Updated Draft Initial Environmental Examination

July 2016

GEO: Urban Services Improvement Investment Program – Tranche 4 (Improvement of Zugdidi and Jvari Water Supply Systems Sub-project)

Prepared by United Water Supply Company of Georgia LLC of the Ministry of Regional Development and Infrastructure for the Asian Development Bank

ABBREVIATIONS

ADB	-	Asian Development Bank
CA	-	Cross section area
CC	-	Civil Contractor
DC	-	Design Consultant
EA	-	Executing Agency
EIA	-	Environmental Impact Assessment
EIP	-	Environmental Impact Permit
EMP	-	Environmental Management Plan
GoG	-	Government of Georgia
GRC	-	Grievance Redress Mechanism
IA	-	Implementing Agency
IEE	-	Initial Environmental Examination
IP	-	Investment Program
IPMO	-	Investment Program Management Office
kg	-	Kilogram
km	-	Kilometre
lpcd	-	Litres per Capita per Day
M	-	Metre
MFF-IP	-	Multitranche Financing Facility Investment Program
mg/l	-	milligram per litre
mm	-	Millimetre
MoRDI	-	Ministry of Regional Development & Infrastructure
MoE	-	Ministry of Environment and Natural Resources Protecion of Georgia
PS	-	Pumping Station
UWSCG	-	United Water Supply Company of Georgia
WS		Water Supply

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EXECUTIVE SUMMARY

1. It is proposed to improve the water supply system in Zugdidi and Jvari under the Asian Development Bank (ADB) funded Urban Services Improvement Investment Program, which is under preparation stage. This Investment Program, implemented in eleven towns, will develop the water and sanitation services, which will improve quality of life and optimize the social and economic development. Ministry of Regional Development and Infrastructure (MoRDI) is the Executing Agency (EA) and United Water Supply Company of Georgia (UWSCG) is the Implementing Agency (IA) of this Program. This subproject will be implemented from 2014 to 2017, including Jvari water supply project to be implemented from 2016 to 2017. The majority of the works will be within the existing boundaries of facilities, however there will be a number of new pipelines laid. All environmental impacts associated with the works are minor and can be managed through effective implementation of an environmental management plan. Since the subproject is unlikely to have significant adverse impacts, it is classified as environment Category B, and accordingly an Initial Environmental Examination has been conducted. This is a summary of the IEE Report.

2. The Investment Program will improve water supply and sanitation (WSS) services in 11 secondary towns of Georgia. TheInvestment Program includes (i) infrastructure improvement to rehabilitate, improve, and expand WSS services; (ii)institutional effectiveness to improve the service utility's technical and management capabilities of the key WSS serviceprovider, United Water Supply Company of Georgia LLC (UWSCG) to provide efficient WSS services, and develop the capacity of sector regulators to regulate tariffs, services standards, environmental protection, and drinking water quality in the long-term; and (iii) Investment Program implementation support.

3. Zugdidi, situated 258 km west of Tbilisi, the capital of Georgia and 30 km of Black sea coast, is the administrative centre of the Samegrelo-Zeda Svaneti Region. UWSCG's Zugdidi Service Centre operates the water supply system in Zugdidi City and a number of outlying small towns and villages. Traditionally the water abstraction for the City of Zugdidi was from Rechko headworks located in Abjkazia. With the 1992-93 Civil War, this source was no longer available. At present, water supply is provided to only 7% of the population from local boreholes. This water supply improvement sub-project is therefore designed for a complete revival of the system to meet the present and the projected demand of 2040. This will be achieved by: (i) construction of a water supply system,(ii) construction of a new sewer system; and (iii) construction of a new wastewater treatment plant (WWTP) which is subject of this IEE. As for Jvari, Town Jvari is located in Samegrelo-Zemo Svaneti Region, West Georgia. The town belongs to the Tsalenjikha Municipality and is located on the left bank of the rivers Enguri and Managa on 240-350 meters above sea level. Zugdidi-Mestia highway passes through the Jvari town. It is about 30 km from Zugdidi.

4. The project will be implemented according to the requirements of Georgian National and the same as of Asian Development Bank's Environmental Legislative Framework (SPS 2009).

5. The new well field will comprise 9 wells in Inghiri, located south of Zugdidi. One test well had been drilled in 2012 with positive results. The expected yield amounts to up to 40 l/s per well. The quality of the water is good. The distance between the wells will be minimum 330 m. For Jvari, well-fields in Lia, was considered to be water intake for Zugdidi. Hydro-geological Surveys were carried out there, but, because of small quantity of water, it was decided to change the intake location. But, the quantity of water was insufficient for Zugdidi consumption, which is big town comparing to Jvari and required bigger amount. For Jvari, the quantity will be sufficient. It was foreseen under hydro-geological survey, that 3-4 l/s can be abstracted from one well in Lia. In case

of 5 wells, around 15-20 l/s will be abstracted. Water will be pumped in the reservoir. Exact capacity of the pumps will be defined during design preparation.

From reservoir water will be distributed to the network by gravity. In order to ensure rational consumption, individual metering of customers will be carried out, including, in the apartment blocks.

6. The well field will serve a new pumping station to be constructed between the well field and Zugdidi. The pumping station will include a receiver tank with a volume of 768 m^3. The pumping station will be equipped with five pumps (4 + 1 in stand-by) with a Qmax of 1,692 m^3/h and a total head of 140 m..

7. Bashi reservoir is located north of Zugdidi at an elevation that allows the supply from this reservoir by gravity. It serves as balancing reservoir. The storage volume is 5 x

3,500 m^3. The old reservoir will be demolished and a new reservoir will be constructed at the same site. The condition of the old reservoir was investigated and its rehabilitation was ruled as not feasible.

8. The distribution net is divided into three pressure zones. The total length of the network is approximately 230 km. The network covers the Municipality of Zugdidi plus small, settled zones right outside the municipal border.

9. Ecologically-sensitive receptors are not located in the vicinity of the project territory. The nearest protected area - Kolkheti National Park, is located 40 km away from the project zone.

10. However, due to the specifics of the project, it is essential to conduct a number of mitigation measures during construction and operational phases in order to avoid the potential negative impact on the environment.

11. The main problems at the construction phase arise in the process of rehabilitation of the existing water pipes and installation of the new ones. The above mentioned construction activities will be carried out on the territory of the city of Zugdidi and will cause disturbance of the population due to the noise and dust. In addition, the usage of necessary heavy construction equipment for the implementation of the project, especially in the narrow streets of the city, will significantly restrict transportation for the population.

12. During the operation phase the minor problems will be created during the repairing and rehabilitation activities. When the above mentioned repairing activities will be carried out on the territory of the city of Zugdidi and will cause disturbance of the population due to the noise and dust.

13. The present document has been developed a number of mitigation measures to eliminate these problems. Accordant with this, their proper and timely implementation will significantly reduce the potential negative impact.

14. UWSCG if the executing agency of the project, which in turn hires construction and consulting companies on the basis of the tender. The above mentioned team takes full responsibility for the effective implementation of the project.

15. The overall conclusion of the IEE is that provided the mitigation and enhancement measures are implemented in full, there should be no significant negative environmental impacts as a result of location, design, construction or operation of the subproject. There should in fact be positive benefits through major improvements in quality of life and individual and public health once the scheme is in operation. Project will stimulate economic growth. The wastewater good quality is a prerequisite for tourism development. Standard of individual and public health will improve as a result of the project. Project will generate new job opportunities.

I. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

16. This section discusses the national and local legal and institutional framework within which the environmental assessment is carried out. It also identifies project-relevant international environmental agreements to which the country is a party.

A. ADB Policy

17. Superseding the previous safeguard policies (the Involuntary Resettlement Policy, 1995, the Policy on Indigenous Peoples, 1998, and the Environment Policy 2002), ADB, has adopted a comprehensive Safeguard Policy Statement in 2009 (SPS, 2009). This Statement describes common objectives of ADB's safeguards, lays out policy principles, and outlines the delivery process for ADB's safeguard policy. It applies to all ADB-financed and administered projects, and their components including investment projects funded by a loan, grant or other means.

18. Aiming on promotion and sustainability of project outcomes by protecting the environment and people from projects' potential adverse impacts, the objectives of ADB's safeguards are to:

- avoid adverse impacts of projects on the environment and affected people, where possible;
- minimize, mitigate, and/or compensate for adverse project impacts on the environment and affected people when avoidance is not possible; and
- help borrowers/clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks.

19. The objective of environmental safeguards is to ensure the environmental soundness and sustainability of projects and to support the integration of environmental considerations into the project decision-making process. All ADB funded projects are screened at initial stages of preparation and categorized according to significance of the project's potential environmental impacts. Projects are assigned to one of the following three categories:

Category A - Projects likely to have significant adverse environmental impacts, which are irreversible, diverse or unprecedented and may affect an area larger than the location subject to physical works. An Environmental Impact Assessment is required.

Category B –. Projects with adverse environmental impacts that are less significant than those of Category A projects, are site-specific, generally not irreversible, and in most cases can be mitigated more readily than for Category A projects. An Initial Environmental Examination (IEE) is required.

Category C - likely to have minimal or no adverse environmental impacts; EIA is not required.

20. The Zugdidi WS subproject has been classified as environmental assessment category B according to the criteria laid down in the checklist for water supply projects of the Environmental Assessment and Review Framework (up-dated in November 2013) that was especially prepared for the environmental assessment of the Georgia Urban Services Improvement Investment Program and approved by ADB.

21. *ADB Review and Approval*. For Category B projects the Draft IEE report is reviewed by ADB's Operational Department (in this case Central & West Asia Department) and after addressing their comments, if any, the EA then officially submits the IEE reports to ADB. Completed reports are made available on the ADB website.

1.1. International Standards

1.1.1 Ambient Air Quality

Projects with significant[1] sources of air emissions, and potential for significant impacts to ambient air quality, should prevent or minimize impacts by ensuring that:

- Emissions do not result in pollutant concentrations that reach or exceed relevant ambient quality guidelines and standards by applying national legislated standards, or in their absence, the current WHO Air Quality Guidelines (see Table 1), or other internationally recognized sources;Emissions do not contribute a significant portion to the attainment of relevant ambient air quality guidelines or standards. As a general rule, this Guideline suggests 25 percent of the applicable air quality standards to allow additional, future sustainable development in the same airshed.

Table 1 : WHO Ambient Air Quality Guidelines		
	Averaging Period	Guideline value in mg/m3
Sulfur dioxide (SO_2)	24-hour 10 minute	125 (Interim target) 500 (guideline)
Nitrogen dioxide (NO_2)	1-year 1-hou	40 (guideline) 200 (guideline)
Particulate Matter PM10	1-year 24-hou	70 (Interim target) 150 (Interim target)
Particulate Matter PM2.5	1-year 24-hour	35 (Interim target) 75 (Interim target)
Ozone	8-hour daily maximum	160 (Interim target) 100 (guideline)

1.1.2 Noise

25. Noise prevention and mitigation measures should be applied where predicted or measured noise impacts from a project facility or operations exceed the applicable noise level guideline at the most sensitive point of reception. The preferred method for controlling noise from stationary sources is to implement noise control measures at source.

26. Noise impacts should not exceed the levels presented in Table 2, or result in a maximum increase in background levels of 3 dBat the nearest receptor location off-site.

Table 2 Noise Level Guidelines

[1] Significant sources of point and fugitive emissions are considered to be general sources which, for example, can contribute a net emissions increase of one or more of the following pollutants within a given airshed: PM10: 50 tons per year (tpy); NOx: 500 tpy; SO2: 500 tpy; or as established through national legislation; and combustion sources with an equivalent heat input of 50 MWth or greater. The significance of emissions of inorganic and organic pollutants should be established on a project-specific basis taking into account toxic and other properties of the pollutant;

	One Hour LAeq (dBA)	
Receptor	Daytime 07:00 - 22:00	Nighttime 22:00 - 07:00
Residential; institutional; educationa	55	45
Industrial; commercial	70	70

1.1.3 Water Quality Standards

27. Many developed countries specify standards to be applied in their own country. In Europe, this includes the **European Drinking Water Directive** and in the **USA** the **United States Environmental Protection Agency** (EPA) establishes standards as required by the **Safe Drinking Water Act**. For countries without a legislative or administrative framework for such standards, the **World Health Organisation** publishes guidelines on the standards that should be achieved.

28. The following table 3 provides a comparison of a selection of parameters for concentrations listed by WHO, the European Union, EPA.

Table 3 water quality standarts

parametr	World heals Organzation	European Union	EPA
Antimory	ns	5.0 µg/l	6.0 µg/l
Arsenic	10µg/l	10µg/l	10µg/l
Barium	700µg/l	ns	2 mg/L
Benzene	10µg/l	1.0 µg/l	5 µg/l
Boron	2.4mg/l	1.0 mg/L	-
Cadmium	3 µg/l	5 µg/l	5 µg/l
Chromium	50µg/l	50 µg/l	0.1 mg/L
Copper	-	2.0 mg/l	TT
Epichlorohydrin	-	0.10 µg/l	-
Fluoride	1.5 mg/l	1.5 mg/l	4 mg/l
Lead	-	10 µg/l	15 µg/l
Mercury	6 µg/l	1 µg/l	2 µg/l

Nickel	-	20 µg/l	-
Nitrate	50 mg/l	50 mg/l	10 mg/L (as N)
Nitrite	-	0.50 mg/l	1 mg/L (as N)
Pesticides (individual)	-	0.10 µg/ l	-
Pesticides — Total	-	0.50 µg/l	-
Polycyclic aromatic hydrocarbons	-	0.10 µg/	-
Selenium	40 µg/l	10 µg/l	50 µg/l
Tetrachloroethene and Trichloroethene	40µg/l	10 µg/l	“

B. Georgian Law

1. Framework Legislation

22. The basic legal document is “The Constitution of Georgia”, which was adopted in 1995. While the Constitution of Georgia does not directly address environmental matters, it does lay down the legal framework that guarantees environmental protection and public access to information with regard to environmental conditions.

23. Article 37, Part 3 states that “any person has the right to live in a healthy environment, use the natural and cultural environment. Any person is obliged to take care of the natural and cultural environment.” Article 37, Part 5 states that “an individual has the right to obtain full, unbiased and timely information regarding his working and living environment.”

24. Article 41, Part 1 states that “a citizen of Georgia is entitled to access information on such citizen as well as official documents available in State Institutions provided it does not contain confidential information of state, professional or commercial importance, in accordance with the applicable legal rules.

25. The **Law of Georgia on Environmental Impact Permit(2007)** defines the full list of activities on the territory of Georgia subject to mandatory ecological expertise. The Law defines the legal aspects of issuing an environmental permit, undertaking the ecological expertise, informing the public and participating in the given procedures. Under the Law, the environmental permit is the authorization to realize the planned activities. Under the Law, an environmental permit is issued by the Ministry of Environmental Protection and Natural Resources of Georgia based on the review/expertise of the application of an applicant for the environmental permit. The aim of the Law is to ensure the protection of a human health, natural environment, physical assets and cultural heritage during the activity.

26. The **Law of Georgia on Environment Protection (1997)** regulates the legal relations between the state establishments and physical or legal entities in the field related to the use of territorial waters, air space, including continental shelf and special economic zones, environmental protection and natural resources on the territory of Georgia. The Law regulates the standards of the environmental protection and issues of environmental management; it describes the economic sanctions, standards and issues of environmental impact, different issues of protection of the natural eco-systems and biodiversity, and global and regional management issues. In addition to the abovementioned, the Law considers the major principles of waste management. The law defines the ecological requirements for the waste (Article 34). According to the provision of the given Article, an entrepreneur is obliged to reduce the origination of industrial, domestic and other types of waste, ensure their treatment, utilization, placement or burying by considering the environmental, sanitary-hygienic and epidemiological standards and rules. The Law defines the requirements for the placement of toxic, radioactive and other hazardous waste and prohibits their discharge in the surface water sources.

27. **Law of Georgia onLicenses and Permits(2005)** defines the list of activities needing licenses or permits, including so called “Environmental permit”. It also defines the requirements for the license or permit issue. The Law, together with the normative bylaws, regulates such organized activity or action, which relates to an indefinite circle of entities, is characterized by increased hazard to the human life or health, affects particularly important state or public interests or is related to the use of a state resource. The given Law regulates the field regulated by a license or permit; it gives a thorough

list of licenses and permits, and establishes the rules to issue the licenses and permits, makes amendments to them or abolish them. Under the Law, a state regulation of the activity or action through a license or permit is undertaken only when the given activity or action is directly associated with the increased hazard to the human life or health or fields of state or public interests. The state regulation is undertaken only when the issuance of a license or permit is a real means to reduce the hazard in question or consider state or public interests. The aim and major principles of regulating the activity or action via licenses or permits are as follows:

- Provision and protection of human life and health;
- Safety and protection of a human's residential and cultural environment;
- Protection of state and public interests;

28. **The Law of Georgia on State Ecological Expertise (2007).** Under the given Law, the ecological expertise is a necessary measure for making decision on the issuance of environmental and/or construction permit(s). The aim of the ecological assessment is to protect the ecological balance by considering the requirements of environmental protection, rational use of natural resources and principles of sustainable development. A positive conclusion of the ecological expertise is mandatory for obtaining an environmental and/or construction permit. In addition, the holder of environmental and/or construction permit is obliged to comply with conditions specified in the ecological expertise conclusion. The process of ecological assessment is regulated by the Ministry of Environmental Protection and Natural Resources.

29. The procedure to be observed during ecological expertise, as well as the requirements on forming the expert commission is prescribed in the Provision on the Rule for Carrying out Ecological Expertise, which is approved by the Minister of Environment and Natural Resources Protection of Georgia. The full list of the activities, subject to mandatory ecological expertise for decision making on issuance of environmental permit or building permit, is specified by the Law of Georgia on Environmental Permit.

30. The state ensures protection of the environment and, correspondingly, protection of water as its main component in **The Law of Georgia on Water (1997)**. All residents of Georgia are liable to ensure the rational and sustainable use and protection of water. They have to prevent its contamination, pollution and depletion. The dumping of industrial, household and other garbage and wastes in water bodies is prohibited according to this act. The disposal of industrial, household and other effluents into water bodies is permitted on the basis of a license by the Ministry. With the objective of protecting the Black Sea and preserving its ecological system, all natural and legal persons (including foreigners) are obliged to take measures for preventing pollution of the sea with wastewater from the sources of pollution located on the land. The use of a surface water body for discharging industrial, communal-household, drainage and other wastewater is allowed only under a water use license issued on the basis of the Ministry-approved multipurpose water utilization plans and water management balance-sheet.

31. The **Law of Georgia on Cultural Heritage (2007)**. Article 14 of the Law specifies the requirements for 'large-scale' construction works. According to this Article, a decision on career treatment and ore extraction on the whole territory of Georgia, as well as on construction of an object of a special importance as it may be defined under the legislation of Georgia, is made by a body designated by the legislation of Georgia based on the positive decision of the Ministry of Culture and Monument Protection of Georgia. The basis for the conclusion is the archaeological research of the proper territory to be carried out by the entity wishing to accomplish the ground works. The entity

wishing to do the ground works is obliged to submit to the Ministry the documentation about the archaeological research of the territory in question. The preliminary research should include field-research and laboratory works. In case of identifying an archaeological object on the territory to study, the conclusion of the archaeological research should contain the following information: (a) a thorough field study of the archaeological layers and objects identified on the study territory by using modern methodologies, (b) recommendations about the problem of conservation of the identified objects and planning of the building activity on the design territory, on the basis of the archaeological research.

32. The aim of the **Law of Georgia on Public Health (2007)** is as follows: Promotion of the introduction of a good health and healthy lifestyle of the population; Creation of the environment, which is safe for a human health; Promotion of the protection of the reproductive health of a family; Prevention of infectious and non-infectious diseases. The Law defines the rights and obligations of the population and legal entities in the field of public health. Aiming at establishing the environment safe to the public health, the Ministry sets the qualitative standards for the environment safe for a human health (atmospheric air, water, soil, noise, vibration, electromagnetic radiation), including maximum permissible concentrations and rates of harmful impact. The standards are mandatory. Every person on the territory of Georgia is obliged not to carry out the activity, which causes a hazard of the infectious and non-infectious diseases to spread and helps the origination of the risks to human health; protect the sanitary and epidemiological standards; to supply the information to the public health department about all emergencies caused by the violation of the sanitary norms in the production or technological process, etc. The observance of the standards is controlled by appropriate state structures. The responsibility for the internal and external audits rests with a certified, independent laboratory.

33. **Environmental Assessment and Review Framework (November 2010, updated in November 2013 due to changes in the scope of the USIIP, EARF)** was established for the Asian Development Bank funded Georgia Urban Services Improvement Investment Program (or the Investment Program). This is prepared to adequately address the ADB Safeguard Policy Statement (2009) requirements and is to be endorsed by the Georgian government. Projects have to be assigned to Categories A, B, and C. General mitigation measures are listed for anticipated impacts.

2. Licenses & Approvals Required

34. Environmental assessment of various activities and development projects in Georgia is governed by the Law on Environmental Impact Permits (EIP). This Law notifies the list of the activities and projects, which are subject to ecological expertise and require Environmental Impact Permit. The Law also makes the public participation mandatory in the process of environmental assessment, ecological expertise and decision making on issuance of an environmental impact permit. Under this Law, various projects/activities have been divided into four categories based on their size, importance and potential environmental impact, and sets out permitting process for each category.

35. None of the components of the proposed water supply improvement subproject in Zugdidi are notified in the Law on EIP and therefore environmental impact permit is not required.

