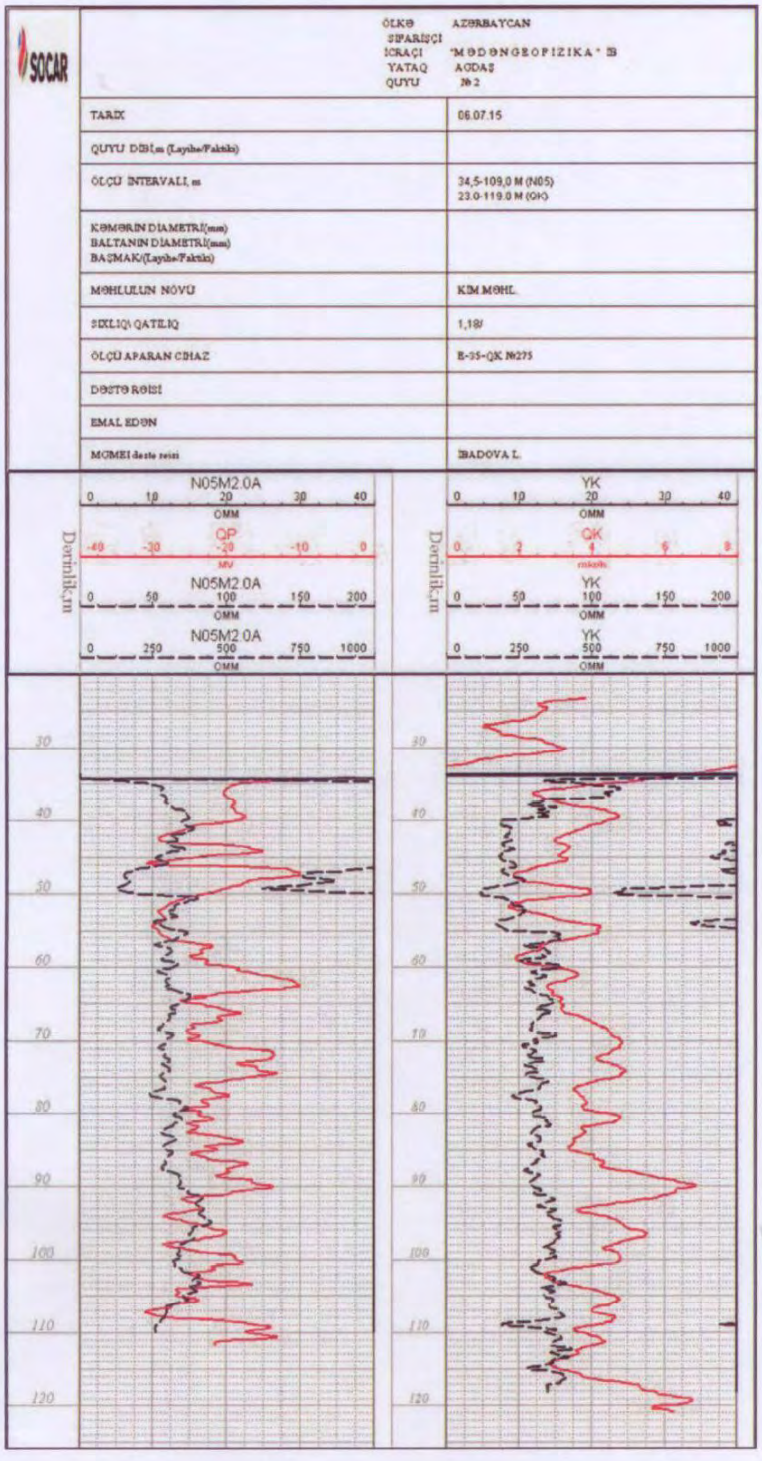
Quyu hal-hazırda istismar edilir. Kəmiyyət və keyfiyyət göstəricilərində dəyişiklik müşahidə edilməmişdir.

