Initial Environmental Examination

August 2016

GEO: Urban Services Improvement Investment Program – Tranche 6
(Improvement of Marneuli Water Supply System 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 of Georgia
MoE	**-**	Ministry of Environment and Natural Resources Protection of Georgia
SSEMP	**-**	Site Specific Environmental Management Plan
PS	**-**	Pumping Station
UWSCG	**-**	United Water Supply Company of Georgia
WS		Water Supply
WWTP	**-**	Waste Water treatment Plant

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A. EXECUTIVE SUMMARY

1. It is proposed to improve the water supply system in Marneuli under the Asian Development Bank (ADB) funded Urban Services Improvement Investment Program, which is under preparation stage. This Investment Program, implemented in seven 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 2015 to 2018. 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 7 secondary towns of Georgia. The Investment 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 service provider, 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. The scope of work under the consultancy services is to (i) assess the technical, financial, economic, and environmental feasibility of subprojects; (ii) conduct surveys and investigations; (iii) develop hydraulic models; and (iv) prepare detailed designs, drawings, cost estimates, specifications, and bid documents for implementing water supply and sanitation schemes in the Investment Program financed by the MFF.

4. Marneuli is located in the south-eastern part of the country in the Kvemo Kartli region, approximately 39 km south of Tbilisi, the capital of Georgia. It is the administrative centre of Marneuli District, which borders with Azerbaijan and Armenia. The total population of the town amounts to 22,506 (2010). Most of the population are Azerbaijan's, the largest ethnic minority of Georgia. The total area of Marneuli Municipality is 935 km² and the altitude of the territory in Marneuli lowland ranges between 350 to 600 meters above sea level. The highest point is the mountain Garadagh at 1,416 masl.

5. 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).

6. At present, only two out of six reservoirs with the total capacity of 3500 m^3 on the territory of the city due to their physical condition (the total capacity of the two reservoirs is 500 m^3 what is approximately 17% of the capacity of the existing reservoirs).As per the present situation, the water is supplied to 60% of the city of Marneuli and 40% of the adjacent villages. Water is supplied to the population in a scheduled manner, two or three days a week, for 4 hours a day The present Project envisages the disassembly of all reservoirs on the territory of the city of Marneuli and building 5 new reservoirs with the total capacity of 1200 m^3. The project also envisages building two new pumping stations.

7. A new 189-km-long water supply pipes will be laid on the territory of Marneuli, with 136 km of new pipes, and any broken down pipes along 43 km will be replaced by the new ones.

8. At the stage of developing the present document, the sensitive receptors were identified and baseline analyses of the following components were conducted: water quality, radiation, noise and air-weighted particles.

9. 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.

10. The new reservoirs to be uninstalled are located near the residential houses: (i) in 50 m for “Marneuli” reservoir and (ii) in 70 m for “Narimanoff” reservoir. Unless additional mitigation measures are taken, a negative impact on the population is expected both, during the disassembly of the old reservoirs and building of the new reservoirs.

11. In order to solve the said problem, the Contractor is obliged to construct a 140-metre-long noise attenuating wall on the territory of “Marneuli” and “Narimanoff” reservoirs.

12. Both, during the disassembly of the existing reservoirs and trench excavation and pipe installation, great amounts of inert waste will be accumulated. The Construction Contractor, in agreement with the local authority, shall select due sites to locate the inert waste. A certain amount of inert waste will be placed on Marneuli landfill, which is located 3 km from the city of Marneuli.

13. The Construction Contractor, prior to the onset of the construction, is obliged to conduct a number of studies and develop environmental plans, including (i) botanical study of the Project zone, (ii) Inert waste management plan, (iii) Site-Specific Environmental Management Plan (SSEMP) (iv), „Reinstatement management Plan“.

14. 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.

15. At the stage of developing the Initial Environmental examination (IEE) document, a number of consultation meetings will be held with the local population, local self-governing bodies and all concerned parties. On 23 March, 2015, at the building of the Municipality of the city of Marneuli, under the organization of UWSCG, a public discussion of the present Project was held. It was attended by both, the representatives of the organizations engaged in developing the Project and other interested entities.

16. 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.

17. 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.

B. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

18. 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.

B.1 ADB Policy

19. 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.

20. 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.

21. 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.

21. The Marneuli 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 ADB's Environmental Assessment and Review Framework (November 2010, Updated in May 2015) that was especially prepared for the environmental assessment of the Georgia Urban Services Improvement Investment Program.

22. *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.

B.2 Georgian Law

B.2.1 Framework Legislation

23. 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.

24. 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."

25. 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.

26. The **Law of Georgia on Environmental Impact Permit (2008)** 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.

27. 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 above-mentioned, 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.

28. The **Law of Georgia on Licenses 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 by-laws, 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, 28 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;

29. **The Law of Georgia on State Ecological Expertise (2008).** 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.

30. 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.

31. 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.

32. 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.

33. 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.

34.**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 Mitigationmeasures are listed for anticipated impacts.

B.2.2 Environmental Quality Standards and Norms

35. with the Law on Public Health, environmental quality standards and norms, among them those of air quality and noise level, are set by Decrees No. 297/N dated 16.08.2001 of the Minister of Labour, Health and Social Affairs of Georgia (including the changes made to it by further decrees of the Minister Nos. 38/N of 02.24.2003, 251/N of 09.15.1006, 351/N of 12.17.2007).Atmospheric air quality standards (level of hazardous pollution) are also defined by the Decree 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 pollutants.

Table 4. Maximum Admissible Concentrations (MAC) of harmful substances in Ambient Air

Substance	MAC, mg/m3
Nitrogen Dioxide	0.085
Sulphur Dioxide	0.5
Carbon Monoxide	5.0
Saturated Carbohydrates, C6-C10	30.0
Inorganic dust	0.3

36. 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.

37. In the case of noise, the WB/IFC standards will apply. Noise impacts should not exceed the levels presented in Table 5, or result in a maximum increase in background levels of 3 dBat the nearest receptor location off-site.

Table 5: Noise Level Guidelines[1] (IFC)

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

46. Environmental standards regulate quality condition requirements of the environment and determine maximum allowable concentration of substances harmful for human health and environment which are contained in water, air and soil.

47. In Georgia, soil quality evaluation criteria is determined by instructions on "Level of Chemical Contamination of Soil" (MM 2.1.7. 004-02). Information on maximum admissible concentrations of various substances and elements is soils are given in the Table6

Table 6: Maximum admissible concentrations of various substances and elements is soils

Component	Unit	Level
Arsenic	mg/kg	2-10
Copper	mg/kg	3
Mercury	mg/kg	2.1
Nickel	mg/kg	4
Lead	mg/kg	32
Zinc	mg/kg	23
Compound Hydrocarbons	mg/kg	0.1
Phenol (Compound)	mg/kg	-
Cyanide	mg/kg	-
Sulphate	mg/kg	-
Chloride	mg/kg	-
Ammonium Nitrogen	mg/kg	-
Evaporable Organic Compounds		
Benzoyl	mg/kg	0.3
Toluol	mg/kg	0.3
Ethylbenzene	mg/kg	-

[1]IFC - Environmental, Health, and Safety (EHS) Guidelines. 1.7 Noise

Compound Xylene (ortho-, meta-, para -)	mg/kg	0.3
Semi-Evaporable Compounds		
Benzoapiren	mg/kg	0.02
Izopropilen-benzol	mg/kg	0.5
Pesticides		
Atrazin	mg/kg	0.5
Linden	mg/kg	0.1
DDT (and its metabolite)	mg/kg	0.1

48. Georgian legislation does not regulate quality standards for groundwater. Quality of groundwater is regulated by norms set for potable water.

49. Potable water quality criteria are determined by technical regulations on potable water (Government Regulation N 58 fromJenuary 15, 2014 Potable water quality criteria are given in table7

Table 7: Potable Water Criteria

Index	Measuring unit	Standard not more than:
Common characteristics		
Hydrogen index	PH	6-9
Permanganate oxidation	mg O_2 /L	3,0
Nonorganic substance		
Barium (Ba^{2+})	mg/L	0.7
Boron (B,total)	mg/L	0.5
Arsenic (As,total)	mg/L	0.01
Quicksilver (Hg, nonorganic),	mg/L	0.006
Cadmium (Cd, total)	mg/L	0.003
Mangan (Mn, total)	mg/L	0.4
Milobden (Mo, total)	mg/L	0.07
Nickel(Ni, total)	mg/L	0.07
Nitrate(short impact by NO^-_3)	mg/L	50
Nitrite (long impact by NO^-_2)	mg/L	0.2
Selenium(Se, total)	mg/L	0.01
Copper(Cu, total)	mg/L	2.0
Lead (Pb, total)	mg/L	0.01
Flourine (F^-)	mg/L	0.7
Chromium (Cr^{6+})	mg/L	0.05
Antimony(Sb)	mg/L	0.02
Cyanide(CN^-)	mg/L	0.07
Organic substance		
Total content of pesticides	mg/L	O,05

B.2.3 Licenses& Approvals Required

51. 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.

52. The components of the proposed water supplysystems subproject in Marneuli are notified in the Law on EIP and therefore environmental impact permit is required.

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

53. 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 end.Angered 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).Below is the list of laws relevant to environmental protection.

Table 8: list of laws relevant to environmental protection

Framework Legislation	
1995	Constitution of Georgia (as amended 04.10.2013) Reg. No - 010.010.000.01.001.000.116
1996	Environmental Protection (as amended 26.12.2014) Reg. No - 360.000.000.05.001.000.184
Permitting Legislation	
2005	Licensing and Permitting (as amended 18.09.2014)
2007	Environmental Impact Permit (as amended 26.12.2014) Rag No - 360.160.000.05.001.003.078
2007	Ecological Expertise (as amended 25.03.2013) Reg. No - 360.130.000.05.001.003.079
2013	Regulation on EIA (as amended 15.05.2013 by the Decree No 31 of MoENRP)
Specific Environmental Laws	
1994	Soil Protection (as amended 26.12.2014 ფ) Reg. No - 370.010.000.05.001.000.080

1996	System of Protected Ares (as amended 30.04.2014) Reg. No - 360.050.000.05.001.000.127
2007	on Status of the Protected Areas (as amended 30.04.2014) Reg. No - 360.050.000.05.001.003.060
2014	Waste Management Code 26.12.2014 Reg. No -360160000.05.001.017608
1996	Minerals (as amended 26.12.2014) Reg. No - 380.000.000.05.001.000.140
1997	Wildlife (as amended 26.12.2014) Reg. No - 410.000.000.05.001.000.186
1997	Water Protection (as amended 26.12.2014) Reg. No - 400.000.000.05.001.000.253
1997	Transit and Import of Hazardous Waste within and into the Territory of Georgia as amended 11.03.2011) Reg. No - 300230000.05.001.016218
1998	Pesticides and Agrochemicals as amended 08.05.2012) Reg. No - 340120000.05.001.016723
1999	Atmospheric Air Protection as amended 5.02.2014) Reg. No - 420.000.000.05.001.000.595
1999	Forest Code as (amended 6.09.2013) Reg. No - 390.000.000.05.001.000.599
2003	Red List and Red Data Book of Georgia (as amended 6.09.2013) Reg. No - 360.060.000.05.001.001.297
Other Relevant Laws	
2007	On Cultural Heritage (as amended 26.12.2014) Reg. No - 450.030.000.05.001.002.815
2007	On Public Health (as amended 29.05.2014) Reg. No - 470.000.000.05.001.002.920
2005	On Fire Protection and Safety 24.06.2005 Reg. No - 140.060.000.05.001.000.355
2006	on Regulation and Engineering Protection of Coasts of Sea, Water Reservoirs and Rivers of Georgia – 27.12.2006

	Reg. No - 330.130.000.11.116.005.130
2014	Technical Regulations: “on Drinking Water standart”. Approved by the Government decree № 58 Reg. No- 300160070.10.003.017676
2014	Environmental Technical Regulations. Approved by the Government decree № 17 Reg No- 300160070.10.003.017608

54. 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).

B.2.3 Administrative Structure in Georgia

55. 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

56. 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.

57. 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.

58. 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.

59. 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.

60. 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).

B.3 Compare of the National legislation and ADB Requirements

61. 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.

62. 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.

63. 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).

64. 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 require EMPs for projects not requiring EIAs. The Asian Development Bank'sguidelines require EMPs for all categories of projects and provide detailed instructions on the content

65. 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.

66. 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.

67. 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.

68. 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 fulfillment. 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 9: Activities and responsibilities in EIA for national law and ADB policy

#	Action	Georgian Legislation	ADBRequirements
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, content and timing	Incorporate Monitoring and 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.

B.4 Harmonization of the ADB and Georgian Legislation Requirements

69. 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.

C. DESCRIPTION OF THE PROJECT

C.1 Type of the Project

70. This is an urban water supply improvement sub-project. It involves the restructuring of the water supply network, the exchange / reconstruction of old transmission pipes, the construction of five new reservoirs and two pumping stations.

C.2 Need of the Project

71. As discussed earlier, the service level of urban water supply and waste water treatment at present is not satisfactory in Georgia. Services are not available to the entire population and the serviced areas suffer with inefficient service levels. Systems are old and inefficient. The situation is no different in the program town of Marneili. Untreated sewage infiltrates into the underground and pollutes into rivers. The WSS project is needed because the present water supply infrastructure in Marneuli is inefficient and inadequate to the needs of the growing population and tourists.

72. The present water supply system covers about 90 % of urban and 60 % of rural population. In Marneuli, about 50 % of the population receives water thrice a week for 4-5 hours, and the rest receives twice a week for 4-5 hours. In villages the scenario is different; the villages which are located close to transmission main receive water daily (for 10-12 hours) while the rest of the villages are supplied 2-3 days a week for 4-5 hours. Based on the seasonal demand, 60 - 500 m^3/d water are supplied to the food processing industries located in Marneuli.Therefore the project is urgently needed.

C.3 General Information

73. Marneuli is located in the south-eastern part of the country in the Kvemo Kartli region, approximately 39 km south of Tbilisi, the capital of Georgia. It is the administrative centre of Marneuli District, which borders with Azerbaijan and Armenia. The total population of the town amounts to 22,506 (2010). Most of the population are Azerbaijanis, the largest ethnic minority of Georgia. The total area of Marneuli Municipality is 935 km^2 and the altitude of the territory in Marneuli lowland ranges between 350 to 600 meters above sea level. The highest point is the mountain Garadagh at 1,416 masl.

Map 1: Project Area

C.4 Existing Water Supply Facilities

C.4.1 Water Sources and Transmission System

74. Water abstraction is taking place at two basic sources, Kolagiri and Orjonikidze headwork. There is also a private supply south of Marneuli near the Orjonikidze headworks. These water sources currently provide the Municipality of Marneuli with a total amount of 14,650 m³/d drinking water.

75. The amount of water obtained daily from all three water intake sources are distributed as follows: (i) 8000 m^3/day from Kolagiri headworks; (ii) 5400 m^3/day from Orjonikidze headworks and (iii) 1250 m^3/day from a privately owned headworks.

C.4.2 Kolagiri Headwork

76. Kolagiri headwork are located 8.5 km south of Marneuli and supply the town with approximately 8,000 m³/d through boreholes and an infiltration gallery. At present the headwork consist of 21 boreholes, 18 of which are in operation. The collector tank has a volume of 300 m³ and the raw water is chlorinated at the site. The water is pumped at a level of 383 masl and transferred via a transmission main with a diameter of 630 mm and a length of 9.3 km to the city of Marneuli and to the Jandari pumping station. In the past, the water was first pumped into the City Reservoirs at Garadakh (2 x 1,000 m³) and then distributed into the city. But currently none of them are in use and the water is pumped directly into the water supply network. The control of the supply into the network and to the pumping station is managed with a valve located adjacent to Kizilajlo dry bridge, about 6.5 km from Kolagiri. The Jandari pumping station supplies the Jandari reservoir (250 m³) via a 273 mm transmission pipe with a length of approximately 2 km.

77. Works have already been tendered for the rehabilitation of Kolagiri headwork in the frame of the "Water Infrastructure Modernization Project" financed by the European Investment Bank (EIB). The rehabilitation measures that are going to be implemented include the following works:

- Arrangement of a horizontal water receiver with 23 boreholes and a pumping station;
- Arrangement of an auxiliary horizontal water receiver with 5 boreholes and a pumping station;
- Construction of one reservoir with a volume of 600 m³;
- Construction of dams to increase the water level in the river;
- Construction of a fence for the delineation of the groundwater protection zone.

78. After the implementation of these measures, the production of water for Marneuli and the surrounding villages will be improved. According to the Feasibility Study of 2010, the estimated future water production of Kolagiri headwork after the rehabilitation and the construction of boreholes will reach 15,600 m³/d.

C.4.3 Orjonikidze Headwork

79. Located 9.5 km south of Marneuli town, close to Khrami river, the Orjonikidze headworks produce 5,400 m³/d water through underground connector pipes (gallery pipeline). There are also 10 boreholes but they are not in operation.

80. The gallery pipeline intercepts the groundwater flow and the water is transmitted by gravity to the storage reservoir with a volume of 80 m³. The water is treated with chlorine and transmitted to Narimanov booster pumping station located 6.7 km from the source via a DN 273 mm pipe. The villages of Orjonikidze, Norgiughi and Tsereteli are supplied with water before the water reaches Narimanov.

81. The condition of the transmission mains and Narimanov pumping station as well is bad. In case of any future use their rehabilitation will be necessary.

C.4.4 Private Supply

82. A private company named “Soguri Limited” sells 1,250 m³/d water to UWSCG. The water source is located at Imiri village close to Orjonikidze headworks, 10 km south of Marneuli. There is a borehole and a collector well. Eight villages located south of Marneuli are supplied from this source.

C.4.5 Reservoirs

83. The total volume of the existing reservoirs in Marneuli amounts to 3,960 m³. As shown in Tab. 3 and 4, the storage volume of 460 m³ is provided for at the well fields while the remaining 3,500 m³ are distributed among various reservoirs in the city of Marneuli.

