

Initial Environmental Examination

October 2017

GEO: Urban Services Improvement Investment Program – Tranche 3 Improvement of Telavi Water Supply System Subproject

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

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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	-	Multitranchise 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 Telavi under the Asian Development Bank (ADB) funded Urban Services Improvement Investment Program, which is under preparation stage. This Investment Program, implemented in secondary towns of Georgia, 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 2017 to 2019. 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 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. The City of Telavi is located in Kakheti region, 160 km eastwards from the capital Tbilisi, at 500-800 meters above the sea level. Tsiv-Gombri Range borders to the south and south-west of the city and Alazani Valley to the north and east. Population of town Telavi is approx. 21000 inhabitants. It is the administrative center of the region, connected with the capital by two highways and railroad. The town is one of the centres of Georgia's wine industry. Proper water supply is very important for Telavi to increase production of wine and other agricultural spheres. Telavi is attracted to tourists as well with its various landmarks and cultural heritages.
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. Currently, in Telavi, water flows from headworks of "Turdos Khevi" (water supply is provided with underground water and drainage, which is fed by river "Turdos Khevi") and "Jvari Patiosani" and discharged into the Water Treatment Plant, clean water from the latter is flowing into the "central" reservoir №1 (2000 m³). The water from reservoir №1 is distributed in the reservoirs №2 (1000 m³) and №3 (2000 m³), located in the southern part of the city. Water from the reservoir №2 is distributed in the reservoirs №4 (350 m³) and №5 (400 m³) located in the central part of the city.
7. The distribution network receives water from the aforementioned reservoirs, about 21 km of which was reconstructed as part of the early implanted projects.
8. At this stage, the EIB finances the partial rehabilitation of the Telavi Water Supply System, namely the construction of reservoirs and the restoration of the IV and V zones of the water supply system. The following activities are financed under the EIB project: construction of a network with a total length of 34 km; construction of a new reservoir with a volume of 2000 m³ in the area of the central reservoir No.1; construction of new reservoir with the capacity of

1000 m3 instead of existing reservoir No.2; construction of a new 500 m3 reservoir in "Zuzumbo", located in the western part of the city and metering of customers in the rehabilitated zone.

9. As it was mentioned above the Water Treatment Plant is supplied with water from "Turdo Valley" and "Jvar-Patiosani" headworks. During baseflow (in summer), the water flow is reduced to 200m3/h, which results in decreased water supply in the area and the population has intermittent water supply.
10. Currently only 18% of the population of Telavi are connected to the network and has 24 hours water supply, 20% - 12 hours and 62% - 2-3 hours a day.
11. The proposed project envisages finalization of water supply system rehabilitation measures commenced at early stages in order to provide Telavi population with 24 hour high quality drinking water. The following works will be carried out within the proposed project: (i) reconstruction/rehabilitation of water producing 11 Boreholes, with the depth of 200-220 m. and capacity 8-10 l/sec, for each; (ii) construction of one new reservoir with the volume of 2000m3 near the new central reservoir # 1 (2000m3); (iii) reconstruction of existing Boreholes (1) and construction of new 2000 m3 reservoir (1) in "Gigo Gora"; (iv) construction of 1000 m3 "Shalauri Reservoir" (1) and (1) new borehole in the south-eastern part of the city; (v) construction of one new reservoir of 500 m3 adjacent to the Caucasian street; (vi) reconstruction of existing Borehole (1) and 1000m3 existing reservoir (1) between the Gigo Gora on the University Street; (vii) construction of 500m3 reservoir (1) and (1) borehole adjacent to the Caucasian street; (viii) reconstruction of existing Boreholes (2) and construction of (2) new Boreholes in the area of central reservoir N1, near the 2000m3 reservoir; (ix) reconstruction of existing (1) Borehole instead of existing reservoir No. 2, near the new 1000m3 reservoir; (x) construction of (2) Boreholes in the western part of Telavi near the new 500m3 reservoir in "Zuzumbo"; (xi) complete rehabilitation of Distribution Network for I, II and III zones, with total length of 63 km; (xii) construction of a new transmission line for water supply from well fields to reservoirs; (xiii) metering of the customers, including multi-storey residential buildings and construction of the Chlorination Building.
12. The Contractor, prior to the onset of the construction, is obliged to conduct a number of studies and develop environmental plans, including (i) Detailed botanical study of the Project zone if the changes are made in design, (ii) Inert Solid Waste management plan; (iii) Site-Specific Environmental Management Plans (SSEMPs) (iv), „Reinstatement Management Plan“; (v) Health and Safety Management Plan; (VI) Emergency Response Plan.
13. Site-specific Botanical study of project areas, including reservoirs and Boreholes have been carried out for proposed IEE and the findings of survey are presented in section D.3 Description of Biological Environment. Based on this survey final design of the proposed sub-project is developed.
14. At this stage of developing the IEE, a number of consultation meetings were held with the local population, local self-governing bodies and all concerned parties (see Section G). These meetings were attended also by the representatives of UWSCG/IPMO and other parties engaged in developing the sub-project design. Views expressed during these consultations were incorporated into the IEE and are reflected into the final planning of Telavi WS sub-project. The IEE will be made available at public locations in the Telavi town and will be disclosed to a wider audience via the ADB and UWSCG websites. The consultation process will be continued and expanded during project implementation to ensure that stakeholders are fully engaged in the project and have the opportunity to participate in its development and implementation. The citizens of Telavi will be the major beneficiaries of this subproject as they will be provided with 24 hours water supply. A Grievance Redress Mechanism was discussed during the consultations and is described within the IEE to ensure any public grievances are addressed quickly. Ongoing consultations will occur throughout the project implementation period with the assistance of the NGOs.

15. UWSCG is the executing agency of the project, which in turn hires construction and supervision companies on the basis of the tender. The above mentioned team takes full responsibility for the effective implementation of the project.
16. 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 as well. The good quality water 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

17. 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

18. 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.
19. 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.
20. 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 Telavi 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.1.1. International Standards

23. During the design, construction, and operation of the project the borrower/client will apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environment, Health and Safety Guidelines.⁷ These standards contain performance levels and measures that are normally acceptable and applicable to projects. When host country regulations differ from these levels and measures, the borrower/client will achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the borrower/client will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in this document.
24. On 27 June 2014, EU and Georgia signed Association Agreement. One of the general demands of the indicated Agreement is integration of Georgian legislative base requirements with EU legislative base, among them in environment protection field. Therefore, after several years Georgian environmental standards will be harmonized with EU standards. All the ongoing projects of Georgia and the introduced new technologies will completely satisfy EU legislation standards. Therefore, at all the ongoing and planned projects implementation stage EU legislative base requirements will be preferred, which as it is indicated in SPS 2009 are mostly identical of IFC requirements.
25. According to SPS 2009 the new EBRD policy and performance requirements provide similar safeguards to those of the IFC but reflect the specific characteristics of the EBRD's region of operations and its commitments under the European principles for the environment, to which the EBRD is a signatory (SPS 2009, paragraph 10).

B. 1.1.1 Ambient Air Quality

26. According the IFC Environmental, Health, and Safety Guidelines "Projects with significant¹ sources of air emissions, and potential for significant impacts to ambient air quality, should prevent or minimize impacts by ensuring that:
- Emissions do not result in pollutant concentrations that reach or exceed relevant ambient quality guidelines and standards by applying national legislated standards, or in their absence, the current WHO Air Quality Guidelines (see Table 1), or other internationally recognized sources; Emissions do not contribute a significant portion to the attainment of relevant ambient air quality guidelines or standards. As a general rule, this Guideline

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

suggests 25 percent of the applicable air quality standards to allow additional, future sustainable development in the same airshed².

Table 1 : WHO Ambient Air Quality Guidelines

	Averaging Period	Guideline value in mg/m ³
Sulfur dioxide (SO ₂)	24-hour 10 minute	125 (Interim target) 500 (guideline)
Nitrogen dioxide (NO ₂)	1-year 1-hou	40 (guideline) 200 (guideline)
Particulate Matter PM ₁₀	1-year 24-hou	70 (Interim target) 150 (Interim target)
Particulate Matter PM _{2.5}	1-year 24-hour	35 (Interim target) 75 (Interim target)
Ozone	8-hour daily maximum	160 (Interim target) 100 (guideline)

1.1.2. Noise

27. 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.
28. Noise impacts should not exceed the levels presented in Table 2, or result in a maximum increase in background levels of 3 dBA at the nearest receptor location off-site.

Table 2: Noise Level Guidelines³

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

29. According the EU legislation permissible sound power levels are laid down within the framework of directive 84/532/EEC on the EEC type-examination for construction plant and equipment, with regard to harmonised requirements for these types of equipment, in seven separate directives, each of them concerning a particular equipment. All the seven 'daughter' directives require that the products covered must be labelled with a mark indicating the noise levels guaranteed by the manufacturer, and contain annexes which define a method of measuring airborne noise and a spot check procedure for checking the conformity of production models with the type examined. Member States are not allowed to keep equipment which meet these requirements out of their markets, but are allowed to regulate the use of the equipment in areas they consider sensitive (e.g. near hospitals).

1.1.3 Water Quality Standards

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

<http://www.ifc.org/wps/wcm/connect/532ff4804886583ab4d6f66a6515bb18/1-1%2BAir%2BEmissions%2Band%2BAmbient%2BAir%2BQuality.pdf?MOD=AJPERES>

³ IFC - Environmental, Health, and Safety (EHS) Guidelines. 1.7 Noise

standards, the World Health Organisation publishes guidelines on the standards that should be achieved.

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

Table 3: Water quality standards

parametr	World Organization	European Union	EPA
Antimony	ns	5.0 µg/l	6.0 µg/l
Arsenic	10µg/l	10µg/l	10µg/l
Barium	700µg/l	ns	2 mg/L
Benzene	10µg/l	1.0 µg/l	5 µg/l
Boron	2.4mg/l	1.0 mg/L	-
Cadmium	3 µg/l	5 µg/l	5 µg/l
Chromium	50µg/l	50 µg/l	0.1 mg/L
Copper	-	2.0 mg/l	TT
Epichlorohydrin	-	0.10 µg/l	-
Fluoride	1.5 mg/l	1.5 mg/l	4 mg/l
Lead	-	10 µg/l	15 µg/l
Mercury	6 µg/l	1 µg/l	2 µg/l
Nickel	-	20 µg/l	-
Nitrate	50 mg/l	50 mg/l	10 mg/L (as N)
Nitrite	-	0.50 mg/l	1 mg/L (as N)
Pesticides (individual)	-	0.10 µg/l	-
Pesticides — Total	-	0.50 µg/l	-
Polycyclic aromatic hydrocarbons	-	0.10 µg/l	-
Selenium	40 µg/l	10 µg/l	50 µg/l
Tetrachloroethene and Trichloroethene	40µg/l	10 µg/l	“

B.2 Georgian Law

B.2.1 Framework Legislation

32. 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.

33. 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.”
34. 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.
35. 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.
36. 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.
37. 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;

38. 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.
39. Environmental Assessment Code was adopted in June 2017 by the Parliament of Georgia and will enter into force from January 2018. The new code replace law on Environmental Impact Permit and Ecological Expertise. Environmental Assessment Code sets up regulations and procedures for Environmental Impact Assessment, Strategic Environmental Assessment, Transboundary Environmental Assessment Public Participation and Expertise in the Decision-Making Process. The EIA shall be subject to the activities envisaged by the Annex I of this Code and the activities envisaged by the Annex II of the same Code, which will be subject to EIA on the basis of screening procedure set out in Article 7 of this Code (Article 5 of Chapter 2).
40. 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.
41. 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.

New DRAFT Water law

42. The new law “on Water Resources Management” is drafted by inter-ministerial working group supported by the United Nations Economic Commission for Europe. The draft law is consistent with the principles of integrated water resources management and the EU Water Framework Directive. In particular, the draft law introduces permits for water use and discharge.
43. As it was mentioned above the scope of the Law, in line with the WFD, it covers surface waters, transitional waters, coastal waters, groundwater and the related protected areas, as well as water infrastructural facilities (all water services which provide, for households, public institutions or any economic activity: abstraction, impoundment, storage, treatment and distribution of surface water or groundwater; waste-water collection and treatment facilities which subsequently discharge into surface water etc.).

44. The Law provide for water management on a river-basin with the Ministry of Environment and Natural Resources Protection as central competent authority. The Law also provide for all other aspects of integrated water resources management including water classification system, water quality objectives and standards, water use, water resources planning, pollution prevention, combined approach, economic tools, public participation, monitoring and enforcement, flood risk management, etc.
45. Currently the draft law is under the process of finalization. The final deadline for submission of draft law to the Parliament is its Autumn Session of 2018, as the water law has to be adopted no later than 2018.
46. 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.
47. 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.
48. 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

49. 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/m ³
Nitrogen Dioxide	0.085
Sulphur Dioxide	0.5
Carbon Monoxide	5.0
Saturated Carbohydrates, C6-C10	30.0
Inorganic dust	0.3

50. Georgian standards for noise control are set in the Decree of the Minister of Labour, Health and Social Affairs (No.297n of August 16, 2001) on 'Approval of Environmental Quality Standards', which specifies the tolerable and maximum admissible levels of noise for different zones.

Table 5. Georgian Admissible Equivalent and Maximum Sound Levels, 2001

Type of area, Time	Equivalent sound levels, dBA	Maximum sound level, dBA
Areas bordering residential houses, schools and other educational institution buildings		
7 AM - 11 PM	55	70
11 PM - 7 AM	45	60
Areas bordering hospitals		
7 AM - 11 PM	45	60
11 PM - 7 AM	35	50

51. 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. Noise impacts should not exceed the WB/IFC standards as presented in Table 2, or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.
52. 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.
53. 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 in soils are given in the Table 6.