1. Quyunun yerləşməsi

2. Quyunun konstruksiyası



3. Geofiziki-karotaj işlərinin qrafik təsviri



4. Kollektor intervallar

№	İnterval, m
1	35.6-38.5
2	40.3-46.5
3	50.6-60.4
4	63.2-71.1
5	75.1-89.1
6	91.5-95.3
7	97.0-99.0
8	101.0-103.0
9	103.8-108.0

5. Quyunun litoloji kəsilişi

S/s	Adı	İnterval		Cəmi
		m-dən	m-dək	m
1	Gilcəli torpaq qatı	0	1.5	1.5
2	Çaqıllı gilcə	1.5	4	2.5
3	Gilcə dolduruculu çaqıl-çınqıl	4.0	8.0	4.0
4	Çaqıllı boz qum	8.0	11.0	3.0
5	Qum dolduruculu çaqıl-çınqıl	11.0	18.0	7.0
6	Çaqıllı boz gilcə	18.0	20.0	2.0
7	Bozumtul gilcə	20.0	26.0	6.0
8	Bozumtul çaqıllı qumca	26.0	32.0	6.0
9	Qumca dolduruculu çaqıl-çınqıl	32.0	36.0	4.0
10	Gilcə dolduruculu çaqıl-çınqıl	36.0	39.0	3.0
11	Qum dolduruculu çaqıl-çınqıl	39.0	46.0	7.0
12	Çaqıllı gilcə	46.0	49.0	3.0
13	Qum dolduruculu qaymalı çaqıl-çınqıl	49.0	51.0	2.0
14	Gilcə dolduruculu qaymalı çaqıl-çınqıl	51.0	53.0	2.0
15	Qum dolduruculu qaymalı çaqıl-çınqıl	53.0	60.0	7.0
16	Çaqıllı gilcə	60.0	62.0	2.0
17	Qum dolduruculu qaymalı çaqıl-çınqıl	62.0	66.0	4.0
18	Çaqıllı boz qum	66.0	73.0	7.0
19	Qum dolduruculu qaymalı çaqıl-çınqıl	73.0	81.0	8.0
20	Gilcə dolduruculu qaymalı çaqıl-çınqıl	81.0	85.0	4.0
21	Qum dolduruculu çaqıl-çınqıl	85.0	97.0	12.0
22	Çaqıllı gilcə	97.0	98.0	1.0
23	Qum dolduruculu çaqıl-çınqıl	98.0	107.0	9.0
24	Çaqıllı gilcə	107.0	118.0	11.0

6. Quyunun hidrodinamik parametrləri

Quyunun dərinliyi: 112 m

Mühafizə borusu üçün quyu lüləsinin diametri: Ø 609.6 mm

İstismar borusu üçün quyu lüləsinin diametri: Ø 444.5 mm

Mühafizə borusunun diametri və yerləşdirilmə dərinliyi: Ø 508 mm x 8mm, 30 m

İstismar borusunun diametri və yerləşdirilmə dərinliyi: Ø 273 mm x 8mm, 118 m
(filtrin uzunluğu daxildir)

Filtrlərin yerləşmə intervalı: 45 – 66 m ; 77 -112 m

Hidrodinamik göstəricilər

Statik su səviyəsi: 33.0 m

Dinamik su səviyəsi: 36.4 m

Səviyə düşməsi: 3.4 m

Quyunun sərfi: 27 l/san

Xüsusi sərfi: 7.94 l/san*m

Nəticə

Ağdaş şəhərinin içməli su mənbəyində (köhnə anbar sahəsində) qazılmış kəşfiyyat-istismar quyusu 2015-ci ilin avqust ayından istismar edilir. Quyunun qazılması və tamamlanması zamanı təyin edilmiş parametrlər və istismar müddətində əldə edilmiş məlumatların (dörd aydan artıq müddətdə istismara verilmiş kəşfiyyat istismar quyusunda sərf və səviyə üzrə göstəricilər stabil olaraq qalmaqdadır) təhlilinə əsasən Türyançayın gətirmə konusunun yuxarı hissəsində dördüncü dövrün əsasən qum dolduruculu çaqıl-çınqıl çöküntülərində formalaşan yeraltı suların istismar edilməsi mümkün hesab edilir və mənbə üzrə digər istismar quyularının sayının, yerləşməsinin və parametrlərinin təyin edilməsi məqsədi kompleks hidrogeoloji tədqiqat işlərinin aparılması məqsədəuyğun hesab edilir.