Table 10: Overview of Reservoirs at Well Fields

Location	Volume M^3	No of reservoirs
Kolagiri	**300**	**1**
Ordjonikidze	**80**	**1**
Private supply	**80**	**1**
Total	**460**	**3**

Table 11: Reservoirs in the City of Marneuli and Surrounding Areas

Location	Volume M^3	No of reservoirs	Details
City reservoirs	1000	2	not in use
PS to Jandari	250	1	In use
Jandari	250	1	In use
Narimanov	500	2	not in use

84. The City Reservoirs with a total volume of 2,000 m³ at an elevation between 483 and 495 masl used to supply the central and western part of Marneuli town (residential areas) and the villages Jandari, Kizilajlo and Patara Mughanlo (Parizi) as well. Their condition is very bad and currently they do not contribute to the supply of the distribution network of the region (figure 1 and 2).

Figure 1 and 2: City reservoirs (not in use)


85. At Narimanov booster pumping station there are two storage reservoirs, each with a volume of 500 m^3 at an elevation of 382 masl. One of the reservoirs has collapsed. The other reservoir supplies the southern part of the city, the industrial areas in the north east, the villages of Sabirkendi, and northern Tsereteli (figure 3 and 4).

Figure 3 and 4: Narimanov Reservoirs (not in use)


86. The Jandari Reservoir at an elevation of about 489 masl and with a volume of 250 m^3 supplies the village of Jandari (figure 5 and 6).

Figure 5 and 6: Jandari Reservoir (in use)

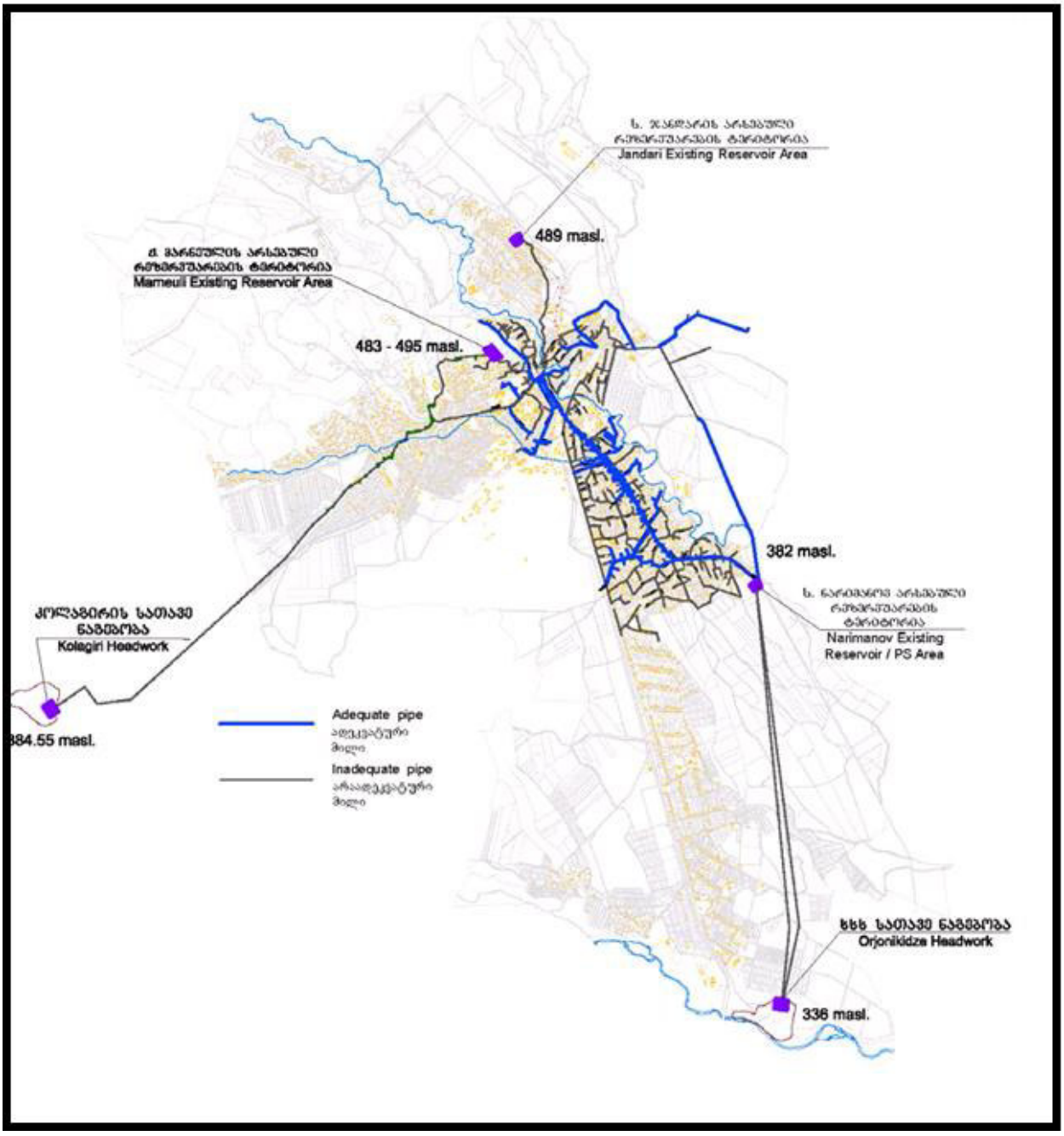

87. In addition, on the territory of the city of Marneuli, there are metal reservoirs with the total capacity of 250 m^3 located near Jandara pumping station(figure 7 and 8).

Figure 7 and 8: Pumping Station Jandari and Jandari Reservoirs


C.4.6 Distribution Network

88. The service area of Marneuli District is divided into three supply zones, supplied by the three existing water sources. The existing distribution network of the whole district has a total length of 180 km including the networks of the city and of the 14 villages. It consists of old cast iron pipes, as well as of PE pipes that have re-cently been installed in Marneuli city (approximately 36 km). There are some residential areas in Marneuli, which are not covered by the existing system. The existing water supply network of Marneuli city with a total length of about 90 km is shown in the figure below(figure 9).

Figure 9: Existing Marneuli Water Supply Headworks, Reservoirs and Network



89.The present water supply system covers about 90 % of urban and 60 % of rural population. In Marneuli, about 50 % of the population receives water thrice a week for 4-5 hours, and the rest receives twice a week for 4-5 hours. In villages the scenario is different; the villages which are located close to transmission main receive water daily (for 10-12 hours) while the rest of the villages are supplied 2-3 days a week for 4-5 hours. Based on the seasonal demand, 60 - 500 m^3/d water are supplied to the food processing industries located in Marneuli.

90. The water supply connection rate of the villages around Marneuli is shown in the following table (Table 5).

Table 12: Rural Areas around Marneuli Municipality

Rural areas around Marneuli Municipality	Connection rate 2011
Orjonikidze	**100%**
Tsereteli	**100%**
Bailari	**50%**
Imiri	**100%**
Muganlo (Parizi)	**100%**
Tsiteli	**80%**
Shulaveri	**80%**
Norgiuli	**N/A**
Maradisi	**100%**
Dashtapa	**60%**

91. In addition to partial coverage and intermittent supply, the water supply system in Marneuli also suffers with unequal supply and low terminal pressure, with some areas receiving less water at very low pressure. Losses in the system are very high due to old/damaged pipeline and lack of regular or periodic maintenance. The percentage of water losses is high. Consequently, per capita water supply at consumer end is very low. While the water is produced at a rate of 280 liters per capita per day (lpcd) at the source, the supply at consumer end is very low at 112 lpcd.

92. There are 6,200 connections to the system, 99% of which are domestic and 1% industrial. Domestic connections are not supplied with water meters, while 50% of the industrial consumers are metered.

C.5Projected Water Demand up to 2044

93. The water supply network will cover the whole area, while the sewer system will not be expanded to the marked sub-areas in the table above. In coordination with UWSCG it was decided that theses sub-areas, at the border of the city and with a very low density shall not be included into the project.

94. The water demand development in the service areas is based on the estimated population figures which are calculated based on the figures for 2014 which are given by the local authorities. The estimated annual population growth for urban population is 0.75% while for rural is 1.25%.

Table13: Population Development in Marneuli

Year	Marneuli upward	Marneuli downward	Industrial zone settlement	Total
2014	8.202	12.304	2.000	22.506
2024	8.838	13.259	2.155	24.252
2034	9.524	14.287	2.322	26.134
2044	10.263	15.396	2.502	18.161

Table 14: Population Development in Villages

	Kizilajlo-down-	Kizilajlo-	Kizilajlo-Mtisuba-	Kizilajlo-holiday	Jandari	Tsere	Orjo-niki-	Beglari	Total

	ward	Lurjimta	ni	houses		teli	dze		
2014	3.162	1.221	1.489	1.100	1.800	3.000	2.200	900	14.872
2024	3.580	1.383	1.686	1.254	2.038	3.397	2.491	1,019	16.839
2034	4.054	1.565	1.909	1.410	2.308	3.846	2.820	1.154	19.066
2044	4.590	1.772	2.161	1.597	2.613	4.355	3.194	1.306	21.588

95. Based on the estimated numbers for inhabitants, the water demand development in the service areas is presented in the table below for the years 2024, 2034 and 2044 (Table 8).

Table 15: Water Demand Development

Item	Unit	2014	2024	2034	2044
Residents TOTAL	capita	37.378	41.091	45,200	49.749
Residents Marneuli	capita	22.506	24.252	26.134	28.161
Residents Villages	capita	14.872	16.839	19.066	21.588
Specific water demands	l/(c*d)		140	140	140
Minor commercial/institutional demand	%		10	10	10
Real losses	%		33	29	27
Transmission losses	%		2	2	2
Subtotal specific water demand	l/(c*d)		202	197	194
Subtotal water demand (residents)	m^2/d		8.813	8.907	9.646
Water demand of industries and large consumers	m^2/d	2.240	3.236	4.051	4.867
Working time	h/d	14	14	14	14
Subtotal water demand (industries)	m^2/d	2.420	3.236	4.051	4.867
Total average water demand	m^2/d		11.548	12.958	14.513
Peak factor daily demand	-		1.80	1.80	1.80
Total maximum daily water demand	m^2/d		16.703	18.628	20.754
Total maximum daily water demand	l/s		193	216	240

C.6 Design of Water Supply Network

96. The project measures for the improvement of the water supply system will include the construction of:

- Reservoirs
- Transmission mains
- Pumping Stations
- Distribution Network

97. The transmission mains, reservoirs and pumping station connect the water source with the distribution network and ensure the constant supply of the network with sufficient pressure.

C.6.1 Reservoirs

98. In the present project, the following measures will be implemented:

- Construction of two new City Reservoirs A and A1
- Construction of new Jandari Reservoir B

99. The resulting reservoirs and the description of the related service areas are sub-summed in the table below (Table 9). The total water reservoir volume amounts to 12,000 m³.

Table 16: Project Reservoirs

Reservoir		Service Area
Name	**Volume**	**location**
Marneuli (A)	**2X3000**	Centre of Marneuli Kizilanjo Patara Mughanlo
Marneuli (A_1)	**1X2000**	Military Base (east of Kizilanjo)
Jandari (B)	**2X2000**	Jandari East part of Marneuli Villages south of Marneuli

100. All water supply zones are served from the reservoirs by gravity, except a part of Jandari village (about 75 ha) on a height of 432 to 492 masl that is served from the Reservoir Jandari (B) via booster station.

101. The existing 250 m³ Jandari Reservoir has to be demolished in order to construct the new reservoir. To ensure the supply of water to Jandari village, prior to the start of construction works:

- The feeder pipe from the existing reservoir to the supply area has to be located;
- A provisional connection between pumping station and supply area has to be established by connecting the existing steel main 273 mm die from the existing Jandari pumping station to the feeder pipe;
- During the construction period Jandari supply area will be fed directly from the existing pumping station;
- After completion of the new Jandari reservoir the provisional connections will be dismantled.

C.6.2 Transmission Mains

102. The transmission line of Kolagiri well field to the Reservoir Marneuli (A) will be of ductile cast iron (DCI) and have a nominal diameter of DN 700, with both an out-side (zinc protection and polyurethane cover) and inside coating (cement mortar lining). This material (DCI) has been chosen for several reasons, such as the high pressure and the condition of the transport routes which it crosses. Itsalignment will follow the existing road from the head works to the city of Marneuli. Its total length is 9,645 m.

103. The gravity transmission pipeline from the new City Reservoir Marneuli (A) at 490 masl to the new Jandari Reservoir (B) at 483 masl will be of ductile cast iron pipe with a nominal diameter of DN 600 and a length of 2,850 m (Table 10).

Table 17: Project Transmission Mains

Start of Transmission Main	**End of Transmission Main**	**Material**	**Diameter [mm]**	**Length [m]**

New Kolagiri PS	New City Reservoir (A)	DCI	700	9.650
New City Reservoir (A)	New Jandari Reservoir (B)	DCI	600	2.830

104. The transport pipeline from the reservoirs (A) at 490 masl to distribution network will be DCI of DN 500 mm with a length of 35 m feeding also the lower level res-ervoir (A1) at 483 masl with a pipeline DCI of DN 250 mm with length of about 10 m.

105. The Marneuli Reservoir (A1) will supply exclusively the Military Base by means of a transport pipeline PE, OD 250mm.

Table 18: Project Transport Pipelines

Start of Transmission Main	End of Transmission Main	Material	Diameter [mm]	Length [m]
New City Reservoir (A)	New City Reservoir (A_1) and Distribution network	DCI DCI	500 250	34 7
New City Reservoir (A_1)	Military Base	PE	250	2.890

106. Valves and Fittings: the following valves and fittings are installed on the transmission mains:

- Butterfly valve: in total 3 pieces, in order for having the possibility to close the main.
- Washout valve: in total 9 pieces in the low points, in order for having the possibility for washing out the main.
- Air valve: in total 7 pieces in the high points, in order for having the possibility for venting the main.

C.6.3 Pumping Stations

107. The project measures are related to the two following pumping stations:

- Kolagiri Pumping Station
- Jandari Booster Station

108. The existing source Orjonikidze headworks will no longer supply Marneuli once the new system is in place, Kolagiri headworks will be able to provide a sufficient amount of drinking water at least until in about 10 years, depending on the development in the industrial area.

109. The existing headworks in Kolagiri will exclusively contribute to the water supply of Marneuli and the surrounding villages which are included in the service area.

C.6.4 Distribution Network

110. Most of the new pipes extend the existing distribution network while only the 24% replace existing pipes, either because they are over-aged or hydraulically unfit for the new system. Most of the replaced pipes are either of steel of cast iron. The material of the new pipes will be HD-PE 100 for smaller pipes and DCI for pipes ≥ DN 400 (Table 12).

Table 19: New Distribution Network

Pipe Diameter (mm)	Pipe Length (m)
OD 60	2.729
OD 63	19.060
OD 70	25.621
OD 90	5.911
OD 110	67.182
OD 125	2.529
OD 140	835
OD 160	449
OD 180	1.772
OD 200	1.639
OD 225	770
OD 250	4.713
OD 280	278
OD 315	322
OD 500	2.273

111. In total a length of around 136 kilometres of distribution network has to be newly laid. The replacement of distribution network is subsumed in the table below (Table 13).

Table 20: Replacement of Distribution Network

Pipe Diameter (mm)	Pipe Length (m)
OD 60	264
OD 63	1.330
OD 70	5.848
OD 90	24.587
OD 110	984
OD 125	0
OD 140	1.979
OD 160	292
OD 180	189
OD 200	164
OD 225	0
OD 250	0
OD 280	3.655
OD 315	270
OD 500	311

112. In total a length of around 43 kilometres of distribution network has to be re-placed. Almost 9.5 km of existing distribution network has to be disconnected.

C.7 Disinfection

113. The disinfection of the raw water per chlorination is included in the Works con-tract for Kolagiri headworks, financed by EIB.

114. Due to long flow time of the raw water, additional chlorination stations are fore-seen at the City Reservoir Marneuli (A) and the Jandari Reservoir (B) in order to secure hygienically clean drinking water.

115. Sodium hypochlorite or chlorine-gas solution can be used for disinfection, Due to the operation experience with sodium hypochlorite in Georgia, this technology is foreseen as terminal disinfection.

116. The appropriate dosages have to be set up in the initial operation period, The chlorine will be dosed at the inflow of the clear water tank, controlled by a chlorine measuring device (measuring point e.g. situated at the outflow), Dosage amounts of 0.2 – 0.5 mg/l chlorine should be sufficient, in order to guarantee chlorine residues of > 0.1 mg/l in the distribution system.

D. DESCRIPTION OF THE ENVIRONMENT (BASELINE DATA)

D.1. General

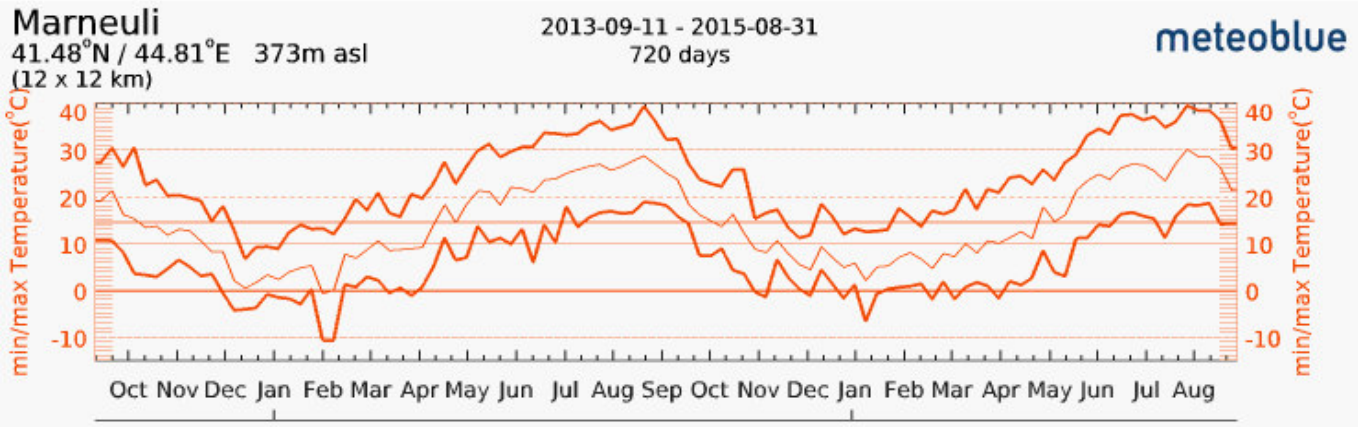
117. The present chapter gives the information about the natural and social-economic conditions of the Project site. This information is based on literary sources and fund materials, statistical data, data provided by the Client and results of the field studies accomplished immediately in the study area. This information will be further used to establish the positive and negative impacts during the construction and exploitation phases of Marneuli water-supply Project and evaluate their scales.