Table 6: Maximum admissible concentrations of various substances and elements in 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	-
Compound Xylene (ortho-, meta-, para -)	mg/kg	0.3
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

54. Georgian legislation does not regulate quality standards for groundwater. Quality of groundwater is regulated by norms set for potable water. Potable water quality criteria are determined by technical regulations on potable water Government Regulation N 58 from January 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
Molibden (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	0,05

B.2.3 Licenses & Approvals Required

55. 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.
56. The components of the proposed water supply systems subproject in Telavi are notified in the Law on EIP and therefore environmental impact permit is required.
57. The requirements related to EIA studies and the EIA report is set forth in the Order N31 of 15 May 2013 of MoENRP.
58. The Law of Georgia "On the Red List and Red Book" (2003) regulates the legal relations in the field of developing the Red List and Red Book, protecting and using the endangered species, except the legal issues of the international trade with endangered wild animals and wild plants, which within the limits of the jurisdiction of Georgia are regulated by virtue of the Convention 'On the international trade with the endangered species of wild fauna and flora' concluded on March 3 of 1973 in the city of Washington. According to Article 10 of the Law, any activity, including hunting, fishing, extraction, cutting down and hay-mowing, except particular cases envisaged by the present Law, Law of Georgia 'On animal life' and legislation of Georgia, which may result in the reduction in number of the endangered species, deterioration of the breeding area or living conditions, is prohibited. The Red List of Georgia was approved by the Presidential Decree No. 303 'On approving the Red List of Georgia' (May 2, 2006). Below is the list of laws relevant to environmental protection.

Table8: 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)
2017	Environmental Assessment Code (01.06.2017) will enter into force from January 2017
Specific Environmental Laws	
1994	Soil Protection (as amended 26.12.2014 ¶) 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

Framework Legislation	
	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

59. 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

60. 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
61. 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.
62. 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.
63. 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.
64. 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.
65. 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

66. The above accounts of national environmental law 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.
67. 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.
68. 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).
69. 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's guidelines require EMPs for all categories of projects and provide detailed instructions on the content
70. 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 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 – UWSCG) 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.
71. 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.
72. 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.
73. 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	ADB Requirements
1	Screening	Project Proponent in consultation with MoE	Bank and Consultant hired by Project Proponent
2	Scoping	Not required. Could be conducted voluntarily by Project Proponent.	Obligatory. Bank and Consultant hired by Project Proponent
3	Draft EIA	To be prepared by Environmental Consultant.	To be prepared by Environmental Consultant.
4	Public Consultations	The EIA should be available for public review during 45 days. Publication of information in central and regional mass-media. Arrange consultation not later than 60 days from the date of publication.	At least two consultations for Category A projects – one at the scoping stage and one for the draft EIA.
5	Final EIA	Consider all comments received during public consultations, incorporate accepted remarks and explain rational when the comments are disregarded.	Consider all comments from Bank and public. Agree with the Bank on each raised point. Incorporate accepted public comments and explain rational when the comments are disregarded.
6	Management Plans	No clear guidelines on format, 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

74. 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. In harmonizing the National and ADB standards the most

stringent will be applied as per requirements of SPS 2009.

C. DESCRIPTION OF THE PROJECT

C.1 Type of the Project

75. This is Telavi Water Supply Rehabilitation project. At present, in Telavi, water flows from “Turdo Valley” and “Jvar-Patiosani” headworks and is discharged into the Telavi Water Treatment Plant (See photos in Annex A), whence the treated water discharges into the central city Reservoir #1 (2000 m³) located in the southern outskirts of the city. From here water is supplied to other Reservoir #2 (1000 m³) and Reservoir#3 (2000 m³) located in the southern part of the city. Reservoirs #4 and #5 (350 m³ and 400 m³) located in the central part are supplied from the Reservoir #2. The detailed list of project components to be constructed and rehabilitated within the proposed sub-project are provided in the Table 10 below:

Table 10: Components of Telavi WS Project

Project Components		Capacity/Length	Location
Construction	Reconstruction		
Water Supply Network and New transmission Line from Well Fields to Reservoirs			
Network		63km	I, II and III zone
Reservoirs			
One new Reservoir		2000m ³	Near the Central reservoir #1 x538599; y 4639599
One new "Shalauri Reservoir"		1000m ³	In the south-eastern part of the city x539728; y 4639752,
One new Reservoir "Gigo Gora"		2000m ³	Between the Gigo Gora and the University Street x540686; y 4639859.
One new Reservoir		500m ³	Adjacent to the Caucasian street x538625; y 4642379
Boreholes			
	One existing Borehole	with the depth of 200-220 m. with the capacity of 8-10 l/s each;	Near the existing 2000m ³ new Reservoir in "Gigo Gora"
One new Borehole		8-10 l/s	In the south-eastern part of the city
	One existing Borehole	8-10 l/s	Between the Gigo Gora and the University Street
One new Borehole		8-10 l/s	Adjacent to the Caucasian street
	Two existing Boreholes	8-10 l/s each	Near the 2000m ³ Central Reservoir N1 (EIB)

Project Components		Capacity/Length	Location
Two new Boreholes		8-10 l/s each	Near the 2000m ³ Central Reservoir N1 (EIB) x538577; y 4639615
	One existing Borehole	8-10 l/s	On the area of existing reservoir No. 2, near the new 1000 m ³ Reservoir (EIB); 1000m ³ - x538903; y 4639673
Two new Boreholes		8-10 l/s	In the western part of Telavi near the new 500 m ³ reservoir in "Zuzumbo" (EIB) x537644; y 4641037.

76. Currently, only 18% of the population is connected to the network and has 24 hours water supply every day, 20% - 12 hours and 62% - only 5-6 hours. In some parts of the city, water is supplied only 2-3 hours during the 2-3 days. During baseflow (in summer), the water flow is reduced to 200m³/h, which results in decreased water supply in the area and the population has intermittent water supply.
77. At present, partial rehabilitation of water supply system is underway In Telavi with the financial support of the European Investment Bank (EIB). This project envisages rehabilitation of water supply network - IV and V zones, with the total length of 34 km; Construction of the new 2000 m³ reservoir №1 (2000 m³) adjacent to the "central" reservoir; Construction of the new 1000 m³ reservoir instead of the existing reservoir N2; Construction of 500m³ reservoir in "zucumbo", which will be located on the western side of the city; Metering of customers in rehabilitation zone. More detail description of water supply interventions in Telavi are provided in Table 11 below:

Table 11: Finalized and on-going Projects In Telavi

#	Name of the Project	Date of completion of the project	Donor
1	Rehabilitation of water supply system of town Telavi	15.03.2011 25.07.2012	EIB
2	Rehabilitation of water supply system of Telavi-Kurdgelaurei	4.05.2015-ongoing	EIB

[illegible]

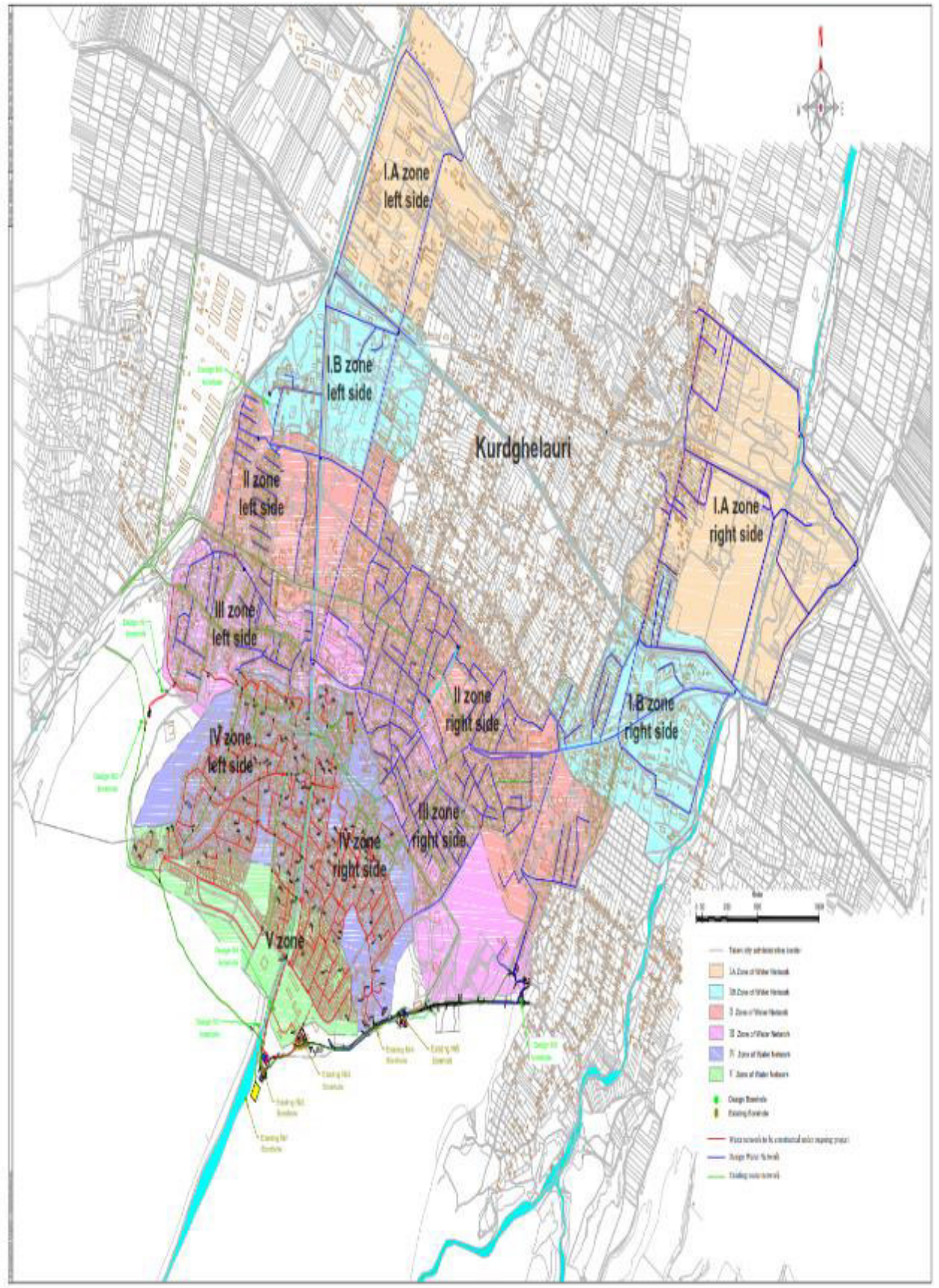
The map illustrates the proposed water network layout for the Kurdghelaury area. The map is divided into several zones, each color-coded and labeled:

- I.A zone left side** (Orange)
- I.B zone left side** (Light Blue)
- II zone left side** (Red)
- III zone left side** (Purple)
- IV zone left side** (Green)
- V zone** (Dark Green)
- I.A zone right side** (Orange)
- I.B zone right side** (Light Blue)
- II zone right side** (Red)
- III zone right side** (Purple)
- IV zone right side** (Green)

The map also shows the following features:

- Water network layout:** Indicated by colored lines corresponding to the zones.
- Administrative boundaries:** Shown as thin black lines.
- Project-related markers:**
 - Red dots: Parameters to be controlled in the ongoing project.
 - Blue dots: Parameters which are planned for construction.
 - Black dots: Existing resources which remain after ending of the project.
 - Red dots: Existing resources which will be demolished after ending of the project.
- Scale bar:** 0 to 100 meters.
- North arrow:** Located in the top right corner.

Fig 3: Telavi Water Supply System Boreholes



78. Telavi water supply will come from 11 boreholes, part of these boreholes will be reconstructed, and additional boreholes will be constructed. The capacity of each boreholes is 8-10 l/s each. Current water consumption per inhabitants is provided in Table 12 below.

Table 12: Water consumption data

Definitions	Measuring Unit	Quantity	Note
Current water consumption per person (inhabitants)	l/d	190	
Produced amount of drinking water	m ³ /d	7 776	

C.2 Need of the Project

79. 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 Telavi. The WS project is needed because the present water supply infrastructure in Telavi is inefficient and inadequate to the needs of the growing population and tourists. Water infrastructure data are provided in the table 13 below.
80. At present, in Telavi, 18% of the population connected to the network has 24 hours water supply every day, 20% - 12 hours and 62% - 5-6 hours.

Table 13: Water infrastructure data

Telavi service centre			
Definitions	Measuring Unit	Quantity	Note
Population (quantity) # of population connected to the network	inhabitant/household	17859/7915	
Length of the distribution network	km	120	
Average age of the network	age	50-60	Except newly rehabilitated districts
Material of the network		Cast iron, steel and polyethylene	
Water consumption per person	litre/per day	190	

81. Currently, in terms of ensuring effective water supply system for the city population, together with rehabilitation measures vertical zoning of the system as well as water meter installation for each service connection are the most critical issues.

C.3 General Information

82. The City of Telavi is located in Kakheti region, 160 km eastwards from the capital Tbilisi, at 500-800 meters above the sea level. Tsiv-Gombri Range borders to the south and south-west of the city and Alazani Valley to the north and east. Population of town Telavi is approx. 21000 inhabitants. It is the administrative center of the region, connected with the capital by two highways and railroad. The town is one of the centres of Georgia's wine industry. Proper water supply is very important for Telavi to increase production of wine and other agricultural spheres. Telavi is attracted to tourists as well with its various landmarks and cultural heritages.