Kompleks hidrogeoloji tədqiqat işlərinin aparılması ilə yanaşı növbəti istismar quyusunun qazılmasına başlanılması mümkün hesab edilir. Növbəti istismar quyusunun qazılması və tamamlanması zamanı əldə edilmiş məlumatların təhlil edilməsi, digər istismar quyuların parametrlərində dəqiqləşdirmələrin aparılması tövsiyyə edilir.

Ümumiyyətlə istismar quyularının növbəlilik prinsipi ilə qazılması daha məqsədəuyğun hesab edilir.

azərsu

"Azərsu" Açıq Səhmdar Cəmiyyəti
"Sukanal" Elmi-Tədqiqat və Layihə İnstitutu
Qrunt və su tədqiqatları şöbəsi
1012, Bakı şəhəri, Moskva prospekti, 67
Lisenziya № 065913. FHN/52-00179 verilmə tarixi: 25.04.2011-ci il

SUYUN ANALİZİ NƏTİCƏLƏRİNİN PROTOKOLU

№ 454 **07 oktyabr 2015-ci il**

Nümunənin götürüldüyü yer: Ağdaş rayonu, Turyançay, anbar sahəsi, quyu № 4 (yeni qazılan)
Nümunənin götürüldüyü tarix: 04.10.2015 saat 18:15
Nümunənin şöbəyə daxil olduğu tarix: 05.10.2015 saat 14:02
Analizin aparılma tarixi: 05.10.2015 saat 14:15 – 07.10.2015

Suyun keyfiyyətinin laboratoriya sınaqlarının nəticələri :

Sıra sayı	Göstəricilərin adları	Ölçü vahidi	ГОСТ 2874-82 "İçməli su"	Nəticələr
1	20^0C – də iyi	ball	≤ 2	0
2	Rənglilik	dərəcə	≤ 20	0
3	Bulanıqlıq	mq/l	≤ 1,5 (2)	0
4	Hidrogen göstəricisi, pH	pH vahidi	6-9	7,72
5	Elektrik keçiriciliyi, 25^0 C	μs/sm	≤ 1500	502
6	Ümumi codluq	mmol/l	≤ 7 (10)	4,6
7	Karbonat codluq	mmol/l	≤ 7	3,7
8	Minerallaşma (Σi)	mq/l	≤ 1000	426,5
9	Quru qalıq	mq/l	≤ 1000 (1500)	314
10	Kalsium (Ca^{2+})	mq/l	≤ 100	70,1
11	Maqnezium (Mg^{2+})	mq/l	≤ 50	13,4
12	Natrium (Na^+)	mq/l	≤ 200 (Na)	28,2
13	Kalium (K^+)	mq/l	≤ 12	3,1
14	Hidrokarbonat (HCO_3^-)	mq/l	30 - 400	225,7
15	Sulfatlar (SO_4^{2-})	mq/l	≤ 500	78,0
16	Xloridlər (Cl^-)	mq/l	≤ 350	4,75
17	Ammonium azotu $(N-NH_4^+)$	mq/l	≤ 2	0,01
18	Nitratlar (NO_3^-)	mq/l	≤ 45	3,23
19	Nitritlər (NO_2^-)	mq/l	≤ 0,1	0,001
20	Flüoridlər (F^-)	mq/l	≤ 0,7	0,12
21	Dəmir (Fe)	mq/l	≤ 0,3 (1)	0,05
22	Manqan (Mn)	mq/l	≤ 0,1 (0,5)	0,031

23	Mis (Cu)	mq/l	≤ 1,0	< 0,01
24	Nikel (Ni)	mq/l	≤ 0,1	< 0,001
25	Xrom $(Cr$ VI$)$	mq/l	≤ 0,05	0,014
26	Sink (Zn)	mq/l	≤ 5,0	0,08
27	Kobalt (Co)	mq/l	< 0,1	< 0,001
28	Fosfatlar (PO_4^{3-})	mq/l	≤ 3,5	0,1
29	Molibden (Mo)	mq/l	≤ 0,25	< 0,01
30	Alüminium	mq/l	0,5	0,005

Şöbə rəisi Şəmsəddin Abdullayev