D.2 Physical Resources

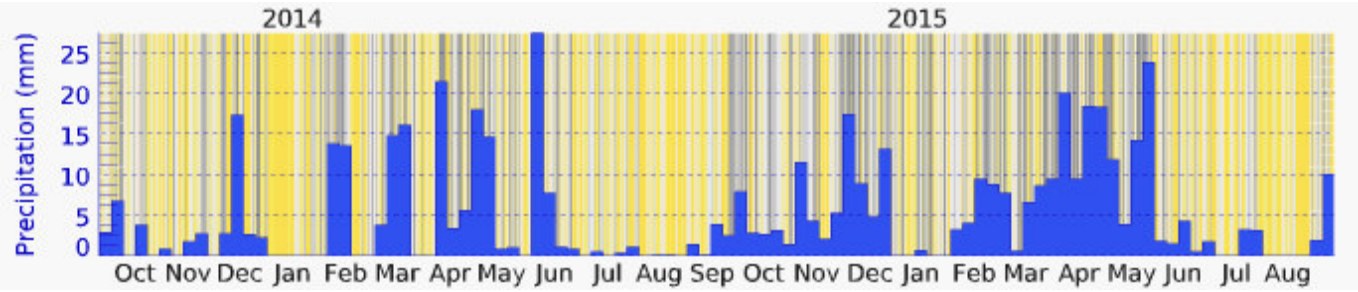
D.2.1 Atmosphere

118. Marneuli Municipality is located in the humid subtropical climatic zone with the climatic zoning corresponding to its relief: the climate in the most part of the territory is a warm steppe one with hot summers. Maximum precipitations fall in May and minimum precipitations fall in December. The climate on Iagluja upland, as well as Loki ridge and Babakari hillock is somewhat different and is transient from the moderately humid steppe climate to the moderately humid climate, with hot summer. The climate on Loki ridge slope is moderately humid with typical cold winter and long warm summer.

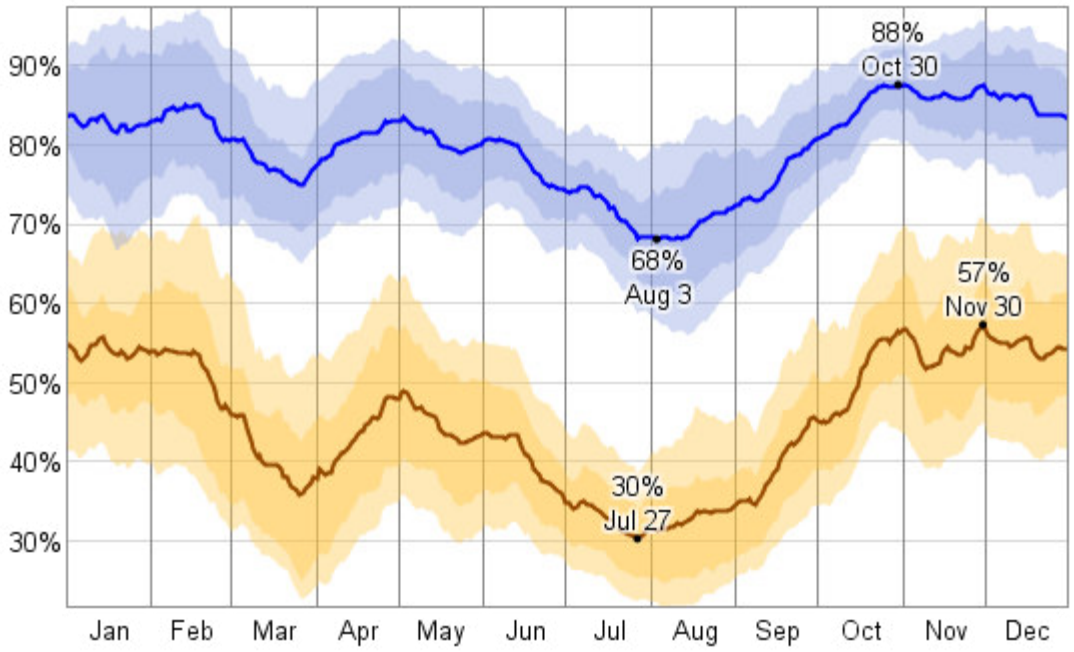
Figur 10: Atmospheric air temperature, C^0 2013-2015 y



Figur 11: Presipitation mm % 2014-2015 y



Figur 12: Rolative Humidity 2015 y



The average daily high (blue) and low (brown) relative humidity with percentile bands (inner bands from 25th to 75th percentile, outer bands from 10th to 90th percentile)

Table 21: Atmospheric air temperature, C^0

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	average	Max	Min
	0.0	1.9	6.0	11.5	16.8	20.6	23.9	23.5	19.0	13.5	7.0	1.9	12.1	-25	40

Table 22: Relative Humidity, %

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Average
	75	72	70	66	67	64	60	60	67	74	78	77	69

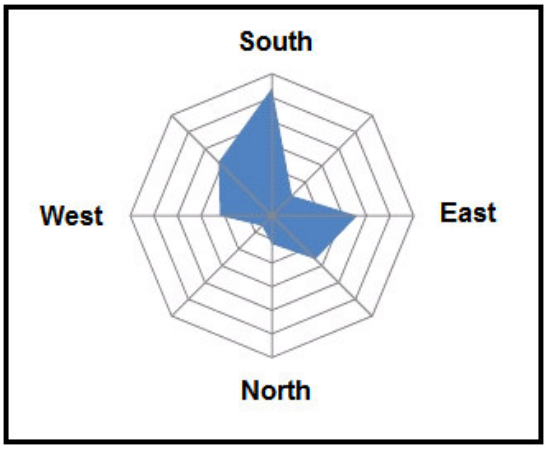
Table 23: Amount of precipitations, mm

Annual amount of precipitations, mm	Daily maximum of precipitations, mm
495	**146**

Table 24: Wind direction and still recurrence a year, %

North	N-E	East	E-S	South	S-W	West	W-N	Still
27	6	18	13	6	3	11	16	33

Figur 13: Wind direction



D.2.2. Ambient Air Quality

119. 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 Marneuli 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 (РД 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 26**).

Table 25: Recommended baseline pollution levels by population quantities

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

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

- Nitrogen dioxide: 0.015 mg/m³;
- Sulphur dioxide: 0.05 mg/m³;
- Carbon oxide: 0.8 mg/m³;
- Dust: 0.15 mg/m³.

D.2.3Relief and Geology

121. Most part of the Municipality territory is occupied by the plain with the same name, which covers the areas of the lower reaches of the rivers Algeti, Khrami, Mashavera and Debeda and is found at 240-400 masl. There are slightly dislocated clay and sandstone horizons of the Neogene found in the basis of Marneuli plain, which are covered with the Continental deposits of the Quaternary Age (shingle, conglomerates, sands and clays) with their total thickness exceeding 100 m at some places (as per the boring data). Marneuli plain is slightly inclined from

west to east. The surface was formed by gradual merging of the flat surfaces of the floodplain, and first and second over-floodplain terraces of the rivers Algeti, Khrami, Debeda and Mtkvari. The first over-floodplain terrace with its relative height varying within the limits of 6-10 m, is clearly seen in the inter-water of the rivers Debeda and Khrami, and the surface of the second over-floodplain terrace (25-30 m) is most vastly represented in the inter-water of the rivers Khrami and Algeti, as well as in the valley of the river Algeti and valley of a former river of Kovutapa on the northern side of the river Algeti. Within the limits of Marneuli plain, the surfaces of the first and second over-floodplain terraces is covered with a dense net of irrigation channels of a minor depth (0.5-1.5 m).

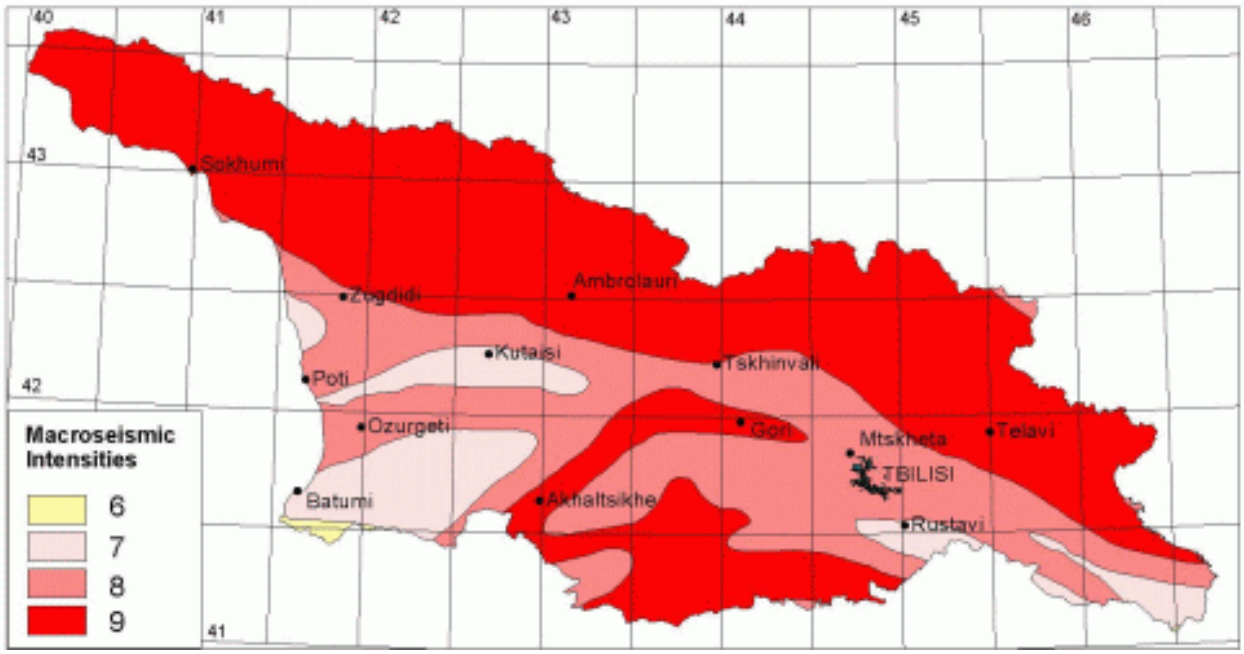
122. The northern slope of Armenia ridge and Babakari hillock within the limits of Marneuli plain are built with the rocks of a volcanogenic and carbonate facies (limestones, marls, sandstones, etc.). The relief is mostly presented by a set of average- and low-mountainous erosive ridges and valleys. The northern slope of Armenia ridge within the limits of Marneuli Municipality is jointed with the erosive valleys of the rivers Talavaristskali, Shulaveristskali, Debeda and their tributaries and offshoots of Opreti (1400-1600 masl) and Shulaveri (800-1600 masl) found between the latter. There are sloping plateau-like surfaces found on the crests and slopes of these offshoots here and there (near villages Opreti, Khojorna, Tserakvi and Damia), and there are quests of minor relative heights and steeply sloping abrupt steps in the zone where the Cretaceous limestones are spread, at 100-1200 masl. South of Marneuli plain, the northern piedmont zone of Armenia ridge along a slightly inclined edge is intensely jointed with river valleys, dry gullies and ravines and is presented by the hills and hillocks of a minor relative height. A similar relief is developed on the right side of the river Debeda, which are intensely jointed slopes of Babakari hillock.

123. Iagluja upland within the limits of Marneuli municipality with its length of 17 km and width of 10-11 km, is built with conglomerates, clays and sandstones of the Neogene Age. The absolute height of Iagluja upland is 784 m, and its relative height in relation to Marneuli plain surface is more than 400 m. The surface of Iagluja upland can be divided into three parts according to its morphological signs: the northern part of the upland is more elevated and is presented by a typical erosive hillock in the relief. Iagluja hillock is steeply inclined northwards and is sloping to Marneuli plain in the south and merges with the flattened surface of the upland. A southern edge of Iagluja upland surface is elevated and forms Jamali erosive hillock. The northern slope of the latter is sloping towards Marneuli plain.

D.2.4.Seismicity

124. Marneuli 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 applicable Georgian construction standard Seismic Resistant Construction (PN 01.01-09)., The area selected for construction of the project facility is located in the seismic intensity zone 8 (MSK 64 scale), which dimensionless seismic coefficient ‘A’ equals to 0.15.

Map 9.1: Seismic Zone Ma p of Georgia



D.2.5 Soil Covers

125. Brown soils (Eutric cambisols Calcic kastanozems) are spread at 500-1200 masl, mostly on carbonate rocks, and are carbonate consequently. These soils have a clearly formed profile, with a dark accumulative or humus horizon with the depth of 20-30 cm. The soil structure is bean-cloddy, with a heavy loamy content, skeletal, with favorable drainage, highly productive and intensely cultivated. Due to inexpedient exploitation (excess irrigation, mistakes during the land cultivation) the brown soils are being degraded intensely.

126. Alluvial soils (Fluvisols) are spread along the valleys of the rivers Algeti, Krami, Debeda and their tributaries. Most of the alluvial soils are carbonate, with favorable physical properties and used for agriculture, while a minor part of them is covered with degraded floodplain forest and marshes.

127. Solonchaks. This type of soils on the territory of Municipality is presented by solonchaks and solonetzs. The solonchaks contain more or less solubale salts in the profile, while the absorbed sodium is accumulated in the colloid complex of solonetzs. These two soil categories of salination are closely associated in a genetic respect. Most of the salinated soils contain both, soluble salts and sodium cation accumulated in the absorbing complex. The salination process is associated with the delluvial-prolluvial phenomena taking place here in the past – the weathering products removed from the salt-containing rocks of Iagluja ridge by the temporal water currents cause soil salination on the inclined surface of the piedmont zone. As a result, solonchaks are formed. As for the solonetz formation, this process is associated with the desulfitation of the sulphates accumulated in the soil in great amounts. Within the limits of Marneuli Municipality, there are slightly, averagely and intensely salinated soils spread. The slightly and averagely salinated soils are spread as individual sites on the territory of villages Jandara, Algeti, Zemo Kulari, Kvemo Kulari, Kapanakhchi and other *sakrebulos*. Soil salination is mainly a sulphate or a chlodire-sulphate nature. In addition to salination, gleization is another clearly typical feature of these soils as a result of a great number of irrigation channels and uncontrolled irrigation.

128. Most of the soils on the territory of Marneuli Municipality have lost their natural appearance and are being degraded to various degrees. This, first of all, is seen in their degraded physical-mechanical, chemical and microbiological properties and reduced productivity.

D.2.6 Hydrographic Network

129. The rivers Algeti, Khrami, Shulaveristskali and Debeda flow on the territory of the Municipality. The river Algeti penetrates the territory of the Marneuli Municipality from north-west, in the environs of village Jandara. Here, it leaves a narrow cliffy valley behind it and flows onto Marneuli plain, where it flows smoothly through quite a wide, low-sided bed in the northern part of Marneuli plain. The river Khrami leaves a canyon cut in the lava near village Nakhiduri and flows onto Marneuli plain. Here, it is a typical smooth plain river with a wide low-sided bed. The average annual discharge of the river Khrami is 65 m^3/sec at the confluence. Within the limits of Marneuli region, the river Khrami is flown by Shulaveristskali and Debeda. The river Shulaveristskali heading on the crest of Armenia ridge, is a typical mountain river to settlement Shaumiani, with the alteration of canyon-like and V-shape erosive valley sections. From settlement Shaumiani, the river Shulaveristskali flows onto Marneuli plain, where its average multiyear flow (0,44 km/sec) is totally directed to the irrigation channels. The river Debeda flows in the extreme south-east part of Marneuli region, through quite a wide low-sided bed. The average multiyear discharge of this river is 29.7 km/sec. The most important tributary of the river Debeda is the river Banoshistskali (with its length of 20,4 km), which heads on the northern slope of Loki ridge.

130. The rivers in Marneuli region are alimented by rainwater (with its share of 40-45% of the annual flow), snow water (20-25%) and underground waters (25-30%). Almost half of the annual flow of the rivers flows in spring. Floods also take place in this period. Flashfloods are rare in summer and autumn. During the droughty summers, due to the negative moisture balance of soils, the artificial irrigation in the field of land cultivation in the region has a decisive role.
As the data of 2008 suggest, there are 23 associations of ameliorators established in the Municipality. The total length of the local irrigation channels is 356,2 km and it is designed to serve 17303 ha of land area making 77.6% of the arable land available in the Municipality. As more than a half of the existing channels need cleaning and rehabilitation works, they cannot be loaded in full. The operating system irrigates only 7010 ha, but after it is cleaned and rehabilitated, it will be capable of irrigating additional 10 293 ha of land, i.e. the existing channels will be fully loaded. There are no lakes on the territory of the Municipality.

D.2.7Biodiversity

131. **Flora**: More plain and valley vegetation dominates on the territory of the Marneuli Municipality. The vegetation of beard-and-feather-grass and thornbush-thorny steppes, sparse hemixelous vegetation and floodplain and semi-desert vegetation is spread here.
Petrosimonia brachiata, wormwood and Salsola dendroides are typical for semi-deserts. The sub-forest is formed by tamarisk, medlar, sea-buckthorn, cornel, wild plum, hawthorn, etc. The vegetation cover on Marneuli plain is dominated by beard-grass, beard-grass- wormwood, beard-grass and thornbush-thorny and Salsoleta nodulosae vegetation. At some places, there is semi-desert vegetation growing here as well. Iagluja hillock is covered with beard-grass and beard-grass- Festuca supine-feather-grass steppe grasses, as well as xerophytic bushes. Small pine plantations also grow over Loki ridge. The slopes are covered with a hardwood forest with oak and hornbeam dominating in its lower part and beech in its upper part. Box elder, Georgain oak, oriental hornbeam and blackthorn dominate on Babakari hillock.

132. **Fauna**: Fauna in Marneuli Municipality is quite diverse. Wild boar, badger, stone marten, Least Weasel live in the forest; jungle cat, rabbit, wolf, jackal are met almost everywhere. Ornitofauna is numerous: Common pheasant, lark, redleg, partridge, quail, etc. Reptiles are also many in numbers. Different kinds of lizards are particularly common with Iajluga upland.

Tortoise, grass snake, sheltopusik and sand boa (rarely) are also common. Barbel, mursa, khramulya and stone loach are common in the river Debeda.
Most of the Project site covers the territory of the city of Marneuli and is consequently, under a strong anthropogenic impact. The impact on flora and fauna both, in the construction and operation phases of the Project, is low.