36. The requirements related to EIA studies and the EIA report are set forth in the Order N31 of 15 May 2013 of MoENRP.

37. The **Law of Georgia "On the Red List and Red Book" (2003)** regulates the legal relations in the field of developing the Red List and Red Book, protecting and using the endangered species, except the legal issues of the international trade with endangered wild animals and wild plants, which within the limits of the jurisdiction of Georgia are regulated by virtue of the Convention 'On the international trade with the endangered species of wild fauna and flora' concluded on March 3 of 1973 in the city of Washington. According to Article 10 of the Law, any activity, including hunting, fishing, extraction, cutting down and hay-mowing, except particular cases envisaged by the present Law, Law of Georgia 'On animal life' and legislation of Georgia, which may result in the reduction in number of the endangered species, deterioration of the breeding area or living conditions, is prohibited. The Red List of Georgia was approved by the Presidential Decree No. 303 'On approving the Red List of Georgia' (May 2, 2006).

Table 1: Other National Environmental Legislations and Applicability

Legislation	Applicability	Remarks
Forestry Code of Georgia, 1999	Applicable to works located in forest areas	Requires permission from the Ministry of Economic and Sustainable Department (MESD). The project proponent shall submit application to the MESD, which in turn forwards it to the Forest Division of MoEPNR for its review and advise, based on which the MESD gives an approval to proceed with works in forest areas
Law on Ambient Air Protection, 2000		It stipulates Maximum Allowable Concentration (MAC) of various pollutants in Ambient Air; however the establishment of emission standards for various sources or activities is under process, therefore at present no standards are available
Law on System of Protected Areas, 1996	Applicable to works or activities in protected areas	Depending on the activity and type of protected area, permission for any work will be granted or denied
Technical Regulation of Drinking Water, 2007 (Decree N 349/N), the Ministry of Labour, Health and Social Affairs of Georgia	Applicable to water supply projects	Water supply and monitoring shall comply with the technical regulation
Rules of the Protection of the Surface Waters of Georgia from Pollution, 1996 (№130 order of the Minister of the Protection of the Environment and Natural Resources of Georgia)	Applicable to water supply projects	Source water quality shall comply with the provisions for domestic use
Technical Regulation of Environmental Protection, 2008 (Decree N745), Minister of the Protection of the Environment and Natural Resources of Georgia	Applicable to sewerage projects	Treated effluent disposal from sewage treatment plants shall comply with the specified standards
"Approval of Environmental Quality Standards" -approved by Minister of Health, Labour and Social Affairs [Decree number - 297n of August 16, 2001])		The Georgian standards for noise control as approved by the Decree of the Minister for Health, Labour and Social Affairs (297n of August 16, 2001) upon the 'Approval of Environmental Quality Standards'; specifying the tolerable and maxi-

Legislation	Applicability	Remarks
		mum admissible levels of noise for different zones

38. Some of the **International Treaties and Conventions** Ratified or Signed by Georgia are provided in the list below.

- Short List of the Ratified or Signed Conventions:
- Ramsar Convention on Wetlands (1996);
- United Nations Framework Convention on Climate Change (UNFCC) (1994);
- Kyoto Protocol (1994);
- Kyoto Protocol (1999);
- Basel Convention on the Control of Transboundary Movement of Hazardous Waste and Their Disposal (1999);
- Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention) (1999);
- Convention on Biological Diversity (1994);
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (1996);
- Convention on Long-range Transboundary Air Pollutants (1999);
- Stockholm Convention on Persistent Organic Pollutants (2006);
- Convention on the Conservation of European Wildlife and Natural habitats (2008);
- The Vienna Convention for the Protection of the Ozone Layer (1995);
- Montreal Protocol on Substances that Deplete the Ozone Layer (1995).

3. Administrative Structure in Georgia

39. Ministry of Environment and Natural Resources Protection of Georgia (MoENRP). MoENRP has the overall responsibility for protection of environment in Georgia. The Department of Permits of MoENRP is responsible for reviewing EIAs and for issuance of the Environmental Permits. MoENRP is the main state body pursuing state policy in the sphere of environment. Their functions for regulating economic or development activities with regard to environmental protection include:

- Issuing permits for project development (Environmental Impact Permit)
- Setting emission limits and issuing surface water intake and discharge consents
- Responding to incidents and complaint

40. For the projects, which do not require Construction Permit, the Environmental permit is being issued by the MoENRP on the ground of State Ecological Examination. State Ecological Examination is carried out by MoENRP upon official submission of Environmental Impact Assessment (EIA) prepared by project developers.

41. For projects requiring Construction Permit, no special permit is issued by MoENRP (according to “One window principle”, only one permit shall be issued for each activity). The Construction Permit is issued by the Ministry of Economy and Sustainable Development of Georgia, but the issuance of the Permit is subject to the consent of the MoENRP in a form of Conclusion of Ecological Expertise, as well as the Ministry of Culture (Centre of Archaeological Studies, Department of Monuments protection).

Consent of the MoENRP in such cases should be issued according to the same procedures (EIA, public consultations; SEE etc.) as for issuing Environmental Permit.

42. The Ministry of Economic and Sustainable Development as an administrative body issuing a permit ensures the involvement of the MoENRP as a different administrative body in the administrative proceedings initiated for the purpose of permit issuance, in accordance with Georgia's Law on Licenses and Permits.

43. As a rule, EIA permitting conditions contains requirement for informing MoENRP regarding fulfilment of the EIA permit conditions. This basically means giving information regarding implementation of Environmental Management and Monitoring Plans.

44. The **Ministry of Culture and Monument Protection of Georgia** is responsible for the supervision of the construction activities in order to protect archaeological heritage. In case if construction is to be carried out in a historic sites or zones of cultural heritage, consent of the Ministry of Culture is also required for issuing construction permit (If such is necessary).

C. Comparison of the National Legislation and ADB Requirements

45. The above accounts of national environmental low and ADB policy indicate that the two systems are similar but then there are certain aspects in which ADB policy is more demanding or specified than the Georgian procedure. The main differences are as follows.

46. The Bank's guidelines provide a detailed description of procedures for screening, scoping and conducting EIA and explain a complete list of stages, which are not specified under the national legislation.

47. Considering ecological risk, cultural heritage, resettlement and other factors, the Bank classifies projects supported by them under categories A, B, C and FI. However in the Georgian legislation, EIA is carried out only if a developer seeks to implement projects listed in the Law on Environmental Impact Permit. This list is compatible with the category A projects of the Bank classification. According to the Georgian legislation EIA is not required in other instances, while Asian Development Bank guidelines requires limited EIA or IEE for the B category projects,and an environmental review of projects that are not expected to produce environmental impacts (category C).

48. Georgian legislation does not specify the format of environmental management plans (EMPs) and the stage of their provision for projects requiring EIA and does not requireEMPs for projects not requiring EIAs. The Asian Development Banks guidelines require EMPs for all categories of projects and provides detailed instructions on the content.

49. According to Georgian legislation MoE is responsible for monitoring of project implementation and compliance with the standards and commitments provided in the EIA, and the role of the EMP is less clearly is defined.. The PIU or "Project Proponent" is responsible for implementing "self-monitoring" programs for projects requiring EIA.In contrast ADB guidelines stress the role of EMPs, which are important for all categories of projects, and the Project Proponent (in our case – MDF) is required to ensure inclusion of a monitoring scheme and plans into EMPs. Monitoring of performance compliance against EMPs is important element of ADB requirements.

50. The national legislation also does not take into account the issue of involuntary resettlement at any stage of environmental permit issuance. The Georgian legislation considers social factors only in regard to life and health safety (e.g. if a project contains a risk of triggering landslide, or emission/discharge of harmful substances or any other anthropogenic impact). While the Bank's document establishes the responsibility of a Borrower for conducting an environmental assessment, the national legislation provides for the responsibility of a project implementing unit to prepare EIA and ensure public consultation.

51. The role of the Ministry is restricted to participation in EIA consultation and carrying out state ecological examination required for the adoption of a decision on issuing an EIA permit as established under the legislation of Georgia. Under ADB regulations ADB carry out project screening and categorization at the earliest stage of project preparation when sufficient information is available for this purpose, also according ADB's Public Communications Policy, ADB is committed to working with the borrower/client to ensure that relevant information (whether positive or negative) about social and environmental safeguard issues is made available in a timely manner.

52. In regard with consultation: The Bank provides for consultations for A and B Category projects (at least two consultations for Category A projects) and requires a timetable of consultations from the Borrower. The national legislation until recently contained only a brief reference to this issue without providing real tools of its fulfilment. The amendments to the Governmental Decree On the Procedure and Conditions of Environmental Impact Assessment established the requirement of public consultation of the EIA, which obligates a developer (i) to ensure public consultation of EIA, (ii) publication of information, (iii) receive comments within 45 days, (iv) arrange consultation not later than 60 days from the date of publication, invite stakeholders and determine the place of consultation.

Table 2: Activities and Responsibilities in EIA for National Law and ADB Policy

#	Action	Georgian Legislation	ADB Requirements
1	Screening	Project Proponent in consultation with MoE	Bank and Consultant hired by Project Proponent
2	Scoping	Not required. Could be conducted voluntarily by Project Proponent.	Obligatory. Bank and Consultant hired by Project Proponent
3	Draft EIA	To be prepared by Environmental Consultant.	To be prepared by Environmental Consultant.
4	Public Consultations	The EIA should be available for public review during 45 days.Publication of information in central and regional mass-media. Arrange consultation not later than 60 days from the date of publication.	At least two consultations for Category A projects – one at the scoping stage and one for the draft EIA.
5	Final EIA	Consider all comments received during public consultations, incorporate accepted remarks and explain rational when the comments are disregarded.	Consider all comments from Bank and public. Agree with the Bank on each raised point. Incorporate accepted public comments and explain rational when the comments are disregarded.
6	Management Plans	No clear guidelines on format,	Incorporate Monitoring and

#	Action	Georgian Legislation	ADB Requirements
		content and timing	Management Plans in the EIA.
7	Review and Approval	MoE	Bank and separately - MoE (if the EIA is required by Georgian legislation).
8	Disclosure of final EIA	Not requested	Publication (mainly electronic) of the final EIA.

D. Harmonization of the ADB and Georgian Legislation Requirements

53. In order to comply with the both regulations – the ADB and Georgian legislation – the content of the EIA should comprise issues required in both regulations, thus complementing each other. The EMPs should therefore be elaborated in details as required by the ADB regulations. The assessment of the stationary sources of emission (e.g. diesel generators) should be executed according to Georgian regulations: "Inventory of the Stationary Sources of Emission" and "Approval of the Emission Limits". For the category a projects the first public consultation (requested by ADB guidelines but not by Georgian regulations) will be held at the Scoping stage. The second one will be executed according to Georgian requirements. Disclosure will be conducted as required by ADB.

II. DESCRIPTION OF THE PROJECT

A. Type of the Project

54. This is the Zugdidi water supply sub-project. It involves the development of a new well field in Inghiri, south of Zugdidi, the construction of transmission mains, of one pumping station, of one reservoir and of the distribution network.

B. Need of the Project

55. The service level of urban water supply and wastewater treatment at present is not satisfactory in Georgia. Services are not available to entire population and the serviced areas suffer from inefficient service levels. Systems are old and inefficient. The situation is not different in the project area, comprising the City of Zugdidi. This subproject is needed because the present water supply infrastructure in Zugdidi is inefficient and inadequate to the needs of the population.

56. The water supply system of Zugdidi has not been in use for the last two decades. Traditionally, water supply to Zugdidi was provided from Rechko headworks located in Abkhazia. With the 1992-93 Civil War, this source was no longer available for Zugdidi which led to a complete collapse of the water supply system. At present, UWSCG supplies 2,200 m³ per day of water from three boreholes, which serve about 7% of the total population. The remainder of the population depends on individual sources (like private wells). Therefore the implementation of a new, complete centralised water supply system is required.

57. The present sub-project is designed to improve the service standards of water supply in Zugdidi. It is designed to meet the maximum water demand by the year 2040 at an amount of 26,212 m³ per day. The development of the demand level in Zugdidi is based on the projected number of inhabitants as indicated in the following table.

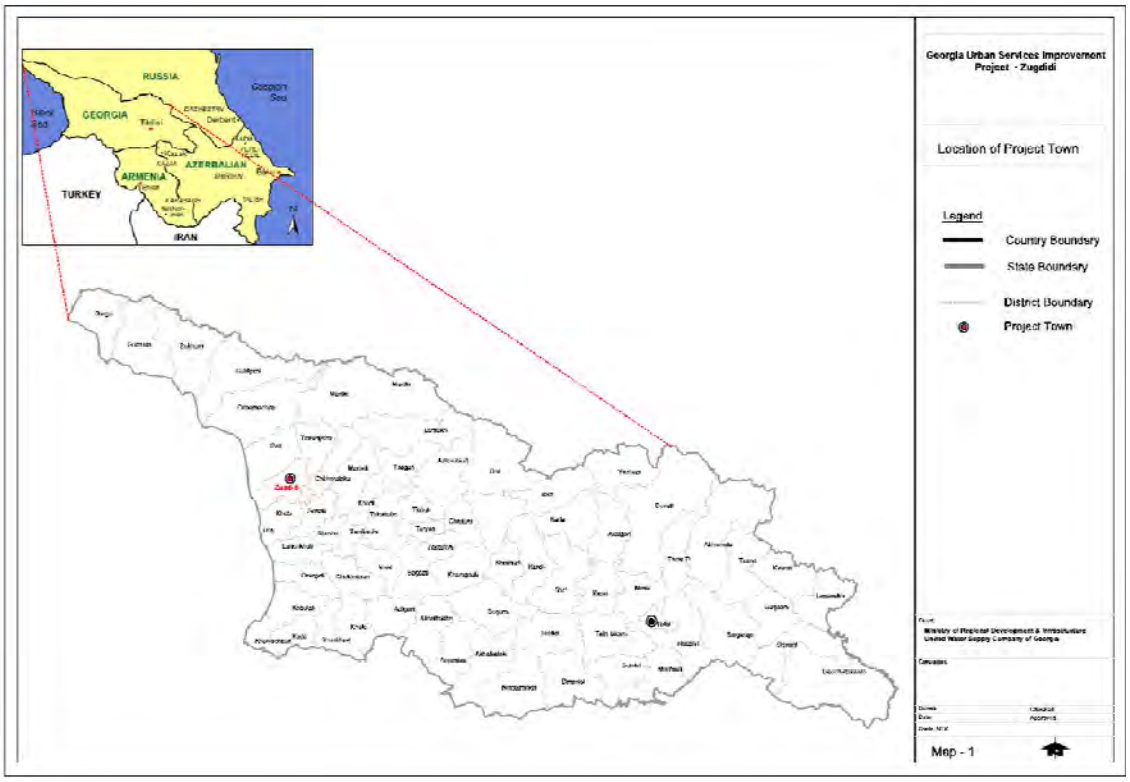
Table 3: Water Demand Development

Description	Unit	2010	2020	2030	2040
Consumers TOTAL	capita	72,244	75,088	78,016	81,048
Specific water demand	l/(c*d)		140	140	140
Minor commercial/institutional demand	%		10	10	10
Real losses	%		25	25	25
Transmission losses	%		2	2	2
Subtotal specific water demand	l/(c*d)		192	192	192
Subtotal water demand (residents)	**m³/d**		**14,402**	**14,963**	**15,545**
Water demand of industries and large consumers	m³/d		500	500	500
Total average water demand	**m³/d**		**14,902**	**15,463**	**16,045**
Peak factor daily demand	-		1.8	1.8	1,8
Max. daily water demand	**m³/d**		**24,321**	**25,250**	**26,212**

58. The forecasted development of the population of the service area is based on population numbers given by the local authorities of Zugdidi.

C. Location

59. This sub-project is located in Zugdidi, the administrative centre of the strategically important Samegrelo-Zeda Svaneti Region, and is located at 318 km west of Tbilisi. Geographically, it is situated at 41°52'14.75" East latitude and 42°30'29.65" North longitude, 100 m above the MSL. Regional location of Zugdidi is shown in below**.**



Map 1: Location of Zugdidi

60. The water supply project measures comprise the development of a new well field in Inghiri, south of Zugdidi, the construction of transmission mains, of a new pumping station, of a new reservoir and of a new distribution network.

Fig. 1 Existing Bashi Reservoirs

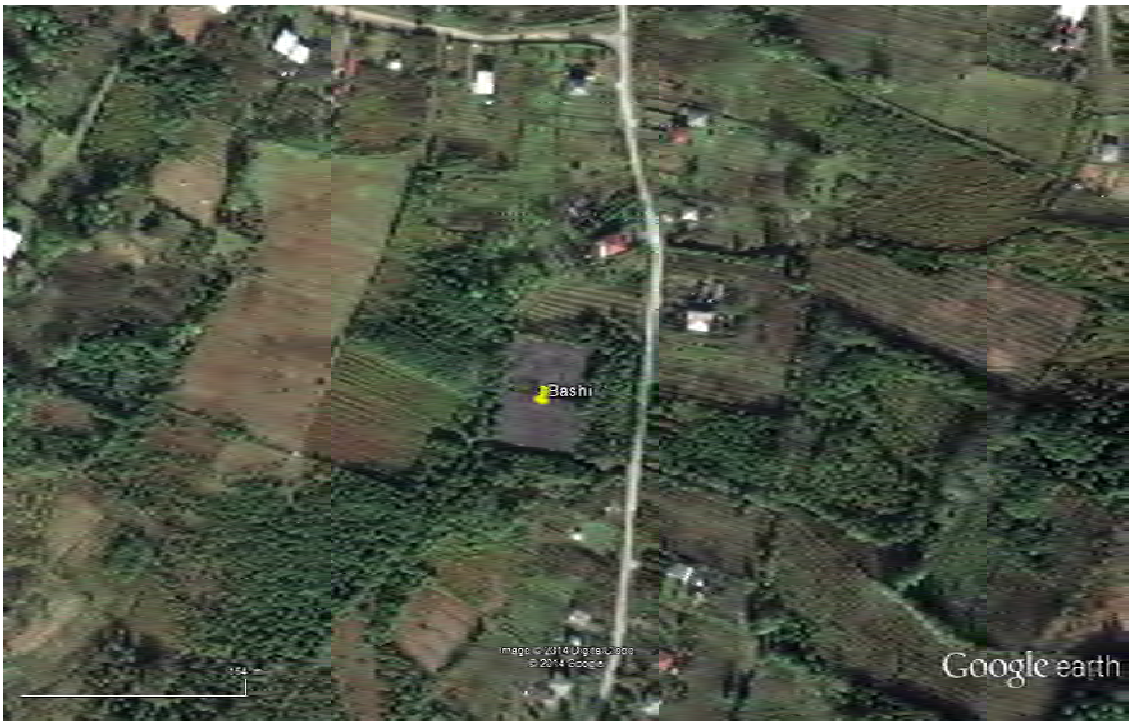
61. The new well field will comprise 9 wells in Inghiri, located south of Zugdidi. One test well had been drilled in 2012 with positive results. The expected yield amounts to up to 40 l/s per well. The quality of the water is good. The distance between the wells will be minimum 330 m. There will be a two level protection zone. An area of 100 m x 100 m around the wells will be procured and fenced in. No activities at all will take place in this area. A second zone is defined by the number of days groundwater will need to reach the well. The Georgian regulations require this zone to cover the distance that the groundwater flows in 100 to 400 days. For comparison, in Germany, this zone has a radius of 50 days water flow. In absence of measurement points, this zone is calculated based on the results of the test drilling. Taking into consideration 100 days of groundwater flow, this zone shall extend to about 180 m from the wells. The Municipality of Zugdidi will be required to change the land use plan for the area around the well field accordingly.

62. The well field will serve a new pumping station to be constructed between the well field and Zugdidi. The pumping station will include a receiver tank with a volume of 768 m^3. The pumping station will be equipped with five pumps (4 + 1 in stand-by) with a Qmax of 1,692 m^3/h and a total head of 140 m.

63. Bashi reservoir is located north of Zugdidi at an elevation that allows the supply from this reservoir by gravity. It serves as balancing reservoir. The storage volume will be 3 x 3,300 m^3. The old reservoir (2 x 10,000 m^3) will be demolished and a new reservoir will be constructed at the same site. The condition of the old reservoir was investigated and its rehabilitation was ruled as not feasible. The reservoir has not been in used for more than 20 years and shows some structural damage. The costs of a serious rehabilitation would come close to the construction of a new reservoir. A new reservoir can be used for a much longer time without further rehabilitation needs. The volume of the construction waste from demolishing is estimated at 3,515 m^3. Noise and emissions are typical impacts of demolition activities. Air quality will be affected during demolition by emissions from vessels, equipment, and land vehicles in work activities at work locations. Also the transportation of demolition waste are to be carried out in Zugdidi streets. The noise and dust generated from demolition and transportation will cause nuisance of the local residents that will further increase during summer season assuming growth of the local population on the account of holiday makers.

64. Inert waste arising from the demolition of reservoir will be of various types, such as metal, concrete, brick and more. In addition, the demolition will produce noise, vibration and dust which in turn has a negative impact on the residents living in the area surrounding the reservoir. As noted above, after the dismantling of the tanks3,515 m^3 of inert waste will be generated for transportation which will require at least 350 flights of trucks. Waste transportation route that will carry heavy equipment will be within the city of Zugdidi, which will cause more inconvenience to local residents.Inert waste should be carried out in coordination with local authorities to specially designated areas.

65. The distribution net is divided into three pressure zones. The total length of the network is approximately 230 km. The network covers the Municipality of Zugdidi plus small, settled zones right outside the municipal border.