Map 1: Project Area



C.4 Existing Water Supply Facilities

C.4.1 Water Sources and Transmission System

83. Currently, in Telavi, water flows from headworks of "Turdos Khevi" and "Jvari Patiosani" and discharged into the Water Treatment Plant, clean water from the latter is flowing into the "central" reservoir №1 (2000 m³). The water from this reservoir is distributed in the reservoirs of №2 (1000 m³) and №3 (2000 m³), located in the southern part of the city. Water from the No. 2 reservoir is distributed in the reservoirs of No. 4 (350 m³) and №5 (400 m³) those are located in the central part of the city.
84. The following components will be constructed/reconstructed within the proposed project: (i) reconstruction/rehabilitation of water producing 11 Boreholes, with the depth of 200-220 m. and capacity 8-10 l/sec, for each; (ii) construction of one new reservoir with the volume of 2000m³ near the new central reservoir # 1 (2000m³); (iii) reconstruction of existing Boreholes (1) and construction of new 2000 m³ reservoir (1) in "Gigo Gora"; (iv) construction of 1000 m³ "Shalauri Reservoir" (1) and (1) new borehole in the south-eastern part of the city; (v) construction of one new reservoir of 500 m³ adjacent to the Caucasian street; (vi) reconstruction of existing Borehole (1) and 1000m³ existing reservoir (1) between the Gigo Gora on the University Street; (vii) construction of 500m³ reservoir (1) and (1) borehole adjacent to the Caucasian street; (viii) reconstruction of existing Boreholes (2) and construction of (2) new Boreholes in the area of central reservoir N1, near the 2000m³ reservoir; (ix) reconstruction of existing (1) Borehole instead of existing reservoir No. 2, near the new 1000m³ reservoir; (x) construction of (2) Boreholes In the western part of Telavi near the new 500m³ reservoir in "Zuzumbo"; (xi) complete rehabilitation of Distribution Network for I, II and III zones, with total length of 63 km; (xii) construction of a new transmission line for water supply from well fields to reservoirs; (xiii) metering of the customers, including multi-storey residential buildings and construction of the Chlorination Building.

C.4.2 Water quality

85. The analysis of water samples taken at the production sites and in the network shows good quality of the water which is compliant with the drinking water national standards. Frequency of sampling in Telavi is 802 in total. The sampling is conducted from 6 points of the networks (10-13 times per month) plus 2 headworks (1 time per month) and 2 reservoirs (1 times per month). From this total number of sampling only 3% does not meet the water quality standards (which have no risk for the health). Further there is necessity for the mobile microbiological laboratory.
86. Water samples were taken by the laboratory of the Water Quality Department of UWSCG from the "Turdos Khevi" headworks in May 2017. A sample report from the laboratory is shown in Table 14.
87. In this table, the second column indicates the test parameter and the last column indicates the method used to determine the test result (sometimes, more than one method may be used to determine residuals). The therd column indicates the measurement unit, the fifth column gives the actual test result which may then be compared to the values in the fourth column. The values in the fourth column are national standards, limits set by Government of Georgia by the Order #58, on the "Technical Regulations for Drinking Water", January 15, 2014. The values in the fourth column should not exceed those in the fifth column.

Table 14: Sample Water Analysis Report – “Turdos Khevi” Raw Water

No	Index	Measuring unit	Standard not more than:	Test results	Method
1	2	3	4	5	6
	Physical & Chemical				
1	Odour 20°C	Scale	2	0	GOST 3351-74
2	Odour 60°C	Scale	2	0	
3	Taste	Scale	2	0	
4	Colour	Degrees	15	0	ISO 7887-1:2010
5	Turbidity	Turbidity Unit	3.5	0	ISO 7027:2010
6	pH	-	6-9	7.9	ISO 10523:2010
7	Residual free Chlorine (Headworks)	mg/l	0,2-1		GOST 18190-72
8	Residual free Chlorine (Network)	mg/l	0,2-0,5		GOST 18190-72
9	Flouride	mg/l F	0.7	0.01	ISO 11885:2007
10	Chloride	mg/l Cl	250	6.65	ISO 11885:2007
11	Nitrite	mg/l ONO ₂	0.2	0.002	ISO 11885:2007
12	Bromide	mg/l Br	-	0	ISO 11885:2007
13	Nitrate	mg/l NONO ₃	50	1	ISO 11885:2007
14	Sulphate	mg/l SO ₄	250	35.6	ISO 11885:2007
15	Phosphate	mg/l PO ₃	3.5	0.05	ISO 11885:2007
16	Total Anions	mg/l Total anion		43.312	ISO 11885:2007
17	Hardness	mg Equiv./l	7-10	4.6	
18	Electrical conductivity	mS/cm		4.62	Laboratory Conductometer model-910/8
19	Total Dissolved Solids	TDS g/l	-	2.3	Laboratory Conductometer model-910/8
20	Salts	%	-	0.24	Laboratory Conductometer model-910/8

No	Index	Measuring unit	Standard not more than:	Test results	Method
1	2	3	4	5	6
21	Aluminum (Al ³⁺)	mg/l	0.1	0.01	ISO 10304-1:2007
22	Arsenic (As, Total)	mg/l	0.01	0.004	ISO 10304-1:2007
23	Bore (B, Total)	mg/l	0.5		ISO 10304-1:2007
24	Barium (Ba ²⁺)	mg/l	0.7	0.1	ISO 10304-1:2007
25	Cadmium (Cd, Total)	mg/l	0.003	0.001	ISO 10304-1:2007
26	Cobalt (Co)	mg/l	-	0	ISO 10304-1:2007
27	Chrome (Cr ⁶⁺)	mg/l	0.05	0.008	ISO 10304-1:2007
28	Copper (Cu, Total)	mg/l	2.0	0.001	ISO 10304-1:2007
29	Iron Total	mg/l	0.3	<0.3	ISO 10304-1:2007
30	Potassium	mg/l	-	0.13	ISO 10304-1:2007
31	Manganese (Mn, Total)	mg/l	0.4	0.006	ISO 10304-1:2007
32	Molibden (Mo, Total)	mg/l	0.07	<0.07	ISO 10304-1:2007
33	Nikel (Ni, Total)	mg/l	0.07	0.0057	ISO 10304-1:2007
34	Lead (Pb, Total)	mg/l	0.01	0.002	ISO 10304-1:2007
35	Stibium (Sb)	mg/l	0.02	0.0014	ISO 10304-1:2007
36	Selenium (Se, Total)	mg/l	0.01	<0.01	ISO 10304-1:2007
37	Stroncium	mg/l	-	0.56	ISO 10304-1:2007
38	Zinc (Zn ²⁺)	mg/l	3.0	0.0040	ISO 10304-1:2007
Microbiology					
39	Mesopoly aerobs and Facultative anaerobes	Colony origin. Unit in 1 mL 370C	20	12	ISO 6222:2008
40	Total Colofirm Bacteria	per 300 ml	Not ecaptable	Negative	ISO 9308-1:2008

No	Index	Measuring unit	Standard not more than:	Test results	Method
1	2	3	4	5	6
41	E. Coli	per 300 ml	Not ecaptable	Negative	ISO 9308-1:2008

C.5 Projected Water Demand up to 2044

88. The major outcomes of the proposed project is to increase the quality of life for the population of Telavi. High quality drinking water will be supplied 24 hours for 100% of the consumers; Risk of contamination will be eliminated; 100% of the consumers will be connected to the network and metered.

Table 15: Water demand projection

Year	Population served	Domestic water consumption per person-day	Domestic consumption	Commercial and other consumption	Total water consumption	Network leakage
	No	l/c.d	m3/y	m3/y	m3/y	m3/y
2012	17505	210	1341742,92	94 072	1 435 815	646 117
2013	17707	210	1357209,43	95 429	1 452 639	435791,58
2014	17795	210	1363995,477	97 013	1 461 009	438302,63
2015	17884	190	1240261,602	98 624	1 338 885	334721,33
2016	17974	180	1180859,599	100 261	1 281 120	320280,11
2017	18063	170	1120832,569	102 266	1 223 099	269081,70
2018	18154	160	1060175,748	110 696	1 170 872	234174,37
2019	18244	160	1065476,627	119 821	1 185 298	213353,57
2020	18336	150	1003878,759	122 217	1 126 096	168914,43
2025	18799	140	960612,7588	133 086	1 093 699	153117,80
2030	19273	140	984869,4347	137 127	1 121 996	134639,52

Other physical components to the Project

89. Construction camps, storage areas, and disposal areas will be located in the vicinity of the sub-project area. However, if it is necessary to locate elsewhere, sites to be considered will not promote instability and result in destruction of property, vegetation, irrigation, and drinking water supply systems. Residential areas will not be considered for setting up camps to protect the human environment (i.e., to curb accident risks, health risks due to air and water pollution and dust, and noise, and to prevent social conflicts, shortages of amenities, and crime). Extreme care will be taken to avoid disposals near the forest, water bodies, swamps, or in areas which will inconvenience the community. All locations would be included in the design specifications and on plan drawings.
90. 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.
91. Site selection of sources of materials. Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution. To mitigate the potential environmental impacts relevant permits and licenses should be obtained from the Agency of Environmental Protection under the MoENRP of Georgia for the quarry sites and borrow sites. Quarry sites will be located away from population centers, drinking water intakes and streams, cultivable lands, and natural drainage systems. It will be the construction contractor's responsibility to verify the suitability of all material sources and to obtain the approval and/or permit from the Ministry of Environment and Natural Resources Protection of Georgia and/or procure materials from licensed sources/traders. The construction contractor shall use the mentioned criteria to select quarry sites.
92. Estimated number and type of personnel who will do the work is provided in the Table 16 below.

Table 16: Number and Type of Personnel on Construction Sites

Sub-project components	Number of personnel	Type of personnel	Type of Equipment	Planned timing of the works
Reservoir	35-30	Workers, Sitemanager/Forman. Engineer/SC	Mini Excavator Bob Cat Mini Loader Saw cut machine Loader 1.5 yd ³ Grader 3.7 m Mobile Compressor Hydromac Excavator Backhoe loader Dumper Truck	Day time 09:00 - 18:00
Boreholes	5-6	Workers, Sitemanager/Forman. Engineer/SC,		
Pumping Station	15-18	Workers, Sitemanager/Forman. Engineer/SC		
Transmission main	10-12	Workers, Sitemanager/Forman. Engineer/SC,		

Sub-project components	Number of personal	Type of personal	Type of Equipment	Planned timing of the works
Network	7-8	Workers, Sitemanger/Forman. Engeneer/SC,	Tower Crane Dynamic Cylinder 15t Water Tanker 5t Hand Compactors Concrete Batching Plant Transmixer Water/Crush/Screen Pl. Concrete Pump Vibrator Pick-up Water Tank 12t Asphalt Plant	

93. No additional roads are planned to be built within the proposed project, since all project components will be located on the existing water supply facilities that currently operate and have their own access roads, however, if any additional road is required to built, this will be appropriately mitigated and described in detail in the corresponding SSEMP.

D. DESCRIPTION OF THE ENVIRONMENT (BASELINE DATA)

D.1 General Overview

94. Environmental and social baseline of Telavi Municipality is described in this paragraph. From physical and geographical point of view, project area lies within the western part of Kakheti plain included in Iberian region (according to L.I. Maruashvili). Physiographic units of Alazani Valley are: From north and northeast side - Kakhetian Caucasus, from south and southwest side - less steep northern slopes of Gombori.

95. The project area is included within the boundaries of Telavi Municipality, Kakheti region. Telavi Municipality is bordered by Akhmeta Municipality from west side, by Kvareli Municipality from east side and by Sagarejo Municipality from southwest side.

D.2 Physical-Geographical Environment

D.2.1 Climate and Meteorological Conditions

96. Telavi Municipality is within a moderately humid subtropical climate zone. There is a moderately humid climate within Alazani Valley, with moderately cold winters and hot summers. The average annual temperature is 11-12°C, in January – 0,20°C, in July - 22-24°C. The absolute maximum temperature is 39°C, while the absolute minimum -21°C. Precipitation - 700-800 mm per year. Preliminary EIA Telavi WWTP Page 45 of 165 Tables and diagrams below provide specific characteristics of the climate within the study area and parameters describing their recurrence, according to the data obtained from Telavi meteorological station (source: Construction Climatology PN 01.05-08).

Table 17: Ambient air temperature

mo n th	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Av e rag e	Abs · min ·	Abs · ma x.
0C	0.5	1.9	5.7	11.	16	19.	22.9	23	18.	13.	7	2.5	11.8	-23	38

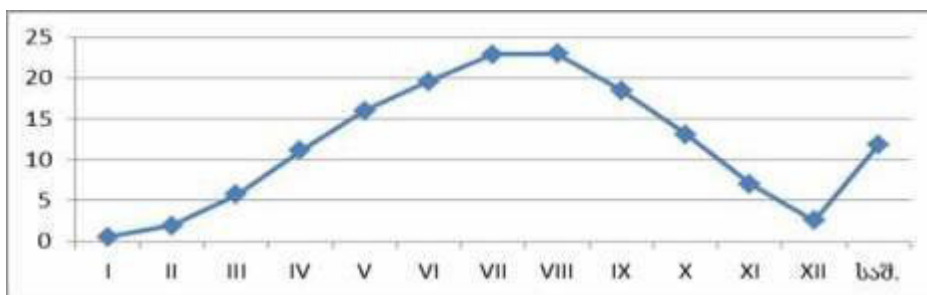
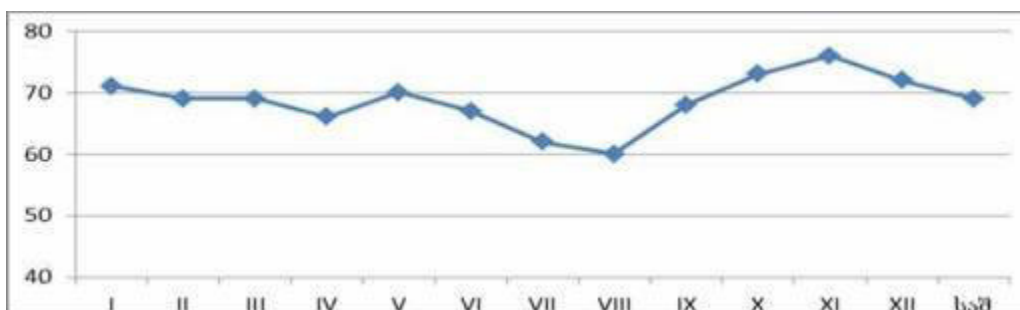


Table 18: Relative humidity - %

Mont	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Avera
%	71	69	69	66	70	67	62	60	68	73	76	72	69



Relative
humidity
- %

Average relative humidity at 13:00		Average daily amplitude of relative humidity	
The coldest month	The hottest month	The coldest month	The hottest month
69	46	14	31

Table 19: Precipitation, mm

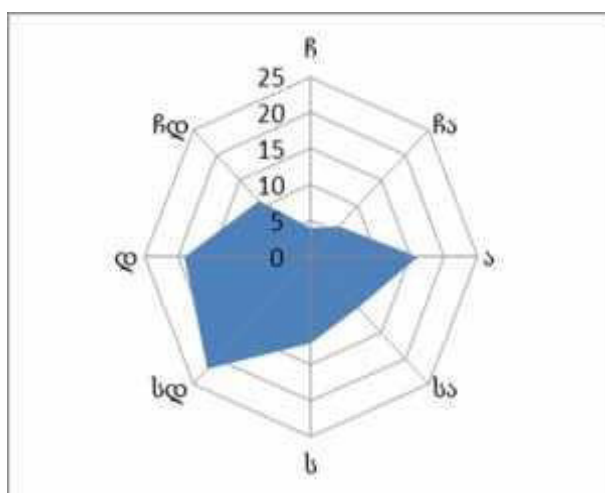
Annual precipitation, mm	Daily maximum of precipitation mm
79	14

Table 20: Wind characteristics

Highest wind speed, possible once in 1,5,10,15,20 years. m/s				
1	5	10	1	20
1	21	23	2	25

Average highest and lowest wind speed, m/s	
January	July
3,3/0,7	3,2/1,

Annual repeatability of wind direction and calm (%)								
Nort	Northea	East	Southe	Sout	Southw	Wes	Northwe	Cal
4	6	16	10	12	22	19	11	23



D.2.2 Geology

D.2.2.1 Relief

97. Alazani Valley is an intermountain accumulative plain between Gombori range and Iori slope. It is located at 200–470 m a.s.l. The plain is inclined towards South-East and it is extended as Agrichai plain on the territory of Azerbaijan. The total length of the plain is 200 km. the length of the plain on the territory of Georgia is 110 km. Its greatest width is 28-30 km.