D.3 Information About the Background Pollution

133. The analyses of background noise, radiation, weighted particles and levels of vibration were made by “Eco-Specti” Ltd. The relevant samplesfor water were taken headed by “Eco-Center” Ltd. The chemical and physical analyses were done by “The center for ecological expertise and analysis” at the laboratory of physical-chemical analysis of R. Agladze Institute of inorganic chemistry and electrochemistry.

134. The laboratory makes chemical analysis. In case of minor concentrations of the study elements in the samples, the following physical methods of analysis are also used: polarography, photocolorimetry, spectrometry, radiography to fix the structure and properties of substances (roentgen-physical analysis), derivatography.

135. The laboratory is equipped with the following appliances to do the above-listed analyses: muffle burners, diffraction roentgenograph ДРОН-3М; photocolorimeter КФК-2МП; polarograph ОН-105; derivatograph Q1500D; atomic absorption spectrophotometer С-115; potentiometer, spectrophotometer-16; differential scanning microcalorimeter ДСМ-2М.

D.3.1 Existing Data About the Air Quality

136. On the territory of the city of Marneuli, no air quality monitoring is undertaken by the Environmental Agency of Georgia. The nearest town where the Agency holds permanent observations over the air quality is Rustavi.

137. The baseline data of the air quality in Marneuli are calculated by using the methodology developed by the Ministry of Environment and Natural Resources of Georgia, which is based on the number of population of the city (the description of the methodology and relevant calculations for the city of Marneuli are given in Chapter D.2.2).

138. At the Project implementation stage, in respect of air pollution (noise, dust), the most sensitive are the areas where the existing reservoirs are planned to uninstall and new reservoirs are planned to build. Disassembly of the existing reservoirs is planned in four different sites of the city of Marneuli. Two of the four sites have reinforced concrete containers and other two have metal containers. Disassembly of the metal containers is s short process and will not cause dust or noise. Consequently, the quantitative analysis of the air-weighted particles was done in the areas where the existing reservoirs are planned to uninstall and new reservoirs are planned to build. These areas are as follows: the project site of Narimanoff reservoir and project site of Marneuli reservoirs.

Figure 14: Suspending particles measuring device

139. The measurement of the background amounts of the air-weighted particles in both areas was done near the residential houses adjacent to the project area.

140. The quantitative analysis of the air-weighted particles was done by using American equipment „Air Quality Monitor – Dulos 1700“(Figures 10). This equipment measures the amount of the weighted particles in the air and allows counting the fine particles individually (with their size less than 0.5 microns) and larger particles with their size of 0.5-2.5 microns.

141. The results of the said measurements are given in Table 26.

Table26: Results of measuring of suspending particulars at “Narimanov” and “Marneuli” reservoirs area

	standart	5min	10 min	15min	20 min	25 min	everange
“Narimanov” reservoir	**0.5 mg/m^3**	0.2	0.2	0.2	0.2	0.2	0.2
“Marneuli” reservoir	**0.5 mg/m^3**	0.2	0.2	0.2	0.2	0.2	0.2

142. Both project areas are distanced from the central site of the city.

D.3.2 Natural Radiation Background

143. The existing radiation background was measured at Narimanov reservoir area by using Russian appliance RADEX. Measurements were done on the territory of the city ofMarneuli and in the Narimanov Reservoir project area (Figure 11 and 12).

Figure 15 and 16: Measuring the radiation background in the Nerimanov reservoir project area


144. The radiation background at different points of the Narimanov reservour area varied between 10 and 12 microroentgen/hr.

D.3.3 Noise

145. The noise level was measured at the same points where the analysis of the amount of weighted particles was analyzed. The noise level was measured with South Korean equipment „Digital Sound Level Meter“(Figure 13 and 14).

Figure 17 and 18: Noise level measurement at “Narimanov” and “Marneuli” reservoirs

146. This equipment measures noise with 1-second intervals and plots the relevant diagram. Neither of the two points where the noise level was measured is not densely populated and is not located near the road mains. As already mentioned (Chapter E.4.5), at present, the pumping stations in the Project zone do not function and consequently, there is no source of noise on the territory. The measurements at both points were done in a 5-minutes interval. The results of the measurements are given in Table 27.

Table 27: Noise level at "Narimanov" and "Marneuli" Reservoirs sites

	5 Min	10 Min	15 Min	20 Min	25Min	30 Min	medium
"Narimanov" Reservoir	**45.2**	**45.0**	**46.2**	**46.0**	**45.5**	**45.5**	**45.5**
"Marneuli" Reservoir	**48.2**	**48.0**	**46.8**	**47.1**	**48.3**	**47.1**	**47.6**

D.3.4 Analysis of the Water Guality

147. The water quality ofOrjonikidze headworkwas analyzed on April 14, 2015.

148. The relevant samples were taken headed by "Eco-Center" Ltd. The chemical and physical analyses were done by "The center for ecological expertise and analysis" at the laboratory of physical-chemical analysis of R. Agladze Institute of inorganic chemistry and electrochemistry.

149. The laboratory makes chemical analysis. In case of minor concentrations of the study elements in the samples, the following physical methods of analysis are also used: polarography, photocolorimetry, spectrometry, radiography to fix the structure and properties of substances (roentgen-physical analysis), derivatography.

150. The laboratory is equipped with the following appliances to do the above-listed analyses: muffle burners, diffraction roentgenograph ДРОН-3М; photocolorimeter КФК-2МП; polarograph ОН-105; derivatograph Q1500D; atomic absorption spectrophotometer С-115; potentiometer, spectrophotometer-16; differential scanning microcalorimeter ДСМ-2М.

151. The results of the analysis are given in Table31.

Table 28: Groundwater Quality at Orjonikidze headwork

N	Parameter	Unit	Bore well	Gallery Water
1	Color	**cobalt scale**	**5**	**5**
2	Odor	**NTU**	**0**	**0**
3	Turbidity	**-**	**10**	**10**
4	Sulphate	**mg/l**	**135.4**	**148.3**
5	Chlorides	**mg/l**	**28.6**	**32.4**
6	Oil Products, total	**mg/l**	**-**	**-**
7	Calcium	**mg/l**	**74.1**	**76.6**
8	Magnesium	**mg/l**	**14.5**	**13.9**
9	Sodium	**mg/l**	**30.2**	**29.3**
10	Zinc	**mg/l**	**0.025**	**0.03**
11	Iron, total	**mg/l**	**0.1**	**0.11**
12	Total coliform	**MPN**	**140**	**155**
13	E-coli	**MPN**	**100**	**120**
14	pH		**7.5**	**7.5**
15	Total mineralization	**mg/l**	**655**	**687**
16	Barium	**mg/l**	**0.08**	**0.075**
17	Boron	**mg/l**	**0.24**	**0.24**
18	Arsenic	**mg/l**	**0.003**	**0.0045**
19	Mercury	**mg/l**	**0.0005**	**-**

N	Parameter	Unit	Bore well	Gallery Water
20	Cadmium	**mg/l**	**0.001**	**0.001**
21	Manganese	**mg/l**	**-**	**0.01**
22	Nickel	**mg/l**	**-**	**-**
23	Nitrate	**mg/l**	**20**	**20**
24	Nitrite	**mg/l**	**0.059**	**0.035**
25	Selenium	**mg/l**	**0.006**	**0.005**
26	Copper	**mg/l**	**0.0025**	**0,002**
27	Aluminum	**mg/l**	**0.005**	**0.006**
28	Lead	**mg/l**	**0.0001**	**-**
29	Fluoride	**mg/l**	**0.1**	**0.15**
30	Chromium	**mg/l**	**0.015**	**0.02**
31	Antimony	**mg/l**	**0.0002**	**0.00025**
32	Cyanide	**mg/l**	**-**	**-**
33	Pesticides	**mg/l**	**-**	**Track**
34	Total hardness (as CaCO3)	**mg/l**	**500**	**500**

D.4SocialSurroundings, Social-Economic Description

152. Marneuli Municipality is located in the eastern part of Kvemo Kartli. The administrative center of the Municipality is the city of Marneuli. It is located on Marneuli plain, on the banks of the river Algeti, 410 masl. The distance between Marneuli and Tbilisi is 29 km. Marneuli is distanced from the city of Rustavi by 48 km and by 30 km from the borders of Azerbaijan and Armenia.

D.4.1 Population

153. The population of Marneuli, as per the data by January 1, 2015 was 104 900 men. The data are based on the preliminary results of the universal population survey of November 5, 2014 and sum of the total growth for the last 2 months of 2014 (natural growth + migration balance)[2].

154. Table23shows the statistical data of the number of population in Kvemo Kartli and Marneuli Municipality in 2005-2015. The preliminary data of the general census of the population in Georgia evidenced that the past data of the Statistical Office of Georgia were not accurate. The given Table clearly shows that since the census, the number of population in Georgia has decreased by 754 200 people (making 16% of the data of 2014), and the population in Marneuli has decreased by 25 700 people making over 19% of the data of 2014).

Table 29: Statistical Data of the Number of Population in Kvemo Kartli and Marneuli

	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Georgia	**4321,5**	**4401,3**	**4394,7**	**4382,1**	**4385,4**	**4436,4**	**4469,2**	**4497,6**	**4483,8**	**4490,5**	**3729,5**
Kvemo Kartli	**494,7**	**507,6**	**508,3**	**486,9**	**488,8**	**499,9**	**505,7**	**511,3**	**511,1**	**513,1**	**425,0**
Marneuli Municipality	117,9	121,0	121,8	122,5	123,5	126,3	128,1	129,6	129,8	130,6	104,9

[2]Source: http://www.geostat.ge/?action=page&p_id=472&lang=geo

155. The following nationalities live on the territory of Marneuli Municipality: the Azerbaijani, Georgians, Armenians and others. The absolute majority of the population (approximately 80%) is Azerbaijani.

156. With their religious belief, most of the population is Moslem, followed by Orthodox Christians. Others are mostly Armenian Gregorian.

157. As per the age groups, Marneuli Municipality much differs from the average indicators of Georgia. Young and average aged people are most in number. This may be the reason for higher birth rate in the area and less migration of the youth to other cities and towns.

D.4.2 Industry and Trade

158. The leading branches of economy in Marneuli Municipality are flour and bread and pastry production, dairy and cheese production, fruit and vegetable tinning, including meat mix, cutting and processing decorative stones, furniture manufacturing and processing sand carriers, etc.

159. There are approximately 2100 enterprises registered in Marneuli Municipality. 100 of them are industrial ones. The industrial enterprises in the Municipality are mostly small or average enterprises. In this respect, Marneuli Municipality does not differ from the other regions of Georgia.

160. Trade is well developed in the Municipality, with many retail and wholesale trade and service units. In terms of appropriate investments, operation of small cement plants is quite perspective, as the components needed for cement manufacturing are available on the territory of the Municipality.

D.4.3 Agriculture

161. As per the data of the Agriculture Development Department of Marneuli Municipality, by December 1, 2011, the agricultural land fund of the Municipality was 57,052,59 ha. The agricultural lands are distributed as follows:

- Arable land - 22,271.29 ha
- Hey-making meadows- 1,724.98 ha
- Pastures - 30,945.8 ha
- Area occupied by perennial crops - 2,110.52 ha.

162. The city of Marneuli and communities of Kapanakhchi, Algeti, Kachagani and Kasumlo use 6512 ha of Iagluja and Babakari pastures. 33,230 ha of agricultural land is privatized. The common agricultural crops in the Municipality are: wheat, barley, maize, rye, sunflower; common vegetables are: potato, cabbage, carrot, onion, garlic, beans, cucumber, tomato, etc.

163. The conditions in Marneuli Municipality are much favorable for agriculture. The major competitive advantage is the favorable climate allowing gaining harvest twice or three times a year.

164. Cattle-breeding is a well-developed branch in the Municipality, including sheep-breeding and poultry-raising. It should be noted that the summer pastures survived on the territory of the Municipality fail to meet the least demand for green forage for the cattle locally, as the ratio of pastures is approximately 0,3 ha of pasture per head. This is 5 or 6 times less the standard. In addition, following the local natural-climatic conditions, the plant vegetation starts in early spring and the people start using the pastures with wet soil as early as the young grass starts growing. Allowing the cattle to the pastures early in spring and overloading some pasture massifs causes burying the young grass with too weak roots into the soil when walking over it, intense destruction of the grass on the pasture, destruction and washing down the soil turf what is

aggravated by frequent rains. This promotes soil degradation and rarefication of the grass cover and reduction of the pasture productivity.

D.4.4Health and Education

165. There are 3 hospitals and 3 polyclinics operating in the city of Marneuli. At least one ambulatory is in every community. Free first aid service is available in the city of Marneuli and villages Kutliari, Damia-Geurarkhi and Shaumiani. There are 74 public schools in Marneuli Municipality, with 9 of them in the city of Marneuli. There are also 3 higher education institutions and 1 college in the city of Marneuli. Kindergartens operate in the Municipality in every community, except villages of Kutliari, Damia-Geurarkhi, Khojorna, Kasumlo, Sadakhlo, Tserakvi, Shulaveri, Akhkerpi, Opreti and Kulari.

166. There are 7 libraries on the territory of the Municipality.

167. A sports school training the young people in football, basketball, boxing, kick-boxing, Taikvando, judo, sambo, Georgian wrestling, triathlon, sports acrobatics, operates in the city of Marneuli.

D.4.5 Infrastucture

168. The territory of Marneuli Municipality is totally in the “Magticom”, “Geocell” and “Beeline” coverage zones. Telephone company “Silknet” also operates in the city of Marneuli. Internet providers are: “Silknet” (ADSL და DIAL-UP), “Magticom” and “Geocell”. Georgian broadcasting or internet is not provided in the communities of Agkerpi, Opreti and Khojorni.
The natural gas supply in the Municipality is provided by “Sokar Georgia Marneulgazi”. The natural gas is supplied to:

169. In respect of electrification, Marneuli Municipality is not totally electrified. Electrical power is supplied by ,,ENERGO-PRO GEORGIA“.

170. Marneuli Municipality totally supplied with drinking water, including the city of Marneuli and all villages, except villages: Khutor Lezhbadini, Khikhani, Takalo, Khanchigazlo and Kirachmuganlo, where the people receive the drinking water from springs and wells. The households with the drinking water supply, receive the water through central water pipelines from the collection reservoirs near the natural springs. 40% of the population of the city of Marneuli and 30% of village Tsopi is equipped with sewage system.

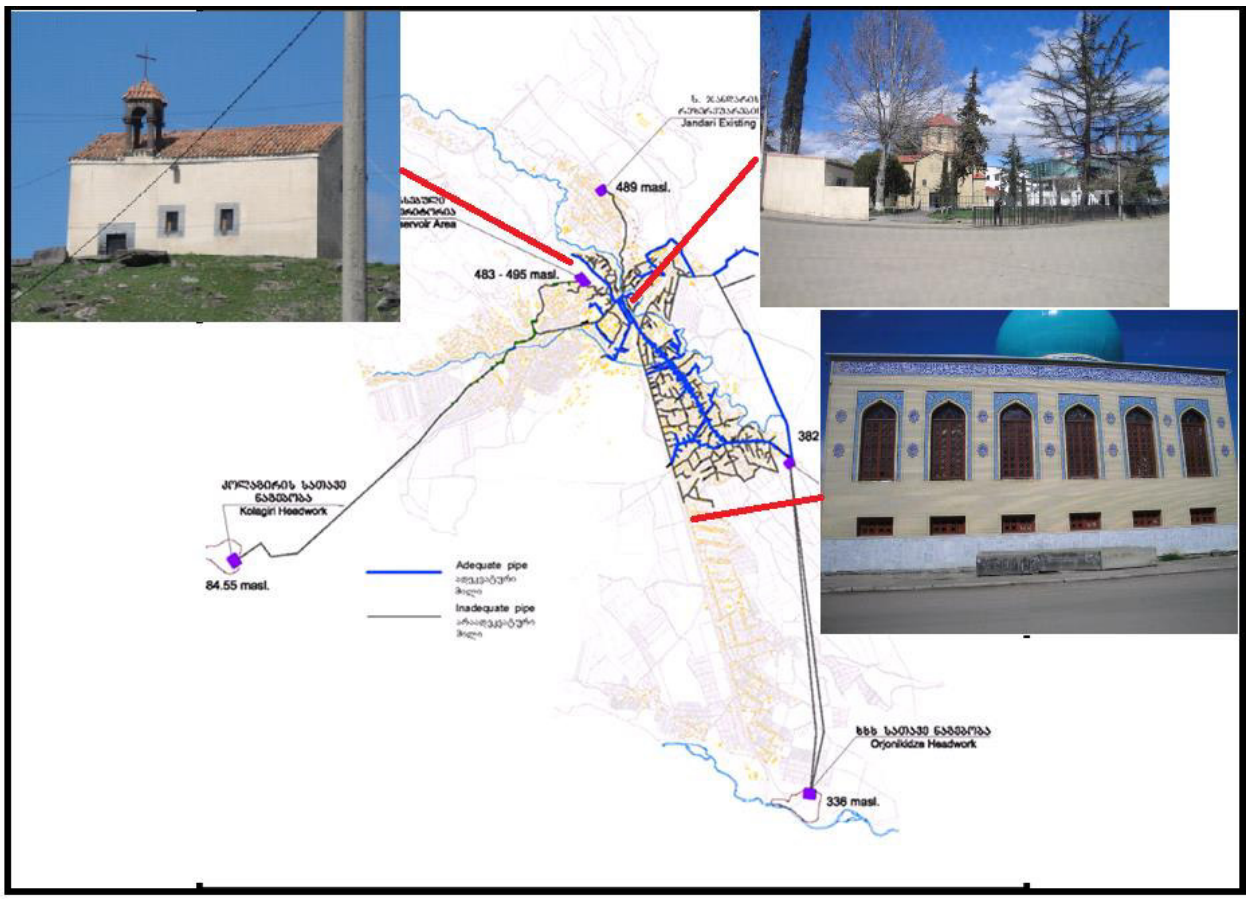
171. Drinking water is not supplied to the following villages: Khojorni, Shaumiani, Tserakvi, Agkerpi and Opreti, as well as Olmazlo, I Kesalo, II Kesalo, Kapanakhchi, Budionovka. The drinking water systems in other communities operate more or less trouble-free. The length of the central and local roads in Marneuli Municipality is 540 km, with 220 km of central roads and 320 km of local roads. 230 km of the roads is asphalted and 310 km is ground roads.