Map 2: Location maps of major components

D. Implementation Schedule

66. The design of the subproject will be completed by August2014. The construction is planned to commence in the end of 2014 or the beginning of 2015. The construction period will be three years.

67. The project is formulated for implementation under the proposed ADB funded Investment Program. Table **4** shows the subproject and components selected for implementation in Zugdidi, for which, according to ADB requirements, this IEE is conducted.

E. Sub Project Components

68. This subproject focuses on the development of a new well field, the laying transmission mains and distribution pipes, as well as the construction of a pumping station and a reservoir.

Table 4: Proposed Subproject & Components Water Supply System

Infrastructure	Function	Description	Location
Inghiri well field	To provide constant supply of potable water	Drilling of wells and laying of transmission pipes.	Inghiri, 6 km south-west of the city centre.
Pumping station	Feeding of distribution network Bashi reservoir	Construction of new pumping station and receiver tank	South-western border of Zugdidi
Transmission mains	Convey water from the well field to the PS and from there into the network and to Bashi reservoir	Laying of new transmission main DN 700, with a total length of 12.5 km	Connecting well field - PS - Bashi reservoir

Infrastructure	Function	Description	Location
Reservoir	Storage of water for the supply during peak hours	1 reservoir with a totalvolume of 9,900 m³	Appr. 6.5 km north of city centre
Distribution network	Convey water to customers	Laying of approx. 230 km PE pipes	Zugdidi

69. An overview of the distribution network is presented in Annex 3. The new transmission mains and the distribution network will comprise the following pipes:

Table 5: Pipe lengths and diameters

Pipe Diameter	Pipe Length
	m
OD 63	9,890
OD 75	25,912
OD 90	14,142
OD 110	127,090
OD 125	7,627
OD 140	4,409
OD 160	3,323
OD 180	10,300
OD 200	1,475
OD 225	4,771
OD 250	4,389
OD 280	1,056
OD 315	2,044
OD 355	3,955
OD 400	1,440
OD 450	2,096
OD 500	2,716
OD 630	38
DN 700	12,418

F. Construction Activities

70. There are the following main elements in water supply components of the subproject:

- development of Inghiri well field
- construction of transmission mains and distribution network
- construction of pumping station
- construction of reservoir

71. Construction practices of these works are described below:

72. *Construction of Inghiri well field* consists of drilling activities and electrical installations. No major earthwork activities are involved.

73. *Laying of Transmission Mains and distribution network.* Transmission mains will be laid to connect Inghiri well field with the pumping station as well as the pumping station with the distribution network and with Bashi reservoir. The pipes will have a diameter of DN 700. The distribution network will be laid with a total length of 230 km. Trenches for new pipe sections will be dug using a backhoe digger, supplemented by

manual digging. Excavated soil will be placed alongside, and the pipes will be placed in the trench. Pipes will be joined, after which excavated soil will then be replaced on beneath and sides. The trench will be refilled with excavated soil and sand and compacted. The depth of trench will be 1 m – 4 m depending on topographical conditions. Minimum width of the trench will be 0.9 m.

74. *Construction ofReservoir.* This work will involve excavation for foundations, placing of reinforcement rods in wooden shutters and pouring of concrete in voids to form foundations, floor, walls and roof. Cement mortar plaster will be applied to walls (outside and inside), floor and roof for smooth finish. Inlet and outlet pipes and fixers/valves will be installed. Excavation for foundation will be done by backhoe digger or manually, where required. Ready-made concrete will be supplied from a concrete plant and a needle (pen) vibrator will be used for compaction of concrete around the reinforcement. The quantity waste/surplus soil generated from this activity will be insignificant and can be used within the site to level the ground surface.

75. *Source of construction materials*. Sand and aggregates will be sourced from licensed borrow areas. There is no designated disposal site for construction waste.

76. Water needed for civil works comprises potable water and construction water. Potable water shall comply with the national quality standards and shall not compete with the needs of the local population. Construction water and water to be used for dust suppression measures may be taken from the Enguri River or from ground water. Quantity of these resources is not a critical issue.

77. *Transportation routes*. The reservoir, the pumping station and the well field are located outside settled areas and are accessible via the highway and dirt roads. For mitigation measures please refer to subsequent chapters.

G. Operation of Improved Water Supply System

78. 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 the pipe was laid, after locating the leaking section.

III. DESCRIPTION OF THE ENVIRONMENT (BASELINE DATA)

A. Physical Resources

1. Atmosphere

79. The climate of Zugdidi Municipality is humid-subtropical. Usually the summer is hot and the winter warm. The average annual temperature shows +13.70C, the average temperature of August, the hottest month of the year, is +22.70C and the average temperature of January, the coldest month, is (+) 4.90C. Amount of annual rainfalls reaches 1 600 mm.

80. Table 6 shows average monthly and average annual temperatures of the city of Zugdidi. In addition, it presents the average minimum and maximum, both monthly and annual temperatures.

Table 6: Average, average maximum and average minimum temperatures

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Annual
Average monthly and annual temperatures of atmospheric air	4.9	5.5	8.2	12.3	17.0	20.3	22.6	22.7	19.2	15.1	10.5	6.7	13.8
Average monthly minimal and annual temperatures	1.1	1.6	2.7	7.4	11.5	15.3	18.0	18.0	14.1	10.0	6.1	2.9	9.1
Average monthly maximum and annual temperatures	9.7	10.4	13.6	18.3	23.1	25.6	27.9	27.8	25.1	21.6	16.3	11.9	19.2

81. The climate is influenced by geographic location, complicated terrain, radiation regime and circulation processes dominated in the atmosphere. Coming breezes from the Black Sea (surface area 400 thousand km²) have significant influence, also plain and mountain winds which flow from the plain towards mountains during a day and from the mountain towards plains during a night, so called Foehns, warm dry winds which flow from mountains to the plain. Monsoon type winds are well expressed.

82. Table 7 presents repeatance of wind directions in %. As we see from the table, mainly West or East direction winds prevail.

Table 7: Repeatance of wind directions in % (annual)

West	West-East	East	South-East	South	South-West	West	North-West	No wind
6	7	36	7	5	8	27	4	53

83. Average annual wind speed in the region is about 1.3 m/sec. Annual average number of strong (15 m/sec and higher speed) windy days is 66. Table 7 shows average monthly and annual wind speeds (m/sec).

Table 8: Average monthly and annual wind speeds (m/sec)

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Annual
1.4	**1.5**	**2.1**	**1.8**	**1.4**	**1.2**	**1.0**	**0.8**	**0.8**	**0.8**	**1.8**	**1.1**	**1.3**

84. Average rainfall in a year is 1616 mm, from this maximum inSeptember (165 mm) and minimum in May (107 mm). Average humidity 72% and number of sunny days210. Table 9 presents average monthly and annual rainfalls.

Table 9: Average monthly and annual rainfalls

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Annual
138	**125**	**119**	**110**	**107**	**142**	**163**	**142**	**165**	**140**	**129**	**136**	**1616**

85. Snowy sediments are rare, but cover of snow may occur in winter months for little time. Average height of snow is 3-9cm. Winter with much snow is rare; if it takes place snow cover reaches 78 cm height.

2. Ambient Air Quality

86. According to the visual audit results, no stationary sources contributing to ambient air contamination are located within the study area. The quality of the ambient air in the study area may be affected by exhaust gases produced by machinery and transportation means operating in the sites of the nearby container terminals and production facilities, as well as by the vehicles moving along the city bypass road. It is obvious that no air quality gauging stations exist in Zugdidi for years, and therefore practically no air quality data are available for the project impacted area. Due to such situation, it was found reasonable to apply the methodology approved by the Ministry of Environment and Natural Resources of Georgia (P 52.04,186-89). This methodology recommends application of the population-based approach for evaluating the baseline ambient air condition for the areas lacking any observation data (Table 10).

Population ('000 persons)	Baseline pollution level, mg/m^3			
	NO_2	SO_2	CO	Dust
250-125	0 .03	0 .05	1 .5	0 .2
125-50	0 .015	0 .05	0 .8	0 .15
50-10	0 .008	0 .02	0 .4	0 .1
<10	0	0	0	0

Table 10: Recommended baseline pollution levels by population quantities

87. The baseline pollution data required for estimating the ambient air impact were determined based on the above methodology with consideration of Zugdidi's population (>50,000), specifically:

- Nitrogen dioxide: 0.015 mg/m^3;
- Sulphur dioxide: 0.05 mg/m^3;
- Carbon oxide: 0.8 mg/m^3;
- Dust 0.15 mg/m^3.

The baseline pollution data required for assessment of the ambient air impact were determined based on the above methodology accounting for Jvari population quantities (>10,000) as follows:

- Nitrogen dioxide: 0.008 mg/m^3;
- Sulphur dioxide: 0.02 mg/m^3;
- Carbon oxide: 0.4 mg/m^3;
- Dust 0.1 mg/m^3.

3. Geology

88. The project area is situated in the Central Caucasus and in Kolkheti depression. In

terms of tectonic development, the major part belongs to Kolkheti tectonicdepression, which is bordered with the Black Sea basin to the west and Fanavi andSamagrelo (Egrisi) ridges to the north. Poti-Askhi and Kurzu-Khikhadziri deep faults arelocated within this area. Erosive forms of mezo and micro relief riverine accumulativeterraces are widely spread. According to seismic zoning map, Georgia is classified into Zone6 to Zone 9 (in increasing order of seismic intensity, Map 5) and Zugdidi falls under Zone 8(high seismic intensity zone). There has been no history of major earthquakes in Zugdidi.

89. By geomorphological viewpoint the site ‘Zugdidi” is located at South-West extreme of Odishi plateau (“half plain”), at the border of Kolkheti lowland and terrace-like surface from North-East. Here high terrace step sets against marshy surface of Kolkheti low-land by steep precipice slope. Terrace step is represented by planar surface, with slight cut slope in South-West direction, with absolute elevations within 86-103 m. The surface is slightly dismembered by small water conduits of local hydrographic net-work, such as: the rivers Chkhoushi, Sintsa, Jumi and others. On the mentioned sur-face the city Zugdidi and surrounding villages are located.

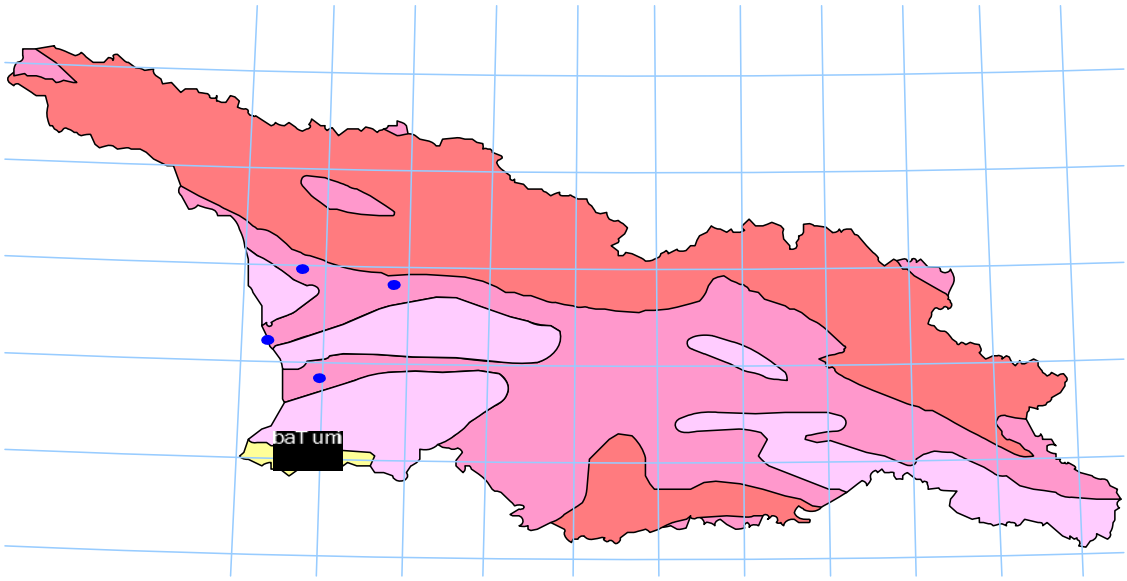
90. The studied site is located on high third terrace surface of the river Enguri; it is struc-tured by cobbles with lean clayey filling. Their total thickness is about 40 m. Fragmen-tal materials are well treated; they are mostly close to spherical or elongated shape. According to mineral content they consist of varieties of sedimentary, magmatic and metamorphic rocks.

91. The investigated territory conditionally can be divided into two sites according to geo-logical structure, geomorphologic, engineering-geological and hydrogeological condi-tions of the area: _ The first site is the largest and covers almost 90% of Zugdidi terri-tory. The surface is almost plain, slightly bending to North-West which moves to slightly expressed steppy-hilly line at North-East. Absolute elevations are within 85-120 m boundaries. The second site covers coast line of the river Chkhoushi and river Kuchkhobini and I over-floodplain terraces changed by anthropogenic factor. Geologi-cally it is structured by Upper Pleistocene (aQ3) and recent Quaternary deposits (aQ4) as well.

92. Natural outlets of groundwaters are not observed at the site. In alluvial deposits weak water appearance is observed at 1.5-4.0 m depths, but total water containing horizon is below 5 m depth. At the mentioned depth alluvial deposits are practically anhy-drous.

4. Seismicity

93. Zugdidi area is located in the active seismic zone. Due to this, the terminal shall be designed and constructed in compliance with the requirements stipulated in the appli-cable Georgian construction standard Seismic Resistant Construction (PN 01.01-09). According to Annex No.1 of this document, the area selected for construction of the project facility is located in the seismic intensity zone 8 (MSK 64 scale), which dimen-sionless seismic coefficient ‘A’ equals to 0.15.



Map 3: Seismic Zone Map of Georgia

5. Soils and fundamental landscapes

94. The Colchis Lowland occupies the largest area within the mountainous lowlands zone of the West Georgia, which is created by accumulative processes of Enguri, Khobi, Rioni, Tskhenistskali and other rivers. This lowland borders the Black Sea at the West and continues to the city of Zestaponi to the East. The zone of mountainous system is presented by river parting ridges and their branches. Water parting of Svaneti ridge-river Enguri and Tskhenistskali, Samegrelo and Lechkhumi ridges-water partings of Enguri, Tskhenistskali and Rioni.

95. The multicomponent of soil cover of the region is connected to the large diapason of its hypsometry (50–3000 m) and to the amplitude of fluctuations of the connected climate factors (rainfalls, temperature). Plant covers are also characterized by such large scopes. In addition, the variety of soil building rocks also influence the large diapason of the spectrum of soil cover-outflowing, carbonate-noncarbonated, alluvium, delluvial soils, shales, conglomerates andsalted deposits of terrigenic character.

96. Anthropogenic factor plays a big role on the type variety of the soil. Due to the influence of this factor peatbog subtropical yellow land-Etseri was created on the Kolkheti lowland and wetland-arable soils on the places of other soils.

97. According to the classification of the region's soil districts, the project zone is located in the area of hilly-knobby frontmountaneous red and yellow soil zones, namely, on the territory of Samegrelo (Zugdidi-Martvili) humus-carbonatic and sub-region of red soils.

6. Surface Water and Groundwater

98. Surface Water. Georgia is rich in water resources; there are in all 26,060 rivers with atotal length of ~ 59,000 km. Besides, there are many thermal and mineral water springs,lakes and man-made water reservoirs. These however are distributed unequally, with majorconcentration in the western part of the country. Nearly all rivers of

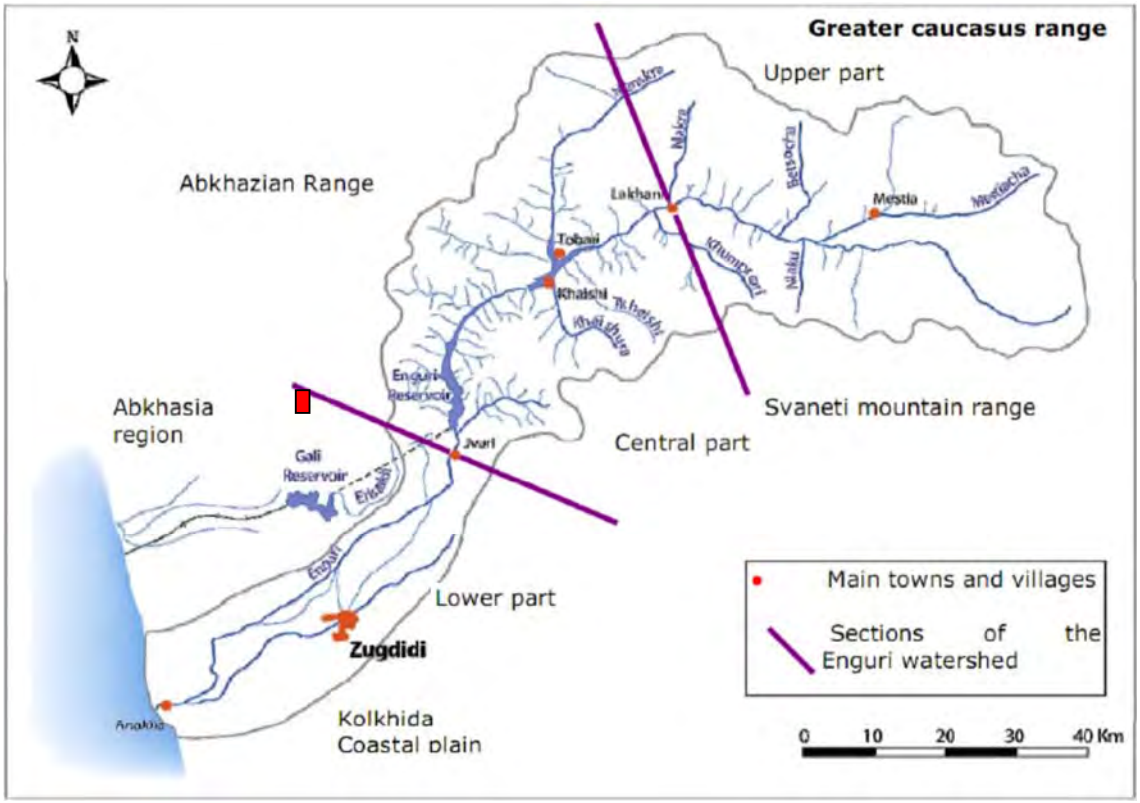
East Georgia flow intothe Caspian Sea while and the rivers in the west join the Black Sea. The project area islocated in lower reaches of the Enguri River Basin.

99. Originating from Namkvani Glacier in Greater Caucuses Range and flowing intoBlack Sea in the west, the Enguri is one of the biggest rivers in Georgia. It traverses adistance of 213 km, during which it is joined by a number of small and large streams/rivers.River flows through hilly region in the upper parts, before the Enguri Dam at foot hills.

100. Water supply for the proposed project will be sourced from 9 wells in Inghiri, located south of Zugdidi. One test well had been drilled in 2012 with positive results. The expected yield amounts to up to 40 l/s per well. The quality of the water is good. The distance between the wells will be minimum 330 m.

101. The river is fed by glaciers, snow and rainfall, and experiences floods during thewarm seasons and lower flow in colder periods. In July-September flow is very high, causedboth by snow melting and the rainfall. As show in Figure 1, generally water level in Dam ishigh in July-August (summer) and minimum in March-April (winter). In the last 10 years,water level in the Dam has always been above the requirement for power plant diversionchannel, except in April-May 2006, which recorded a lower level of 389.86 m. It shows that the dam holds good volume of water throughout the year.

102. The river is divided into three parts as shown in Map 2. Due to steep slopes in theupper portion, the river is deep, flow is turbulent and carries heavy loads of silt, whichaccumulates in Enguri Dam on the foothills near Dzvari Town. The river is wide and shallowin the lower reaches.



Map 4: Enguri River Basin

103. Table 11 shows the Enguri Dam water quality in comparison with the national surface water norms and drinking water norms set by the GoG. Two water samples were collected for analysis: one, from the top of the dam, and two, from the outflow of discharge sluice, where the water supply line is likely to be connected. All the quality parameters confirm to the use of water body for domestic and fishing purposes. In comparison with the drinking water norms, the sample collected from bottom sluice discharge, shows higher turbidity. Both samples show the presence of coliform which are above levels required for drinking water, however all the other parameters analysed were well within the limits.