98. The major characteristic of physiographic unit of Alazani Valley is its relief, which is typical

continental geosyncline. Alazani Valley is a flat plain, but in fact it is complicated by fans of left and right tributaries of Alazani River and by formations with little depth and rare erosions.

99. Telavi is located at 550-800 m a.s.l. relief of the city (mostly its southern part) is inclined and deeply fragmented by V-shaped steep valleys. Absolute elevations of the relief decrease consistently towards the north of the city and are 350-360 m a.s.l. near Alazani riverbed. Sharply expressed negative or positive forms of relief have not been observed along the study corridor.
100. From Geomorphological point of view, the project area is included in Transcaucasian intermountain zone. Folded complex, Alpine, late orogenic (collisional), the late collisional (Quaternary) slightly folded. It is a geological complex of sedimentary rocks. Geologically it is built up by Alluvial-Proalluvial sediments, rocky and semi-rocky sediments of Cretaceous age.

D.2.2.2 Geological and Tectonic Conditions

101. Geologically, Alazani Valley is very peculiar tectonic unit of Georgia. This is a zone of intense immersion - continental geosyncline accumulating sediments. Formation of geosyncline has begun since Pliocene. Evolution of Alazani-Agrichai depression began since Upper Pliocene. Immersion still continues, which is approved by the stratigraphic and geomorphological facts. Caucasus foothill is built up by folded Upper Jurassic and Cretaceous sediments. Gombori range is built up by Mesozoic and Cenozoic suits, which are clearly divided into two different complexes from tectonical and lithological point of view. Older complex combines formations of diverse composition (clays, sandstones, limestones), while younger complex is represented Neogene (Sarmatian-Kimmerian) molasses series. The series is called Alazani Series.
102. Accumulative plain of Alazani, which is located between already mentioned two geomorphological elements is built up by Quaternary alluvial, proluvial and proalluvial-dealluvial cobbles, sandstone and clay. Based on stock material and reconnaissance works it can be said that Quaternary sediments (gravel, sandstone) are represented within the study corridor. Areas adjacent to the corridor are extensively used for agricultural purposes and therefore surface layer is represented by quite productive topsoil.

D.2.2.3 Hydrogeology

103. Central part of Georgia is covered by hydrogeological district of Georgian and Azerbaijan belts. The major aquifers are Tertiary rocks, which built up artesian basins of Alazani and Lori. Among Tertiary sediments highest waters are observed in continental series of Aghchagil Apsheron and in loose formations of Middle Miocene. Aghchagil Apsheron series have been studied in artesian basins of Alazani and Lori. It contains a large amount of calcium bicarbonated fresh water. The second one is common in artesian basin of Kartli and from hydrogeological point of view, it is less well studied. The study area is located near the active riverbed of Alazani, in 1,0-1,2 km distance. It should be also noted that moisture and marsh-loving plants are common within this area.
104. The purpose of the project is to finalize water supply system rehabilitation measures commenced at early stages and provide Telavi city with 24 hour water supply for population. To achieve this goal following works will be carried out:

- ✓ Rehabilitation/Construction of water supply network;

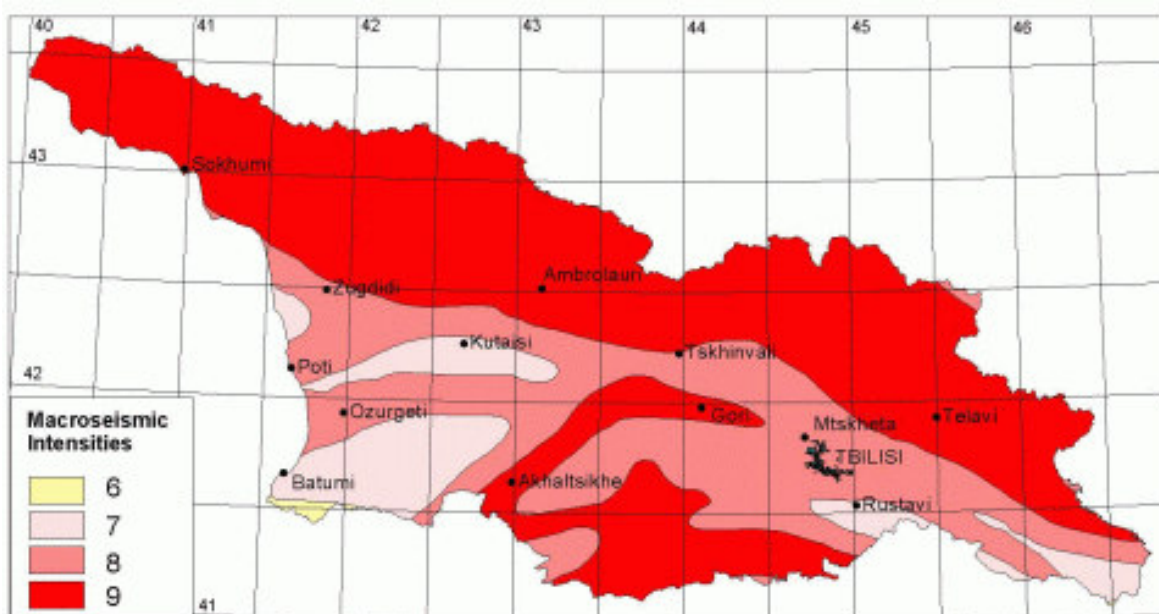
- ✓ Construction of Water Producing Boreholes;
- ✓ Reconstruction/Rehabilitation of exiting water producing boreholes;
- ✓ Construction of the Chlorination Building;
- ✓ Construction of Transmission Main;
- ✓ Construction of new reservoirs;
- ✓ Metering of the customers;

105. Reconstruction of existing five boreholes and construction of five new boreholes, with the depth of 200-220 m. with the capacity of 8-10 l/s each will improve water supply to the town and ensure 24 hours supply of high quality drinking water to the 100% of consumers . 100% of the consumers will be connected to the network and metered.

D.2.2.4 Seismic Conditions

106. According to the Annex #1 of the construction norms and rules - “Seismic Resistance Construction” (pn01.01-09), investigation territory Telavi and its surrounding areas are located in 9 scale (MSK 64) seismicregion. Dimensionless ratio of seismicity within the settlements of the study areas: Telavi - 0,32 m/s², Kurdghelauri village - 0,33 m/s²; Kondoli village - 0,36 m/s² .

Fig 4: Seismic map of Georgia



D.2.3 Hydrology

107. The main artery of hydrographic network of the study area is Alazani River, which originates from the eastern slope of the Caucasus, near Mount Borbala. The River joins Mingechauri basin (Azerbaijan). Thelength of Alazani River is 351 km, basin area – 11 800 km², average water flow– 98 m³/s. It is used for irrigation.

108. The River is fed by groundwater, rain and snow waters. Approximately 40% of runoff is

groundwater, while the rest 30%-30% is rain and snow waters. Floods are observed in the first half of spring and summer, high waters – in autumn. Low waters are observed in winters. 38,3% of runoff is observed in spring, in summer - 29,1%, in autumn – 20,3%, in winter - 12,3%. It does not freeze.

109. Left tributaries of Alazani River are: Stori, Lopota, Intsoba, Cheleti, Duruji, Avaniskhevi, Kabali, Lagodekhistskali, Matsimistskali, Gishistskali (Agrichai), etc. Right tributaries of Alazani River are: Ilto, Turdo, Kisiskhevi, Cheremiskhevi, Fafriskhevi, etc. The project area is located on the right terrace of Alazani River, in 1,0-1,2 km from active riverbed. Project corridor does not cross any other significant surface water bodies. None of these rivers provide a source for the water supply.
110. The reservoir number 1 is supplied from the “Turdos Khevi” Headwork, water supply Pipe from the “Turdos Khevi” is crossing the Telavi Ravine (Dry Gorge, which is filled only during floods or mudflows). The water coming out of “Turdos Khevi” is very Turbit and therefore it needs treatment before the discharge into the reservoir. The new network will cross the telavi Ravine and will be installed in parallel of the existing pipe.

D.3 Description of Biological Environment

D.3.1 Vegetation Cover

111. In order to identify plants with high conservation value and determine potential affect by the project on these species, background data was collected from construction sites and results are presented in proposed IEE.
112. On July 13-14, 2017 an expedition consisting from botanist Mr.Gigo Deisadze and technical staff of Telavi service center carried out baseline botanical survey of vegetation on pre-selected locations of the project components. The GPS coordinates were fixed in UTM 38 T system, with a GPS device.
113. According to the above-mentioned baseline survey, Red Listed species of Georgia are observed only on one location – Reservoir with the capacity of 2000m³ (UTM 38 N0538625 / E4639598). Those are about 9 self-seedlings small elms (*Ulmus minor*) from 0.5 to 2 meters in height and 2-5 cm. diameter, in other proposed areas there are no significant environmental sensitive features and it is expected that the proposed Water Supply components will not cause long-term or significant environmental impacts.
114. During construction, the contractor will be instructed to avoid removing of Red listed trees or to reduce the number of trees to be cut to the maximum available. All trees will be marked, fenced and properly protected, but in case of inevitable tree cutting the contractor must comply with all procedures stipulated by the legislation of Georgia. In particular, Government’s resolution No.242 “On the Rules of Forest Use”, sets the procedures for issuing permit for cutting red listed trees, in case of construction of the state importance. According to these rules compensatory sums should be payed, the amount of which is determined by the MoENRP in accordance with the volume of species to be cut.

More detailed description of botanical survey of the project areas are presented below:

115. No1 - planned borehole near Telavi State University; Coordinates:UTM 38 N0538664/E4639800. Area 20 sq.m; The area is covered with a secondary, ruderal grass cover (*Verbascum* sp .; *Origanum vulgare*; *Agropyron repens*; *Calamagrostis arundinacea*; *Poa bulbosa*; *Cichorium intibus*; *Knautia Montana*; *Lactuca sericea*);

Blackberry (*Rubus* sp.) and rosa (*Rosa canina*) Shrubs, huzelnuts (*Corylus avellana*), *Sambucus ebulus*. Out of the site area grows yang growths of elms (*Ulmus minor*), -1-2 m. Height and 2-3 cm Diameter. They do not face injury.

Photo of No1 - planned borehole near Telavi State University



116. No2 - The construction of a 2000 m³ capacity reservoir is planned to be located near the previous location. Locations coordinates: UTM 38 N0538625 / E4639598; The construction area is 0.4 ha area, which is also covered as a secondary ruderal plants. Here, together with the above-mentioned beads, grows about 9 self-seedlings small Elms from 0.5 to 2 meters in height and 2-5 cm. Diameter.

Photo of No2 – Reservoir with capacity of 2000m³



117. No.3 In the vicinity of the previous locations, site for borehole (boreholes No. 3, company materials) is located on the second bank of the river, on the area covered by inert materials, which are only fragmented by the rudder herbaceous plants. Locations coordinates: UTM 38 N0538591 / E4639725; Building Area 20m².

Photo of Borehole No.3



118. №4- Place to build a borehole.-20 m² area, roadside secondary meadows, company materials borehole №5; Coordinates: UTM 38 N0540670 / E4639848. There are no woody plants here, the crops in the cereal-subdivided secondary meadows are represented by *Agropyron repens*; *Lolium perenne*; *Calamagrostis arundinacea*; *Poa bulbosa*; *Cichorium intibus*; *Knautia Montana*; *Lactuca sericea*; *Dorycnium intermedium*; *Achillea setacea*; *Scabiosa columbaria*; *Gypsophilla bicolor* and so on.

Photo of Borehole №4



119. №5 - The construction of 1000m³ water capacity reservoir is planned to be constructed near the previous location. Coordinates: UTM 38 N0540681 / E4639847. Construction area 0,4 ha; The plot represents a roadside secondary meadow, surrounded by black pine plantation; Forest derivatives and blossoming shrubbery. The threat of damage to the space for construction is threatened by one single black pin, which is quite suppressed - with a height of 2 m. And diameter - 9 cm.

Photo of Borehole №5



120. №6 - On the roadside secondary meadows, 20m² area is intended to construct a borehole. Coordinates: UTM 38 N0537776 / E4641125; Company materials, -№1 boreholes. Vegetation is represented by weeds and invasive herbs: *Ambrosia artemisifolia*; *Erigeron Canadensis*; *Chaerophyllum aureum* and others.