D.4.6 Historical and Archeological Monumnets

172. There are 34 historical-archeological monuments in Marneuli Municipality. An old Georgian architectural monument, Monastic Complex Khujabi (XIII c.) near village Akhkerpi is worth mentioning. A middle-century monastery Khojorni is also important. Tsopa Fortress is also worthwhile. It functioned in the VI-XIII centuries. The fortress is built on a cliffy mountain. There is a site of ancient village near Tsopa Fortress. Opreti Fortress near village Opreti is also worthwhile, which is first mentioned in the literary sources in the X century. The Tserakvi Monastic Complex near village Tserakvi is also notable. The Complex includes a church and other structures.

173. Mikheil Javakhishvili's House-Museum is found in village Tserakvi and Melik Pashaev's House-Museum is found in village Shaumiani.

Figure 19: Historical Monuments in marneuli



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

D.4.7 Proceduresin Response to the Artifact Findings

Chance Finds Procedure:

175. Construction Contractor engages 1 especially dedicated archaeologist (archaeological supervisor) for conducting daily supervision activities during the earthwork operations. Good practice is to agree the candidature of person assigned for that task with the Ministry of Culture and Monument Protection.

176. The Ministry of Culture and Monument Protection may also assign a person or company for periodical supervision of construction works, although this is practiced only in exclusive cases of sensitive projects.

177. Archaeological supervisor conducts daily monitoring at all construction sites, where the earthworks (land clearance; grading; excavations etc.) are planned according to the schedule.

178. Besides that, archaeological supervisor instructs the workers to report him immediately in case of any chance finding of potential archaeological relics.

179. In case of finding any artefacts of potential archaeological value, following steps are taken:

1. Construction workers are obliged to stop works and immediately report to the Archaeological Supervisor.
2. Archaeological supervisor reports to the Chief Engineer at site and requests to stop activities at the site of finding. Archaeological supervisor executes first checking of the finding and the site where finding was made
3. In case the finding has no potential archaeological value, the Archaeological Supervisor reports to the Chief Engineer and the works are restarted. Appropriate record regarding the case is made in record book.
4. In case if the finding is estimated as potential archaeological relic, the Archaeological Supervisor reports to Chief Engineer of the Construction Contractor and to MDF Environmental Specialist (and supervising company / Engineer) requesting to stop construction activities and to inform the Ministry of Culture and Monument Protection about the incident.
5. Chief Engineer of the Construction Contractor also reports to UWSCG informing about the stopped operations and requesting immediate engagement of the Ministry of Culture and Monument Protection.
6. Ministry of Culture and Monument Protection will assign expert or group of experts and conduct necessary archaeological works at the site to identify the problem.
7. In simpler cases, after removal of the movable artefacts, fixing materials and conducting other required works, the experts of the Ministry of Culture and Monument Protection will issue decision on recommencement of stopped construction works.
8. In exclusive cases of valuable and spatially spread findings, the Ministry of Culture and Monument Protection may issue request to relocate the RoW shifting it on a safe distance from the archaeological site.

D.4.8 Tourism

180. The region has certain tourism potential, but this potential is not significant. Mostly, cultural-recognition tourism is developed in Marneuli Municipality. Agro-tourism is developed on the territories of Tamarisi and Kulari communities. Akhkerpi has a certain potential to become a resort. The Municipality has a perspective to develop horse and hunting tourism. Marneuli can be considered as an intermediate point along the south tourist route of Kvemo Kartli, starting in Tbilisi and ending in Bolnisi.

E. ANTICIPATEDENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

E.1 Summary of Activities and Anticipated Impacts

181. Proposed water supply systems project will certainly produce some environmental impacts in project area. Activities to be performed within the scope of the Project were examined in 2 phases:

A. Construction Phase

- Pre-construction activities such as contractor office set ups, necessary equipment stacks and the site preparation;
- Removal and placement of the debris left after the disassembly of the existing reservoir and waste.
- Building the new reservoirs and pumping stations.
- Installation of the new pipes and replacement of the old pipes on the territory of the city of Marneuli.

B. Operational Phase

- Drinking water quality monitoring.
- Management of emergencies, scheduled rehabilitation and conducting repairs.

182. Positive impact: after the Project is realized, the drinking water network will fully cover on the territory of the city of Marneuli and adjacent villages. Water will be supplied 24 hrs.a days.

183. Negative environmental impact at the construction stage of the project is expected during the following operations:

1. During the disassembly of theexistingreservoirs in the project area, a great amount of debris is expected to originate, which under the preliminary estimates, may reach 7000 m^3. (The methods to calculate the amount of waste is considered in chapters E.2.1 and E.2.2).
2. Noise dust and vibration exerted during the disassembly of the existing concrete reservoirs in “Marneuli” and “Narimanoff” project sites on the territory of the city of Marneuli will have a negative impact on the buildings and premises adjacent to the Project zone and local population. In order to avoid this problem, additional mitigation measures will be necessary (the relevant mitigation measures are described in Chapter E.2.3).
3. When installing the new water supply pipes or replacing the old ones, during the excavations of the trenches to install the pipes a great amount of inert waste will also be accumulated. This is mostly concrete, asphalt and ground. As per preliminary calculations, their amount is approximately 72 000 m^3. The methods to calculate the amount of waste and alternatives of transportation are considered in chapter E.9.1.
4. Some streets in Marneuli are narrow and the traffic in them will be limited much during the project works.

184. This paragraph provides a brief description of anticipated site-specific impacts related to the construction phase of the sub-project “Improvement of Marneuli Water Supply system”.

Table 30: Site-Specific Impacts

N	Pre-Construction Phase. Potential Impacts During Construction site preparation works Works	Risk	Sites
2	Demolishing the existing reservoirs and removal of waste	High Risk	"Narimanov" and "Marneuli" project site. Transportation of waste to landfill.
	Construction Phase. Potential Impacts During Construction Works	Risk	Sites
1	Dust, noise, vibration	High Risk	"Narimanov" and "Marneuli" project site. During excavation of pipe trenches within the areas of town of Marneuli.
2	Pollution of surface water during construction and rehabilitation works	Moderate Risk	Planned rehabilitation of the existing network of watersupply system crosses rivers in several places.
3	Impacts on Archaeological Sites	Low Risk	No damage to any archaeological site shall be expected. The pipe laying sites in Marneuli is located in the areas of extensive on-going human impact.
4	Impacts on traffic	High Risk	Existing water supply system of Marneuli 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 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.
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

N	Pre-Construction Phase. Potential Impacts During Construction site preparation works Works	Risk	Sites
			occur during fuelling construction machinery at 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 Marneuli
9	Poaching by construction workers	Low Risk	Algeti 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.

E.2. Developing Environmental Documents

185. Prior to the onset of the construction, the Construction Contractor will be obliged to develop the following environmental documents:

186. The Site - Specific Environmental Management Plan(SSEMP) must cover the following issues:

- Define boundaries
- Identify sensitive receptors & environmental values
- Specify construction activities
- Conduct risk assessment
- Assign environmental management measures
- Prepare monitoring plan
- Prepare site plans
- Prepare environmental work plan

187. At the stage of risk assessment the ADB risk assessment methods must be used:

1. Following the specifics of the work to be accomplished, the Construction Contractor must develop the Site Specific Waste Management Plan. This document must describe the methods to prepare the construction site and manage the waste originated during construction (collection, transportation, recycling/reuse and placement).
2. Following the location of the construction site, the Construction Contractor prior to the onset of the construction must develop the Site Specific Noice Management Plan. This document must give the model of the sources and distribution of the noise originated at the construction stage, and possible impact on the adjacent facilities, as well as all mitigation measures and methods to monitor them.

188. All the above-mentioned documents must be developed by the Construction Contractor and submitted to the Project Implementing Unit (PIU) for approval. The Construction Contractor will be entitled to start the construction works only after the above-said documents are approved by PIU.

E.3 Pre-Construction Phase

E.3.1 Inert Waste

189. The disassembly of the existing reservoirs will be accomplished at the four following locations:

1. City Reservoirs;
2. PS to Jandari reservoirs;
3. Jandari Reservoirs;
4. Narimanov Reservoirs.

190. Out of the four presented locations, 250-m^3-capacity small iron reservoirs are located on the sites of „PS to Jandari reservoirs“ and „Jandari Reservoirs“, which will be disassembled in very short times, and no noise, dust or vibration is expected during the disassembly works. Similarly, it is not necessary to take any specific mitigation measures for the metal waste management. The owner of the existing metal reservoir will use it at his own discretion on some other territory, or sell it as a scrap.

191. As for four reinforced concrete large reservoirs, their disassembly, following their large sizes, construction material and location, creates quite a high risk both, for the environment and local people.

E.3.1.1 “Narimanoff” Reservoirs

192. Two “Narimanoff” reservoirs are located south-east of the city of Marneuli, adjacent to a less densely populated area. On the territory, there are two 500-m^3-capacity reinforced concrete reservoirs, which are broken down. Under the Project, both reservoirs shall be subject to the disassembly. The reservoirs are oval in shape and their sizes are as follows: radius – 10 m, depth – 4 m, wall thickness – 0.4 m.

193. After the disassembly of these reservoirs, approximately 250 m^3 of the reinforced concrete inert waste will be originated, this must be removed to Marneuli landfill.

Figure 20: Diagram of location of "Narimanoff" reservoirs

194. The distance between the existing reservoir and two nearest buildings and premises is 50 m. These buildings are privately owned, but at present, are not used for living. The distance between the existing reservoir and the residential house is 70 m.

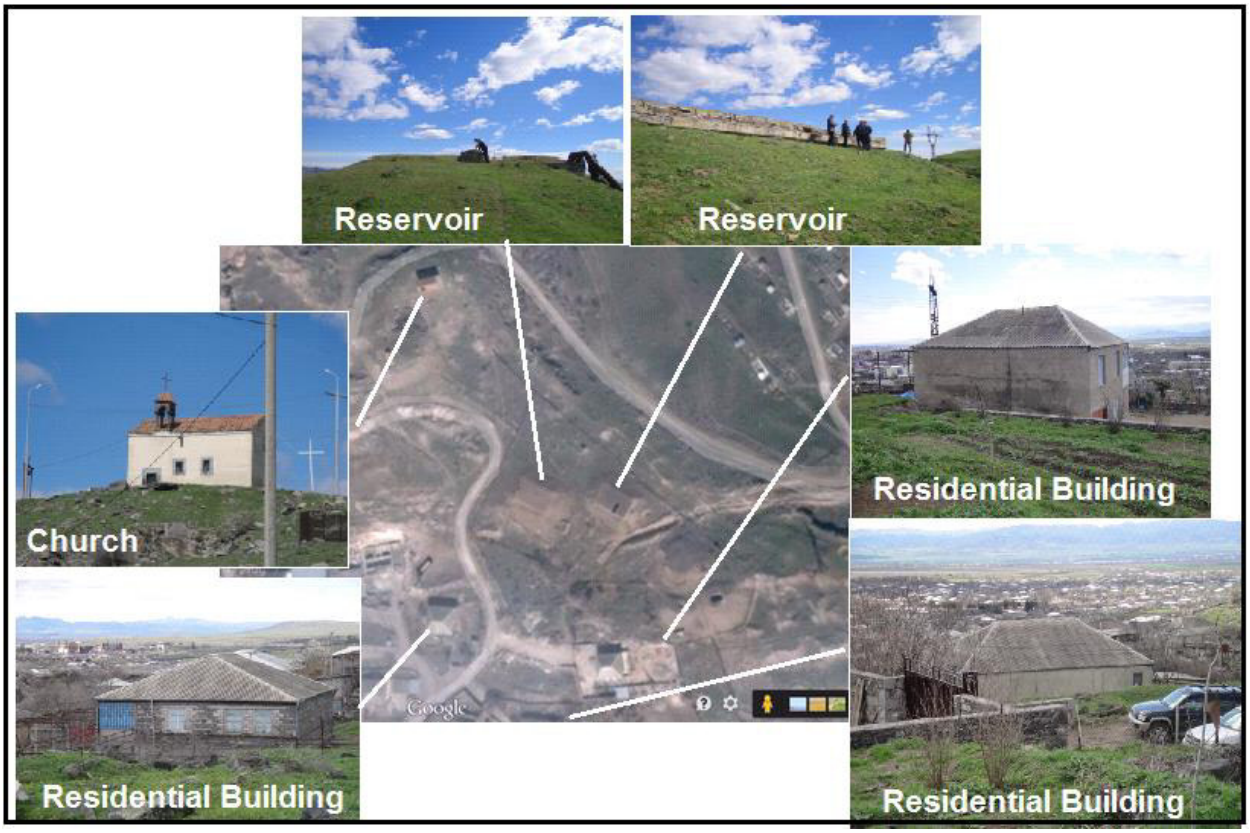
E.3.1.2 "Marneuli" reservoirs

195. These two reservoirs are located north-west of the city of Marneuli. These reservoirs, with 1000 m^3 capacity each, are of reinforced concrete. The sizes of the reservoirs are as follows: depth – 3 m, width – 10 m, and length - 20 m. After the disassembly of these reservoirs, approximately 2500 m^3 of the reinforced concrete inert waste will be originated.

196. In addition, the disassembly of these reservoirs will entail removing approximately 4000 m^3 ground and temporarily storing it. This ground will be used for the construction of the new reservoirs.

197. The nearest residential houses (three two-storey buildings) to the Project zone are located within a 50 m radius. Following the works specificity, a negative impact on these buildings and population is expected both, during the disassembly of the old reservoirs and building of the new reservoirs.

Figure 21: Diagram of location of "Marneuli" reservoirs



E.3.1.3 Waste Transportation

198. At the stage of developing the IEE document, two options of waste final placement will be considered: (i) placement of the inert waste accumulated after the disassembly of the existing containers on Marneuli landfill and (ii) identification of the relevant location adjacent to the Project site to place inert waste on it in agreement with the local authority.

199. Marneuli landfill is located 3 km from the city of Marneuli, adjacent to the central road. In January of 2015, the landfill was rehabilitated, the access roads were built, the landfill was fenced and the scales were provided on site. At present, the waste is being covered with soil. At the same time, the authority is seeking the funds build a new landfill, as the old landfill is overfilled as per their information.

200. Due to the number of reasons listed below, placement of the waste accumulated after the disassembly of the old reservoirs on the existing landfill within the scope of the Project will not be justified:

- The landfill is overfilled and placing any extra waste will not be expedient.
- Heavy techniques loaded with waste must move along the streets of the city of Marneuli to take the waste to the existing landfill. This will complicate the traffic and entail extra costs.
- The access ground roads of the existing reservoir (particularly, the access road to the city reservoir) and dust, noise and vibration exerted during the movement of the heavy techniques along them will have an impact on the local people (Figure 18 and 19).

Figure 22 and 23: Road leading to the city reservoir

201. Following the above-mentioned, identification of the relevant location adjacent to the Project sites to place inert waste on it in agreement with the local authority seems more expedient. For every such area, the Construction Contractor must prepare the “Inert waste management and placement plan” and submit it to UWSCG for approval.

E.4 Noise, Dust and Vibration

102. The new reservoirs to be uninstalled are located near the residential houses: (i) in 50 m for “Marneuli” reservoir and (ii) in 70 m for “Narimanoff” reservoir. Unless additional mitigation measures are taken, a negative impact on the population is expected both, during the disassembly of the old reservoirs and building of the new reservoirs.

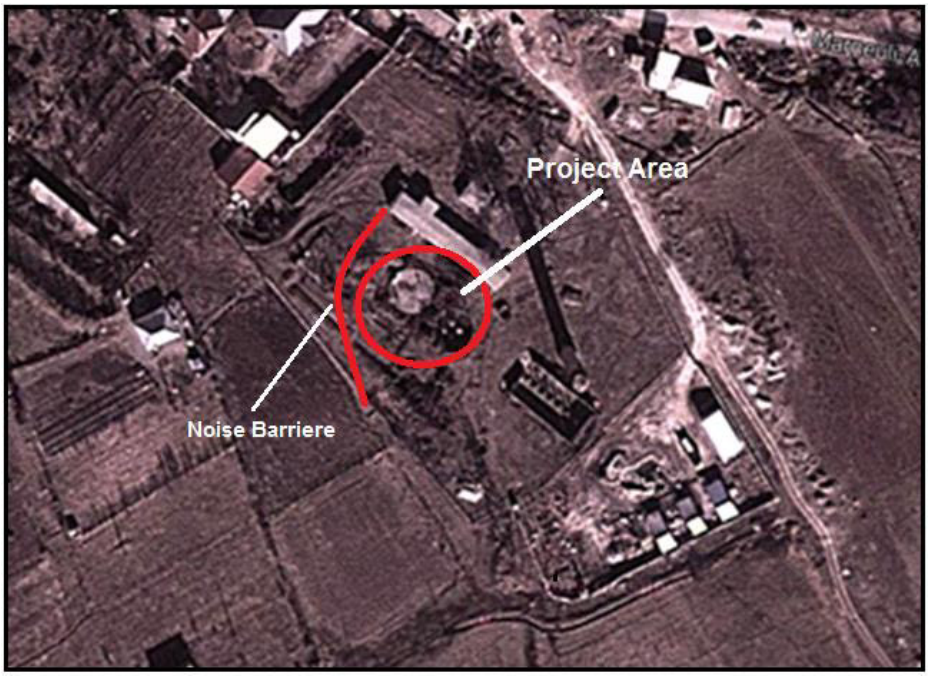
203. Noise exerted by the equipment and plants loses intensity after some distance. However, as per the data of „Federal Highway Administration of the ministry of transport of the USA (FHWA)“, the reduction of noise level at the distance f 40-80 m is insignificant.

204. In the given surroundings, installing noise attenuating barriers on both construction sites seems most acceptable. Noise attenuating barriers in each case must be installed by considering the necessity for them.

Figure 24: Locations of the noise attenuating barriers on the territory of "Marneuli" reservoirs

205. Because of the relief on the territory of Marneuli, the existing reservoirs are located on the top of a hill. Installing the noise attenuating barriers is expedient on the territory adjacent to the sensitive receptors. In this case, the length of the noise attenuating barriers will be 120 m and their height shall be 2.5 m following the requirements of the relief (Figure 21).