Table 11: Water Quality of Enguri Dam

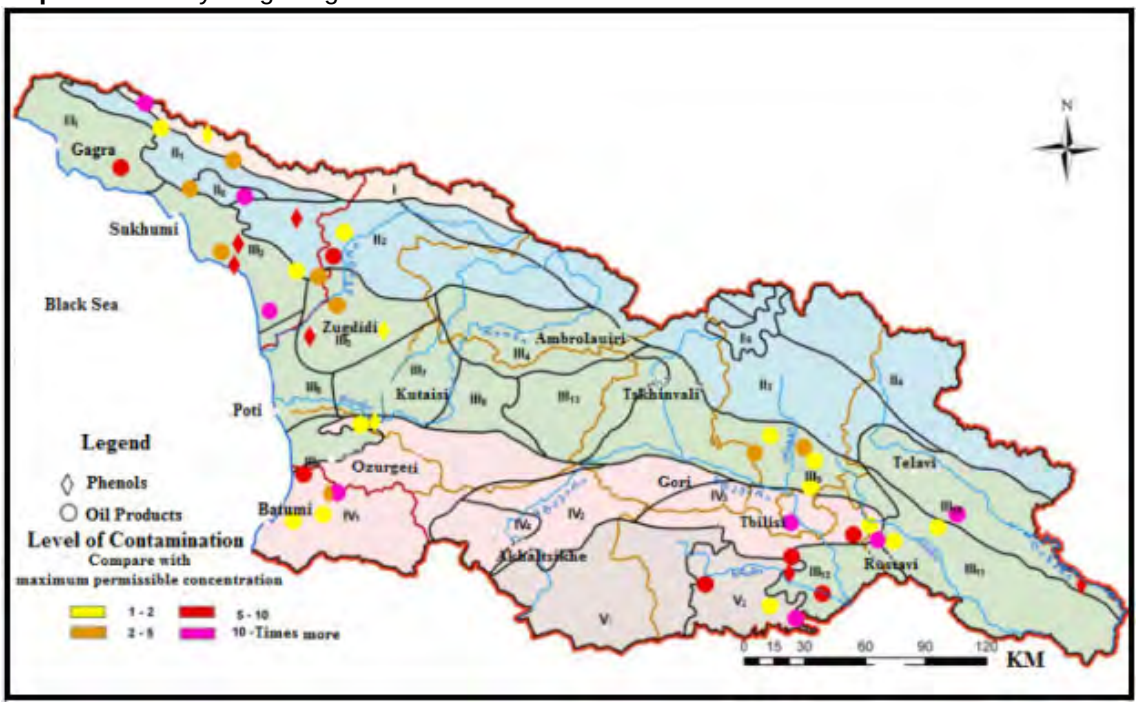
S. No	Parameters	Unit	Enguri Dam Storage	Enguri Dam sluice	Surface water – domestic use	Surface water – fishing purpose	Drinking Water Norms
1	Colour	-	5	15	-	-	15
2	Odor	-	0	1/2	-	-	2
3	Turbidity	NTU	10	40	-	-	3.5
4	Sulphate	mg/l	38.3	42.8	500	100.0	250
5	Chlorides	mg/l	35	30	350	300	250
6	Oil Products	mg/l			0.3	0.05	
7	Calcium	mg/l	18.03	20.04	-	-	140
8	Magnesium	mg/l	26.97	7.8	-	-	85
9	Sodium	mg/l	8.1	8.3	-	-	200
10	Zinc	mg/l	0.0311	0.0386	1.0	0.01	3.0
11	Iron, total	mg/l	0.08	0.1102	0.3	0.005	0.3
12	Total coliform	MPN	110	160	-	-	Nil
13	E-coli	MPN	50	80	-	-	Nil
14	pH		7.8	8.3	-	-	6-9
15	Total mineralization	mg/l	206.6	322.4	-	-	1000
16	Barium	mg/l	0.0025	0.0030	0.1	2.0	0.7
17	Boron	mg/l	0.0136	0.0151	0.5	10.0	0.5
18	Arsenic	mg/l	0.0041	0.0046	0.05	0.05	0.01
19	Mercury	mg/l	0.0003	0.0003	0.0005	0.00001	0.006
20	Cadmium	mg/l	0.0006	0.0009	0.001	0.005	0.003
21	Manganese	mg/l	0.0025	0.0072	0.1	0.01	0.4
22	Nickel	mg/l	0.0034	0.0037	0.1	0.0001	0.07
23	Nitrate	mg/l	10	20	45.0	40.0	50
24	Nitrite	mg/l	-	-	3.3	0.08	0.2
25	Copper	mg/l	0.0058	0.0120	1.0	0.001	2.0
26	Aluminum	mg/l	0.0062	0.0095	0.5	0.5	0.1
27	Lead	mg/l	0.0073	0.0086	0.03	0.1	0.01
28	Fluoride	mg/l	0.0065	0.0088	0.05	0.05	0.7
29	Chromium	mg/l	0.0051	0.0073	0.1	0.001	0.05
30	Antimony	mg/l	-	0.0003	-	-	
31	Cyanide	mg/l	-	-	0.1	0.05	0.07
32	Pesticides	mg/l	-	-	-	-	0.05
33	Alkalinity	mg/l	0.92	1.25			-
34	DO	mg/l	7.27	6.55			-
35	BOD	mg/l	3.63	0.19	3	15	-
36	COD	mg/l	3.2	3.2	6	15	-

104. BOD – Biochemical Oxygen Demand; Chemical Oxygen Demand, and DO – Dissolved Oxygen Source: Sampling Survey, September 2010.

105. **Groundwater**. Based on the groundwater characteristics, Georgia is divided into five hydro-geological zones, which are further defined into sub-zones/districts. Project area, Zugdidi is in Zone – III (Artezian basin zone of Georgian belt) and in hydro-geological district- III3 (Fractured and fractured/karstic artesian basin of Samegrelo) (Map 4). The water in this artesian zone is abundant, and towards the coast the utilizable groundwater is limited.

106. The depth of groundwater is about 5 m and towards the coast it is between 1-2 m. Groundwater in the densely populated areas shows the presence of Nitrogen compounds - nitrates, nitrites, and ammonia, mainly due to leachates from poor sanitation systems.

Map 5: Hydro-geological zones



7. Biological Baseline

107. Information on biological baseline of the project area is prepared on the basis of the materials given in literary sources and field survey results. Field surveys have been conducted in February, 2014

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108. Considering this, only ruderal plants are spread throughout the project area. This plants are: Angel's trumpets (Datura stramonium), Henbanes (Hyoscyamus niger),Mugwort (Artemisia vulgaris), Rough cocklebur (Xanthium strumarium), Thistles (Cirsium), Belvedere (Kolchia scoparia),Garget (Phytolacea americana);Liana and thorny plants are: Blackberry (Rubus), Greenbrier (Smilax excelsa), Dog rose (Rosa canina) and Fern (Pteridium tauricum).

109. In addition to the above mentioned plants, there are bushes of Nutwood (Corulus avelana), Privet (Ligustrum vulgare), Cherry plum (Prunus divaricata), Tree of heaven (Ailanthus altissima) and white mulberry (Morus alba). They are barely visible in the areas covered by Blackberry (Rubus) and Greenbrier (Smilax excelsa).None of the big tree has been observed on the project area.

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110. None of the species of mammals have been recorded during the visual audit of the project area. As mentioned above there are a lot of reinforced - concrete construction waste on the project area. It can be used as a shelter by a bat.

111. The area is near the residential area and is strongly contaminated by household waste. Therefore, the spread of rodents and different types of sinanthropus animals is inevitable.

112. The following species of birds have been observed during the visual audit: Carrion crow (Corvus corone), Common Gull (Larus radibundus), Eurasian Tree Sparrow (Passer montanus). It is noteworthy that the banks of the river and floodplain areas will be usedby water-loving birds during the active migration period.

113. The area is a favourable environment for the propagation of reptiles (river, dumping area, warm environment, waste of the reservoirs full of water, etc.). The following species are spread there:European legless lizard (Pseudopus apodus), grass snake (Natrix natrix), Green Lizard (Lacerta media). Lake - swampy areas are favourable for Caspian terrapin (Clemmys caspica).

114. Marsh frog (Rana ridibunda) is inhabiting in the existing waterlogged facilities.

115. Invertebrate animals – favourable conditions are for the following species: Round-worms (Nematoda), Arachnids (Arachnida), oligochaete (Oligochaeta), Cockroaches (Blattodea), lepidopterans (Lepidoptera), flies - mosquitoes, flies (Diptera) and others.

Summarizing the results of a preliminary survey of the project area

116. According to the survey results,habitats and species of flora and fauna of high conservation value are not presented in the project area.Though, if we consider the specifics of the planned activity, a significant impact is not expected.

117. Still the most “rich” with flora is the adjoining territory of the existing reservoir (Figure 2). The territory is mainly covered with shrubs and low trees.

Fig. 2 Area adjoining territory of the existing reservoir

118. Any signs of cultural heritage existence in the project area have not been recorded during the visual audit and the risk oflate discovery of archaeological sites is minimal due to the high anthropogenic load (previously, the project area was used for operat- ing the old treatment facility of Zugdidi)..

8. Noise

119. As determined in result of the audit, no fixed noise and vibration sources exist within the study area. The noise propagated over the area is mainly generated by the mov- ing vehicles and the special machinery operated at the container terminal sites. For evaluating the background noise levels in the study area, instrumental measurements were carried out using noise and vibration measurement device Digital MultiMeter (this device has passed the metrological certification testing). The measurements were conducted during daylight hours (from 11:00 to 18:00), three measurements per day, and the average value was recorded as the background level. The results of noise level study are given in Table 12.

Table 12: Results of noise level study

Measurement point number	Measurement point description	Sound levels / Equivalent sound levels, dBA
1	Project area	45,5
2	Nearest residential zone	45,1

120. According the measurement results, the noise propagation levels within the study area do not exceed the statutory limits.

For Jvari project, the noise level was measured on three different points. The noise level was measured with South Korean equipment „Digital Sound Level Meter“.

This equipment measures noise with 1-second intervals and plots the relevant diagram. The measurements at all three points were done in a 5-minutes interval. The results of the measurements are given in following table.

Sites	**5 Min**	**10 Min**	**15 Min**	**20 Min**	**25Min**	**30 Min**	**medium**
Site 1 – Wells	**40.5**	**40.2**	**40.2**	**39.9**	**40.0**	**41.7**	**40.41**
Site 2 – Transmission	**42.1**	**41.9**	**42.5**	**42.7**	**42.6**	**42.2**	**42.33**
Site 3 – Distribution Network at town Jvari	**47.2**	**47.1**	**47.2**	**47.5**	**47.8**	**47.5**	**47.38**

9. Natural Background Radiation

121. In Georgia, the radiation safety issues are regulated by the Laws of Georgia on Health Care, and on Nuclear and Radiation Safety, and the secondary legislation including Radiation Safety Limits (RUN-2000), and Principal Hygienic Standards Applicable to Handling Radioactive Substances and Other Ionizing Radiation Sources. In May, 2014, monitoring of the background radiation was carried out in the study area aiming exploration of the background gamma radiation and identification of the possible non-controlled radioactive sources.

122. It should be stated that the natural radiation background in Zugdidi surrounds varies in the range of 8-15 R/h, and remains stable during the last years. The radiation monitoring was conducted using the dosimeter RADEX intended for determining the background gamma radiation for the area.

123. The open parts of the project area were checked in detail during radiation monitoring process. The measured background gamma radiation rates for the study area varied from 7 R/h to 15 R/h that is within characteristic interval for Zugdidi surrounds. Neither uncontrolled radiation sources nor any radioactive contamination was revealed.

B. Socio-Cultural Resources

1. Demography

124. The territory of Zugdidi Municipality occupies 683 km², population number 171.6 thousand, population density-251 persons on km².The Municipality is divided into territorial units: 1 city of Zugdidi, 17 communities and 12 villages (59 inhabited localities).Big villages: Inghiri (5,8 thousand), Kakhati (5,9 thousand)and Rukhi (5,2 thousand). The table 13 shows number of population of Samegrelo-Upper Svaneti and Zugdidi for the last 10 years.

Year	2004	2005	2006	2007	2009	2010	2011	2012	2013	2014
Samegrelo-Upper Svaneti	**460.4**	**471.0**	**469.8**	**467.7**	**468.0**	**474.1**	**477.1**	**479.5**	**476.9**	**476.3**
Zugdidi Municipality	166.2	172.2	172.1	171.4	171.6	175.0	176.6	178.2	177.2	177.0

Table 13: Number of population (as of January 1st)

125. 98.2 % of population in Zugdidi are national Georgians. We meet very few representatives of other nationalities in the city, mainly they are Russians (0.9%), Abkhazians (0.1%),Ukrainians (0.1%) and other.

126. The Municipality of Zugdidi is the biggest centre after Tbilisi in the regards of internally displaced persons. Their total number in the municipality makes 43 603. Among them number of the inhabitants in orderly settlements reaches 14 632 and the other30 971 in private settlements. Number of pensioners on the territory of Zugdidi Municipality is 31,672 as of December, 2013.

2. Medical outpatient facilities

127. As of 2012, 21 medical-outpatient facilities function on the territory of the municipality. Should be mentioned “Zugdidi Medical Centre” after Saint Luka established on the

Republic Medical Complex, which fully satisfies modern European standards. The blood transfusion centre also functions on the base of the same complex.

3. Training educational institutions

128. As of 2013, 59 schools function on theterritory of the municipality, among them 50 public, 1 basic and 8 private schools. Number of preschool institutions (kindergardens) is 56, among them9 are the private ones. There are also 2 high educational institutions in the city of Zugdidi (ZugdidiIndependent University and Shota Meskhia State Teaching Institute). Care home for orphans and disabled children also functions on the territory of the Municipality (village New Abastumani), as well as the residential school for homeless children (city of Zugdidi).

4. Agriculture

129. Agroclimatic conditions are very advantageous for the establishment of multisphered and high rentable agricultural productions, especially for the development of such spheres as walnut cultivation, maize cultivation, tea-growing, cultivation of subtropical cultures (citruses, laurel, guavasteen and other), fruit trees, monocyclic plural cerealsand vegetables.

130. The whole area of agricultural lands in Zugdidi Municipality makes 36,316 ha, among them:

- arable land - 13,110 ha
- multiyear plants - 7,419 ha
- pasture land - 6,271 ha

131. As of 2009, in the Municipality of Zugdidi were cultivated1.2 thousand ton of mandarin,25 ton of orange, 50 ton of lemon,9400 ton of nuts, 625 ton of laurel, 350 ton of kiwi fruit, 30 000 ton of maize and300 ton of tea.

132. The main export products of the agriculture are walnuts and fruits of citrusand kiwi. Especially the production of walnuts was increased as export demand on this increases year by year.

133. Several walnut reprocessing factories are presented in Zugdidi Municipality. These factories take the ready production for the export. Tea reprocessing factories function on the half base. It should be mentioned that the Georgian Tea „Gurieli“ is produced exactly in Zugdidi Municipality (village Rukhi) which also goes on export.

134. Unfortunately, factories of tinned and fruit productions do not function. These factories earlier were proceeding local raw materials. As a result of this, more people were employed in that period. Taking into consideration that big agricultural industries are not located on the territory of Municipality, farming establishments are mainly met in individual and small scales. The service agro-centres of the village and also the service centres and the level of their equipment are very essential for the development of the agriculture.

5. Motorways

135. 591 km motorway is registered in total on the territory of Zugdidi Municipality, from this351 km with black cover (asphalted road) and 240 km gravel road. As we see the significant part of the roads(40,6%) is gravelled and needs to be asphalted. It is nec-

essary to mention that condition of inner roads is significantly improved compared to the recent years. The inner roads of the village were rehabilitated with the sums from central and local budgets, asphalting of Inghiri-Oktomberi-Kakhati and Kakhati-Orsanti motorways was financed by the Municipal Development Fund of Georgia, as well as asphalting the streets of the city, this process is still going on for the moment..

136. The length of motorways according to the categories:

- international significance - 25 km, completely asphalt or concrete surface
- national significance - 120 km, completely asphalt or concrete surface
- local significance (without city roads) - 276 km. Thereof 115 km with asphalt or concrete surface and 161 km with gravel surface.

137. As for the condition of inner roads of the city, total length of inner roads and streets in Zugdidi makes 170 km, among them: asphalted-91 km, gravelled–79 km. There are located approximately 80 path and auto bridges, their total length reaches app. 1600 m.

6. Waste management and Landfill

138. The Municipality of Zugdidi has a functioning land fill on the territory of the Village Chitatskari, area- 6 ha. The land fill annually receives about 40-45 thousand m³solid and construction waste. For the moment the functioning land fill ground is almost overloaded. Environmental condition of the land fill is not satisfactory because the existence of ground waters and specificity of the soil do not give possibility to bury and punch the loaded waste. According to the above mentioned, the existing land fill does not satisfy modern requirements.

139. The construction of the new land fill complex is completed on the territory of Village Tsatskhvi. The area of the land fill is calculated up to 10 hectares together with reprocessing andrecycling.

7. Water Supply System of Zugdidi Municipality

140. On the territory of Zugdidi Municipality Water Supply is implement by three following systems: a) boreholes, b) individual wells, c) village water lines without system.

141. It should be mentioned that the length of inner water network of the city makes 120 km, which is not functioning from 1993. 60% of the population is not connected to water supply network and they getwater from4015 existingArtesian wells.

8. Wastewater System

142. The total length of waste water system of Zugdidi is 65km. Annually 3,000 m³ used water flows into the waste water system. The wastewater system can not provide service for the whole city (42% of the total population is not connected to the sewerage system) and accordingly it is necessary to rehabilitate and enlarge the network. The existing system does not have waste water treatment plant

9. Transport

143. The central highway of Georgian railway goes on the territory of Municipality.The following stations are locatedon the territory of Municipality: Khamiskuri, Tsaishi, Ingiri and Zugdidi. In addition there is a motor highway to the direction of Abkhazia on the

territory of Municipality (Tbilisi- Sukhumi). As of today, 32 (inside the city) and 56 (in outskirts) regular travelling routes are functioning on the territory of Zugdidi Municipality. Internal routes are daily serviced by 59 buses, among them 13 medium and 46 of small capacity. Recently opened Ltd „MunicipalTransport“ takes passengers by comfortable buses (brand „Bogdana“) and serves with cheaper prices on internal andoutskirt routes.

144. 4 bus terminals and 3 bus cashboxes function in the city. Small buses are connected with them considering the direction of the route outside the Municipality towards all big cities of Georgia.

10. Tourism

145. The Municipality of Zugdidi is significant for the tourists because of its historical past and plenty of monuments. Archaeological materials and material cultural monuments, discovered on the territory of Zugdidi, prove that humankind permanently lives here from the Stone Age up to nowadays. The settlement of the modern city Zugdidi was established in late feudal age. Exactly in this period are mentioned Anaklia and Zugdidi among other settlements of Samegrelo as “small cities”. The first one was the harbour port and the second the residence of the Samegrelo head and the trade centre. Major development of Zugdidi starts during the period of Davit Dadiani, the last principle of Samegrelo. In the 50ies ofXIX century, in the period of Davit Dadiani, the Garden of Zugdidi Palace was already known. Development of the industry is also connected with the name ofDavit Dadiani. He made foundation for the construction of the silk factory in 1848.This factory was the first industry in Samegrelo. The thread of high quality, produced in the factory, was expensive, it was exported in Russia and the cities of Europe. Davit Dadiani also became famous by creation of cultural institutions, establishment of the library, creation of the chessfollowers club where Andreya Dadiani, the world famous chess player, was learning to play chess. Today the Dadiani Palace represents historical and architectural Museum of Zugdidi where is kept the Holy Robe of the Mother of Jesus. There are many other blessed part together with the Holy Robe of the Mother of Jesus: Arm of Saint Mariane, hand Palm ofSaint Kvirike, Part of Thigh Bone of Saint George and Part of the bone of Saint John the Baptist. Together with other distinguished elements there are kept the mask of Napoleon Bonaparte and personal things in the Zugdidi Museum. In the hall of the palace there are exhibited works of world known Georgian, Russian and Foreign painters and samples of decorative art.

IV. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Summary of Activities and Anticipated Impacts

146. 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 analysed during preconstruction, construction, and operational stages in the context of the subproject’s area of influence. As defined previously, the primary impact areas are (i) well field/water collection site (ii) reservoir site (iii) pipelines and network sites; and (v) quarries and borrow pits as sources of construction materials. The secondary impact areas are: (i) entire Zugdidi area outside of the delineated primary impact area; and (ii) entire Zugdidi Rayon in terms of over-all environmental improvement.

147. 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 system leakage and (iv) minimize construction pollution and waste.

148. This paragraph provides a brief description of anticipated site-specific impacts related to the construction phase of the sub-project "Improvement of Zugdidi Water Supply system".

Table 14: Site-specific impacts

#	**Construction Phase. Potential Impacts During Construction Works**	**Risk**	**Sites**
1	Dust, noise, vibration	High Risk	During excavation of pipe trenches within the areas of town of Zugdidi. During demolition of existing Bashi reservoir and transport of demolition waste to disposal site.
2	Pollution of surface water during construction and rehabilitation works	Moderate Risk	Planned rehabilitation of the existing network of water supply system crosses rivers Chkhoushi and Enguri in several places.
3	Impacts on Archaeological Sites	Low Risk	No damage to any archaeological site shall be expected. The pipe laying sites in Zugdidi are located in the areas of extensive on-going human impact.
4	Impacts on traffic	High Risk	Existing water supply system of Zugdidi is almost totally replaced by the project. For the implementation of above mentioned will be necessary to cut trenches in the streets of the city which will restrict transportation by transport means or for pedestrians as well. Special problems will be created in the narrow streets of the city..
5	Landslides, slumps, slips and other mass movements.	Moderate Risk	No large scale earthworks are planned under the Project. Despite this, the landslide processes may be triggered during construction of the pumping stations.
6	Impacts on flora and fauna	Low/Moderate Risk	All Project sites are located within the area have been experiencing the severe human impacts. Therefore, no influence on flora and fauna shall be expected during implementation of the Project. Relatively bigger impact on flora and fauna will be on the territory of the reservoir construction.
7	Pollution risk for ground waters	Moderate Risk	No major spills of fuel and lubricates at construction sites due to leakages are expected. The spills, which are likely to cause groundwater contamination may occur during fuelling construction machinery at

#	Construction Phase. Potential Impacts During Construction Works	Risk	Sites
			the construction sites and/or construction camps.
8	Pollution risk for air quality	Moderate Risk	Air pollution may occur in the inhibited areas, including town of Zugdidi.
9	Poaching by construction workers	Low Risk	Enguri river
10	Hazardous Construction Wastes	Low Risk	Small quantities of hazardous wastes will be generated as a result of vehicle operations and the maintenance activities.
11	Impact on existing infrastructure	Low Risk	Electric power transmission systems, existing water supply and drainage channel systems and channels
12	Poor sanitation and solid waste disposal in construction camps and work sites (sewerage, sanitation, waste management)	Low Risk	Camp will not be used as living facilities because it is expected that majority of the employees would be local persons. The construction camp would be equipped with a bio toilet and other necessary infrastructure.
13	Construction Related Impacts at the Quarrying Sites	Low Risk	The exploration of the borrow pits should be conducted by the licensed companies or the Contractor has to obtain its own license. However, potential impact of the increased quarrying activities on river bed and floodplain landscape, ichthyofauna and groundwater should be considered.