Photo of Borehole №6



121. №7- The construction of a reservoir of 500m³ capacity has already begun in front of the previous location. "Zuzumbo" reservoir, coordinates UTM 38 N0537632 / E4641059. In the existing area (0,2 ha), soil cover has already been removed and no timber plant is observed. The Georgian Oak and 2 Vine are only in the borders of the plot, which are not in danger.

Photo of: Borehole №7



122. №8 UTM 38 N0538636 / E4642404 is the coordination of the North East of Telavi, 500 m³ reservoir and company materials are planned - Arrangement of N6 borehole. The total area is 0.4 ha. It is represented by secondary meadows, blackbarrys and some self-growth plums that are not in danger.

Photo of Borehole №8



123. The vegetation identified in the study areas is of secondary nature (developed by naturally occurring vegetation and subsequently replaced by replacement weeds and / or invasive, unnatural groups). They do not represent any conservation value. Red list species of Georgia are observed only on one location – reservoir with the capacity of 2000m³, near the central reservoir #1, these are 9 self-inflated elms (*Ulmus minor*).

D.3.1.1 General Description of Vegetation Cover in the Region

124. Natural vegetation within Telavi Municipality area is heavily altered due to agricultural activities. Plains favorable for agricultural lands are cleaned up from forests, which led to a gradual decline in forest cover and sometimes to its disappearance. Major part of the area is covered by vineyards, corn fields and pastures.
125. Following plants are spread within the forested areas: Georgia Oak (*Quercus iberica*), Caucasian.

126. Hornbeam (*Carpinus caucasica*), Oriental beech (*Fagus orientalis*), Black alder (*Alnus barbata*), Maple (*Acer* sp.), Oriental hornbeam (*Carpinus orientalis*), black locust (*Robinia pseudoacacia*), Gleditsia (*Gleditschia triacanthos*), wych elm (*Ulmus scabra*), Ash tree (*Fraxinus excelsior*), wild pear (*Pyrus caucasica*), wild apple (*Malus orientalis*), Common nut (*Corylus avellana*), Plums (*Prunus divaricata*), Pomegranate (*Punica granatum*); Thorny and liana plants spread in forests and remote areas: Medlar (*Mespilus germanica*) Hawthorn (*Crataegus* sp.), Dog-rose (*Rosa canina*), Peripcola (*Periploca graeca*), Blackberry (*Rubus*), Catbriers (*Smilax excelsa*), Clematis (*Clematis vitalba*), etc.
127. Grain crops are sown in small quantities within this zone. Priority is given to vines and fruit crops. As for the pastures, they are widespread on the river banks and along the forests.

D.3.2 Fauna

D.3.2.1 Wildlife of the Region

128. According to literary sources, following animal species can be found within the municipality area: Chamois, wolves, foxes, jackals, wild boars, rabbits, weasels, voles, the normal mouse, rat, etc. here area lot of bird species. Following fish species can be found in Rivers: Cyprinid, ray-finned fish, Chub, Barbell, Catfish, Carp, Barbel, Asp, etc.
129. According to the locals, there are many wolves - *Canis lupus*, Jackals *Canis aureus*, Pine marten - *Martes martes*, Least Weasel - *Mustela nivalis*, Fox - *Vulpes vulpes*, Badger - *Meles meles*, European Hedgehog - *Erinaceus concolor*, Caucasian Mole - *Talpa caucasica*, Small Forest Mouse - *Sylvemus uralensis*; During snowfall local population has observed Roa - *Capreolus capreolus* and Wild Boar - *Sus scrofa*. However, this consultation data is not enough to determine species existence and density.
130. Despite the proximity to the river and the favorable environment condition for Otter - *Lutra lutra* (IUCN Red List), their existence has not been identified during the studies.
131. **Birds:** In spring and summer the area of interest is likely to be visited by different species of migratory birds. Water is available for the species inhabiting within the study area, as it is bordered by Alazani River. Therefore, it may be favorable habitat for waterfowl species. In addition, it's much more important for nesting and migratory birds, as a place for food extraction.
132. Based on literature data, the area is a favorable shelter for the following birds: Lesser Spotted Eagle - *Aquila pomarina*, Peregrine - *Falco biarmicus* VU, common kestrel - *Falco tinnunculus*, Black Kite - *Milvus migrans*, Tawny Owl - *Strix aluco*, Great Spotted woodpecker - *Dendrocopos major*, Lesser Spotted Woodpecker - *Dendrocopos minor*, Jays - *Garrulus grandarius*, Common Cuckoo - *Cuculus canorus*, Common Blackbird - *Turdus merula*, Wood Pigeon - *Columba palumbus*, Great Tit - *Parus major*, Eurasian Wren - *Troglodytes troglodytes*, Common Chaffinch - *Fringilla coelebs*, Magpie - *Pica pica*, Rook - *Corvus frugilegus*, Spades - *Corvus cornix*, Seagull - *Larus* sp., Hoopoe - *Upupa epops*, European bee-eater - *Merops apiaster*, Quail - *Coturnix coturnix*, Maybe Pheasant - *Phasianus colchicus*, etc.
133. **Amphibians:** Green Toad - *Bufo viridis*, Common Toad - *Bufo bufo*, Caucasian Parsley Frog - *Pelobates caucasicus*, Forest Frog - *Rana rididunda*, etc.
134. **Reptiles:** Grass Snake - *Natrix natrix*, Water Snake - *Natrix besselata*, Large-headed

Water Snake – *Natrix megalocephala*, Aesculapian Snake - *Elaphe longissima*, Slow Worm - *Anguis fragilis*, Testudo Graeca - *Testudo pontica*, Caucasian Lizard - *Darevskia caucasica*, Georgian Lizard - *Darevskia rudis* is more frequently found, Dagestan Lizard - *Darevskia dagestanica*, etc.

135. **Fish.** Information on fish species in Mtkvari basin and Alazani River is based on literary data and interviews with local communities and fishermen, according to which 29 species are found in the Caspian Sea area, out of which 12 species are found in Mtkvari River basin from which 9 are endemic species of Mtkavri River and its tributaries. Among them are several species of economic importance such as Kura barbell - *Barbus lacerta cyri*, ray-finned fish - *Barbus mursa*, Barbel - *Barbus capito* and Sevan khramulya - *Varicorhinus capoeta*.
136. Freshwater fishes are widespread within the section of Alazani River where it is bordered to the project area. Alazani River in the upstream is a mountain river, which according to the inclination is anecosystem zone of trout.
137. The following fish species have been identified in Alazani River: Alazani Nase - *Ghondrostoma nasus*, Ray-finned fish - *Barbus mursa*, Common carp - *Cyprinus carpio*, Barbel - *Barbus capito*, Sevan khramulya - *Varicorhinus capoeta*, Barbel - *Barbus barbus*, Danube bleak - *Chalcalburnus chalcoides*, Chub - *Leuciscus cephalus*, Bleaks - *Alburnus filippi*, Roach - *Rutilus rutilus*, River Goby – *Gobius cephalarges*, Common carp - *Cyprinus carpio*, Barbel - *Barbus capito*, Catfish - *Silurus glanis*, Trout *Salmo fario*, etc.
138. Invertebrate animals: following groups of invertebrate animals are represented within the study area: Nematodes - Nematoda, Oligocheta, Leeches - Hirudinea, Molluscs - Mollusca, Crustacea, Arachnida and Insects - insecta.

D.3.3 Protected Areas

139. There is no any protected area in the vicinity of the study corridor.

D.3.4 Soils

140. Alluvial strongly calcareous clay soils are developed on the right plain of Alazani River, while on the right side - meadow-forest Alluvial not calcareous clay soils. The same type is developed in fragments infoothill zone, brown soil developed on conglomerates and sandstones weathering products. Forestbrown soils are developed in Kakhetian Caucasus and lower part of Gombori range, under mixeddeciduous forest, on clay shales and sandstones weathering crust; above the forest zone, under subalpineherbaceous vegetation - mountain meadow lawn, in some places peat soils and primitive mountainmeadow soils.
141. Telavi Municipality area is combined into moderately humid subtropical plains and hilly foothill, moderately humid mountain forest and mountain-meadow landscapes, where the landscapes are the following types: Land plots adjacent to the study area are agricultural lands and they are actively processed. Therefore, the topsoil within the influence zone is of high conservation value. This issue should be considered within the framework of further studies.

D.3.5 Baseline Survey

1. Regulatory Requirements

142. The environmental quality standards on the territory of Georgia are regulated by Decree No 287N of August 16, 2001 of the Minister of Labor, Health and Social Affairs of Georgia "On the approval of the environmental quality standards" (State Registration Code 470.230.000.11.119.004.920).
143. Noise impacts should not exceed the levels presented in Table 2, of World Health Organization (WHO) 1999, or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.

3. Accomplished measurements and results

144. The basic measurements of Dust, Noise, Radiation and Vibration were done both at the construction site and near the sensitive receptors of the proposed project at the following locations on the territory of the city of Telavi:
1. Public School no. 4. (on the territory adjacent to Erekle II street)
 2. 2000 m³ adjacent to the central Reservoir;
 3. Adjacent to existing Borehole No. 1
 4. Adjacent to Georgian University;
 5. Adjacent to Gigo's Gori reservoir;
 6. Adjacent to the Church of Easter;
 7. Adjacent to Shalauri Reservoir;
 8. Adjacent to public school no. 7;
 9. Adjacent to Telavi Referral Hospital;
 10. Adjacent to Kindergarten #9;
 11. Adjacent to 500 m³ reservoir, in Caucasioni street;
 12. On the territory adjacent to Erekle's Palace (Hotel Erekle II).
145. All measurements were carried out during the day time 12:00-16:00 and were temporary. For The locations of these points see Figure 5.

[illegible]

146. Under the project, the new Reservoirs and Boreholes as well as new water-supply network will be installed in the city. The project also envisages the rehabilitation of the existing water-supply infrastructure. The major impact on the local population is expected both, in the rehabilitation and construction phases of the existing reservoirs and wells. Following the fact that the construction/rehabilitation of these objects will take place on one location, for some months.
147. As for the installation of the new water-supply pipelines, this process will have an impact on the local population for 2 or 3 days. The process of digging the trenches for the pipes, laying the pipes and backfilling with soil is short. As the practice shows, following the subjective and objective reasons, the Construction Company installs 50-150 m pipelines a day.
148. Neither site where the rehabilitation or construction of the reservoirs and boreholes are planned, is located in a densely populated area. The nearest buildings and premises are located minimum 100 m from them.
149. The basic measurements were done for noise, vibration, dust and radiation levels. See Table 21 for the results of basic measurements.

Table 21: Results of Environmental Measurement

#	Place of Measurement	Dust Mg/m ³		Noise db		Radiation mR/h		Vibro- acceleration m/sek	
		Standard	Result	Standard	Result	Standard	Result	Standard	Result
1	4 Public school 41°55'05.95 ¹¹ N 45°28'17.27 ¹¹ E	0.5	0.03	55	55	30	10	4.0	0.5
2	2000 m ³ reservoir 41°54'26.12 ¹¹ N 45°27'55.206 ¹ E		0.01		51		11		1.2
3	Well 1 41°54'19.20 ¹¹ N 45°27'48.89 ¹¹ E		0.01		52		11		2.0
4	1000 m ³ reservoir 41°54'28.45 ¹¹ N 45°28'08.22 ¹¹ E		0.015		52		12		1.0
5	"Gigos Gora" Reservoir 41°54'30.23 ¹¹ N 45°28'41.33 ¹¹ E		0.01		51		10		0.5
6	Charch 41°54'32.01 ¹¹ N 45°28'59.56 ¹¹ E		0.01		53		12		0.2
7	"Shaluri Reservoir" 41°54'31.36 ¹¹ N 45°29'29.86 ¹¹ E		0.1		52		11		1.2
8	#7 Public School 41°55'37.30 ¹¹ N 45°08'29.86 ¹¹ E		0.02		53		11		1.0

#	Place of Measurement	Dust Mg/m ³		Noise db		Radiation mR/h		Vibro-acceleration m/sek	
		Standard	Result	Standard	Result	Standard	Result	Standard	Result
9	Telavi Referral Hospital 41°55'18.51 ¹¹ N 45°28'10.13 ¹¹ E		0.03		55		12		1.5
10	Kindergarden 9 41°55'16.19 ¹¹ N 45°28'18.02 ¹¹ E		0.05		57		11		1.0
11	500 m ³ Reservoir 41°55'47.42 ¹¹ N 45°28'08.70 ¹¹ E		0.02		52		11		0.5
12	Erekle II Castel 41°55'03.86 ¹¹ N 45°28'34.93 ¹¹ E		0.1		55		12		1.4

D.4 Description of the Socio-Economic Environment

150. Environmental measurements were carried out for proposed IEE to be reflected in design process and identified mitigation measures.

D.4.1 Population

151. Based on the data of the National Statistics Office, the approximate population of Telavi Municipality is 70 900 people and the majority lives in villages. In the municipality density is 84/km².

Table 22: The number of population in Georgia, in a research region and municipality (thousand persons).

	2009	2010	2011	2012	2013	2014
Georgia	4385.4	4436.	4469.	4497.6	4483.8	4490.
Kakheti region	401,4	404,5	406,2	407,1	405,1	405,0
Telavi Municipality	69,8	70,5	71,0	71,2	70,9	70,9

152. According to the 2002 census, number of population in Telavi was 21.8 thousand people. Prognostic number of population within the area served by the proposed treatment plant is given in table 23 below.