Figure 25: A noise attenuating barrier near "Narimanoff" reservoir



206. The noise attenuating barrier near “Narimanoff” reservoir is better to install near the reservoirs. In such a case, the total length of the noise attenuating barrier will be 40 m and their height shall be 2 m (Figure 21).

207. This kind of barrier must be considered both, in the construction and operation phases. In addition to the noise attenuating barrier, the following mitigation measures are absolutely necessary:

- Prohibited use of blasting equipment during the demolition process of reservoirs;
- 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;
- 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;
- Ensure that all equipments is in good repair and operated in the correct manner;
- The funds necessary for the work to be undertaken will be included in the Works contract.

E.5 Air Quality

E.5.1 Noise and Dust

Construction Phase

208. 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 Marneuli 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.

209. 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 31: Noise levels (Administration of the ministry of transport of the USA)

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

Table 32: Noise levels (California Department of transportation)

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

210. 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 33: Noise levels

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

211.Noise sources generated by excavation for WS pipes during construction period in scope of city Marneuli are mainly engineering machinery and vehicles, and they are featured by their intermittent nature with mobility and high noise level (which is 80~90 dB from a distance of 5 meters).

212 The following measures are to be taken during construction engineering to reduce impacts on acoustic environment:

(1) Any construction engineering entity shall adopt advanced engineering equipment and technologies of low noise, and this requirement shall be a principal criterion for selecting contractors during the bidding process.

(2) Any operation by such equipment as a percussion piling machine or pneumatic hammer shall be prohibited.

(3) The working time and construction schedule must be arranged rationally, and all engineering entities shall make reasonable arrangements for working time, and engineering activities after 22:00 hours through 8:00 hours the next day shall be strictly prohibited, except as required by the proposed project.

213. Prior to startconstruction activities construction contractor should prepare Noice SSEMP for city Marneuli. Prepared plan should be submitted to SC for endorcemnet and to UWSCG for approval.

214. Problems related to noise at the construction phase are basicly generated during installation of waste water pipes. According to the design proposal, the existing wastewater pipes are replaced approximately at every street of the town, or in the areas where there is no waste water system, the new ones shall be installed. Total length of the pipes is approximately 30 km and it covers mostly the whole town.

215. The basic sensitive receptors that will be affected by the noise generated as a result of trench excavation are schools, kintergardens and hospitals.

216. There are 9 secondary schools (8 public and one private), three kintergardens and three hospitals located in Marneuli

217. Information regarding the schools and the kintergardens is given in the tables 25 and 35

Table 34: Schools in the Marneuli area

N	Adress	Contact Person Phone	Period of Study	Distance from the Project Are M	Remarc
School 1	Azi Aslanov str 2	Ketevan MerabiShvili 551096265	9^{00} - 13^{00}	15	execute construction works during non-labor days
School 2	Kostava 6	Shorena Khukhua 577973247	9^{00} - 18^{00}	30	execute construction works during non
School 3	Rustaveli 63	Gulnara Dargali 551095979	9^{00} - 18^{00}	15	execute construction works during non
School 4	Gorki 1	Dilara Dargali 551097501	9^{00} - 18^{00}	25	execute construction works during non
School 5	Rustaveli 52	Lela KharshilaZe 551096030	9^{00} - 18^{00}	25	execute construction works during non
School 6	Muskhelishvili 1	Lela Akhsabadze 551096171	9^{00} - 18^{00}	20	execute construction works during non
School 7	Narimaniv 31	Vakhtang Ibragimov 551096616	9^{00} - 18^{00}	20	execute construction works during

					non
School 8	Rustaveli 96	Elman Jafarli 551096636	9^{00} - 18^{00}	20	Under Rehabilitation
Ltd. Davit Agmashenebeli school-lyceum	Agmashenebeli 89		10^{00} - 15^{00}	15	execute construction works during non-labor days

Table 35: kindergardens in the city Marneuli

N	Adress	Contact Person Phone	Period of Study	Distance from the Project Are (m)	Remarc
1	Erekle 2	Zainab Nadiradze 593614242	9^{00} - 18^{00}	20	execute construction works during non
2	26 May	Ketevan Minadze 568715299	9^{00} - 18^{00}	15	execute construction works during non
3	Rustaveli 77	Tamar Suleimanova 555223374	9^{00} - 18^{00}	20	execute construction works during non

218. The following facilities are located in Marneuli:

1. Interregional hospital;
2. Birth house;
3. Medical center " Geo Hospital

219. All the three hospitals of Marneuli are located in the city center. From them the interregional hospital of Marneuli and the birth house are located on one of the main streets (Gorgasali Street), where the traffic is quite intense and the noise level is high enough. In noise point of view, an unfavorable situation takes place near the birth house that is located at the edge of the street (picture 12) and the safety barriers are excluded as well. The basic measurements have revealed that the noise level observed along the birth house exceed the allowed limit and it often reaches approximately 80 db-s (during rush hours).

220. The best situation in noise point of view is near the medical center "geo hospital", though it is located in the city center of Marneuli, it is in the blind alley and only the vehicles heading to the medical center occure to enter the nearby areas. Therefore, the noise level 30-40 m. away from the medical center varies between 50-55 db, that is considered to be a very low indicator.

Figure 26: Birth house;

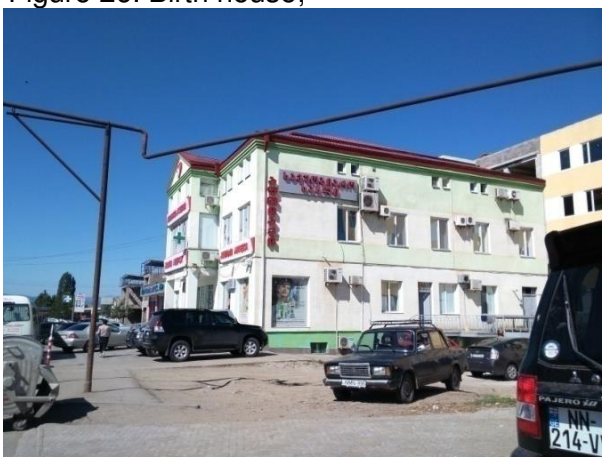


Figure 27: Interregional hospital

Figure 28: Medical center " Geo Hospital"

Mitigation Measures

221. 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 airpollution.
- 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 8:00.
- The population to be informed regarding the pending works.

222. As for the noise, generated during excavation of the trenches in Marneuli area, affecting the sensitive receptors disposed in the town, will require execution of additional mitigation measures.

223. It should as well be taken into consideration that the source of the noise generated during the trench excavation is not in a fixed position. The excavator conducting the trench excavation or pipe installation including backfilling, is permanently moved. During the meeting with the engineers, it turned out that movement speed of the construction equipment depends on the road surface type (soil, asphalt, concrete), relief and the existing infrastructure, and the speed varies between 10-25 m/h. On the basis of the fact that no concrete roads are observed in Marneuli, therefore reducing the digging speed to minimum and increasing noise level to maximum, we have to assume that the average speed of equipment movement during trench excavationis 20-25 m. that represents 160-200 m during 8-hour work day.

224. Therefore, during the project implementation phase we will have to wait averagely 2 days for increasing noise level of each sensitive receptor. On the first day, the noise will increase step by step and by the end of the day it will reach its maximum, and on the second day it will start to decrease from the maximum and will completely disappear by the end of the day.

225. In spite of short-term affect, it is essential, mostly for the above mentioned work phases involving sensitive receptors, planning and implementation of the following additional mitigation actions:

1. As a result of the meeting with the heads of educational institutions (such as schools, kindergartens), it was found out that the studying process, throughout Georgia take place during 5 days a week. No study process takes place on weekend in schools and kindergartens. Therefore, the request has to be included in the tender proposal, that the construction contractor company shall execute construction works during non-labor days;

226. As for implementation of the works nearby medical facilities, where patients shall be disposed, the following mitigation measures have to be processed and conducted:

227. Option 1: if the contractor shall conduct the works without using equipment (treanches should be dug with shovels) on the nearby area of the hospital, that will represent the best option. The method must be used for digging 400 m. long trench, for each facility approximately 200 m. (Marneuli interregional hospital and the birth house are located on the same street, in front of each other). Certainly, the method will increase the project price and duration of execution, but it will practically reduce to zero the noise generated as a result of works at the above mentioned areas.

228. Option 2: In case the construction contractor rejects using the proposed method because of financial problems, the contractor will have to execute the following mitigation measures along the construction works area:

1. Not to allow joint operation of two or more heavy technics 100 m away from the medical facility;
2. To use portable noise screens (barriers) that will be disposed on both sides of the construction technics, 2.– 2.5 m. away, in such way to protect direct sound emission to the medical center
3. To measure static noise level near health care facilities with noise measuring equipment continously;
4. In case the noise level exceeds the permissible level, the construction works must be stopped and additional mitigation actions must be executed:
5. The construction works will not be resumed unless the noise level reaches the norms.

Operation Phase

229. 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.

E.6 Water Quality

E.6.1 Contaminations of Surface Water

Construction Phase

230. 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.

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

Mitigation Measures

232. 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 work;
- 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's recommendations to prevent natural soil erosion.

Operations Phase

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

234. The construction of a new water supply system will increase the generation ofwastewater. Works for the rehabilitation of the wastewater network and the constructionof a new wastewater treatment plant will be taken up successively under the same Tranche5 in scope of other sub project.

E.6.2 Contamination of Underground Water

235. Groundwater table depth within the Project zone is 5-6 meter; therefore potential impactarises from implementation and maintenance of contractors' yard, transport,maintenance of vehicles and handling and storage of lubricants and fuel. The requiredprovisions for contractor's yard are described in the chapter on impacts and mitigationmeasures concerning quality of soils.

E.7Soils Quality and Topsoil Management

Construction Phase

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

237. 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 earthworksfor trench laying are of temporary nature. The pipes will be placed in the trench manually.

238. A sand layer of 30 cm thickness will be laid on top of the pipe, after which thetrench will be refilled with excavated material and compacted manually. The excavationis expected to generate surplus material. Surplus material will be used as embankmentfill as far as possible.

239. Construction of the pumping station and the reservoirs 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

240. The following practices will be adopted to minimize the risk of soil contamination andtopsoil loss:

- The contractors will be required to instruct and train their workforce in the storageand handling of materials and chemicals that can potentially cause soilcontamination.
- Solid waste generated during construction and at campsites will be properlytreated 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 perimeterwalls 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 forsafely discharging the leakages.

Operation Phase

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

242. Soil contamination may also occur during performance of the planned or emergencyrepair works.

Mitigation Measures

243. Water pressure in the pipelines must be continuously monitored during entire operationphase. In addition, the relevant mitigation measures shall be implemented duringmaintenance works.

E.8 Biological Environment

Impacts during Construction

244. The impacts on flora and fauna during implementation of contractor's yard, reservoirs sites and transmission mains will be minimized 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.

Impacts during Operation

245. Operation of the water supply components of the subproject will not have any significantimpact on the biological environment.

E.9 Traffic

Impacts during Construction

246. The rehabilitation of the water supply network and transmission mains 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. 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.

247. 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

Impacts During Operation

248. 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.

E.10 Hazardous Construction Wastes

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

Mitigation Measures

250. 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 of MoENRP 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.

E.11 Other Wastes from Construction Activities

E.11.1 Inert Waste

251. The amount of waste accumulated due to the destruction of existence reservoirs and the methods to manage it are given in chapter E.2 of the document.

252. Inert construction waste is also accumulated during laying the new pipes and replacing the old ones, also during implementation of transmission mains. Such waste is first of all: asphalt and ground.

253. In total a length of around 136 kilometres of distribution network has to be newly laid and in total a length of around 43 kilometres of distribution network has to be re-placed.

254. Under the project, approximately 189-km-long trenches must be excavated during laying the new water supply pipes and replacing the old ones. The width of the trenches depends on the pipe diameter and varies from 70 to 100 cm.

189000m X 0.85m X 0.15 m = 24 095 m^3

255. Under the preliminary design, after the installation of the pipes, 30-cm-thick fine sand will be placed over the pipes to protect them leading to the accumulation of additional 48195 m^3soil.

256. Total 72.290 m^3inert waste will be accumulated during the excavation of trenches on the territory of the city of Marneuli. The said waste will be transported and placed on the landfill in Marneuli.

E.11.2 Municipal Waste

257. 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 0.24m^3 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.

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

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

259. 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.

E.11.3 Medical Waste

260. 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 be met:

- 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.

E.11.4 Non-Hazardous Construction Waste

261. 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 construction waste temporary storage facility before transferred to a contractor.

262. 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.

E.12 Impacts on Archaeological Sites

263. 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 feasible. 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

264. 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.

265. 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.
- 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.

266. 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.

E.13 Socio-Cultural Resources

Impacts during Construction

267. 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

268. 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

269. *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

E.14 Construction Camps

270. 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.

271. 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.

272. 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.

E.15 Construction Related Impacts at the Quarrying Sites

273. 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

274. 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.

276. 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.

E.16Existing Asbestos Pips

276. At construction stage, according to the contract is considered the installation of newpipes in the whole area of the city. During excavation works of trenches it is possibleto damage as existing sewer pipe network, also other legally or illegally water supplypipes. A large part of the existing pipes contains asbestos and asbestos dust in caseof damage may occur, and which is very dangerous for health.All asbestos pipes will remain in placeand willbe covered by soil.

Mitigation Measures

277. It is necessary to implement whole set of mitigation measures:

- Special training for the personnel of the contractor;
- 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 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 contractor;
- Further works to be implemented only after issuance of the permission.

E.17Cumulative Impacts

278. On the territory of Marneuli, there are the following ongoing infrastructural projects or the ones planned in the near future:

- Improvement of Marneuli Water Supply System Sub-project;
- Improvement of Marneuli Wastewater System Sub-project
- Construction of new 500 kW Marneuli Substation;

279. Implementation of the first two projects is planned in the city of Marneuli and its adjacent area, while the construction of the new substation is planned east of Marneuli, 4 km from the city.

280. Marneuli Wastewater and Water Supply Systems sub-projects are considered as different sub-projects and within the scope of each of the sub-projects, two different tenders are planned to declare to select construction companies. Within the scope of the two sub-projects, the installation of the wastewater and water supply pipelines will be accomplished on the same territory of the city of Marneuli. Within the scope of the Water Supply System Improvement Sub-project, new water supply pipelines are planned to install and the failed pipelines are planned to replace, while within the scope of another sub-project, the new wastewater pipelines are planned to install and the failed pipelines are planned to replace. As per the technical documentation developed within the scope of both sub-projects, the water supply and wastewater pipelines are planned to install side by side. Consequently, if within the scope of these two sub-projects two different tenders are declared as it is planned, and the winning companies start installing the pipelines without agreeing with one another, this will mean that in the same streets first, one company will accomplish the planned activities, in particular, they will dig out the trenches, install the pipes, fill in the trenches and lay the asphalt, and after some tome, another company will do absolutely the same actions in the same streets.

281. A similar situation wasobserved in the city of Kutaisi, when two different companies accomplished the water supply and wastewater projects without any agreement with one another. Within the scope of the water supply sub-project in the city of Kutaisi, the paved roads were demolished in some streets of the city and water supply pipes were installed. Under the decision of the City Hall, in order to protect the area against the erosive processes, they laid a 16-mm-thick concrete layer in some streets. After some months, another sub-project to improve the wastewater system of Kutaisistarted planning to demolish the laid concrete layer and install the relevant pipes.

282. Following the above-mentioned, aiming at avoiding the said risks, it is necessary to accomplish any of the options listed below:

1. Marneuli Water Supply and Wastewater System Sub-projects to be merged as a single lot and one tender is to be declared with one winning contractor.
2. Installation of the water supply and wastewater pipelines of both projects to be assigned as a separate lot, with the replacement of the outdated pipes and tender for it to be declared as an independent lot.
3. The contractors winning both sub-projects to develop the working schedule and submit it to Sakrebulo of the city of Marneuli and UWSCG.

283. The third infrastructural project being accomplished on the territory adjacent to Marneuli by "Georgian State Electrosystem" has already started. As already mentioned, the Project is being implemented 4 km east of the city of Marneuli. This sub-project will not coincide with the water supply or wastewater sub-projects and will not take place near the construction camps or construction sites. However, within the scope of the project accomplished in the field of power supply, the construction techniques move across the city of Marneuli. Consequently, all three projects have a cumulative impact due to the movement of the heavy techniques across the city of Marneuli.

284. Within the scope of each sub-project, as per the preliminary estimation, the movement of the heavy techniques along the streets of the city of Marneuli was considered as a high-risk impact. Consequently, the joint implementation of all three sub-projects in case of incorrect regulation, may complicate the traffic in the city of Marneuli or make it impossible.

285. Above all, within the scope of the water supply and wastewater sub-projects, the traffic in all streets of the city of Marneuli will be hampered or totally limited even though for a short time, but permanently.

286. As all three projects will be implemented under the financial assistance of Asian Development Bank, it is desirable to hire one more traffic safety specialist, who, together with a representative of the City Hall, will coordinate the regulation of this issue.

E. 18Climate Change Impact

287. The information related to the existing threats in respect of climate change in Marneuli Municipality was provided by the Georgian local self-governing national association. They evaluated this problem within the limits of the project financed by the USAID.

E.18. 1 Natural Threats

288. As the data of the above-stated group suggest, the natural threats in the Municipality include: intense rain, flood/flashflood, mudflow, drought and hail. Flood/flashflood, river-bank erosion and hail have been more frequent in recent year.

289. The workgroup has not provided any information about the areas damaged by the catastrophes. As per their information, the natural calamities of the recent years cause much damage to agriculture. In particular, the flood and hail in 2011-2012 damaged much harvest in many villages. For example, hail in the villages of Kutliari, Tamarisi, Tsereteli, Kulari and Akhali Diokani damaged approximately 221 ha of the arable and sowing lands and 460 families. Most of them are in village Tamarisi (75 ha) and village Kulari (99 ha).

290. As per the information of the employees of the Municipality Board, the damage inflicted by hail in 2012 was 200 000 Gel, and damage caused by the flood in 2011 amounted to 100 000 Gel. In 2010, approximately 100 000 Gel was spent for bank reinforcement and cleaning works of Algeti banks. Marneuli Municipality has no catastrophe early warning system, and the entities responsible for reacting to emergencies are the State Commission and Rescue Service. As per the information of the Board, the Municipality has the Emergency Management Plan covering fire, drought and hail. The local authority (Rescue Service) has no sufficient resources to react to natural calamities.