B. Air Quality

1. Noise and Dust

Construction Phase

149. Noise and emissions of harmful substances are typical impacts of construction. Air quality will be affected during construction by emissions from vessels, equipment, and land vehicles in work activities at work locations. During the pipe replacement stage the rehabilitation works are to be carried out in Zugdidi streets. The noise and dust generated in course of excavating the trenches will cause nuisance of the local residents that will further increase during summer season assuming growth of the local population on the account of holiday makers.

150. Also the territories of pumping station and construction of the reservoir are located nearby settled areas, coming from this, creation of noise and dust is anticipated in the process of construction.

151. Modeling and assessment of the noise, caused by construction activities is based on existing information about operation of various equipments at various stage of construction. For example, noise level in 15 m as it is considered by the Federal Highway Administration of the ministry of transport of the USA (FHWA), California Department of transportation (CADOT) and SBAG is as follows:

Table 15: Noise levels

Noise source	Equivalent noise level dBA
Excavator	84 - 85
Bulldozer	84 - 85
Grader	91 - 92
Compressor	80 - 88
Pneumatic drilling hummers	85 - 98
Pile boring equipments	96 - 107

152. Noise level according to Environment Preservation Department of USA, 1972:

Table 16: Noise levels

Noise source	Equivalent noise level dBA
Excavator	72 - 92
Bulldozer	83 - 93
Grader	80 - 95
Compressor	75 - 88
Pneumatic drilling hummers	82 - 98
Pile boring equipments	72 - 82

153. As a rule, noise caused by moving equipments is reduced at some distance. Such reduction has logarithmic properties. In case of noise caused by construction activities, noise spread pattern from the noise point is used, that can be determined as: Noise level1-Noise level2=20 log r2/r1, meaning that by doubling of distance noise is reduced by 6dBA.

Table 17: Noise levels at distances

Distance from noise source, m	Calculation level of the noise Average value - dBa	Calculation level of the noise Maximum value - dBa
10	80	90
20	74	84
40	68	78
80	62	72
160	56	66
320	50	60

154. The existing and forecasted noise level at a distance of 80 meters from the point of use of construction equipments is not significant. In fact, after 120-130 m from the noise source, the noise level is acceptable without implementation of mitigation measures. It can be assumed according to rough calculations, that noise impact will not exceed 150 m and increase of noise level within 150 m is assessed as acceptable impact. There are a few living houses within 150 m radius from the existing reservoirs that are to be demolished (minimum distance is 50 m), therefore, the contractor should implement all mitigation measures mentioned in the document.

Mitigation Measures

155. These impacts can be reduced by a variety of measures, many of which are common in most urban construction. These include:

- Require adherence to engine maintenance schedules and standards to reduce air pollution.

- Use of defined, well planned haulage routes and reductions in vehicle speed where required;
- Periodically water down temporary roads on site;
- Cover trucks carrying cement, gravel, sand or other loose materials;
- Wet or cover trucks carrying stone/ sand/ gravel;
- Haul materials to and from the site in off peak traffic hours;
- Halting work during excessive winds.
- Immediately replacing defective equipment and removing it from the work site
- No truck movements in inhabited areas between 22:00 and 6:00.
- Inform population of anticipated works.

Operation Phase

156. No permanent dust emission sources will exist during operation phase. It is expected that in small quantities dust will be generated only during maintenance works.

Mitigation Measures

157. The standard approaches shall be employed to reduce the dust and noise pollutions during maintenance works as follows:

- Periodically water down temporary roads on site;
- Immediately replacing defective equipment and removing it from the work site
- No truck movements in inhabited areas between 22:00 and 6:00.

C. Water Quality

1. Contaminations of Surface Water

Construction Phase

158. During implementation of the Project the risk of surface water contamination is of medium level. The surface water may be contaminated due to improper placement of the excavated soil, poor management of construction camps, and improper storage of construction materials and leakage of fuel and lubricates from construction machinery.

159. Pollution of river Chkhushi is also anticipated in the process of replacement of the existing water supply pipes at the river crossings.

Mitigation Measures

160. The following mitigation measures shall be implemented:

- Where works are in progress, erosion control and sedimentation facilities including sediment traps and straw bale barriers or combinations thereof will remain in place;
- Lubricants, fuels and other hydrocarbons will be stored at least 100 m away from water bodies.
- Topsoil stripped material shall not be stored where natural drainage will be disrupted.
- Solid wastes will be disposed of properly (not dumped in streams).
- Guidelines will be established to minimize the wastage of water during construction operations and at campsites.

- During construction, machinery and transport will be used by the contractor, both have potential of causing contamination to underground and above ground water assets. There is need to compile temporary drainage management plan before commencement of works.
- Proper installation of temporary drainage and erosion control before works within 50 m of water bodies should be done
- Solid Construction material and spoil stockpiles will be covered to reduce material loss and run-off and stockpiles will not be nearer than 100 m to water bodies;
- Borrow sites will not be close to sources of drinking water in case of runoff;
- Water samples will be taken and analysed based on the baseline monitoring results obtained in the preconstruction stage.
- Samples will be taken as soon after the complaint as possible and analyses immediately and again two weeks after the complaint to determine if water quality has been restored;
- The contractors will be required to maintain close liaison with the local community to ensure that any potential conflicts related to common resource utilization for project purposes are resolved quickly;
- Guidelines will be established to minimize the wastage of water during construction operations and at campsites;
- Borrow sites (if required) should not be close to sources of drinking water;
- Rock rip rap material to be used in river / stream crossings per owner/engineer'srecommendations to prevent natural soil erosion

Operations Phase

161. The risk of the pollution of surface water in operational phase is very low. Minor pollution of water can take place during maintenance and repair works. In that case the above mentioned mitigation measures shall be implemented.

162. The construction of a new water supply system will increase the generation of wastewater. Works for the rehabilitation of the wastewater network and the construction of a new wastewater treatment plant will be taken up successively under Tranche 5, which will be coming up for processing early 2015.

2. Contamination of Underground Water

163. Groundwater table depth within the Project zone is 3-5 meter; therefore potential impact arises from implementation and maintenance of contractors' yard, transport, maintenance of vehicles and handling and storage of lubricants and fuel. The required provisions for contractor's yard are described in the chapter on impacts and mitigation measures concerning quality of soils.

D. Soils Quality and Topsoil Management

Construction Phase

164. During the construction, impacts on soils are mainly due to earthworks and the operation of the contractor's yard.

165. The works for the transmission mains comprise material excavation, pipe laying and backfill of material including compaction. Material will be stored temporary alongside the trench and refilled after pipe lying. Therefore impacts associated with earthworks

for trench laying are of temporary nature. The pipes will be placed in the trench manually. A sand layer of 30 cm thickness will be laid on top of the pipe, after which the trench will be refilled with excavated material and compacted manually. The excavation is expected to generate surplus material. Surplus material will be used as embankment fill as far as possible.

166. Construction of the pumping station and the reservoirs, as well as performance of trenching works for installation of waste water main may lead to disturbance or loss of topsoil. Therefore the Contractor shall implement the following measures:

- The top soil of about 1 ft depth (0.3 m) shall be removed and stored separately during excavation work, and after the construction of the main trunk the same soil shall be replaced on the top, in unpaved areas;
- Subject to advance consent of the local self-governance authorities, the excess topsoil remained after construction of the new pumping station and reservoir will be used at other Project sites or handed over to the appropriate authorities.

Mitigation Measures

167. The following practices will be adopted to minimize the risk of soil contamination and topsoil loss:

- The contractors will be required to instruct and train their workforce in the storage and handling of materials and chemicals that can potentially cause soil contamination.
- Solid waste generated during construction and at campsites will be properly treated and safely disposed of only in demarcated waste disposal sites.
- Construction chemicals will be managed properly
- Clearly labelling all dangerous products,
- Fuel tanks (diesel or oil) should be placed in a concrete pool which its perimeter walls will be at least 1.0 m high with the concrete or plastered masonry wall,
- A proper floor drain should be installed on the slab of the concrete pool for safely discharging the leakages.

Operation Phase

168. During operation phase, the soil may be contaminated due to water leakage from the damage pipe. In case such damage is not detected in a due time, the area may be "bogged".

169. Soil contamination may also occur during performance of the planned or emergency repair works.

Mitigation Measures

170. Water pressure in the pipelines must be continuously monitored during entire operation phase. In addition, the relevant mitigation measures shall be implemented during maintenance works.

E. Biological Environment

1. Impacts during Construction

171. The impacts on flora and fauna during implementation of contractor's yard will be minimised through site selection and installation. The following measures need to be implemented to avoid any impacts on flora and fauna:

- Avoid tree cutting
- In unavoidable cases, plant two trees of same species for each tree that is cut for construction
- The trench shall not be kept open in the night/after working hours. This will avoid any safety risk to wild animals.

2. Impacts during Operation

172. Operation of the water supply components of the subproject will not have any significant negative impact on the biological environment.

F. Traffic

1. Impacts during Construction

173. The rehabilitation of the waste water network will be mainly conducted along roads existing in the town. Although work will not require land acquisition it could still have economic impacts, if the presence of trenches, excavated material and workers discourage customers from visiting shops and other businesses, which lose income as a result. These losses however will be short in duration. A time limit for completing working sections of pipelines and quantitative assessment of noise at Bashi reservoir shall be part of the site-specific SEMP. Implementation of the following best construction measures will reduce the inconvenience and disturbance:

- **Traffic management**: A traffic control and operation plan will be prepared together with the local traffic management authority prior to any construction. The plan shall include provisions for diverting or scheduling construction traffic to avoid morning and afternoon peak traffic hours, regulating traffic at road crossings with an emphasis on ensuring public safety through clear signs, controls and planning in advance;
- **Information disclosure**: Residents and businesses will be informed in advance through media of the road improvement activities, given the dates and duration of expected disruption
- **Construction sites**: Clear signs will be placed at construction sites in view of the public, warning people of potential dangers such as moving vehicles, hazardous materials, excavations etc and raising awareness on safety issues. Heavy machinery will not be used after day light and all such equipment will be returned to its overnight storage area/position before night. All sites will be made secure, discouraging access by members of the public through appropriate fencing whenever appropriate.

174. Another aspect of the work that has economic implications is the transportation of material to the site and surplus soil from the site to locations where it can be put to beneficial use as recommended. There will be truck movements carrying material.

Although this is not significant, considering the narrow roads, it could disrupt traffic in the Town. Dust generated during the transport may also impede the commercial and trade activities, which are predominantly located along the main roads. The transportation of material/waste shall be implemented by the Civil Contractor in liaison with the town authorities, and the following additional precautions should be adopted to avoid effects on traffic:

- Plan transportation routes in consultation with Municipality and Police
- Schedule transportation activities by avoiding peak traffic periods.
- 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/unloading inside a barricaded area
- Clean wheels and undercarriage of haul trucks prior to leaving construction site

2. Impacts during Operation

175. As the operation and maintenance activities would be conducted within the existing facilities no impact is envisaged on economic resources. Repairs and leaks of the water supply pipes will be minor and localized. In fact, the improvements to the water supply system will bring various benefits. Availability of good infrastructure facilities will add to the quality of life, and there will be more people interested to live and visit, which will bring new investments and boost economic development.

G. Hazardous Construction Wastes

176. Small quantities of hazardous wastes will be generated as a result of vehicle operations and the maintenance activities.

Mitigation Measures

177. There are no specific hazardous waste treatment facilities in Georgia, so the common construction practice accepted by the authorities is to dispose of these types of wastes at the municipal landfills. However, prior to disposal appropriate consultation and agreement ofMoENRP is required, and controlling will be required to obtain the necessary approvals.To ensure good practice they will also be required to store, transport and deposit all hazardous materials in secure watertight containers.

H. Other Wastes from Construction Activities

1. Municipal Waste

178. Municipal waste may be generated on the Storage area. Mainly this is rubbish, plastic or glass bottles, glasses, waste food, etc. and a stationary waste. Waste should be collected both by the specially assigned personnel and the workshop workers on the area. The waste is placed into 0.24m³ plastic containers and further a local Sanitary Service takes it to landfills. The following should be taken into account:

- Generation of dust should be avoided;
- Plastic containers should be closed to prevent spread of the smell and also to avoid contact of rodents and insects with the waste.

179. The personnel involved in the handling of hazardous and non-hazardous waste will undergo specific training in:

- Waste handling
- Waste treatment; and
- Waste storage.

180. Burning of waste on any construction site is forbidden with the exception of stub and small branches from felled trees and bushes, which is better to be burned in order to avoid pest dissemination.

2. Medical Waste

181. Medical waste is generated in the Medical Care and Control Point and belongs to hazardous waste category. This waste is collected in special plastic boxes and is transferred to a contractor for farther incineration. It is recommended that the medical waste is directly transferred to a contractor from the place of its consolidation.While disposal of the medical waste the following requirements are to meet:

- Medical waste must be disposed in special plastic boxes, which can be hermetically closed.
- Medical waste for farther incineration should be transferred to a certified contractor (Batumi municipal waste operator).

3. Non hazardous construction waste

182. Non hazardous construction waste may be generated on the storage and construction area and will be collected by contractor's workers. Waste disposed first on the sites of origin, and then moved to the newly constructed landfill in Tsatskhv (about 12 kmfrom Zugdidi) as proposed by the local service centre. A disposal site for construction waste is not available near Zugdidi. This shall be re-assessed by the Contractor at the commencement of works. Disposal of the waste shall be agreed in advance by the local service center of UWSCG with the local municipality of Zugdidi.

183. While disposal construction wastes both on the sites and at the temporary storage facilities the following requirements are to meet:

- Place of disposal of the waste concerned must be enclosed.
- The waste must not have access to drainage water.
- Waste must be immediately removed from the working sites.
- Waste must be placed in secondary protective basins.
- This waste can be transferred only to a certified contractor.

Demolition of existing reservoirs

184. Within the scope of the Project it is envisaged to demolish two existing reservoirs of 10,000 m^3 volume each and to construct a new reservoir at the same place. Taking into account size of existing reservoir there is expected the production of approximately 3,515 m^3 inert waste. The framework of the reservoirs is wholly made of reinforced concrete. During the construction phase there is no usage of hazardous materials (asbestos containing materials, ACM, and lead-based paint, LBP). The reservoirs are placed at a densely populated area. 50 to 100 meters from the reservoirs, private one and two floor houses are located. The existing construction of reservoirs is solid and in order to demolish them it is necessary to use relevant technology. Noise and dust are expected during the demolition process. Noise and dust are also expected during the transportation of inert waste. The usage of heavy machinery creates vibration in densely populated area as well.

Mitigation Measures

185. The following mitigation measures shall be implemented during the transportation of inert waste produced throughout the demolition process of existing reservoirs:

- Before demolition of the building install dust and noise protective barrier (fabric or solid);
- Prohibited use of blasting equipment during the demolition process of reservoirs;
- No use of heavy duty equipment is allowed;
- Prior to the commencement of any activity, the Contractorshall identify whether any machinery or planned action will cause significant vibration. If is the answer is yes, the Contractoris to undertake a condition survey of all structures within the zone of influence;
- The Contractorshall monitor vibration at the nearest vibration-sensitive receptors at the start of and during use of non-blasting equipment causing vibration.If vibration levels are monitored and found to exceed the vibration threshold according to relevant criteria, the Contractor shall modify the construction activities until compliance with the criteria has been achieved;
- Restrict demolition activities during period of the high winds or under more stabile conditions when winds could nevertheless direct dust towards adjacent communities;
- Using a water truck for dust suppression on all exposed areas as required;
- Active areas adjacent to residents should be kept damp at all times.
- Establish and enforcing vehicle speed limits to minimize dust generation;
- Using tarpaulins to cover fugitive loads (for demolition concrete materials) on haul trucks moving off-site;
- Select plant and equipment, design work practices, and limit hours of operation to minimize potential impacts as far as practicable;
- Operators of noisy equipments or any other workers in the vicinity of excessive noisy equipment are to be provided with ear protection equipment;
- Under noisy conditions, do not allow operators or other workers to be exceed the threshold that has been establish for exposure to noise;
- Schedule construction so as to minimize the multiple use of the most noisy equipments near sensitive receivers;
- Ensure that all equipments is in good repair and operated in the correct manner;
- Consult with local residents and building owners the address community concerns;
- The funds necessary for the work to be undertaken will be included in the Works contract.

186. Before the commencement of construction activities the Construction Contractor should prepare a site-specific SEMP for demolishment works and waste disposal, which will be endorsed by the supervision consultant and and approved by UWSCG before commencing the works.

I. Impacts on Archaeological Sites

187. Land clearance works, grading and excavations are associated with the risks of damaging underground archaeological remnants. However in the case of the proposed Project no archaeological monuments are expected to be touched during construction phase since pipes will run along and inside existing roads as far as technically feasi-

ble. There is a low probability for chance finds of archaeological objects. However, during construction, possibility of appearance of the new archaeological findings still should be taken into account and, therefore, special care should be taken not only at the new construction sites, but also at construction camps and storage areas.

Mitigation Measures

188. To avoid this risk, preliminary preventive studies and archaeological supervision during the earth-works is necessary. Supervisory procedures and all other necessary measures should be agreed with the Ministry of Culture when obtaining the construction permit, in accordance with the rules of the permit issuance. According to the article 14 of the Law on Cultural Heritage, Permit on conducting quarrying activities in Georgia, as well as construction of an object of a special importance as it may be defined under the legislation of Georgia, is issued by a competent authority based on the positive decision of the Ministry of Culture, Monument Protection of Georgia. The basis for the conclusion is the archaeological research of the proper territory to be carried out by the entity wishing to accomplish the ground works. The entity wishing to do the earth-works is obliged to submit the Ministry the documentation about the archaeological research of the territory in question. The preliminary research should include field-research and laboratory works.

189. Therefore steps should be taken minimize the risk. This should involve:

- Contractor should put in place a protocol for 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:
- to comply with the previous condition, having excavation observed by a person with archaeological field training.Supervisory procedures and any other necessary measures shall be agreed with the Ministry of Culture;
- Stopping work immediately to allow further investigation if any finds are suspected;
- Calling in the state archaeological authority if a find is suspected, and taking any action they require ensuring its removal or protection in situ.

190. At the construction stage archaeological monitoring should be ensured by the contractor under the supervision of the Ministry of Culture, Monument Protection of Georgia. The budget necessary for the archaeological supervision and other agreed works should be fixed under the construction works appraisal.

J. Socio-Cultural Resources

1. Impacts during Construction

191. There are various social-cultural resources (such as school, church, recreation and entertainment centre, etc.) in the town. The construction impact will include noise and dust, and interrupted access due to movement of heavy vehicles transporting material and waste. Mitigation will therefore be needed to protect socio-cultural resources and to enable usage by local people and visitors to continue throughout the construction work. This will be achieved through several of the measures recommended above (under the impacts on air quality), including:

- Limiting dust by removing waste soil quickly; by covering and watering stockpiles, and covering soil with tarpaulins when carried on trucks

- Providing wooden walkways planks across trenches for pedestrians and metal sheets where vehicle access is required
- Increasing the workforce in to complete the work quickly

192. There is invariably of safety risks when substantial construction such as this is conducted in an urban area, and precautions will thus be needed to ensure the safety of both workers and citizens. The Contractor will be required to formulate and implement health and safety measures at construction sites, which should include such measures as:

- Following standard and safe procedures for all activities - such as provision of shoring in deeper trenches (> 2 m)
- Excluding public from the site - enclosing the construction area and provide warning and sign boards, and security personnel
- Providing adequate lighting to avoid accidents
- Ensuring that all workers are provided with and use appropriate Personal Protective Equipment - helmets, hand gloves, boots, masks, safety belts (while working at heights etc.)
- Maintaining accidents records and report regularly
- Traffic control. Irregular control of trucks by local police (radar control, safety control). Speed limits to be introduced within construction areas and on access roads.
- Yellow / orange warning tape to protect workers and pedestrians from falling into building pits, to prevent pedestrians from entering the construction site. Warning signs to prevent accidents within the construction site and on access roads

193. *Economic Benefits*. There could be some short-term socio-economic benefits from the construction work if local people gain employment in the workforce. To ensure that these benefits are directed to local people, the Contractor should be required to employ as much of his labour force as possible from the local communities in the vicinity of construction sites. Drawing of majority of workforce from local communities will avoid problems that can occur if workers are imported, including social conflicts and issues of health and sanitation due to labour camps. If temporary labour camps are to be provided, Contractor should ensure that they are maintained well with proper water supply and sanitation facilities. In unavoidable case of sourcing labour from other areas, provide adequate housing facilities so that there are no impacts and conflict with the local people. Following measures shall be followed:

- Establish temporary labour camps in consultation with the local authority
- Construction camps Shall be located away from water bodies
- No clearance of trees vegetation shall be allowed for establishment of camp
- Provide all basic amenities (water, sanitation, waste collection & disposal, first aid facilities, etc.)
- Contractor shall provide fire wood and no worker shall be allowed to cut any tree
- Ensure regular and clean maintenance of the camp

K. Construction Camps

194. The establishment of contractor's work camp may cause adverse impacts if various aspects such as liquid and solid waste management, equipment maintenance, materials' storage, and provision of safe drinking water are not addressed properly. The

site for the work yard will be selected by the contractor in agreement with the Municipality, UWSCG and the supervisor.