Table 23: Prognostic number of population within the area served by the proposed treatment plant

Town/village	Phase 1 – 2030		Phase 2 – 2040	
	Number of population	Associated with the treatment plant	Number of population	Associated with the treatment plant
Telavi	23,065	Yes	23,461	Yes
Kurdghelauri	5,096	Yes	5,183	Yes
Chinandali	3,843	Yes	3,909	Yes
Vardisubani	3,270	Yes	3,326	Yes

	Phase 1 – 2030		Phase 2 – 2040	
Shalauri	2,902	Yes	2,952	Yes
Kodoli	2,772	Yes	2,820	Yes
Kisiskhevi	2,524	Yes	2,567	Yes
Nasamkhrali	637	Yes	648	Yes
Karajala	9,123	No	9,279	Yes
Rusipiri	3,213	No	3,268	Yes
Ikalto	2,985	No	3,036	Yes
Akura	2,536	No	2,579	Yes
Kvemo Khodasheni	1,829	No	1,860	Yes
Gulgula	1,527	No	1,553	Yes
Busheti	1,419	No	1,443	Yes
Vanta	1,276	No	1,298	Yes

D.4.2 Internally Displaced Persons

153. There is a natural decrease of population in Kakheti, both in cities and villages. The death rate was higher than the birth rate in 6 regions of Georgia, while the natural decrease of population in cities was registered in three regions: Kakheti, Samegrelo-Zemo Svaneti and Racha-Lechkhumi. Therefore, in- and out-migration of the population is obvious. Migration statistics for the region is unavailable but according to the information obtained during studies, there is a whole number of deserted villages in Kakheti (in Akhmeta and Dedoplistskaro municipalities). A large part of employable workforce migrates to other cities of Georgia or abroad.
154. Due to the lack of prospects for finding a job, young people often leave the region. This leads to the ageing of population, especially in villages. Stopping the migration of young people and increasing the birth-rate is a challenge facing the region. If the ageing trend continues, the economy will not develop, the standard of living will not improve and, as a result, the government's social and healthcare spending will increase considerably.

D.4.3 Employment Rate

155. The table given below shows the level of the economic activity of Kakheti region. The figures are obtained from HIS (Integrated Household Survey).

Table 24: Economic Activity Level in Kakheti Region for 2014

Total active population (workforce)	196,4
Employed	183,9
Hired	47,2
Self-employed	136,6
Undefined	0,1
Unemployed	12,5
Population out of the workforce	73,4
Unemployment Rate (%)	6,4
Activity Rate (%)	72,8
Employment Rate (%)	68,2

D.4.3.1 Number of Employed in the Region by Activity

156. Kakheti region population employment rates by their activities are given in the table 19.

Table 25: Number of Employed by Activity

EmploymentTy	Number of Employ
Agriculture, hunting and forestry	1369
Fishing, fishery	50
Mining Industry	567
Processing	4548
Power, gas and water production and distribution	1158
Construction	2378
Trade: cars, household goods and personal item repair	4167
Hotels and restaurants	671
Transport and communications	197
Real estate operations, renting and customer service	643
Education	252
Healthcare and social assistance	995
Community, social and personal service provision	795

D.4.4 Production

157. As Kakheti is an agricultural region, the share of non-agricultural economy in the gross value added(GVA) of the region and in the gross domestic product of the country is small. The level of urbanization is low in Kakheti due to the mono-agrarian character of the region which means that Kakheti will not shift its focus to industry in the near future. In 2011, agriculture accounted for 24% of the region's GVA, while the share of industry was only 9%, trade was 5%, transport and communication - 1,2% and construction - 1,7%. It is noteworthy that there are no data available about the share of tourism, whereas the share of various service sectors in 2011 was high (20%). The aggregate share of other sectors was 38%.

158. The recent growth of construction has spurred the production of local construction materials (bricks, tiles, building blocks, etc.). There are mining and processing industries in the region: mining and processing of slate and marble, mining of limestone in the municipalities of Telavi and processing of limestone in the municipalities of Dedoplistskaro.

D.4.5 Agriculture

159. 38% of Georgia's agricultural land is in the Kakheti region, where arable lands and pastures occupy the largest area. Kakheti ranks first in Georgia in this category of lands and is therefore a leading region in the production of cereals and livestock. Dedoplistskaro is the largest municipality in Kakheti with the largest area of agricultural lands, followed by Akhmeta, Sagarejo and Signagi.

160. It is noteworthy that farmers do not take good care of soil and do not enrich it with a sufficient amount of mineral or organic fertilizers. Due to the poor management of soil, lands are often infested with weeds. Due to a large number of animals grazing on pastures there is a process of desertification, especially in Sagarejo and Dedoplistskaro. Most agricultural lands are affected by soil erosion caused by wind and water.

161. The greatest threat to the agricultural lands of Kakheti is posed by the Alazani River in the area of Georgia-Azerbaijan border. For the past 15 years the river has flooded more than 100 hectares of arable and pasture land, and such losses increase annually. As a result, the local population loses a significant part of incomes from livestock and agricultural crops. The massive spread of pests (especially Caucasian Marble Chafer (*Polyphylla olivieri*) in the soils of Kakheti that damage the new vineyards has also become dangerous.

D.4.5.1 Viticulture and Wine-making Sector

162. Kakheti is a unique ancient vine-growing and wine-producing region. It has unique micro zones that traditionally produce wines of origin appellations and other high-quality Georgian wines. Today, around 65–70 % of all vineyards in Georgia are concentrated in the Kakheti Region. Kakheti ranks first in the area of vineyards (33,582 ha), followed by Imereti and Shida Kartli.
163. The total area of vineyards in Kakheti is 33,582.5 ha. Gurjaani has the largest vineyards in Kakheti with the total area of 7,618 ha, followed by Kvareli - 6,382 ha, and Telavi - 6,048 ha. The smallest area of vineyards is in Dedoplistskaro - 1,499 ha, and Akhmeta - 1,747 ha. It is noteworthy that 14 out of 18 appellations of wine, registered in Georgia are produced in Kakheti.
164. There was a considerable decline in the export of Georgian wines in 2006 and 2009 due to the embargo imposed by the Russian Federation, followed by a relatively steady upward trend in 2010.
165. Georgian wines are exported primarily to the post-Soviet countries. In 2005-2012, the largest quantity of wine was exported to Ukraine, Kazakhstan and Belarus, and the least quantity was exported to the Kyrgyz Republic, Turkmenistan, Uzbekistan and Moldova. The wines produced in Kakheti account for 79-82% in total exports of appellation wines.

D.4.5.2 Cereal Production Sector

166. Kakheti has a long history of cereal production thanks to the fertility of land and diversity of cereal crops. Kakheti is a leading wheat-producing region with a large area of land under wheat. Kakheti has the largest area of land under wheat compared to other regions but this area has been decreasing year by year. In 2007, Kakheti had the largest crop of wheat - 62 thousand tons; in 2009-2010 there was a sharp decline in wheat yields which increased again in 2012.

D.4.5.3 Livestock

167. Livestock has traditionally been an important component of the agricultural industry of Kakheti. Large areas of pastures and grasslands, favorable agricultural and climatic conditions are major factors contributing to the development of this sector. Kakheti ranks fifth with a share of 9% after Imereti, Samegrelo, Kvemo Kartli and Samtskhe-Javakheti. Cattle-farming is an important part of Kakheti's livestock sector. Among the other municipalities of Kakheti, Telavi has the smallest stock of cattle, and Sagarejo has the largest stock. Kakheti ranks fourth in meat production after Imereti, Samegrelo, Kvemo Kartli and Shida Kartli.

D.4.6 Healthcare

168. The standard of living in the region is largely dependent on the efficiency of the healthcare sector. Effective from 1 April 2013 the government-funded comprehensive healthcare program has been launched in Kakheti, as well as in Georgia, with the purpose of providing the population with access to free primary and emergency care. 122 rural outpatient clinics operate in Kakheti. In 2011, Kakheti ranked fourth at 1.3% among other regions of Georgia in the number of referrals to medical assistance on per person basis, the lowest level for the past 6 years. Primary care facilities are in a very poor state. Most of the facilities do not meet international standards. Very often, despite the efforts of medical staff, hygienic condition is very bad.

169. In the primary care sector of Kakheti there is one doctor for 1,000 people which is a quite high ratio. At the same time, there is a lack of paramedical personnel (0.9 medical assistants per doctor). The educational level of doctors is satisfactory: 198 primary care doctors and 209 medical assistants were retrained as family physicians, i.e. 49% of the total medical staff in Kakheti. Renovated and properly equipped hospitals are available in every municipality. Based on the data of the Ministry of Labor, Healthcare and Social Protection (MoLHSP), the hospital bed-population ratio in Kakheti is 95.4 per 100,000 people, which is the lowest level in Georgia after Mtskheta-Mtianeti.

D.4.7 Education

170. All levels of the educational system are present in Kakheti. In 2013 there were 206 child day care centers, 192 schools (mostly public schools including several private schools), 2 state vocational colleges and 1 state university in the region. 18% of population has a degree-level qualification (higher education), and 32% has a vocational qualification. According to Geostat data, 29 schools are functioning in Telavi municipality, and the total number of pupils is 8053.

D.4.8 Tourism

171. Around 30 hotels of different levels (including the expensive hotel Ambassador, Lopota, Dzveli Telavi, Kvarlis Tba), more than 100 small hotels and guest houses, around 70 catering facilities, restaurants, café-bars, pizzerias, etc. (being only 3.4% of similar facilities in Georgia), and 15 travel companies operate in the Kakheti region. Room rates range from GEL 10-15 to GEL 350 in the region. The level of service, standards and staff shortage is a problem faced even by expensive hotels. It should also be noted that hotel owners do not provide statistical agencies with accurate data on occupancy rates so it is difficult to determine the total number of visitors.
172. In 2013, the flow of tourists to Telavi is expected to increase considerably (the recently renovated Telavi is becoming a popular destination). However, these are mostly low-budget tourists. Therefore, attraction of high-budget tourists remains a challenge for the region.
173. The natural biodiversity of Kakheti provides an opportunity for the development of recreational tourism in Akhmeta, Gurjaani, Telavi, Sagarejo, Signagi and Kvareli municipalities. It is important to develop adventure tourism in Akhmeta, Dedoplistskaro, Lagodekhi municipalities, eco-tourism in Akhmeta, Dedoplistskaro and Lagodekhi municipalities, and agricultural tourism in all municipalities of Kakheti.
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D.4.9 Historical-Cultural Monuments in the Region

176. Telavi is the main city and administrative center of Georgia's eastern province of Kakheti. Its population consists of some 19,629 inhabitants (as of the year 2014). Telavi and its surroundings are rich in historical, architectural and natural monuments. The most important heritage monuments preserved within the city limits include:

- "Dzveli Galavani" (old walls) - fortress of the first Kakhetian kings (9th-10th centuries AD);
- Church of the St. Mary (16th century AD);
- Church of the Holy Trinity (6th century AD);
- Fortress "Batonis Tsikhe" (fortress of master) built in 17th century AD - this is one of the only well-preserved medieval royal palaces in Georgia;
- "Korchibashishvilebis Tsikhe" - castle of the local noblemen named Korchibashishvilis (16th-18th century AD);
- "Vakhvakhishvilebis Tsikhe" - castle of the local noblemen named Vakhvakhishvilis (18th century AD).

177. Telavi is the only city in Georgia where four different fortification monuments from different historical periods remain relatively intact. Due to this reason, architects, scholars and art historians consider Telavi as the most "medieval" city in the country.

178. Another curious sight in Telavi is a 900-year-old plane tree (40 meters high, 11 meters around the trunk). Other notable landmarks around Telavi include the Alaverdi Cathedral (11th century AD) - the second highest cathedral in Georgia after the newly built Tbilisi Sameba Cathedral, the Ikalto Academy (8th-12th centuries AD) - where the famous Georgian writer Shota Rustaveli studied, the Church of St. George (dedicated to the patron saint of Georgia, where it is said that there are 365 churches named St. George), ruins of the city and castle of Gremi (the former capital of Kakheti from the 15th-17th centuries AD), Shuamta - a complex made up of three churches of different periods - 6th, 7th and 8th centuries in a highland forest, Akhali Shuamta ("New Shuamta" in English) - the monastery close to Dzveli Shuamta ("Old Shuamta" in English), built in the 16th century, the stunning Tsinandali Gardens (the residential Palace of Noblemen Chavchavadzes family) and many others.

Photo of the plane tree:



Photo of Alaverdi cathedral:



Photo of batonis Tsikhe in the center of Telavi



179. **The Palace of King Erekle II in Telavi:** is considered to be the best preserved medieval royal palace in Georgia. Built by King Archil in 1667-1675, it was the residence of Kakhetian kings during the 17th and 18th centuries.
180. The Batonis-Tsikhe fortress has survived in Telavi center. "Batonis-Tsikhe" means "The Master's Fortress". In the 17th–18th centuries this fortress was the residence of Kakhetin Kings. According to historians it was built in two stages – in 1667-1675 and in the second half of the 18th century. The complex comprises the wall, the imperial palace, two churches, the bath and the tunnel. The fortress wall is a limestone battlement of 5m height with towers. It performed the defensive function.

E. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

E.1 Summary of Activities and Anticipated Impacts

A. Introduction

181. Potential environmental impacts of the proposed infrastructure components are presented in this section. Mitigation measures to minimize / mitigate negative impacts, if any are recommended along with the agency responsible for implementation. Monitoring actions to be conducted during the implementation phase is also recommended.
182. As a general practice, an IEE should evaluate impacts due to the location, design, construction and operation of the project. Construction and operation are the two activities in which the project interacts physically with the environment, so these are the two activities during which the environmental impacts occur. In assessing the effects of these processes therefore, all potential impacts of the project should be identified, and mitigation is devised for any negative impacts. Following sections evaluate impacts of the proposed Water Supply project in Telavi i) Location Impacts: Includes impacts associated with site selection and include loss of on-site biophysical array and encroachment either directly or indirectly on adjacent environments. It also includes impacts on people who will lose their livelihood or any other structures by the development of that site. ii) Design Impact: Includes impacts arising from Investment Program Design, including technology used, scale of operation / throughput, waste production, discharge specifications, pollution sources and ancillary services. iii) Construction Impacts: Includes impacts caused by site clearing, earthworks, machinery, vehicles and workers. Construction site impacts include erosion, dust, noise, traffic congestion and waste production. iv) O & M Impacts: Include impacts arising from the operation and maintenance activities of the infrastructure facility.
183. **Utilities.** Existing telephone lines, electric poles, and wires within the proposed subproject locations may require to be shifted in few cases, specifically at urban area. To mitigate the adverse impacts due to relocation of the utilities, IA will: (i) Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction phase; (ii) Conduct detailed site surveys with the construction drawings and discuss with the respective agencies during the construction phase, before ground clearance; (iii) Require construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services. In case of disruption of water supply, alternative supply, through tankers, shall be provided. The IPMO has to obtain necessary clearances before starting the work. The proposed clear water transmission line will cross highways, railways and canal, which needs permission. If utilities are moved to private land, a corresponding LARP will be developed and relevant compensation will be paid to APs.
184. **Site selection of construction work camps, stockpile areas, storage areas, and disposal areas.** Priority is to locate these near the subproject locations. However, if it is deemed necessary to locate elsewhere, sites to be considered will not result in destruction of property, vegetation, irrigation, and drinking water supply systems. Residential areas will not be considered for setting up camps to protect the human environment (i.e., to curb accident risks, health risks due to air and water pollution and dust, and noise, and to prevent social conflicts, shortages of amenities, and crime). Extreme care will be taken to avoid disposals near the water bodies, swamps, or in areas which will inconvenience the community. All locations would be included in the design specifications and on plan drawings. Construction work camps shall be located at least 200 m from residential areas. Material stockpiles shall be protected by bunds during the monsoon to arrest the silt laden runoff into drains. The subproject is likely to generate soil from excavations, which needs to be disposed safely or utilized locally. The following measures should be considered for disposal of surplus/waste soil: i) The excavated soil should be removed from construction area at the earliest for beneficial reuse such as land raising / filling of excavated areas. ii) Soil should be covered with tarpaulin sheets during transportation. 48 iii) Soil transportation should not be done during peak hours and should be avoid narrow and heavy traffic routes and important religious or tourist sites etc.

- 185. Site selection of sources of materials quarries.** Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution. To mitigate the potential environmental impacts, locations of quarry site/s and borrow pit/s (for loose material other than stones) would be included in the design specifications and on plan drawings. Priority would be sites already permitted by Mines and Geology Department. If other sites are necessary, these would be located away from population centers, drinking water intakes and streams, cultivable lands, and natural drainage systems; and in structurally stable areas even if some distance from construction activities. 15. For Davangere subproject, the quarry material required will be sand and stone aggregate, and the nearest quarries are at ChikkaKuruvatti, Harihar and Medleri (sand quarries along River Tungabhadra) and Chatra at Motebennur and Hunasikatte in Ranebennur Taluka for stone aggregate. These are existing quarries and are licensed by Mines and Geology Department. The material from the existing quarries will be adequate for the subproject construction, and therefore no new quarry sites will be developed for the purpose.
- 186. Quarry and Borrow Sites.** The following measures shall be implemented at quarry and borrow sites to minimize impacts on water quality, reduce dust emission during transport, minimize soil erosion and siltation of nearby water courses and avoid damage to productive land and ecologically sensitive areas: Utilize readily available sources of materials. If contractor procures materials from existing borrow pits and quarries, ensure that these conform to all relevant regulatory requirements; Borrow areas and quarries (if these are being opened up exclusively for the project) must comply with environmental requirements, as applicable. If additional quarries will be required after construction has started, obtain written approval from CMC PMU; and Submit to DSIDC on a monthly basis the documentation of sources of materials
- 187. Noise Levels.** The soils are shallow in some parts of the subproject area, and therefore activities like rock cutting for trenching will be required in those areas. This requires using of pneumatic drills and there will be high noise during the activity. Also, where the pipelines are required to be laid in the roadway, pneumatic drills will be used to break open the road surface. Pneumatic drills typically generate an equivalent noise of 82-98 dBA, at 1 m distance from the activity. The sensitive receptors are the general population and sociocultural institutions in the area. Noise will be for a short term (about 2-3 days at each location) thus impact is minimal and short-term. The construction contractor will be required to: (i) Plan activities in consultation with the PIU so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance; (ii) Construction work shall be limited to day light hours (6 AM to 6 PM) for all the works located within the town; for facilities outside the town and habitations, the timings may be relaxed with the permission of IPMO and Telavi Municipality, however no work should be conducted between 10 PM – 6 AM at any site. (iii) Provide prior information to the local public about the work schedule; (iv) Ensure that there are no old and sensitive buildings that may come under risk due to the use of pneumatic drills; if there is risk, cut the rocks manually by chiselling; (v) Minimize noise from construction equipment/pneumatic drills by using silencers, fitting jackhammers with noise-reducing mufflers, and portable street barriers the sound impact to surrounding sensitive receptor; and (vi) Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s. Impact on Economic Development
- 188. Land Use.** Subproject activities will not affect the land use. Most of the subproject activities are being conducted along the road ways within semi urban / urban environment; and other facilities (like water reservoirs) are being developed on government-owned land.
- 189. Accessibility.** Transport infrastructure will be affected by the pipe laying work, as in the highway and semi urban/ urban areas. The road itself may also be excavated. Traffic will therefore be disrupted. Potential impact is negative but short term and reversible by mitigation measures. The construction contractor will be required to: i) Plan pipeline work in consultation with the traffic police ii) Plan work such that trench excavation, pipe laying, and refilling including compacting, at a stretch is completed

in a minimum possible time; iii) Provide for immediate consolidation of backfilling material to desired compaction – this will allow immediate road restoration and therefore will minimise disturbance to the traffic movement; iv) Schedule transport and hauling activities during non-peak hours; v) Do not close the road completely, allow traffic to move on one line; vi) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites; vii) In unavoidable circumstances of road closure, provide alternative routes, and ensure that public is informed about such traffic diversions; viii) At all work sites public information/caution boards shall be provided – information shall inter-alia include: project name, cost and schedule; executing agency and contractor details; nature and schedule of work at that road/locality; traffic diversion details, if any; entry restriction information; competent official's name and contact for public complaints. ix) Keep the site free from all unnecessary obstructions; x) Drive vehicles in a considerate manner; xi) Prepare a Traffic Management Plan –a template is provided for reference at

190. The implementation of the project will affect most of the city as branches of the distribution network are located in most roads and streets and the construction process will continue for about 1.5-2 years. However, the construction work is in fact not expected to cause major negative impacts. This is because: (i) Most network construction will be conducted by small teams working on short lengths at a time so most impacts will be localized and short in duration; and (ii) Because of the small population and not overcrowded conditions in much of the City, the environment of Telavi is not degraded, and all environmental condition are within the eccapted norms (see table 21).
191. Planning and Design was done by Design Department of UWSCG. To define the project detailed survey of the project area was conducted and the initial design was update with additional information obtained from survey; and submit the detailed design package.
192. **Vehicle movement:** Plan and conduct work in such a way that can construction works in the city be completed in 6-8 hours with as little as possible of traffic interruption, so all of this work (most of the daytime work in minor roads) will be conducted by small teams of men, working on short lengths of the network (around 100 - 150 m) at a time. Provide, erect and maintain barricades, signs, markings, flags, lights and flagmen as may be required for the information and protection of traffic. The flagmen shall be equipped with red and green flags and lanterns/lights. Ensure barricades, signs, marking, and flags are of strong design. All barriers on roads and pedestrian areas shall be lit with warning lights during night time or when there is poor visibility. Where the diversion or closure of any existing carriageway, walkway or public right of way is temporarily necessitated by the works, provide and maintain an alternative, which shall be operational before interference with the existing way.

Table 26: Environment-Related Design Features of the Package

Activity	Design Consideration
Contractor's responsibility	The contractors shall be familiar with the present traffic congestion rules of Telavi, for preparaton of road cutting plans before execution of works
Pipe replacement rehabilitation and network extension	In all cases, AC pipes shall be replaced. Existing AC pipes, where intact, shall be left insitu and not disturbed. Where the AC pipe is damaged and where there is a risk of asbestos particles becoming airborne, the contractor shall follow all necessary laws as laid out

Activity	Design Consideration
	locally or by this IEE/EMP to contain and remove hazardous material
Working hours and times	The Contractor will perform all construction work in the city of Telavi in the daytime from 08:00 to 19:00
Road cutting	<ul style="list-style-type: none"> - Unnecessary road cutting should be avoided. - The contractor has to take all necessary safeguards to avoid accidents at site, prevent loss/damage to all existing utilities like pipelines, telephone/gas/electric cables, poles etc and any government or private property during the contract period. - DWASA will apply for the road cutting permission and the contractor shall give full effort and cost for collection of road cutting permission for required days. Therefore, the road cutting plans necessary for the application must be prepared by the contractor. - No temporary or permanent works must proceed before the design and drawings are approved by the Project Manager and road cutting permission obtained from DCC by PMU - The contractor shall prepare a traffic management scheme (road closure program or diversions) and incorporate detail of traffic diversions and pedestrian routes, all traffic signs (for the regulation and for information) and road markings shall be ensured prior to start of road cutting.

193. 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;
- Building the new reservoirs;
- Installation of the new pipes and replacement of the old pipes on the territory of the city of Telavi.
- Use of quarries
- Vehicle movements
- Construction of camp/yard,
- Disposal of waste etc.

B. Operational Phase

- Drinking water quality monitoring.
 - Management of emergencies, scheduled rehabilitation and conducting repairs.
194. Positive impact: after the Project is realized, the drinking water network will fully cover the territory of Telavi town. High quality drinking water will be supplied 24 hrs.a days. 100% of Telavi population.
195. The local community is in favor of the project, as it has great problems with the current situation, when in some parts of the city water is served only 2-3 hours within 3-4 days.
196. A series of consultations were carried out in the framework of the proposed IEE, and a public hearing was held in Telavi in June 2017. Detailed information about the consultations is described in section G - Information Disclosure, Consultation, and Participation. The issues raised during the public hearings are presented in the ANNEX C.
197. All thoughts and suggestions of the local population, expressed during these meetings on, timing of works, reinstatement of roads, , traffic issues, others, are filtered into design and construction planning.
198. Negative environmental impact at the construction stage of the project is expected during the following operations:
1. Noise dust and vibration exerted during the construction of new reservoirs;
 2. 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.
 3. Some streets in Telavi are narrow and the traffic in them will be limited much during the project works.
199. This paragraph provides a brief description of anticipated site-specific impacts related to the construction phase of the sub-project "Improvement of Telavi Water Supply system".

Table 27: Site-Specific Impacts

	Construction Phase. Potential Impacts During Construction Works	Risk	Sites
1	Dust, noise, vibration	High Risk	Construction of New Reservoirs During excavation of pipe trenches within the areas of town of Telavi.
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 Telavi is located in the areas of extensive on-going human impact.

	Construction Phase. Potential Impacts During Construction Works	Risk	Sites
4	Impacts on traffic	High Risk	Existing water supply system of Telavi is partially 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 Telavi.
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	High Risk	Most of the project sites located in this area have been experiencing the severe human impact. However, some loss of red list trees may occur on the territory of the reservoir No.1.
7	Pollution risk for ground waters	Moderate Risk	No major spills of fuel and lubricates at construction sites due to leakages are expected. The spills, which are likely to cause groundwater contamination, may occur during fuelling construction machinery at the construction sites and/or construction camps.
8	Pollution risk for air quality	Moderate Risk	Air pollution may occur in the inhabited areas, including town of Telavi
9	Poaching by construction workers	Low Risk	With the construction of boreholes, the accessibility of humans to the river will increase, which may increase the risk of poaching. At other sites too, wildlife are at risk from poaching by construction workers, so awareness raising will be an important means to mitigate this risk. Awareness will be raised among workers and contractors regarding illegal poaching. Workers will be made aware of the fines and penalties for poaching, as well as the risk of job loss, if caught in these illegal activities.
10	Hazardous Construction Wastes	Low Risk	Small quantities of hazardous wastes will be generated as a result of vehicle operations and the maintenance activities.

	Construction Phase. Potential Impacts During Construction Works	Risk	Sites
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.
14	Vehicle movement	Moderate Risk	The frequency of vehicle will be increased. Dump trucks may be using minor roads next to residential houses.
15	Minimizing noise level		Ensure noise level of the machineries and equipment must not exceed 70dB(A). - Use modern vehicles and machinery with standard adaptations to reduce noise and exhaust emissions, and ensure they are maintained to manufacturers' specifications. - Noise-generating equipment must be fitted with silencers. - If a worker is exposed to noise above a noise exposure limit, the contractor must investigate options for engineered noise control such as using low-noise excavators, jackhammers, drills, and power generators. - If it is not practicable to reduce noise levels to or below noise exposure limits, the contractor must post warning signs in the noise hazard areas. Workers in a posted noise hazard area must wear hearing protection
16	Mimimizing dust generation and air pollution		Limit dust by removing waste soil quickly, bringing sand to site only when necessary, covering and watering stockpiles, and covering soil and sand when carried on trucks. - Vehicles travelling to and from the

	Construction Phase. Potential Impacts During Construction Works	Risk	Sites
			construction site must adhere to speed limits so as to avoid producing excessive dust. - Access and other cleared surfaces, including backfilled trenches, must be dampened whenever possible and especially in dry and windy conditions to avoid excessive dust. - Vehicles and machinery are to be kept in good working order and to meet manufacturer's specifications for safety, fuel consumption, etc. - The contractor is to have the equipment seen to as soon as possible should excessive emissions be observed.