E.18.2 Conclusions

291. Based on the analysis of the survey results of the employees of Marneuli Municipality Board, the vulnerability of Marneuli Municipality to the climate changes can be formed as follows:

292. Natural threats: the natural threats in Marneuli Municipality include: intense rain, flood/flashflood, mudflow, drought and hail. Flood/flashflood, river-bank erosion and hail have been more frequent in recent year. However, as it seems, the natural calamities are made more frequent due to the anthropogenic impact, such as destruction of the wind break belts, cutting down the forests, etc. As per the information of the employees of the Municipality Board, the damage inflicted by hail in 2012 was 200 000 Gel, and damage caused by the flood in 2011 amounted to 100 000 Gel. In 2010, approximately 100 000 Gel was spent for bank reinforcement and cleaning works of Algeti banks.

293. The expected climate changes in Marneuli Municipality are not assessed yet. However, following the general trends, we may consider that the climate changes in the future will further aggravate the above-listed issues and will make Marneuli Municipality more vulnerable to the natural threats.

294. **Agriculture:** at present, agriculture is a leading economic branch in Marneuli Municipality promoted by favorable climatic conditions, and water and soil resources. However, in recent years, the agricultural lands have been degraded mostly due to overgrazing; in addition, the washout of the river banks causes the loss of arable and sowing lands. The analysis of the provided information evidences that the number of cattle owned by the people in the Municipality is not high if compared to the available hey-making and pasturing resources in the region. However, the cattle-breeders experience the lack of hey-making meadows and pastures well evidenced by the erosion of the hey-making meadows and pastures due to overgrazing. As the locals state, the problem is aggravated by the increasing number of cattle driven to the summer pastures from other administrative units, as well (this is particularly true with sheep); however, the number of such cattle is not known to the Board. Despite this, the cattle-breeders do nothing to care of or maintain the hey-making meadows and pastures. In addition, the grazing rates are not developed for the pastures, i.e. no rates as to how much and how long the cattle must graze some or other pasture are fixed.

295. Agricultural service in the Municipality able to identify the problems in the field of agriculture and react to them is underdeveloped.

296.**Forest resources:** the forest resources in Marneuli Municipality are poor. The major problems with the forest resources are forest cutting, including illegal cutting and serious destruction of the wind break belts since the 1990s. In addition, virtually, no restoration or growing of forests is accomplished.

297. **Water resources and water use:** there are bulk of surface and underground waters in Marneuli Municipality; the water resources or their quality are not monitored. As the employees of the Municipality Board consider, the intensity of floods has reduced for the last 2 years, but the discharge of the rivers has increased during the floods. However, they have no objective proof of this.

298. The water resources in the Municipality are sufficient to fully meet the existing demand. However, the problem of water supply still exists in the Municipality (including the problem of drinking water) following the poor condition of water supply/irrigation systems. The water supply and irrigation systems need rehabilitation.

299. The settlements of the Municipality have no discharge water collecting and treatment structures what may cause the pollution of water resources.

300. **Local government bodies**: in the Municipality, certain activities of adaptation to the climatic changes are being accomplished. However, such activities are quite small-scaled and

are mostly reactions, i.e. they are oriented in the elimination of the results. A number of preventive measures are undertaken in the Municipality: rehabilitation of the irrigation systems, rehabilitation of the water supply, etc. In order to mitigate the climate changes, the awareness of the methods to improve the waste management was improved. As a rule, the Board of the Municipality is not fully informed about the issues determining the sensitivity of the Municipality to the climate changes, as well as natural catastrophes, agriculture water resources, water supply and forest resources. This limits their possibility to analyze the expected threats and plan and realize preventive measures.

E.18.3 Recommendations

301. For the purpose of adaptation to the climatic changes in the Municipality, the following measures are recommended:

- Restoration of the wind break belts (what was the priority of the self-government, too), what will reduce the impact of winds and promote the regulation of the temperature regime during high temperatures.
- Prevention of the erosion of hey-making meadows and pastures. This can be done by using several methods. First of all, the exact number of grazing cattle on some or other pastures is desirable to fix, and the fixed rates are to be observed. In addition, it is desirable to introduce alternating grazing mode; the number of heads of the introduced cattle must be identified and limited and the cattle-breeders must shift to partially trough-feeding (what will have its affect on the milk yield.
- Restoration of the eroded pastures. For this purpose, grass may be sown, grazing on the eroded sections must be limited, etc.
- Evaluation of the riverbed management methods to identify the most efficient methods to reduce the risks of the expected catastrophes.
- Obtaining the information about the volume of the inert material obtained from the rivers; fixing the facts of the riverbank washout and high-risk sites; submitting this information to the body issuing the license for mining the inert materials so that to review the available resources of the inert material and regulate the mining volumes as necessary.
  Managing the database about the natural threats and damage inflicted by them, as well as about the agriculture, water resources, forest resources and waste management to provide a full picture of the challenges to the Municipality and plan due responses.

F. Analysis of Alternatives

302. The present Project envisages the disassembly of the reservoirs on the territory of the city of Marneuli and building the new reservoirs, as well as replacement of a 43-km-long water supply pipes and assembly of new 136-km-long pipes o the territory of the city of Marneuli. No new water intake units will be built within the scope of the Project.

303. As the construction of the new reservoirs is planned on the locations of the old reservoirs and the water supply pipes will be replaced where there are old pipes already, no alternatives of the project implementation sites was considered within the limits of the present Project. Zero alternative analysis was done only.

F.1. Zero Alternative Project

304. as per the present situation with the water-supply in the city of Marneuli:

- At present, only two out of six reservoirs with the total capacity of 3500 m^3 on the territory of the city due to their physical condition (the total capacity of the two reservoirs is 500 m^3 what is approximately 17% of the capacity of the existing reservoirs).
- As per the technical conclusion, the rehabilitation of other reservoirs is impossible.
- As per the present situation, the water is supplied to 60% of the city of Marneuli and 40% of the adjacent villages. Water is supplied to the population in a scheduled manner, two or three days a week, for 4 hours a day.
- As the preliminary studies evidence, the water loss due to the damages of the existing infrastructure is 60%.
- As per the calculations, by 2040, the city will need the reservoirs with the capacity of 12000 m^3 water for full coverage in a 24-hrs. water-supply mode.

305. Following the above-mentioned, non-implementation of the Project will be much harmful for the city of Marneuli what will further aggravate the social conditions in the city of Marneuli and adjacent villages.

G. Information Disclosure, Consultation, and Participation

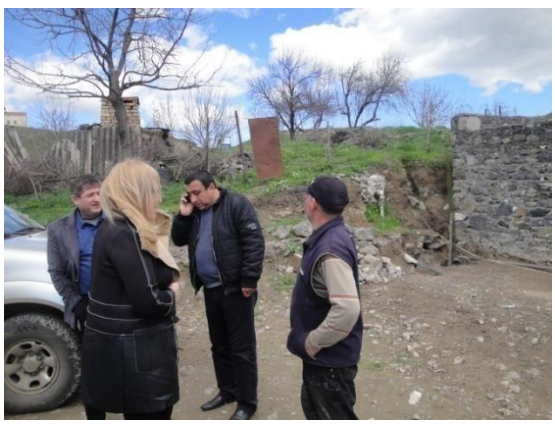
306. The main stakeholders have already been identified and consulted during preparation of this IEE, and any others that are identified during project implementation will be brought into the process in the future. Stakeholders of this project include:

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

307. 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 Marneuli (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.

308. Stakeholder consultation and participation was an important process in the preparationof this IEE. The process engaging stakeholders and affected people during theconduct of the IEE included joint sites visits of IA, design and supervising consultants, onsite discussions with local population and public hearings. Fig. 22 and 23 below showsthe picture of consultation with people living near City "Marneuli" reservoir in Marneuli.

Figure 29 and 30: Meeting with the population living adjacent to "Marneuli" reservoir



309. At the stage of developing the IEE document, a number of meetings were held with the representatives of Marneuli water company to consider tehelements of the Project design and actions to be accomplished in the field of environmental protection (Figure 24 and 25).

Figure 31 and 32: Meeting with marneuli UWSCG's representatives


310. The Public Hearing was held on March 23, 2015 in Marneuli City Hall and commenced at 12:00. The Public Hearings was organized with representatives from the local government of Marneuli, local population and representatives of UWSCG and Design Company Kocks.

311. By giving advertisements in advance at Marneuli Service Centre, 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 Marneuli sub-project;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

312. Local residents and the representatives of UWSCG held discussions about particular issues during the meeting. The Minutes of the Meeting is presented in Annex 1.

313. During public consultation the main issue raised by local population was employment. To solve this problem have got desition to put in the contract contructors resposobilities at workers hiring stage in case similar qualification to give priority local representatives.

H. Grievance Redress Mechanism

314. For the effective implementation of a GRM system under the USIIP, UWSCG issued special order (#122) on 30 April 2014. The "Establishment of GRM within the Framework of the Asian Development Bank Funded Projects" signed by the head of UWSCG gives clear instructions to every involved stakeholder how to act when affected people are impacted by the project.

315. After issuance of the special order, a GRM was first set up by UWSCG in Marneuli under the REG-01 project of USIIP. The GRM allows affected people to appeal any disagreeable decision, practice or activity arising from project implementation.

316. Any affected person can apply at a UWSCG **local service centre** through different ways, either by going to the service centre, sending a letter to the service centre, or calling a hotline. The operators of the service centre can respond by going directly to the affected person if they are disabled to get the written grievance from them..

317. GRM in Marneuli will operate in three stages:

318. During the **first stage**, complaints are discussed within two weeks of being received by the local service centre of UWSCG (e.g. Marneuli office), based on the verbal or written complaint. In the first stage of grievance review and resolution, an authorized representative of the local service centre is responsible for ensuring the registration of the claim and its further processing. He/she engages in the grievance review and resolution process representatives (managers and environmental specialists) of Construction and Supervision Companies, and the representatives of UWSCG central office as required. At the local service centre, the affected person is provided with a queue number and then registers the grievance at the service desk.

319. The service centre operators, who are trained[3] in USIIP/Reg-01 project, register all relevant grievances with support of an **online task management system**, which tracks information on the grievance review process and the responsible person. Moreover, the operators fill the ADB complaints log with the registered grievance that coincides with local internal forms.This **electronic intranet system**[4]allows the UWSCG Tbilisi Office to immediately see claims. Therefore, claims submitted to any regional service centre can be monitored by the Head of the Investment Projects Management Office (IPMO), as well as the Head of the Environmental and Resettlement Division, Maka Goderdzishvili.

320. When a grievance is solved positively in the first stage, the grievance is closed through an Agreement Protocol, which is reflected in the eDocument – Task Management System.

[3] UWSCG and Supervision Consultant (Eptisa) conducted trainings for service center operators covering general procedures of GRM functioning in order to ensure proper coordination of different departments.

[4]The **eDocument - Task Management System** was developed by LEPL Financial-Analytical Service of the Ministry of Finance of Georgia. It is an innovative electronic document and task management mechanism for electronically processing of documents. Used by almost all the major budgetary organizations in Georgia, the eDocumentservice offers an opportunity to manage, find, and trackdocuments for information-intensive organizations. The system significantly simplifies the process of organizing and managing documents, tasks, information and processes. It thereby enables State companies, organizations and agencies to increase their efficiency and productivity. The many benefits of the eDocument service include: a) significant saving of time; b) effective management of tasks; c) flexible installation procedures; d) synchronized with MS Office; e) control of tasks implementation process; f) group working opportunities on assignments; g) automatic scanning; h) high quality security; i) electronic signature and electronic conformation; k) control of various versions of documents; and j) control of accomplished and uncompleted documents.*eDocument service is used by almost all the major budgetary organizations in Georgia.*

321. The grievance enters a **second stage** if it is not solved. In that case, the authorized representative of the local service centre will help the claimant prepare a package of grievance application documents for official submission to the Grievance Redress Committee (GRC). The package contains the following information:

- Name, ID, address and contact details of the claimant
- Description of the essence of the complaint
- Supporting documents and evidences (photos, maps, drawings/sketches, conclusion of experts or any other documents confirming the claim)
- Brief description of the actions proposed for the grievance resolution at the first stage and the reasons why these actions were denied
- Minutes of meetings conducted at the first stage

322. The GRC should make a decision within two weeks after the registration of the grievance. The GRC is staffed as follows: (i) Representative of self-government – the head of committee; (ii) Director/ Manager of UWSCG service centre; (iii) Investments Project Management Division representative of the company; (iv) Representative of local authoritative NGO (according to the claim reference); (v) Stakeholders' female representative;(vi) Stakeholders' informal representative; and (vii) Heads of local municipalities.

323. The GRC will review the package of grievance documents, set a date for a meeting with the claimant, discuss the claim at the meeting, and set up a plan for further actions (actions, responsible persons, schedule etc.). Upon the resolution of the case, the GRC will prepare a brief resume and protocol and the protocol signed by complainant and all parties will be registered in a grievance log.

324. There is a **third stage** in case there is a failure to resolve the grievance. In this case, GRC will help the claimant to prepare the documents for submission to the Rayon (municipal) court. They can also apply to ADB at the address below:

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

325. **Public awareness:** Affected people will be fully informed of their rights and of the procedures for addressing complaints, whether verbally or in writing, through the comprehensive public awareness activities (door-to-door campaign, consultation meetings and media campaign). These PA activities will be carried out by the supervision consultant and UWSCG/DREP/PR Division.

I. Environmental Management Plan

326.The Environmental Management Plan (EMP) documents the impacts identified in the EIA report, the actions required to mitigate those impacts to acceptable levels in accordance with the laws of the country and the ADB safeguard policy, and the monitoring activities that are to be undertaken as part of the project to confirm that the mitigation actions have been effective in achieving their objectives or to initiate changes in the actions required.

327. The EMP also details the institutional arrangements and capacities that currently exist, or that will be put in place as part of the project implementation, to ensure that the environmental due diligence (including the EMP) has comprehensively considered both the national and ADB requirements for environmental protection, has identified all likely environmental impacts and proposed appropriate mitigation measures, and has the systems in place to ensure that effective procedures for environmental monitoring and control of the project impacts and mitigation measures are implemented throughout the life of the project

I.2 Environmental Impacts, Mitigation and Monitoring Plans

228. The environmental impacts associated with Tranches 1 and 2 projects - the Development Program, have been detailed above in the relevant sections of this EIA. Mitigation measures required to address the impacts identified in the EIA have been summarized in each of the relevant sections covering the physical, biological and socio-economic environment affected by the project. The impacts identified and the specific mitigation measures proposed to address them have been consolidated into the **environmental mitigation plan** presented in Table 33, which includes time frames, responsibilities and where applicable, estimated costs for each measure.

329. The environmental mitigation plan includes a number of standalone construction-related management plans on: health and safety; waste; sewage; soil (including topsoil and vegetation); site drainage; traffic control; noise; air pollution; dust and cultural/archeological finds. In addition, it specifies the need for the Contractor to provide method statements on spillage control and the location of fuel storage, filling stations and vehicle washing sites to be provided to ARS for approval.

330. An **environmental monitoring plan** is presented in table 34 which outlines the activities and responsibilities associated with monitoring the effectiveness of the proposed mitigation plan and ensuring compliance with the recommendations of the EIA.

I.3 **Implementation Arrangements and Responsibilities**

331. The main institutions that will be involved in implementation of the EMP are **UWSCG** the program executing agency (EA), the Design and Supervision Consultant (DSC) the Contractor and to a lesser extent the Ministry of Ecology and Natural Resources (MENR).

332. A Project Implementation Uni**t (PIU) established within UWSCG** will be responsible for the day to day management of the project including implementation of the EMP. The PIU currently has one Safeguards Specialist who is responsible for management of the environmental and social aspects associated with development of **all donor funded water sector projects for which** is the responsible Executing Agency (EA).

333. The PIU (Safeguards Specialist) responsibilities in respect of implementation of the EMP are as follows:

(i) Ensure that all relevant EMP requirements (including environmental designs and mitigation measures) are duly incorporated into the project bidding documents.

(ii) Obtain necessary permits and/or clearance, as required, from MENR and other relevant government agencies, ensuring that all necessary regulatory clearances are obtained before commencing any civil work on the project.
(iii) Ensure that contractors have access to the EMP and EIA report.
(iv) Ensure that contractors understand their responsibilities to mitigate environmental problems associated with their construction activities and facilitate training of their staff in implementation of the EMP.
(v) Approve the Site Specific Environmental Management Plan (SEMP) before Contractor takes possession of construction site
(vi) Monitor the contractor's implementation of the EMP in accordance with the environmental monitoring plan.
(vii) Submit six monthly Environmental Monitoring Reports to ADB.
(viii) In case unpredicted environmental impacts occur during the project implementation, prepare and implement as necessary an environmental emergency program in consultation with MENR, any other relevant government agencies, and ADB.

334. The **DSC** will include a part time international environmental specialist and fulltime site-based national environmental specialist to assist the PIU supervise and monitor implementation of the EMP during construction.

335. A Non Compliance Notice will be issued to the contractor if the DSC requires action to be taken. The contractor will be required to prepare a corrective action plan which is to be implemented by a date agreed with the DSC. Non-compliance will be ranked according to the following criteria:

- Non Compliance Level I: A situation that is not consistent with requirements of the EMP, 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.
- Non Compliance Level II: A situation that has not yet resulted in clearly identified damage or irreversible impact, but which demonstrates potential significance. Level II requires expeditious corrective action and site-specific attention to prevent severe effects. Repeated Level II concerns may become Level III concerns if left unattended.
- Non Compliance Level III: A critical situation that will result in significant social or environmental damage occurring or a reasonable expectation of very severe impending damage. Intentional disregard of Non Compliance Notices or specific prohibitions is also classified as a Level III concern.

336. The failure to prepare a corrective action plan or to implement it within the required timeframe will result in the Employer undertaking the work at the Contractor's expense (as will be specified in the Contract).