195. To ensure that potentially resulting impacts are kept at a minimum the contractor will be required to prepare the following plans or method statements:

- Layout plan of the work camp including a description of all precautionary measures proposed to avoid potential adverse impacts on the receiving environment (surface and ground water, soils, ambient air, human settlement);
- Sewage management plan for provision of sanitary latrines and proper sewage collection and disposal system to prevent pollution of watercourses or groundwater;
- Waste management plan covering the provision of garbage bins, regular collection and disposal in a hygienic manner, as well as proposed disposal sites for various types of wastes (e.g., domestic waste, used tires, etc.) consistent with applicable national regulations; and
- Description and layout of equipment maintenance areas and lubricant and fuel storage facilities including distance from the nearest surface water body. Storage facilities for fuels and chemicals will be located at a save distance to the water body. Such facilities will be bounded and provided with impermeable lining to contain spillage and prevent soil and water contamination.
- These plans will be approved by the Engineer prior to beginning of construction activities.

196. Prior to establishment of the work camp(s) the contractor shall conduct consultations with local authorities to identify sources of potable water for the workforce that will not compete with the needs of the local population. Potable water for the workforce shall comply with the national quality standards. Construction water should be sourced from the local water supply.

L. Construction Related Impacts at the Quarrying Sites

197. The quarries and borrow pits will be finally selected by the contractor. The exploration of the borrow pits should be conducted by the licensed companies or the Contractor has to obtain its own license. However, potential impact of the increased quarrying activities on river bed and floodplain landscape, ichthyofauna and groundwater should be considered.

Mitigation Measures

198. The exploration of the borrow pits should be conducted by the licensed companies. In case if the constructing company intend to perform quarrying activities, the company has to obtain related license. Potential impact of the increased quarrying activities on ichthyofauna, groundwater and landscape should be considered anyway. Validity of licenses for the abovementioned companies is a main mechanism to guarantee that most of impacts related to quarrying will be mitigated. License is provided by the MoENRP only on a basis of preliminary assessment (including limits and conditions for reinstatement). The Regional Services of the MoENRP and Environmental Inspectorate are in charge to control compliance of the quarrying company's performance. The role of the UWSCG within this plan should be to ensure timely and permanent involvement of the MoENRP in construction supervision.

199. The measures aimed on mitigation of the dust and emission impacts, as well as potential river contamination due to improper fuelling and vehicle operation should be

the same as above described pollution prevention measures, but control on this sensitive site should be stricter. Contractor's environmental personnel shall pay attention to this site during monitoring.

M. Existing Asbestos pipes

200. For the installation of new pipes under the project it is envisaged to dig trenches on the whole territory of Zugdidi at the stage of construction. It is possible to damage the existing waste water pipes or other legal or illegal water supply network pipes in the process of cutting of the trenches. The majority of the existing pipes contains Asbestos and in case of their damage can be created asbestos dust which is very dangerous for health.

Mitigation Measures

201. It is necessary to implement a number of the following mitigation measures:

- Special training for the personnel of the construction company;
- Environmental specialist of the consultingcompany must develop a special procedure and present to the water company which will be used in the process of cutting of the trenches-in case of the connection with the existing Asbestos pipes;
- Environmental specialist of the construction contractor must attend the process of cutting of the trenches;
- In case of finding asbestos pipes, the excavator must stop working and cutting of the trenches must be continued by means of the blade;
- In case of the damage of Asbestos pipes the construction works must be stopped. Environmental specialist of the consulting company should be immediately informed about this and the fact should be written down by environmental specialist of the construction company;
- Further works to be implemented only after issuance of the permission.

N. Cumulative Impacts

202. Project is designed to improve environmental quality and living conditions in Zugdidi through the improvement of water supply system. The potential negative impacts identified on various environmental parameters, during both construction and operation, in the previous sections of this report, are localized and temporary.

203. By nature, impacts such as on air quality and on people (due to disturbance, nuisance and safety risk of construction activity) can have cumulative impacts, as all the construction activities are conducted simultaneously. These are common impacts associated with any construction activity, and as discussed in the earlier sections, there exists proven and easy-to-implement measures to mitigate these impacts.

204. No cumulative impacts envisaged during the operation stage.

V. ANALYSIS OF ALTERNATIVES

1. Source

205. At the beginning of the project two options for the source of the water were investigated. The feasibility study that was prepared before the present project proposed to use Enguri Dam as source for the supply of drinking water to Zugdidi. The Consultant proposed to investigate the availability of groundwater as source for the water supply. The reason for proposing an alternative were the expected difficulties that came with the use of Enguri Dam:

- Requirement for initial and regular desilting of the dam
- Complicated construction to tap the old dam that needed rehabilitation itself
- Ambiguity about the water quality
- Necessity to construct water treatment plant
- Operation of sophisticated plant
- Possible conflicts of interest with energy production;

206. The high investment costs for the surface water solution were the main reason for the decision to investigate the availability of groundwater which was proven during the course of the project after geophysical investigations and pump tests at a test well.

For Jvari, there were several options:

1. Get water from existing sources – as the sources were not reliable because in dry weather capacity of the sources are lmited.
2. Get water from new underground sources – as investigations were already done for underground water in village Lia for Zugdidi sub-project and the studies showed, that there is enough and reliable source of water, it was decided to choose this option and get water from underground water, by drilling wells.

2. Supply System

207. After the decision to use Inghiri well field as source for the water supply system of Zugdidi two options for the supply system were considered. As the source is in the South-West and the reservoir in the north of Zugdidi the two alternatives to use the reservoir as balancing reservoir or flow-through reservoir were compared. Technical reasons as well as lower investment and operation costs lead to the choice of the first option.

As for Jvari, there is existing reservoir and chlorination building, which is in normal conditions. Therefore, it was decided to pump water from wells to existing reservoir, from where, water will be distributed to the town Jvari network.

VI. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

208. Most of the main stakeholders have already been identified and consulted during preparation of this IEE, and any others that are identified during project implementation will be brought into the process in the future. Stakeholders of this project include:

- People who live, and work near construction sites of facilities in Zugdidi
- UWSCG as implementing agency
- Other government regulatory institutions
- Municipality of Zugdidi
- NGOs and CBOs working in the affected communities;
- Other community representatives (prominent citizens, religious leaders, elders, women's groups);
- The beneficiary community in Zugdidi in general; and

- The ADB, as funding agency

209. Stakeholder consultation and participation was an important process in the preparation of this IEE. The process engaging stakeholders and affected people during the conduct of the IEE included joint sites visits of IA, design and supervising consult-

ants, onsite discussions with local population and public hearings. Fig. 3 below shows the picture of consultation with people living near Bashi reservoir in Zugdidi.

Fig. 3 Meetings with population living near Bashi Reservoir (June 6, 2014)

210. Consultation meeting with affected people living in close proximity to the construction site in Zugdidi/Bashi reservoir were undertaken on June 6, 2014 by UWSCG. The meeting was attended by representatives of DREP/UWSCG, Mr.Badri Tsatava, Senior Environmental Specialist and Ms.Ketevan Chomakhidze, USIIP Environmental Specialist, representatives of Eptisa Mr.Irakli Legashvili, Environmental Monitoring Specialist, Ms. Elene Aladashvili and Gvantsa Lukava Public Awarenss Specialists, as well as representatives of the local Service Center of Zugdidi. Prior to public consultation leaflets were prepared and published by Eptisa. Information leaflets were distributed among the local population during the meeting.

211. The purpose of above mentioned consultation were: to ensure the local residents informed participation in project implementation and monitoring; to inform them of the possible impacts of the project on their health and the environment, and efforts to be undertaken by the contractor to minimize the impact and to mitigate impact when avoidance is not possible; to introduce the project benefits to them as a result of project implementation; to incorporate all relevant views of affected people into mitigation measures:

212. During the meeting local population showed a support for the Zugdidi water supply subproject. They stressed the importance and the need to improve the water supply system in Zugdidi. Residents also were of the view that the proposed project will improve the socio-economic development of Zugdidi.

213. The meeting with local residents of Bashi village took place in the mode of questions and answers. The residents were mainly interested in the start and the duration of the project, the impacts and benefits of the sub-project as well as in the planned environmental and social safeguard measures.

214. UWSCG and Eptisa explained the schedule of works and informed local population that impacts are mainly limited to construction works. But as the existing reservoirs have a large volume and the reservoirs are constructed solidly, respective heavy equipment is required for demolition. Noise and dust are expected during the demolition process. Noise and dust are also expected during the transportation of inert waste. The usage of heavy machinery will create vibration in densely populated area. Therefore mitigation measures to reduce the impact on the population, are clearly defined in EMP.

215. Local population were explained also, that the Contractor shall have to followan Environmental Management Plan to minimize impacts andcarry out mitigation measures. UWSCG and the supervising company will carry out the monitoring and the supervision of theconstruction process. It was explained to the local population thatthe principal benefit will be the 24 h supply with drinkingwater after completion of the project.

216. Public hearings were held in the frames of the project on July 7, 2014. The Minutes of the Meeting is presented in Annex 1.

217. This IEE Report in Georgian language will be distributed to the interested public. Report will be available for review in Tbilisi (at UWSCG Head Office), and Zugdidi (at UWSCG Service Centre and the Town Hall). It will also be disclosed to public by making it available on websites of UWSCG, MoRDI and ADB, together with the IEEs prepared for the other subprojects.

VII. GRIEVANCE REDRESS MECHANISM

218. The contractor is obliged to implement the environmental management plan during the whole construction period and the supervising consultant will monitor these activities. The consultant will point out any deviations from the EMP and make sure that the contractor addresses all issues of the EMP in a timely and professional manner.

219. A grievance resolution mechanism will be set up to allow an AP appealing any disagreeable decision, practice or activity arising from project implementation. APs will be fully informed of their rights and of the procedures for addressing complaints whether verbally or in writing during planning and implementation of the project. Care will always be taken to prevent grievances rather than going through a redress process. This is achieved by ensuring full AP participation and consultation, and by establishing extensive communication and coordination between AP, UWSCG, and the local government. The affected population and stakeholders may send their grievances, related to the project induced environmental impacts and nuisance to UWSCG or directly to the administrative bodies responsible for the environmental protection. The MoENRP and concerned municipalities are obliged to respond on the grievances, which have been received from population or other interested parties in accordance with the Administrative Code of Georgia.

220. UWSCG on its part, in order to provide a direct channel to the affected and concerned citizens for approaching project authorities and have their grievance recorded and redressed in an appropriate time frame, will establish a Grievance Redress Mechanism. A Complaint Cell and a Grievance Redress Committee will be established for each Investment Program town at the local UWSCG service centre, which will function throughout the construction period. The procedures adopted and the responsibilities of various project agencies in grievance redress are discussed in the following paragraph. During the public consultationprocess, UWSCG (the IA) will inform the stakeholders about the Grievance Redress Mechanism and provide contact details of persons responsible for grievance collection and response. These details will also be made available on UWSCG website. The DREP at the head office of UWSCG will be available for the local complaint cells for establishing direct links to relevant environmental authorities.

221. Complaint Cell at the UWSCG Service Centre in the Investment Program town will accept complaints regarding the environment safeguard issues in implementation of subprojects under the respective town. A three stage grievance redress mechanism is

indicated in Fig. 5 below. The grievances received and actions taken will be included into the environmental monitoring reports submitted to ADB.

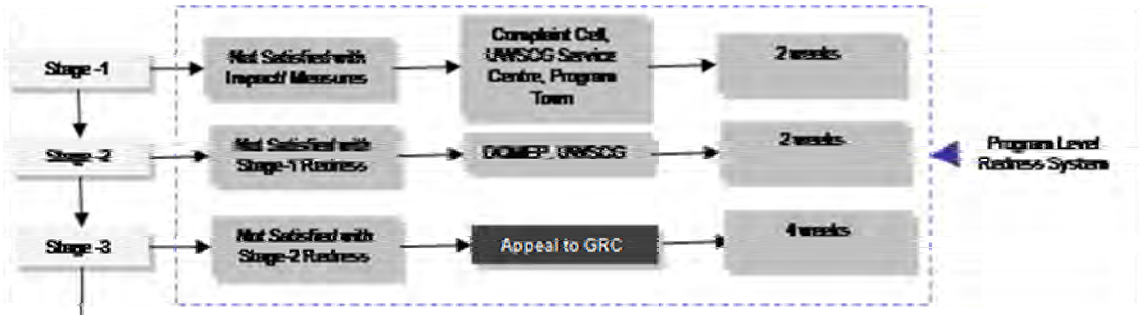

Fig. 4 Grievance Redress Mechanism

(i) Complaints received (written or oral communication) by the Complaint Cell (CC) will be registered in database system, assigning complaint number with date; Complaint Cell will inform the complainant the time frame in which the corrective action will be taken.

(ii) Complaint resolution will be attempted at Zugdidi level with the involvement of Community leaders and informal mediators.

(iii) The Complaint Cell and the Investment Program Management Office (IPMO), which is the Project Management and International Relations Departmentat UWSCG, will investigate the complaint to determine its validity, and assess whether the source of the problem is indeed due to subproject activities; if invalid, the Complaint Cell will intimate the complainant and may also provide advice on the appropriate agency to be approached.

(iv) If the complaint is valid, the Complaint Cell will check the environmental management plan (EMP) of the subproject whether this issue was identified and mitigation was suggested; if yes, the Complaint Cell and UWSCG IPMO will direct the civil works Contractor to take immediate actions as per the EMP.

(v) If this is an unanticipated issue, the UWSCG IPMO will to identify mitigation measures and advise the civil works Contractor accordingly and a corrective action should be taken and a Corrective Action Plan (CAP) prepared.

(vi) The Complaint Cell will review the civil works Contractor's response on corrective action and update the complainant within two weeks.

(vii) If the complainant is still dissatisfied with the action taken or decision, he/she may approach the Grievance Redress Committee (GRC, see below) established in the town.

222. **Grievance Redress Committee (GRC)**. A GRC will be established to resolve the unresolved issues at Stage 2 and this will function throughout the construction period, and will have hearings on need-basis. GRC will have following members:

- Chairman of the GRC – Head of Department of Social Issues at Zugdidi Municipality
- UWSCG Service Centre Head
- Designated informal leader of sub-project affected community
- Female AP
- Local NGO representative

223. Considering the anticipated impacts, it is not expected that there is any likely issue which will remain unresolved in the Stage 3 of the process. In the unlikely event of dissatisfaction after Stage 3, the complainant can approach ADB with a complaint. ADB has in place a system under the ADB Accountability Mechanism, where people adversely affected by ADB-assisted projects can voice and find satisfactory solutions to their problems. An affected person can file a complaint (mail, facsimile, electronic mail, or by hand delivery) with the:

Complaints Receiving Officer, Accountability Mechanism
Asian Development Bank Headquarters
6 ADB Avenue, Mandaluyong City 1550, Philippines
Email: amcro@adb.org, Fax +63-2-636-2086

224. Complaints will also be accepted by any ADB office such as a resident mission, regional office or representative office, which will forward them unopened to the CRO.

VIII. ENVIRONMENTAL MANAGEMENT PLAN

EMP is addressed as a condition of the contract.

A. Institutional Arrangements

225. Following agencies will be involved in the Investment Program:

226. Ministry of Regional Development and Infrastructure (MoRDI) is the Executing Agency (EA) responsible for

- oversee progress and provide guidance on the Investment Program implementation
- meet regularly until Investment Program completion
- responsible for Investment Program oversight and administration
- hold monthly meetings with UWSCG to review progress
- submit progress reports to the SC for decision making
- ensure compliance with Investment Program covenants
- submit Investment Program documents, including audit reports, to ADB on time
- convene regular meetings in consultation with the SC Chairperson and UWSCG

227. (i) United Water Supply Company of Georgia (UWSCG) is the project Implementing Agency (IA), which will be responsible for

- prepare the periodic financing request oversee Investment Program implementation and management
- oversee Investment Program accounting and auditing manage all consultants
- coordinate with all line ministries to ensure smooth and efficient implementation
- secure technical and environmental approvals for all civil works prior to bidding
- implement the environmental management plan for each subproject
- ensure compliance with Investment Program covenants
- comply with social safeguards requirement detailed in the PAM
- invite bids, evaluate and prepare bid evaluation reports for ADB's approval

- award contracts prepare quarterly progress reports

(ii) Local Service Centre of UWSCG in Zugdidi will coordinate all line agencies at the local level including Municipality of Zugdidi and existing Non-governmental organizations to ensure smooth an effective implementation of sub-project.

228. UWSCG as responsible IA for the project recruited a Supervision Consultant (SC). The national and international team of consultants will assist UWSCG as project supervisor for the construction of Zugdidi WW project. The SC will also provide capacity building training to contractor staff for management and operation and maintenance for the Project. The SC will assist UWSCG in assuring that the project is implemented according to the specified standards. This SC assignment will include the supervising of the implementation of the environmental management plan.

229. All mitigation measures during construction have to be implemented by the contractor that will be monitored by the supervision consultant (SC). Implementation of EMP of this project require an experienced EnvironmentalManagement Specialist (EMS), employed by the SC, to spend a total of around 36 months for project construction period, conducting routine observations and surveys, and preparing quarterly reports.

230. **Environmental Specialis**t: The environmental specialist (ES) is hired by UWSCG under the Urban Services Improvement Investment Program (USIIP) to assist and advise the Division of Resettlement and Environmental Protection (DREP) of UWSCG in investment program implementation in compliance with the, ADB Safeguard Policy Statement, 2009 and National Legislation, and oversee the work of DCs and SCs in safeguard compliance. ES supports DREP in EARF implementation, in particular, reviewing IEE/EIA Reports and overseeing implementation of EMP/SEMPs. In training and capacity building activities

231. The Contractor has the following obligations:

- to employ Environmental consultant responsible for developing and implementing the construction phase EMP and for provision of corresponding information toUWSCG and SC;
- to prepare SSEMP;
- to develop, if required, a Spoil Disposal Plan and Construction Waste Disposal Plan agreed with the MoENRP and Local government;
- to prepare and update Construction Schedule;
- The SSEMP implementation costs should be included into the construction budget

B. Reporting

232. The **Contractor** is responsible for the preparation of weekly environmental monitoring report that should be sent to SC.

233. The **Supervision Consultant** is responsible for the preparation of quarterly environmental monitoring reports that should be sent to UWSCG

234. The **USIIP Environmental Specialist** is responsible for the preparation of bi-annual and annual environmental monitoring reports (based on contractor's and supervisor's and its own audit reports) and will provide to ADB.

C. Inspection

235. The Employer will regularly inspect works undertaken by the contractor to check on the implementation of environmental management and monitoring requirements. A non-compliance notice will be issued to the contractor if the employer requires action to be taken. The contractor is required to prepare a corrective action plan which is to be implemented by a date agreed with the employer. The non-compliances will be ranked according to the following criteria:

236. **Non-compliance Level I**: A noncompliance situation not consistent with the requirements of the concession agreement, but not believed to represent an immediate or severe social or environmental risk.Repeated Level I concerns may become level II concerns if left unattended.

237. **Non-compliance Level II**: A noncompliance situation that has not yet resulted in clearly identified damage or irreversible impact, but which potential significance requires expeditious corrective action and site specific attention to prevent severe effects.

238. **Non-compliance Level III**: A critical situation, typically including observed significant social or environmental damage or a reasonable expectation of very severe impending damage, intentional disregard of specific prohibitions is also classified as a level III concern. The failure to prepare a corrective action plan or to implement it within the required time frame will result in the owner undertaking the works and the cost, and 20% will be recovered from the final payment to the Contractor.

239. The contractor will have a system for recording and communicating any complaints received by any person employed by or contracted to the Contractor. All complaints will be communicated in writing to the Employer within one working day of their receipt.

D. Implementation Costs

240. The Costs for Environmental Management of the project shall mainly consist of the (i) monitoring of works by the EMS who will be employed by the SC; (ii) baseline and regular parametric measurements of noise, dust and emission (water quality testing may not be needed unless water supply sources will be affected by the construction works). All of the implementation of mitigation measures shall be part of the contractual works and obligation of the Contractor.

241. The cost for the environmental management for construction period is tentatively estimated.

Table 18: Environmental management cost

Item	Quantity[1]	Unit Cost	Total Cost	Remarks
Baseline Parametric Measurements	6	200 USD	1,200	To be conducted by the Contractor for noise, air emissions, dust (and water, if necessary) measurements
Monthly Parametric Measurements (at least	72	200 USD	14,400	Tests to be conducted by the Contractor at 2 sites x 36

[1]To be established by CS Consultant and Environmental Specialist.

Item	Quantity[1]	Unit Cost	Total Cost	Remarks
2 sites)[2]				months monthly monitoring
Noise, air emissions, dust measurements at Bashi Reservoir during use of heavy equipment	100	10 USD	1,000	Tests to be conducted by the Contractor during demolition and construction.
Environmental Management Specialist (SC)	36 months	2,500 USD	90,000	The costs are included in the contract signed between UWSCG and SC and no additional costs will occur.
Dust and noise barriers	1	10,000 USD	10,000	To be installed by Contractor at Bashi reservoir
Miscellaneous			11,660	10% for above Items
Subtotal			128,260	Total for above
Contingency			15,391	12% of Subtotal
GRAND TOTAL			143,651	For the entire construction period of 36 Months

Table: Environmental Management Cost for Jvari

Item	Quantity[2]	Unit Cost	Total Cost	Remarks
Baseline Parametric Measurements	6	200 USD	1,200	To be conducted by the Contractor for air emissions, dust, vibration measurements
Monthly Parametric Measurements (at least 3 sites) Noise, vibration and dust	108	200 USD	21 600	Tests to be conducted by the Contractor at 3 sites x 12 months monthly monitoring. Noise, dust and vibration should be monitored on the regular bases as well as during the peak operation of Construction Equipment and Machinery.
Environmental Management Specialist (SC)	12 months	2,500 USD	12 500	The costs are included in the contract signed between UWSCG and SC and no additional costs will occur.