337. The **Contractor** will appoint a full time **Environmental Manager** (EM) to be a senior member of the construction management team based on site for the duration of the contract. The EM shall have a university degree (preferably at Masters level) in Environmental Science or related discipline and have at least 10 years work experience in environmental management of infrastructure project

238. Key responsibilities of the Contractor (through the EM) are as follows:

(i) Preparing the site specific environmental management plan (SEMP) for approval by the Employer (PIU) prior to the Contractors taking possession of the construction site (see below)
(ii) Ensuring the SEMPis implemented effectively throughout the construction period.
(iii) Coordinating community relations issues through acting as the Contractor's community relations focal point (proactive community consultation, complaints investigation and grievance resolution)
(iv) Establishing and maintaining site records of:

- weekly site inspections using checklists based on SEMP,
- environmental accidents/incidents including resolution activities
- environmental monitoring data,
- non-compliance notifications issued by the DSC
- Corrective action plans issued to the DSC in response to non-compliance notices.
- Community relations activities including maintaining complaints register
- Monitoring reports
- Routine reporting of SEMP compliance and community liaison activities (see below).
- Adhoc reporting to the Employer's Engineer of environmental incidents/spillages including actions taken to resolve issues

I.4 Site Specific Environmental Management Plan (SEMP)

339. Following the award of the contract and prior to construction commencing the Contractor will review the EMP and develop this into a detailed Site Specific Environmental Management Plan (SEMP) that amplifies the conditions established in the EMP that are specific for the site and the tasks involved. The SEMP will identify persons who will be responsible for supervising the work within the contractor's team. The SEMP will include a matrix of mitigation measures corresponding to specific site activities. This information will be presented on a series of site plans covering the whole project site showing all environmental management requirements for all activities in the construction phase. Site plans will include:

(i) Indication of North and scale
(ii) Existing and planned supporting infrastructure (e.g., access roads, water supplies, and electricity supplies)
(iii) Location of planned work (ROW/alignment, camp layout)
(iv) Contours (as applicable)
(v) Drainage systems
(vi) Locations of sensitive receptors and environmental values

340. The SEMP will also include a monitoring plan and a reporting program corresponding to the requirements of the EMP. The SEMP will be submitted to XXXX PIU for approval at least 10 days before taking possession of any work site.

I.4 Site Induction

341. Following approval of the SEMP by the UWSCG PIU, the Contractor will be required to attend a site induction meeting with the DSC's International Environmental Specialist whereby the SEMP is confirmed with the Contractor to ensure that all compliance conditions are clearly understood. Following confirmation of the SEMP withthe Contractor the DSC's International Environmental Specialist advises the DSC Team Leader that the Contractor is now cleared to take possession of the Site and may commence moving equipment to the Site.

342. The Contractor will be responsible for ensuring that all sub-contractors abide by the conditions of the SEMP.

Reporting

343. The Contractor will prepare a monthly concise report (Maximum 3 pages and appendices, if required) in respect of compliance with EMP/SEMP requirements that will be submitted to the PIU through the DSC. The report will contain the following sections.

(i) Details of any environmental incidents
(ii) Status of all non-conformance identified during audits and inspections that are identified by non compliance notices.
(iii) Complaints from the public and proactive community relations activities
(iv) Monthly Accident Report

(v) Waste volumes, types and disposal
(vi) Details of any contaminated areas that have been identified and rehabilitated.
(vii) Details of any archaeological discoveries.
(viii) Details of any ecological issues.
(ix) Other relevant environmental issues.

344. The Contractor will have a duty to immediately report to the Engineer if any serious environmental breach has occurred during construction e.g. clearing of sensitive areas, serious oil spills etc.

345. ADBs responsibilities in regard to implementation of environmental safeguards requirements for the project include: undertaking periodic monitoring of the EMP implementation and due diligence as part of an overall project review mission; and if required, provide advice to XXXX in carrying out its responsibilities to implement the EMP for the project.

I.4 Implementation Costs

346. 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.

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

Table 36: Environmental Management Cost

Item	Quantity[5]	Unit Cost	Total Cost	Remarks
Baseline Parametric Measurements	6	200 USD	1,200	To be conducted by the Contractor for air emissions, dust, vibratio 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 36 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)	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.

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

Item	Quantity[5]	Unit Cost	Total Cost	Remarks
Environmental specialist (Contractor)	36 month	1500 USD	54.000	The costs will be included in the contract signed between UWSCG and Contractor.
E&HS Trainings	33 (on monthly daze)	18000 USD	5000 USD	Training should be conducted for all prsons involved in construction process
Study of the landslide-prone areas and buildings and premises on the adjacent territories	1	15000	15000	Study should be conducted before construction activities started.
Traffic Specialist	12 month	2.500	30.000	Specialist will be hired in scope of three projects took place in Marneuli at the same time
Construction dust and noise barriers	140 m	250	35.000	To be installed by Contractor at the WWTP construction site
Miscellaneous			251.80	10% for above Items
Subtotal			27680.00	Total for above

Table 37: Environmental Impacts and Mitigation Measures

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost
Pre-Construction				**Part of Construction Cost**
Biological study of the project area	Prior to start construction activities, construction contractor should carry out the biological study of the project area. Results of the work submitted for consideration UWSCG.	**Environmental Specialist Of Construction Company**	City "Marneuli" Reservoir site; "Narimanov" reservoir site. Transmission mains	**6 000 USD**
Preparation of "Inert Waste Management Plan"	Prior to start construction activities, construction contractor should choose the areas for disposal inert waste and prepare "Inert waste management plan". Prepared plan should be submitted to SC for endorcemnet and to UWSCG for approval.	**Environmental Specialist Of Construction Company**	City "Marneuli" Reservoir site; "Narimanov" reservoir site.	Included in Project price
SSEMP	Prior to start construction activities, construction contractor should prepare SSEMP and submit to SC for endorcement and to UWSCG for approval.	**Environmental Specialist**	Project Area	Included in Project price

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost
		Of Construction Company		
Social Issues	Put in the contract contructors resposobilities at workers hiring stage in case similar qualification to give priority local representatives.	**CS**	Contract documents	Project prise
Possible removal of Terrestrial habitat. Loss of the top soil	If at the stage of the detailed biological study, there are rare or red-listed species are fixed in the project area, the Construction Contractor is obliged to: • Replant the rare or red-listed species found in the Project area and return them to their original site after the completion of the Project. • Attempt to avoid cutting down the trees in the Project zone (by considering the Project alternatives). • Develop a compensatory planting plan and submit it to the relevant bodies for approval, if it is unavoidable to cut down the trees.	**Environmental Specialist** **Of Construction Company**	Construction and labour camp, storage area. WW Pipe construction	Part of construction cost
A negative impact on soil, water and air may be caused because of an incorrect management of the	• Before demolition of the building install dust and noise protective solid barriers; • Prohibited use of blasting equipment during the demolition process of reservoirs; • No use of heavy duty equipment is allowed;	**Environmental Specialist** **Of**	City “Marneuli” Reservoir site; “Narimanov”	Included in Project price

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost
generated inertial waste during demolishing of the existing Reservoirs. Also the generated noise, dust and vibration during demolition may cause a negative impact on the surrounding buildings and population.	• Prior to the commencement of any activity, the Contractor shall identify whether any machinery or planned action will cause significant vibration. If is the answer is yes, the Contractor is to undertake a condition survey of all structures within the zone of influence; • The Contractor shall 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	**Construction Company**	reservoir site.	

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost
	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.			
Construction of noise attenuation wall	Prior to the onset of the civil works, the Construction Contractor is obliged to construct the noise attenuating barriers.	**Environmental Specialist Of Construction Company**	City "Marneuli" Reservoir site; "Narimanov" reservoir site.	35 000.00
Construction				

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost
Ambient Air and Local Dust[6]	• 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	**Environmental Specialist**	Excavation areas for trenches at Marneuli town; City "Marneuli" Reservoir site; "Narimanov" reservoir site.	Part of construction 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	**Of Construction Company**	Transportation routes of construction materials	Part of construction cost

[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

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost
	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			
Noise Pollution[7]	• Approximately 140 m length noise attenuation wall must be constructed at the "Marneui" and "Narimanov" reservoirs area. • Maintain machinery and vehicle silencer units to minimize noise • Keeps noise generating activities associated with construction activities to a minimum and within working hours. • Notify the residents of Marneuli 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.	**Environmental Specialist**	Project Area	Part of construction cost
Impact on surface water bodies due to	• In case of heavy rain, protect open trenches from entry of rain water by raising earthen bunds with excavated soil	**Of Constructi**	Project area	Part of constructio

[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

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost
construction[8]	• Confine construction area including the material storage (sand and aggregate) so that runoff from upland areas will not enter the site • Ensure that drains are not blocked with excavated soil	**on Company**		n cost
Soil Contamination	• 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 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 concrete or plastered masonry wall, • A proper floor drain should be installed on the slab of the concrete pool for safely discharging the leakages.	**Environmental Specialist** **Of Construction Company**	Construction sites Camp	Part of construction 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 • In case of cut of the Red Book listed trees, Develop Compensation Action Plan and number of planted trees should be agreed on with UWSCG. • 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		Construction sate Camp	Part of construction cost

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

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost
	clean, tidy and free of rubbish that would attract animals.			
Impact on Traffic	• Informing all residents and businesses about the nature and duration of any work well in advance so that they can make necessary preparations if necessary; • Providing wooden walkways/planks across trenches for pedestrians and metal sheets where vehicle access is required • Increasing workforce to complete the work in minimum time in these stretches • Initial situation of private properties has to be re-established after construction	**Environmental Specialist Of Construction Company**	Construction site Access Road	Part of construction cost
Hazardous Materials	• Comply with all national, regional and local legislation with regard to the storage, transport, use and disposal of petroleum, chemical, 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.	**Environmental Specialist** **Of Construction Company**	Construction site Storage Area	Part of construction cost
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	**Environmental Specialist**	Project area	Part of construction cost

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost
	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 • Waste storage.	**Of Construction Company**	Storage Area Construction camp	
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.	**Environmental Specialist Of Construction Company**	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.	**Environmental Specialist** **Of Construction Company**	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	**Environmental Specialist Of Construction Company**	Marneuli town City “Marneuli” Reservoir site; “Narimanov” reservoir site.	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	**Environmental Specialist** **Of Construction Company**	All construction sites	Part of construction cost

Potential Negative Impacts	Mitigation measures	Responsibility	Location	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	**Environmental Specialist** **Of Construction Company**	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.	**Environmental Specialist** **Of Construction Company**	All construction sites	Part of construction cost
Historical, archaeological chance	• Contractor shall put in place a protocol for conducting any excavation work, to ensure that any chance finds are	**Environmental**	All construction sites	Part of constructio

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost
finds during excavation	recognized and measures are taken to ensure they are protected and conserved. This should involve: ○ Having excavation observed by a person with archaeological field training; ○ 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 to ensure its removal or protection in situ..	**Specialist** **Of Construction Company**		n cost
Cumulative impacts – repeated disturbance to roads and people	• Schedule the construction activities in harmony with the other on-going works • Schedule works before road work	**Environmental Specialist** **Of Construction Company**, SC	Works on waste water supply network in the town	Part of construction cost
Climate Change	• Restoration of the wind break belts in the area adjacent to the Project zone what will reduce the soil erosion potential and will help regulate the temperature regime during the high air temperatures;	**Environmental Specialist** **Of Construction Company**	Construction area	Part of construction cost
Operation Phase				

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost
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
Disturbance/ nuisance/ noise due to operation activity	• Consulting company has to define the noise level and its spreading area generated at the stage of pumping stations operation; • Additional changes will have to be included in the design if required and also noise reducing barriers will have to be arranged	UWSCG	pumping stations area	Part of operation costs

I.5 Monitoring

348. 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. All parameters (Water quality, noise) should be monitored against international standards.

349. 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.

350. 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 Marneuli is needed.

Table 38: Environmental Monitoring Plan for general construction activities in Marneuli

Item	Parameter	Frequency	Action Level	Response When Action Level Exceeded	Responsibility
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 SSEMP have been included	The contract document shall reflect all environmental mitigation measurements	SC
Contract documentation with construction contractor	Social Issues	Once before contract with construction company signed	Ensure relevant section of contructors resposobilities to hire local population have been included in contract.	50 % of workers shoul be hired from local population.	SC
Construction company prepared all necessary environmental management plans and conducted all requested investigations	Environmental Issues	Once before contract signature	Environmental audit of the environmental plans prepared by construction contractor	All environmental plans were prepared and approved by relevant organizations.	SC
Construction					
Ambient Air	Dust	Continual	Visual assessment during the Works Measuring at nearest	If dust levels are above acceptable visual levels, implement dust suppression	SC

Item	Parameter	Frequency	Action Level	Response When Action Level Exceeded	Responsibility
		Dust should be monitored on the regular bases as well as during the peak operation of Construction Equipment and Machinery	potentially sensitive receivers.	techniques (wetting down area) and/or assess weather conditions and maybe temporarily cease works until conditions ease	
Noise	(15 minute) Noise Levels	Periodic attended Monitoring at hourly Intervals. Noise, should be monitored on the regular bases as well as during the peak operation of Construction Equipment and Machinery	Measuring at nearest potentially sensitive receivers.	If noise action level is exceeded then review work practices and noise control procedures, including maintenance of equipment, installation of silencers, provision of noise barriers and modification of work hours.	SC
Vibration	(15 minute) Vibraition level	Periodic attended Monitoring at hourly Intervals. Vibration should be monitored on the regular bases as well as during the peak operation of Construction Equipment and	Measuring at nearest potentially sensitive receivers.	If vidration level is exceeded then review work practices, maintenance of equipment.	SC

Item	Parameter	Frequency	Action Level	Response When Action Level Exceeded	Responsibility
		Machinery			
Water Quality	Quality/ Contaminant concentrates	Continue In rain weather after 10-15 minits rain stats.	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
Waste Management Implications	Segregation, Storage and transport of wastes	Daily Monthly inspection	- Visual assessment during the Works; - Field inspection, - Report of waste volumes generated. - Report and record all leakages and spills - Impact Monitoring. - Compliance Monitoring	Solid waste cycled as 0 % of movement of solids or liquid waste through the soil, rocks, water, atmosphere.	SC
Ground	Soil Monitoring and Erosion Control	Continual	Assess adequacy of sedimentation/environmental controls on-site Impact Monitoring	If controls have failed or are found inadequate, cease works immediately and repair to an acceptable standard	SC
Ecological Resources	Fauna and Flora	Continual	Minimal ecological impacts Impact Monitoring	Required to ensure the recommended mitigation measures are properly implemented.	SC
Landscape and Visual	Surface treatment of temporary structures	Once at the Completion of work	Minimum disturbance of the original landscape. Impact Monitoring	Required to ensure the recommended mitigation measures are properly implemented	SC

Item	Parameter	Frequency	Action Level	Response When Action Level Exceeded	Responsibility
Operation					
Conduct source water 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

K. Conclusion and Recommendation

K.1 Recommendation

351. The environmental impacts of infrastructure elements proposed in the water supply system improvement subproject in Marneuli 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.

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

353. 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 water supply system are presented in a monitoring plan.

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

355. The main beneficiaries of the improved system will be the citizens of Marneuli, 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.

356. 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.

360. 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.

K.2 Conclusion

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

362. 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.

363. 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 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.

Annex 1

LCC "United Water Supply Company of Georgia"

Improving the Water Supply System in Marneuli

Initial Environmental Examination
(Marneuli City Hall; 23 March, 2015; 12:00AM)

Minutes of Public Hearings

Marneuli 23.03.2015

The following persons attended the meeting:

1. Ketevan Chomakhidze– "United Water Supply Company of Georgia, LLC" (UWSCG), USIIP, Environmental Specialist;
2. Irakli Legashvili – Environmental Specialist, Supervision Consultant Company "Eptisa"
3. Irakli Kaviladze – Expert of DC Kocks

The following local representatives of Marneuli attended the meeting:

1. Kakhaber Chigovadze - Municipality of Marneuli
2. Shakhin Iusupov - Resident of Marneuli
3. Giorgi Mtivlishvili – Resident of Marneuli
4. Namazov Rafail – Municipality of Marneuli
5. Vasil Namazov – Resident of Marneuli
6. Shafi Agatov - Resident of Marneuli
7. Abas Abasov - Municipality of Marneuli
8. Ismail Asugramov - Municipality of Marneuli
9. Teona Tkemaladze – Municipality of Marneuli
10. Ismail Bairamov - Resident of Marneuli
11. Tabriz Aliev - Resident of Marneuli

Meeting Agenda

The Public Hearing for Marneuli WS project was held on 23 March, 2015 in Marneuli City Hall, commencing at 12:00 a.m.

Public Hearing have been attended by the representatives of UWSCG, local Service Center, Design Consultant "Kocks", UWSCG/USSIP environmental specialist, local government and local population.

The PowerPoint presentations were held by Irakli Kaviladze and Ketevan Chomakhidze. The full information for local residents and attendees have been presented by consultants about projected activities and described the project nature and estimated impacts as a result of this project implementation.

Local government, local residents and the representatives of UWSCG and DC Kocks held discussions about particular issues during the meeting.

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

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

The Following questions have been asked from the local population:

#	**Questions from local residents**	**Answers from the United Water Supply Company of Georgia**
1	What is duration, date of start and completion of the construction of the project?	Project will start in 2016 and finish in 2018.
2	Will local population employed by contractor?	Yes. Contractor will ensure involvement of local population in construction works.
3	What will be Socio Economic Impacts of the Project?	Project will generate new job opportunities. Standard of individiual and public health will improve as a result of the project. Improvements of hygiene conditions will reduce the incidence of diseases associated with poor sanitation.
4	How many streets will be involved in the project and will it completely cover the city?	Representatives of the UWSCG and Kocks explained the local population that project will cover the whole Marneuli with 100% connection of the local population to the water supply network.
5	Will local people employed in the construction	Yes, contractor will be obliged to employee unskilled labor from the local population during the construction

6	Who will supervise and monitor construction and operation of the project?	Project implementation will be monitored by the UWSCG and supervised by the Supervision Consultant - Eptisa
7	What type of impact on environment is associated with the project? And what mitigation measures will be taken?	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 nighttime construction activities; (vii) avoiding tree cutting through location alignment changes; and (viii) avoiding hazards during construction by securing the site at critical segments.
8	Who is responsible for repair and maintenance of pipes in case of damage?	United Water Supply Company of Georgia
9	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

Local population noted the importantse of the rehabilitation of the waster supply system in Marneuli, however, expressed concern that it would be better that the project is carried out in conjunction with the rehabilitation of the water supply system in Marneuli, because in this case people are less likely to be disturbed.

მარნეულის წყალმომარაგების სიტემის რეაბილიტაციის პროექტი

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საჯარო განხილვა

Marneuli Water Supply System Rehabilitation Project
Initial Environmental Examination (IEE)
Public Hearing

23 მარტი, 2015

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