[2]To be established by CS Consultant and environmental specialist.

Item	Quantity[2]	Unit Cost	Total Cost	Remarks
Environmental specialist (Contractor)	12 month	1500 USD	7500	The costs will be included in the contract signed between UWSCG and Contractor.
E&HS Trainings	2	2500 USD	5000 USD	Training should be conducted for all persons involved in construction process
Traffic Specialist	12 month	2.500	12.500	Specialist will be hired in scope of three projects took place in Jvari at the same time
Miscellaneous			6030	10% for above Items
Subtotal			66 330	Total for above

[2]These may be moving sites, based on the construction intensity (network, pumping stations, transmission line) and will be determined by SC and ES.

Table 19: Environmental Impacts and Mitigation Measures

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost
Pre-Construction				
Possible removal of Terrestrial habitat. Loss of the top soil	Sites rehabilitated before contractor leaves site upon completion of construction activities. Planting and stabilization of site, including replacement of any native plant species	Construction Contractor	Construction and labourcamp, storage area. WS Pipe construction	Part of construction cost
Construction				
Ambient Air and Local Dust[3]	• Cover or damp down by water spray on the excavated mounds of soil to control dust generation; • Apply water prior to levelling or any other earth moving activity to keep the soil moist throughout the process; • Bring the material (aggregate and sand) as and when required; • Ensure speedy completion of work and proper site clearance after completion; • Damp down unsatisfied /bad condition roads to avoid dust generation while using for transport of waste/material • 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/unloading inside barricaded area • Clean wheels and undercarriage of haul trucks prior to leaving construction site • Don't allow access in the work area except workers to limit soil disturbance and prevent access by fencing	Constructor Company	Excavation areas for trenches at Zugdidi and Jvari towns, pumping station and reservoir construction areas	Part of construction cost

[3]Environmental Quality Norms approved by the Order #297N (16.08.2001) of the Ministry of Labour, Health and Social Protection (as amended by the Order No 38/n of the same Ministry of 24.02.2003). The quality of atmospheric air (pollution with hazardous matter) is also defined by the order of the Minister of Environment Protection and Natural Resources (#89, 23 October 2001) on approval of the rule for calculation of index of pollution of atmospheric air with hazardous pollution

Potential Negative Impacts	Mitigation measures	Responsi-bility	Location	Cost
	The Contractor shall coordinate with local Traffic Management Department to minimize construction traffic impact in the following topics: • Temporary parking restrictions, • Pedestrian and cyclist diversion routes where construction prevents access, • Temporary traffic signals, • One way scheme, • Maintaining local residential access at all times, • General traffic diversion routes where roads are closed. • Sound barriers should be erected at schools and hospitals if the distance to the construction site is less than 50 m	Contractor	Transportationroutes of construction materials	Part of construction cost
Noise Pollution[4]	• Maintain machinery and vehicle silencer units to minimize noise • Keep noise generating activities associated with construction activities to a minimum and within working hours. • Notify the residents of Zugdidi and Jvari towns close to the Project area prior to commencement of the construction phase. • Vehicles and machinery that are used intermittently should not be left idling condition for long period of time. • Equipment used on site will be quietest reasonably available. • Haul routes for construction traffic entering and leaving the site will be selected to ensure noise levels at noise sensitive recep-	Construc-tor Company	Excavation areas for trenches at Zugdidi and Jvari towns pump station and reservoirs construction area	Part of construction cost
Impact on surface water bodies due to construction[5]	• In case of heavy rain, protect open trenches from entry of rain water by raising earthen bunds with excavated soil • Confine construction area including the material storage (sand and aggregate) so that runoff from upland areas will not enter the site	Construction Contractor	Project area	Part of construction cost

[4]The Georgian standards for noise control as approved by the Decree of the Minister for Health, Labour and Social Affairs (297n of August 16, 2001) upon the 'Approval of Environmental Quality Standards', which specify the tolerable and maximum admissible levels of noise for different zones

[5]Rules of the Protection of the Surface Waters of Georgia from Pollution

Potential Negative Impacts	Mitigation measures	Responsi-bility	Location	Cost
	• Ensure that drains are not blocked with excavated soil			
Soil Contamination	• The contractors will be required to instruct and train their work-force in the storage and handling of materials and chemicals that can potentially cause soil contamination. • Solid waste generated during construction and at campsites will be properly treated and safely disposed of only in demarcated waste disposal sites. • Construction chemicals will be managed property • Clearly labelling all dangerous products, • Fuel tanks (diesel or oil) should be placed in a concrete pool which its perimeter walls will be at least 1.0 m high with the con-crete or plastered masonry wall, • A proper floor drain should be installed on the slab of the con-crete pool for safely discharging the leakages.	Construc-tionCon-tractor	Construction site Camp	Part of con-struction cost
Impact on Flora and Fauna	• Avoid tree cutting • In unavoidable cases, plant four trees of same species for each tree that is cut for construction • The trench shall not be kept open in the night/after working hours. This will avoid any safety risk to people, domesticated, stray or wild animals. • The Contractor shall ensure that the work site be kept clean, tidy and free of rubbish that would attract animals.	Construc-tion Con-tractor	Construction sate Camp	Part of con-struction cost
Impact on Traffic	• Inform all residents and businesses about the nature and dura-tion of any work well in advance so that they can make neces-sary preparations if necessary; • Provide wooden walkways/planks across trenches for pedestri-ans and metal sheets where vehicle access is required • Increase workforce to complete the work in minimum time in these stretches • Initial situation of private properties has to be re-established after construction		Construction site Access Road	Part of con-struction cost
Hazardous Materials	• Comply with all national, regional and local legislation with regard to the storage, transport, use and disposal of petroleum, chemi-		Construction site Storage Area	Part of con-struction cost

Potential Negative Impacts	Mitigation measures	Responsi-bility	Location	Cost
	cal, harmful and hazardous substances and materials. • Establish an emergency procedure for dealing with spills or releases of petroleum. • Storage of all hazardous material to be safe, tamper proof and under strict control. • Petroleum, chemical, harmful and hazardous waste throughout the site must be stored in appropriate, well maintained containers. • Any accidental chemical / fuel spills to be corrected immediately.			
Solid Waste	• Place of disposal of the waste concerned must be enclosed. • The waste must not have access to drainage water. • Waste must be immediately removed from the working sites. • Waste must be placed in secondary protective basins. • This waste can be transferred only to a certified contractor. The personnel involved in the handling of hazardous and non-hazardous waste will undergo specific training in: • Waste handling • Waste treatment; and • Wastestorage.		Project area Storage Area Construction camp	Part of construction cost
Solid waste (after the demolishment of Bashi reservoir or other structure required for Jvari Project)	• Before demolition of the building install dust and noise protective barrier; • Prohibited use of the blasting equipments during the demolition process of reservoirs; • Prior to the commencement of any activity, the project shall identify whether any machinery or planned action will cause significant vibration. If is the answer is yes, the project is to undertake a condition survey of all structures within the zone of influence; • The project shall monitor vibration at the nearest vibration-sensitive receptors at the start of and during use non-blasting equipment causing vibration; If vibration levels are monitored and found to exceed the vibration threshoild according to relevant criteria, the contractor shall modify the construction activities until compliance with the criteria has been achieved;			

Potential Negative Impacts	Mitigation measures	Responsi-bility	Location	Cost
	• Restrict demolition activities during period of the high winds or under more stabile conditions when winds could nevertheless direct dust towards adjacent communities; • Using a water truck for dust suppression on all exposed areas as required; • Active areas adjacent to residents should be kept damp at all times; • Establish and enforcing vehicle speed limits t minimize dust generation; • Using tarpaulins to cover fugitive loads (for demolition concrete materials) on haul trucks moving off-site; • Select plant and equipment, design work practices, and limit hours of operation to minimize potential impacts as far as practicable; • Operators of noisy equipments or any other workers in the vicinity of excessive noisy equipment are to be provided with ear protection equipment; • Under noisy conditions, do not allow operators or other workers to be exceed the threshold that has been establish for exposure to noise; • Schedule construction so as to minimize the multiple use of the most noisy equipments near sensitive receivers; • Ensure that all equipments is in good repair and operated in the correct manner; Consult with local residents and building owners the address community concerns			
Loss of top soil	• Top soil of about 1 ft depth (0.3 m) shall be removed and stored separately during excavation work, and after pipeline construction the same soil shall be replaced on the top.	Civil Contractor	Pipeline work in pasture lands, agricultural land,	Part of construction cost
Erosion due to excavation/refilling	• 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. • In the steep slopes, local grass species shall be planted on the refilled trenches.	Civil Contractor	All construction sites	Part of construction cost

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost
Impact on air quality due to emissions from construction equipment/vehicles	• Ensure that all equipment & vehicles used for construction activity are in good condition and are well maintained • Ensure that all equipment & vehicles confirms to emission and noise norms	Civil Contractor	Zugdidi and Jvari towns, construction area	Part of construction cost
Socio-economic benefits from employing local people in construction work	• To the extent possible labour force should be drawn from the local community	Civil Contractor	All construction sites	Part of construction cost
Impacts due to import of labour and establishment of temporary labour camps	• In unavoidable case of sourcing labour from other areas, provide adequate housing facilities so that there are no impacts and conflict with the local people: o Establish temporary labour camps in consultation with the local authority o Shall be located away from water bodies o No clearance of trees vegetation shall be allowed for establishment of camp o Provide all basic amenities (water supply and sanitation, waste collection & disposal, first aid facilities, etc.) o Contractor shall provide fire wood and no worker shall be allowed to cut any tree o Ensure regular and clean maintenance of the camp	Civil Contractor	Temporary labour camps	Part of construction cost
Safety risk – public and worker	• Follow standard and safe procedures for all activities – such as provision of shoring in deep trenches (>2 m) • Exclude public from the site – enclose construction area, provide warning and sign boards, security personnel • Provide adequate lighting to avoid accidents • Ensure that all workers are provided with and use appropriate Personal Protective Equipment - helmets, hand gloves, boots, masks, safety belts (while working at heights etc.); • Maintain accidents records and report regularly • Trench construction shall be taken up in small segments, so that work (excavation, pipe laying and refilling) in each segment is completed in a day. No trenches shall be kept open in the night/after work hours.	Civil Contractor	All construction sites	Part of construction cost
Historical, archaeological	• Contractor shall put in place a protocol for conducting any exca-	Contractor	All construction	Part of con-

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost
chance finds during excavation	vation work, to ensure that any chance finds are recognized and measures are taken to ensure they are protected and conserved. This should involve: o Having excavation observed by a person with archaeological field training; o Stopping work immediately to allow further investigation if any finds are suspected; o Calling in the state archaeological authority if a find is suspected, and taking any action they require to ensure its removal or protection in situ..		sites	struction cost
Cumulative impacts – repeated disturbance to roads and people	• Schedule the construction activities in harmony with the other ongoing works • Schedule works before road work	Civil Contractor, SC	Transmission line works, works on water supply network in the town	Part of construction cost
Operation Phase				
Health and Safety Hazards for UWSCG workers and the public	• Ongoing training programs for first aid and Occupational Health and Safety training to • Undertake periodic inspections of electrical equipment by qualified staff and periodic safety audits	UWSCG	Well field, water network	Part of operating costs
Sustainability of Infrastructure Efficiency and reliability of water supply systems	• Provide training for water 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 UWSCG staff • Undertake planned cleaning of town drains and dispose of sludge to designated disposal sites	UWSCG	Well field, water network	Part of operation costs

[3]Environmental Quality Norms approved by the Order #297N (16.08.2001) of the Ministry of Labour, Health and Social Protection (as amended by the Order No 38/n of the same Ministry of 24.02.2003). The quality of atmospheric air (pollution with hazardous matter) is also defined by the order of the Minister of Environment Protection and Natural Resources (#89, 23 October 2001) on approval of the rule for calculation of index of pollution of atmospheric air with hazardous pollution

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Noise Pollution[4]	• Maintain machinery and vehicle silencer units to minimize noise • Keep noise generating activities associated with construction activities to a minimum and within working hours. • Notify the residents of Zugdidi town close to the Project area prior to commencement of the construction phase. • Vehicles and machinery that are used intermittently should not be left idling condition for long period of time. • Equipment used on site will be quietest reasonably available. • Haul routes for construction traffic entering and leaving the site will be selected to ensure noise levels at noise sensitive receptors are kept at a minimum.	Construc-tor Company	Excavation areas for trenches at Zugdidi town pump station and reservoirs construction area	Part of construction cost
Impact on surface water bodies due to construction[5]	• In case of heavy rain, protect open trenches from entry of rain water by raising earthen bunds with excavated soil • Confine construction area including the material storage (sand and aggregate) so that runoff from upland areas will not enter the site	Construction Contractor	Project area	Part of construction cost

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Soil Contamination	• The contractors will be required to instruct and train their work-force in the storage and handling of materials and chemicals that can potentially cause soil contamination. • Solid waste generated during construction and at campsites will be properly treated and safely disposed of only in demarcated waste disposal sites. • Construction chemicals will be managed property • Clearly labelling all dangerous products, • Fuel tanks (diesel or oil) should be placed in a concrete pool which its perimeter walls will be at least 1.0 m high with the con-crete or plastered masonry wall, • A proper floor drain should be installed on the slab of the con-crete pool for safely discharging the leakages.	Construc-tionCon-tractor	Construction site Camp	Part of con-struction cost
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Impact on Traffic	• Inform all residents and businesses about the nature and dura-tion of any work well in advance so that they can make neces-sary preparations if necessary; • Provide wooden walkways/planks across trenches for pedestri-ans and metal sheets where vehicle access is required • Increase workforce to complete the work in minimum time in these stretches • Initial situation of private properties has to be re-established after construction		Construction site Access Road	Part of con-struction cost
Hazardous Materials	• Comply with all national, regional and local legislation with regard to the storage, transport, use and disposal of petroleum, chemi-		Construction site Storage Area	Part of con-struction cost

Potential Negative Impacts	Mitigation measures	Responsi-bility	Location	Cost
	cal, harmful and hazardous substances and materials. • Establish an emergency procedure for dealing with spills or releases of petroleum. • Storage of all hazardous material to be safe, tamper proof and under strict control. • Petroleum, chemical, harmful and hazardous waste throughout the site must be stored in appropriate, well maintained containers. • Any accidental chemical / fuel spills to be corrected immediately.			
Solid Waste	• Place of disposal of the waste concerned must be enclosed. • The waste must not have access to drainage water. • Waste must be immediately removed from the working sites. • Waste must be placed in secondary protective basins. • This waste can be transferred only to a certified contractor. The personnel involved in the handling of hazardous and non-hazardous waste will undergo specific training in: • Waste handling • Waste treatment; and • Wastestorage.		Project area Storage Area Construction camp	Part of construction cost
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Loss of top soil	• Top soil of about 1 ft depth (0.3 m) shall be removed and stored separately during excavation work, and after pipeline construction the same soil shall be replaced on the top.	Civil Contractor	Pipeline work in pasture lands, agricultural land,	Part of construction cost
Erosion due to excavation/refilling	• 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. • In the steep slopes, local grass species shall be planted on the refilled trenches.	Civil Contractor	All construction sites	Part of construction cost

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost
Impact on air quality due to emissions from construction equipment/vehicles	• Ensure that all equipment & vehicles used for construction activity are in good condition and are well maintained • Ensure that all equipment & vehicles confirms to emission and noise norms	Civil Contractor	Zugdidi town, construction area	Part of construction cost
Socio-economic benefits from employing local people in construction work	• To the extent possible labour force should be drawn from the local community	Civil Contractor	All construction sites	Part of construction cost
Impacts due to import of labour and establishment of temporary labour camps	• In unavoidable case of sourcing labour from other areas, provide adequate housing facilities so that there are no impacts and conflict with the local people: o Establish temporary labour camps in consultation with the local authority o Shall be located away from water bodies o No clearance of trees vegetation shall be allowed for establishment of camp o Provide all basic amenities (water supply and sanitation, waste collection & disposal, first aid facilities, etc.) o Contractor shall provide fire wood and no worker shall be allowed to cut any tree o Ensure regular and clean maintenance of the camp	Civil Contractor	Temporary labour camps	Part of construction cost
Safety risk – public and worker	• Follow standard and safe procedures for all activities – such as provision of shoring in deep trenches (>2 m) • Exclude public from the site – enclose construction area, provide warning and sign boards, security personnel • Provide adequate lighting to avoid accidents • Ensure that all workers are provided with and use appropriate Personal Protective Equipment - helmets, hand gloves, boots, masks, safety belts (while working at heights etc.); • Maintain accidents records and report regularly • Trench construction shall be taken up in small segments, so that work (excavation, pipe laying and refilling) in each segment is completed in a day. No trenches shall be kept open in the night/after work hours.	Civil Contractor	All construction sites	Part of construction cost
Historical, archaeological	• Contractor shall put in place a protocol for conducting any exca-	Contractor	All construction	Part of con-

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost
chance finds during excavation	vation work, to ensure that any chance finds are recognized and measures are taken to ensure they are protected and conserved. This should involve: o Having excavation observed by a person with archaeological field training; o Stopping work immediately to allow further investigation if any finds are suspected; o Calling in the state archaeological authority if a find is suspected, and taking any action they require to ensure its removal or protection in situ..		sites	struction cost
Cumulative impacts – repeated disturbance to roads and people	• Schedule the construction activities in harmony with the other ongoing works • Schedule works before road work	Civil Contractor, SC	Transmission line works, works on water supply network in the town	Part of construction cost
Operation Phase				
Health and Safety Hazards for UWSCG workers and the public	• Ongoing training programs for first aid and Occupational Health and Safety training to • Undertake periodic inspections of electrical equipment by qualified staff and periodic safety audits	UWSCG	Well field, water network	Part of operating costs
Sustainability of Infrastructure Efficiency and reliability of water supply systems	• Provide training for water 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 UWSCG staff • Undertake planned cleaning of town drains and dispose of sludge to designated disposal sites	UWSCG	Well field, water network	Part of operation costs

E. Monitoring

242. Monitoring describes (a) monitoring measures with technical details, including parameters to be measured, methods to be used, sampling locations that will signal the need for corrective actions; and (b) monitoring and reporting procedures to ensure early detection of conditions that necessitate particular mitigation measures and document the progress and results of mitigation.

243. A program of monitoring will be required to ensure that all concerned agencies take the specified action to provide the required mitigation, to assess whether the action has adequately protected the environment, and to determine whether any additional measures may be necessary. Regular monitoring of implementation measures by Civil Contractors will be conducted by the SC, on behalf of Implementing Agency. Monitoring during operation stage will be conducted by the UWSCG.

244. 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. The regular control and inspection during general construction activities in Zugdidi is needed.

Table 20: Environmental Monitoring Plan for general construction activities in Zugdidi

Item	Parameter	Frequency	Action Level	Response WhenAction Level Exceeded	Responsib
Pre construction					
Tender documentation	Environmental Issues	Once before bid announcement	Environmental audit of bidding documents to ensure relevant sections of the EMP have been included	The bidding document shall reflect all environmental mitigation measurements	SC
Contract documentation with construction contractor	Environmental Issues	Once before contract signature	Environmental audit of contract documents to ensure relevant sections of the EMP have been included	The contract document shall reflect all environmental mitigation measurements	SC
Construction					
Ambient Air[6]	Dust	Continual	Visual assessmentduring the WorksImpact MonitoringComplianceMonitoring	If dust levels are above acceptable visual levels,implement dust suppressiontechniques (wetting down area) and/or assess weather-conditions and maybe temporarily cease works untilconditions ease	SC will monitor based on measurements executed by the Contractor
Vibration (During demolition of reservoirs and transportation of inert materials)	Level of vibration.	Continual	Monitoring	If vibration levels are monitored and found to exceed the vibration threshoild according to relevant criteria, the contractor shall modify the construction activities until compliance	SC will monitor based on measurements executed by the Contractor

[6]Environmental Quality Norms approved by the Order #297N (16.08.2001) of the Ministry of Labour, Health and Social Protection (as amended by the Order No 38/n of the same Ministry of 24.02.2003). The quality of atmospheric air (pollution with hazardous matter) is also defined by the order of the Minister of Environment Protection and Natural Resources (#89, 23 October 2001) on approval of the rule for calculation of index of pollution of atmospheric air with hazardous pollution

Item	Parameter	Frequency	Action Level	Response WhenAction Level Exceeded	Responsib
				with the criteria has been achieved	
Noise[7]	(15 minute)Noise Levels	Only as required:Periodic attendedMonitoring at hourlyintervals at nearestpotentially sensitivereceivers.	+20 dBA for shortterm (1 month)	If noise action level is exceeded then review workpractices and noisecontrol procedures,including maintenance ofequipment, installation ofsilencers, provisionof noise barriers andmodification of workhours.	SC will monitor based on measurements executed by the Contractor
WaterQuality	Quality/Contaminantconcentrates	Continue in rain weather	guideline / licence requirements (whichever is Applicable) Impact Monitoring Compliance Monitoring	If contaminant concentrations/licence conditions are exceeded, review disposal options and decide on most applicable. Report any accidences of licence (of applicable) to issuing authority.	SC will monitor based on measurements executed by the Contractor
WasteManagementImplications	Segregation,Storage and-transport ofwastes	Monthlyinspection	Visualassessmentduring the Works;- Field inspection,- Report of waste-volumesgeneratedReport and recordall leakages andspills Impact MonitoringComplianceMonitoring	Solid waste cycledis 0 % of movementof solids or liquidwaste through thesoil, rocks, water,atmosphere.	SC
Ground	SoilMonitoringand ErosionControl	Continual	Assess adequacy of sedimentation/environmentalcontrols onsiteImpact Monitoring	If controls havefailed or are found inadequate, cease works immediately and repair to an acceptable standard	SC
EcologicalResources	Fauna andFlora	Continual	MinimalecologicalimpactsImpact	Required to ensurethe	SC

[7]The Georgian standards for noise control as approved by the Decree of the Minister for Health, Labour and Social Affairs (297n of August 16, 2001) upon the 'Approval of Environmental Quality Standards', which specify the tolerable and maximum admissible levels of noise for different zones

Item	Parameter	Frequency	Action Level	Response WhenAction Level Exceeded	Responsib
			Monitoring	recommendedmitigation measuresare properly implemented.	
Landscapeand Visual	Surfacetreatment oftemporarystructures	Once at theCompletionof work	Minimumdisturbance of theoriginal landscapeImpact Monitoring	Required to ensurethe recommendedmitigation measuresare properly implemented	SC
Operation					
Conduct source quality monitoring	As per the government regulations	1 sample from each borehole	Comparison with the base values and standards as per government regulations	Required to ensure the recommended mitigation measures are properly implemented.	UWSCG
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 base values and standards as per government regulations	Required to ensure the recommended mitigation measures are properly implemented.	UWSCG

IX. CONCLUSION AND RECOMMENDATION

A. Recommendation

245. The environmental impacts of infrastructure elements proposed in the water supply system improvement subproject in Zugdidi have 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 sub project components. Mitigation measures have been developed to reduce all negative impacts to acceptable levels.

246. Mitigation measures were discussed with engineering specialists, and such measures have already been included in the designs.

247. Regardless of these and various other actions taken during the IEE process and in developing the project, there will still be impacts on the environment when the infrastructure is built and when it is operating. Appropriate monitoring measures to guarantee the long term and sustainable operation of the waste water system are presented in a monitoring plan.

248. When operating, water supply components will have overall beneficial impacts to human health and the environment as it will provide the inhabitants of Zugdidi with a new water supply system.

249. The main beneficiaries of the improved system will be the citizens of Zugdidi, who will be provided with a new water supply system. This will improve the quality of life of people as well as raising the standards of both individual and public health as the improvements in hygiene should reduce the incidence of disease. 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.

250. Mitigation will be assured by a program of environmental monitoring conducted during both construction and operation to ensure that all measures are provided as intended, and to determine whether the environment is protected as envisaged.

251. The recommendation of this Environmental Assessment process is that all mitigation, enhancement and monitoring activities proposed here shall be implemented in full. This is essential to ensure that the environmental impacts are successfully mitigated; this is the responsibility of UWSCG.

B. Conclusion

252. The environmental impacts of the proposed water supply components have been assessed by the Initial Environmental Examination reported in this document.

253. An Environmental Management Plan (EMP) has been prepared and will be implemented during the project implementation. The EMP identifies the potential environmental impacts arising from the project along with a set of the mitigation measures to reduce the impacts to acceptable levels. It also includes the institutional arrangements for implementing the EMP to ensure its effectiveness.

254. The overall conclusion of the IEE is that provided the mitigation and enhancement measures are implemented in full, there should be no significant negative environmental impacts as a result of location, design, construction or operation of the subpro-

ject. There should in fact be positive benefits through major improvements in quality of life and individual and public health once the scheme is in operation.. Project will stimulate economic growth. The water good quality is a prerequisite for tourism development. Standard of individual and public health will improve as a result of the project. Project will generate new job opportunities.

Appendices

Appendix 1

Minutes of Meeting of Public Hearing on 3rd of July 2014

LCC "United Water Supply Company of Georgia"

Public Hearing Meeting
Improving the Water Supply System in Zugdidi

Initial Environmental Examination Report

17:00 pm

Minutes

Zugdidi 03.07.2013

The following persons attended the meeting:

1. Ketevan Chomakhidze– "United Water Supply Company of Georgia, LLC" (UWSCG), USIIP, Environmental Specialist;
2. Nino Abuladze - "United Water Supply Company of Georgia, LLC", Department of Investments Programs, Investment Project Manager
3. Beka Giorgadze - "United Water Supply Company of Georgia, LLC", Department of Investments Programs, Investment Project Manager
4. Alexander Mikashvili – Representative of Kocks Georgia
5. David Potskhveria - "United Water Supply Company of Georgia, LLC", Head of the local service centre

The following residents of Zugdidiattended:

1. Erekle Berishvili – local resident
2. Teimurz Antelava – local resident
3. Giorgi Gasashvili – Sakrebulo, Zugdidi municipality
4. David Kodua – Samegrelo Zemo svaneti region, Governer's Office
5. Nugzar Gabelia– Samegrelo Zemo svaneti region, Governer's Office
6. Merab Kvaraia – gamgeblis movaleobis semsrulebeli
7. Natia Bzjalava – Local NGO/Centre for the Local Democracy
8. Paata Lemonjava – local resident
9. Ramaz Kiria - localresident

Meeting Agenda

The public hearing was held on July 3, 2014 in Zugdidi Service Centre and commenced at 16:00 p.m.. The consultative meeting was organized with representatives from the local population of Zugdidi. The meeting covered the water supply system to be constructed in Zugdidi.

By giving advertisements in advance, attendance of a wide range of related people to the meetings was encouraged. During the public hearing, citizens were informed about the activities to be carried out within the scope of the project, environmental effects of

the project and measures to be taken against these effects. Opinions, ideas and suggestions of the local residents and related people were received during the meeting.

Public Opinion

Consultation with affected population was undertaken

- to ensure their informed participation in the design, implementation and monitoring of the project measures and their impacts on the environment, as well as the efforts to minimize and the mitigate impact when avoidance is not possible;
- to introduce the project benefits to the local population that accrue to them as a result of project implementation;
- to incorporate all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues.

The following topics were discussed during the meeting:

- project context and rationale
- expected start and end of the project
- benefits of the project to local population and to the country as a whole
- the environmental issues and mitigated measures related to the project

The power point presentations were held by Ketevan Chomakhidze. She presented full information for present local residents and attendees about projected activities and described the project nature and estimated impacts as a result of this project implementation.

Local residents and the representatives of UWSCG held discussions about particular issues during the meeting.

The following questions were asked from the local population.

#	**Questions from local residents**	**Answers from the United Water Supply Company of Georgia**
1	What is duration and date of completion of the construction of the project?	Duration of the construction is three years, project will start in 2015 and finish in 2018
2	Who is responsible for repair and maintenance of pipes in case of damage?	United Water Supply Company of Georgia
3	Who will supervise and monitor construction and operation of the project?	UWSCG and Supervision Consultant
4	What type of impact on environment is associated with the project?	Environmental impacts that are associated with the project are only site specific. Impacts are mostly confined to the construction stage of the project and are therefore temporary. For permanent environmental impacts during operation stage, suitable mitigation measures will be implemented

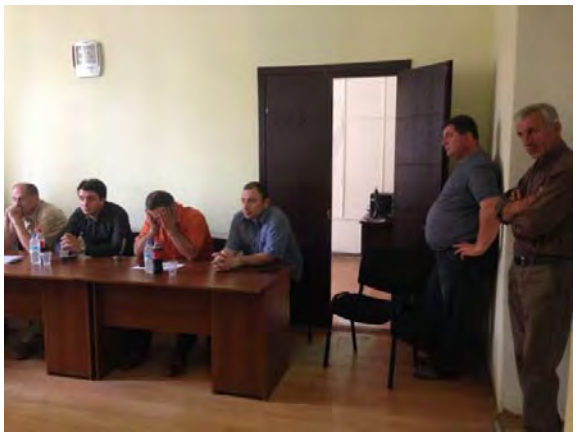
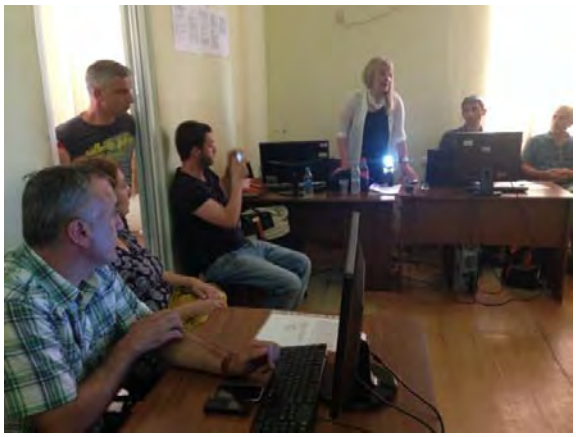
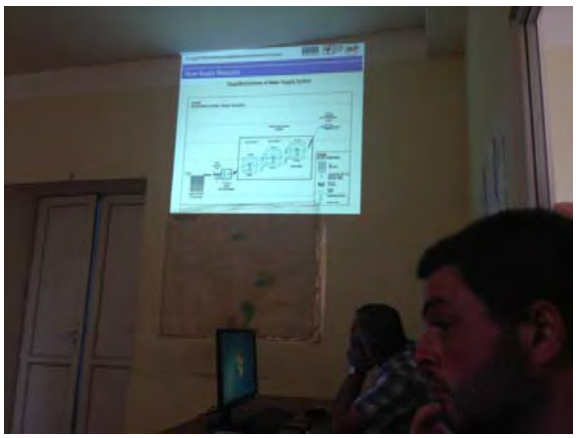
#	Questions from local residents	Answers from the United Water Supply Company of Georgia
5	What will be benefit for local population from the rehabilitation of the water supply system in Zugdidi?	The Project will have overall beneficial impacts on quality of life for the citizens of Zugdidi. It will stimulate economic growth by constant supply and good quality of drinking water which is a prerequisite for development.
6	Who is implementing and sponsoring the Project?	Project is co-financed by the Asian Development Bank (ADB) and the Government of Georgia and implemented by the United Water Supply Company of Georgia (UWSCG).
7	What type of impact on environment is associated with the project? And what mitigation measures will be taken?	Within the proposed sub-project old reservoir will be demolished and a new reservoir will be constructed.The new wells will be on land that has been used agriculturally. The likely impacts are short-term, localized and can either be easily avoided or mitigated. There are other impacts associated with the construction process because that process is invasive, involving trenching and other ground disturbance. However the routine nature of the impacts means that they can be easily mitigated. Impacts mainly arise from generation of dust from soil excavation and refilling; and from the disturbance of residents, traffic and activities by methods suggested for their mitigation. These include: (i) utilizing surplus/waste soil for beneficial purposes; (ii) using measures to reduce/control dust generation; (iii) providing prior public information; (iv) planning transport routes/schedules carefully and awareness creation in drivers; (v) following standard and safe procedures for public and worker safety; (vi) avoiding night-time construction activities; (vii) avoiding tree cutting through location alignment changes; and (viii) avoiding hazards during construction by securing the site at critical segments. There are no health and safety risks associated with the subproject. There will be no access for unauthorized persons. No major waste generation is anticipated.
8	Where will the reservoir be constructed?	Bashi reservoir will be constructed at the same location of the present reservoir.
9	What will be the size of the transmission main?	DN 700.
10	What is the water source?	A new well field in Inghiri.
11	What is the construction period for the reservoir?	This question could not be answered and was noted for the next meeting.
12	Where there alternatives for the water source?	Other sources were investigated but did not show a sufficient yield, so Inghiri was selected.
13	When will the construction start and when will it	It will begin in 2015 and end in 2018.

#	Questions from local residents	Answers from the United Water Supply Company of Georgia
	end?	
14	Which area will be supplied with drinking water? Are the villages between Inghiri and Bashi included?	As we know water supply system will be built only inside Zugdidi town borders.
15	What are the construction costs?	This question could not be answered and was noted for the next meeting.
16	Why was it decided to first construct the water supply system and not to improve the wastewater drainage?	A survey showed that the improvement of the water supply system was more important to the population of Zugdidi. The rehabilitation and extension of the wastewater system will be carried out in a next step.
17	How good is the elevation of Bashi reservoir for the supply of Zugdidi?	The hydraulic model of the water supply system confirmed that Bashi reservoir is at a sufficient elevation.
18	What is the consumption of electricity of the pumps and what is their efficiency?	This question could not be answered and was noted for the next meeting.
19	Was there no alternative for the water source with a higher elevation in order to avoid the pumping costs? Is it possible to ask local water engineers for advice?	During the design of the system the type and location of the source was discussed intensively with UWSCG. Geophysical investigations and test drillings were executed. Inghiri turned out to be the best solution.

General comments from the local community were concerns about the sanitation system in Zugdidi and wishes of the rehabilitation of sewerage system, including the waste water treatment plant.

Photos of the public hearing:




Appendix 2

Chance Finds Report Form

Please contact: _____
To discuss find, on: _____

Date of Find: _____ Person who identified find: _____

Description of Initial Find:

Was work stopped in the immediate vicinity of the find? ☐ Yes ☐ No
Was an archaeologist contacted? ☐ Yes ☐ No

Archaeological Detail:

Date of inspection: _____ Reporting Archaeologist: _____
GPS coordinates: Photo Record:
Zone: _____ N: _____ E: _____ ☐ Yes ☐ No
Does Chance Find Correspond to a known PNG National Museum site? ☐ Yes ☐ No
If Yes, which site code: _____
If No, temporary site code is: _____
If No, new Museum site code is: _____

Description of Find (fill in applicable information) (use additional pages if required):

Artefact type: _____
Max artefact length (in mm): _____ Max artefact width (in mm): _____
Max artefact thickness (in mm): _____ Max artefact platform width (in mm): _____

Approximate number of artefacts at site:
☐ 1
☐ 2 to 10
☐ > 10
☐ >50
Other: _____

Approximate size of site:
Site area: _____ m^2
Site length: _____ m
Site height (max) (for rockshelters/caves): _____ m

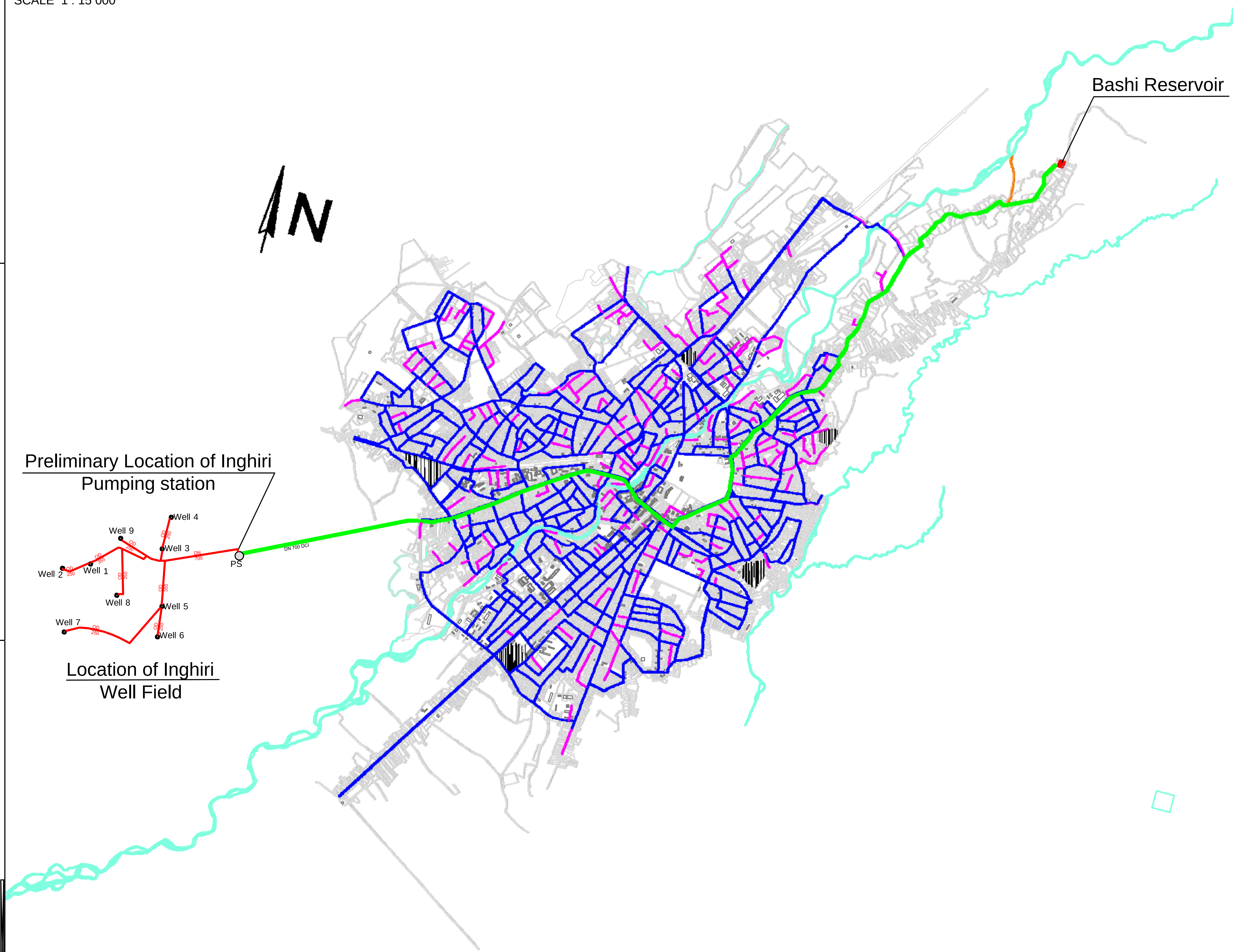
Brief description of site and vegetation (e.g., surface sediment type, ground surface visibility, distance to nearest freshwater source, attach site sketch if necessary):

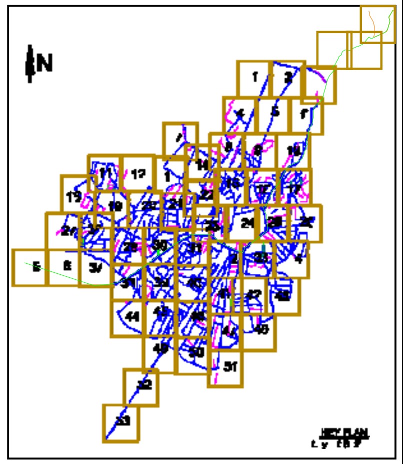
Brief description of find(s):

Statement of Significance (scientific, spiritual, historic, aesthetic and emotive and any evidence of stratification):

ZUGDIDI - WATER SUPPLY SYSTEM

SCALE 1 : 15 000





LEGEND

New Transmission Main

New Main Distribution Network

New Secondary Distribution Network

New Well Field pipeline

Railway

United Water Supply Company of Georgia LLC

Tbilisi, Georgia | Lead Management Koblenz, GER - Tbilisi GEO | Tbilisi, Georgia

Georgian Urban Services Improvement Investment Program

ZUGDIDI

DETAILED DESIGN Overview of Water Supply System SCALE 1 : 15 000

Drawing-No. :	Date :
ZUG-01-WS-1	MAY 2014

Appendix 4

სამეცნიერო-კვლევითი ფირმა "გამა"

დამკვეთი: შპს "კოქსი"
ნიმუშის დასახელება: ზუგდიდის კანალიზაციის წყალი
ნიმუშის მიღების თარიღი: 21.02.2014
ლაბ.ნომერი: 258w

ქ. ზუგდიდის კანალიზაციის წყლის ქიმიური ანალიზის შედეგები

№	განსაზღვრული პარამეტრი, ერთეული	მიღებული მნიშვნელობა
1	ამონიუმის იონი, მგ/ლ	837
2	ნიტრიტ იონი, მგ/ლ	38.0
3.	ნიტრატ იონი, მგ/ლ	95.0
4.	საერთო აზოტი, მგ/ლ	684
5.	საერთო ფოსფორი, მგ/ლ	21.9
6	შეტივნარებული ნაწილაკები, მგ/ლ	335
7	ჟჭმ, მგ/ლ O_2	>700
8	ლაქტოზადადებითი ჯგუფის ბაქტერიები, (100მლ) კწე	$>11\cdot10^9$

ლაბორატორიული სამსახურის ხელ-ლი: ტ.ადამია

27.02.2014

SCIENTIFIC RESEARCH FIRM GAMMA 17 Guramishvili av. 0192, Tbilisi, Georgia
Tel: +(995 32) 260 10 24 E-mail: t.adamia@gamma.ge; gamma@gamma.ge

Customer: LTD "Kocsi"
Sample name: water sample "Zugdidi Sewer water sample".
Data sampled: 21.02.2014
Lab # 258w

Results of chemical and microbiological examinations

№	Determined	Results
1	Ammonia, mg/l	837
2	Nitrite, mg/l	38.0
3.	Nitrate, mg/l	95.0
4.	N (Total), mg/l	684
5.	P (Total), mg/l	21.9
6	Suspend. Solids, mg/l	335
7	COD, mg/l O_2	>700
8	Lactose-positive bacteria Colony forming unit (100ml)	$>11 \cdot 10^9$

The work Leadership T. Adamia

27.02.2014

SCIENTIFIC RESEARCH FIRM GAMMA 17 Guramishvili av. 0192, Tbilisi, Georgia
Tel: +(995 32) 260 10 24 E-mail: t.adamia@gamma.ge; gamma@gamma.ge