200. When construction is conducted in residential areas, people may be disturbed by the noise of the construction activities and by dust during dry and windy weather, and trenches may impede access to houses for residents and their vehicles. However, these impacts will not be greatly significant because: (i) Disturbance at most locations will last for a few days only; (ii) Background noise of Telavi is low, and even if the noise level will raise during the construction period, people will be more willing to tolerate short-term temporary disturbance if they are aware of the benefits they will gain from an improved water supply.
201. There is inevitably a safety risk when substantial construction such as this is conducted in an urban area, and strict precautions are needed to ensure the safety of both workers and citizens. Contractors will be required to produce and implement site Health and Safety (H&S) Plan.
202. An additional, particularly acute health risk presented by this work derives from the fact that some parts of the existing water supply system include Asbestos pipes. There is therefore a significant health risk for workers and the public if these pipes are uncovered and damaged or cut accidentally, or deliberately to conduct the necessary pipeline refurbishment. This is in fact not such a major problem as might be expected, because: (i) there might be only a small number of AC pipes in the existing water supply system. (ii) The design of the project involves the replacement of these pipes and this can be done without removing or disturbing them, so all AC pipes will be left in situ.
203. Given the dangerous nature of this material, additional measures will still be established to protect the health of all parties in the event (however unlikely) that AC pipes are encountered in the course of the work. During the developments of IEE, UWSCG have developed a protocol to be applied in any instance that AC pipes are found, to ensure that appropriate action is taken. The protocol is based on the approach recommended by some internationally recognized organizations. The AC pipe management plan is attached in Annex D.

E.2. Developing Environmental Documents

204. Prior to the onset of the construction, the Contractor will be obliged to develop the Site-Specific Environmental Management Plan (SSEMP) which must cover the following issues:
- Define boundaries
 - Identify sensitive receptors & environmental values , including vulnerable groups: elderly, schools, hostpitals etc.
 - Specify construction activities
 - Conduct risk assessment

- Assign environmental management measures
- Prepare monitoring plan
- Prepare site plans
- Prepare environmental work plan

205. In addition to the above mentioned Construction Contractor prior to the onset of the construction must develop the Site Specific Noise and Vibrations Management Plan This document must give the model of the sources and distribution of the noise and vibration originated at the construction stage, and possible impact on the adjacent facilities, as well as all mitigation measures and methods to monitor them. This should include pre-construction surveys of buildings for condition so if cracks occur during construction they can be investigated. Decision on survey area to be agreed and included in SSEMP.

206. All the above-mentioned documents must be developed by the Contractor and submitted to the Supervision Consultant for Endorsement. Finally documents are send to UWSCG/IPMO. The Construction Contractor will be entitled to start the construction works only after the above-said documents are approved by UWSCG.

E.3 Construction Phase

E.3.1 Waste Transportation

207. 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 Telavi 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.

E.14 Existing Asbestos Pips

208. 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 possible to damage as existing sewer pipe network, also other legally or illegally water supplypipes. Part of the existing pipes contains asbestos and asbestos dust in case of damage may occur, and which is very dangerous for health.

Mitigation Measures

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

- Special training for the personnel of the contractor;
- Environmental specialist of the consulting company 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.4 Air Quality

E.4.1 Noise, Dust and Vibration

Construction Phase

210. Noise, air emissions of harmful substances and vibration 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 Telavi 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.

211. 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 28: 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 29: 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

212. 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: $\text{Noise level}_1 - \text{Noise level}_2 = 20 \log r_2/r_1$, meaning that by doubling of distance noise is reduced by 6dBA.

Table 30: 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

213. Noise sources generated by excavation for WS pipes during construction period in scope of city Telavi 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).
214. 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) 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 19:00 pm through to 08:00 am the next day shall be strictly prohibited, except the circumstances, agreed under consultation with the IPMO and relevant local stakeholders.
215. As it was already mentioned above, prior to start construction activities construction contractor should prepare Noise SEMP for Telavi. Regular (weekly) noise monitoring should be carried out by contractor, noise level has to be within WB EHS standards. During the monitoring noise from road movement should also be considered. Mitigations to be carried out to keep noise within the standards are presented in para 209.
216. Consultation should be carried out prior to the start of works to inform residents of upcoming activities, including noise, dust and vibration and to make them aware of the GRM as well.
217. The basic sensitive receptors that will be affected by the noise generated as a result of trench excavation are schools, kindergartens, hospitals, elderly, religious places

Mitigation Measures

218. These impacts can be reduced by a variety of measures, many of which are common in most urban construction. These include:
- Require adherence to engine maintenance schedules and standards to reduce air pollution.
 - Use of defined, well planned haulage routes and reductions in vehicle speed where required;
 - Periodically water down temporary roads on site;
 - Cover trucks carrying cement, gravel, sand or other loose materials;
 - Wet or cover trucks carrying stone/ sand/ gravel;
 - Haul materials to and from the site in off peak traffic hours;
 - Halting work during excessive winds.
 - Immediately replacing defective equipment and removing it from the work site
 - No truck movements in inhabited areas between 22:00 and 8:00.
 - The population to be informed regarding the pending works.
219. As for the noise, generated during excavation of the trenches in Telavi area, affecting the sensitive receptors in the town, this will require execution of additional mitigation measures.
220. 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 Telavi, 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 excavation is 20-25 m. that represents 160-200 m during 8-hour work day.

221. 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.

222. 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:

- In educational institutions (such as schools, kindergartens), throughout Georgia, studying process, take place during 5 days a week. No study process takes place on weekend in schools and kindergartens. Therefore, the construction contractor company may execute construction works during non-labor days.

223. As for implementation of the works nearby medical facilities, where patients are present, the following mitigation measures have to be conducted:

Option 1: if the contractor shall conduct the works without using equipment (trenches 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. 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.

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 installed on both sides of the construction technics, 2.– 2.5 m. away, in such a way to protect direct sound emission to the medical center
3. To measure static noise level near health care facilities with noise measuring equipment continuously;
4. In case the noise level exceeds the WB EHS levels, 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

224. 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.

Dust

225. The types of activities during the construction with the potential to generate dust along the Scheme route include: a) movement of vehicles; b); minor demolition (e.g. concrete bases and footings); d) excavation works e) construction of retaining walls; removal of top soil and vegetation.

Mitigation measures:

- a. Damp down unsatisfied /bad condition roads to avoid dust generation while using for transport of waste/material

- b. Use tarpaulins to cover loose material that is transported to and from the site by truck
- c. Control dust generation while unloading the loose material (particularly aggregate and sand) at the site by sprinkling water/unloading inside barricaded area;
- d. Clean wheels and undercarriage of haul trucks prior to leaving construction site;
- e. Bring the material (aggregate and sand) as and when required;
- f. Ensure speedy completion of work and proper site clearance after completion

Vibration

226. Vibration from the construction activities is a cause concern to the community. The effects of vibration varies and depends on the magnitude of the vibration source, the particular ground conditions between the source and receiver, presence of rocks or other large structures in the area. The intensity, duration, frequency and number of occurrences of a vibration all play an important role in both the annoyance levels caused and the strains induced in structures.
227. Sources of vibration includes construction equipment movement, pile driving, compaction, hammering (hydraulic or pneumatic) and operation of generators. The propagation of vibration from construction activities are different in nature from the vibration from blasting. The construction activities are undertaken essentially on ground surface and spreads basically as two-dimensional waves.
228. Table 31 provides an indication of the approximate vibration levels that may be expected for various vibration sources.

Table 31: Approximate Vibration Levels for Various Sources

Activity	Typical levels of ground vibration
Vibratory rollers	Up to 1.5 mm/s at distances of 25 m Higher levels could occur at closer distances; however, no damage would be expected for any building at distances greater than approximately 12 m (for a medium to heavy roller)
Hydraulic rock breakers (levels typical of a large rock breaker operating in hard sandstone)	4.50 mm/s at 5 m 1.30 mm/s at 10 m 0.4 mm/s at 20 m 0.10 mm/s at 50 m
Compactor	20 mm/s at distances of approximately 5 m, 2 mm/s at distances of 15m. at distances greater than 30 m, vibration is usually below 0.3 mm/s
Pile driving/removal	1 to 3 mm/s at distances of 25 m to 50 m depending on soil conditions and the energy of the pile driving hammer
Bulldozers	1 to 2 mm/s at distances of approximately 5 m. at distances greater than 20 m. vibration is usually below 0.32 mm/s
Air track drill	4 to 5 mm/s at a distance of approximately 5 m, and 1.5 mm/s at 10 m. at distances greater than 25 m, vibration is usually

	below 0.6 mm/s and at 50 m or more, vibration is usually below 0.1 mms
Truck traffic (over normal (smooth) road surfaces)	0.01 to 0.2 mm/s at the footing of buildings located 10 to 20 m from a roadway
Truck traffic (over irregular surfaces)	0.1 to 2.0 mm/s at the footings of buildings located 10 m to 20 m from a roadway

Mitigation Measures

229. Prior to the commencement of any activity, the Contractor shall identify whether any machinery or planned action will cause significant vibration. If the answer is yes, the Contractor is to undertake a condition survey of all structures within the zone of influence;
230. 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.

E.5 Water Quality

E.5.1 Contaminations of Surface Water

Construction Phase

231. 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.
232. Impacts to the Alazani River will be minor and that will only be from increased turbidity and sediment loading. The potential for unplanned events such as a spill etc. will be there but the likelihood for its happening is low and will be reduced by the mitigation presented below.

Mitigation Measures

233. 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;
- If a complaint is received Samples will be taken 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.
- Lubricants/fuels should be placed in drip tray or bunded area and stored over 50m from the Alzani River.
- An oil spill response kit will be kept on-site during the crossing to ensure that should any spill occur it can be dealt with immediately. In addition, staff will need to be trained in how to use the kit, should it be needed.
- All river crossing activities should be done in low flow periods.

Operations Phase

234. The risk of the pollution of surface water in operational phase is very low. Minor pollution of water can take place during maintenance and repair works. In that case the above mentioned mitigation measures shall be implemented.
235. The construction of a new water supply system will increase the generation of wastewater. Works for the rehabilitation of the wastewater network and the construction of a new wastewater treatment plant will be taken up successively in scope of SIDA/Municipal Development Fund (MDF).

E.5.2 Contamination of Underground Water

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

E.6 Soils Quality and Topsoil Management

Construction Phase

237. During construction, impacts on soils are mainly due to the excavation works.
238. 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 laying. Therefore impacts associated with earthworks for trench laying are of temporary nature. The pipes will be placed in the trench manually.
239. A sand layer of 30 cm thickness will be laid on top of the pipe, after which the trench will be refilled with excavated material and compacted manually. The excavation is expected to generate surplus material. Surplus material will be used as embankment fill as far as possible.

240. Construction of 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;
- The excavated soil should be removed from construction area at the earliest for beneficial reuse such as land raising / filling of excavated areas;
- Soil should be covered with tarpaulin sheets during transportation
- Soil transportation should not be done during peak hours and should avoid narrow and heavy traffic routes and important religious or tourist sites etc.

Mitigation Measures

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

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

Operation Phase

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

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

Mitigation Measures

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

E.7 Biological Environment

Impacts during Construction

245. 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 10 trees of same species for each red list 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; and in unavoidable cases relevant fencing and barriers should be installed;
- Remove vegetation as far as possible outside the breeding season (late spring – summer for most species) to avoid impacts to fauna as far as possible.

Impacts during Operation

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

E.8 Traffic

Impacts during Construction

247. 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.** Consultations have been carried out with the local population within the proposed IEE to help improve the project design. During the construction 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.

248. 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

249. 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.9 Other Wastes from Construction Activities

Non-hazardous waste

E.9.1 Construction Waste

250. Non-hazardous construction waste may be generated on the storage and construction area and will be collected by contractor's workers. Construction wastes in significant amounts will be generated during demolishing of existing buildings of WWTP #2. Storage of such wastes in area close to settlement and untimely or improper disposal may impact on air quality, dust generation and disturbance of neighboring settlements. In addition, waste from packing materials and woods also will be generated.

251. Disposal of construction wastes both on the sites and at the temporary storage facilities has to meet the following requirements:

- 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 can be transferred only to a certified contractor.

Scrap metals

252. Old equipment from WWTP and sewer network, such as old pumps, pipes and etc. will be handed over to the nearest local service center for further use, recycling or disposal.

A. Mitigation measures:

- Segregation of wastes on recyclable and non-recyclable wastes;
- Selling recyclable wastes to relevant organizations and timely disposal of non-recyclable wastes to the landfill, determinate by local Municipality;
- Burning of waste on any construction site is forbidden small branches from felled trees and bushes will be donated to the local population;
- Create a safe (sheltered with concrete foundation) storage facility

E.9.2 Inert Waste

253. Inert construction waste is accumulated during the construction of new reservoirs, laying the new pipes and replacing the old ones, also during implementation of transmission mains. Such waste is first of all: asphalt and ground.
254. Within the proposed project waste water network has to be newly laid and some part of the network has to be re-placed.
255. The said waste will be transported and placed on the nearest landfill in Gudauri.

E.9.3 Municipal Waste

256. Municipal solid wastes and waste waters will be generated at the construction and camp sites. Mainly this is rubbish, plastic or glass bottles, glasses, waste food, etc. Improper wastes management may cause the spread of infectious diseases, emergence of insects and parasites in construction camp sites. In addition, it may lead to conflict with local population.
257. Waste should be collected both by the specially assigned personnel and the workshop workers on the area. The waste will require segregation and will need to follow the waste hierarchy – reduce, reuse, recycle. For food contaminated or other non-recyclable items the waste will be placed into 0.24m³ plastic containers and further a local Sanitary Service takes it to landfills. The following should be taken into account:
- Generation of dust should be avoided;
 - The waste hierarchy should be followed as far as possible;
 - 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.

Mitigation measures:

260. The followings shall be implemented for proper waste management:
- Segregation of wastes on recyclable and non-recyclable wastes;
 - Selling recyclable wastes to relevant organizations (paper, scraps, accumulators) and timely disposal of non-recyclable wastes to the landfill
 - Providing hydro isolated septic tank for collecting waste waters at the camp sites and bio toilets for workers at the construction sites and timely disposal of waste waters to the local waste water treatment plants.

E.9.4 Hazardous construction wastes

261. During construction phase hazardous wastes will be generated from vehicle operation and maintenance and rehabilitation works within the proposed projects. In addition, there is possibility of presence of

asbestos materials in remaining building of the original WWTP and the existing sewer network (See Annex 5 - Asbestos-Containing Material Management Plan).

Mitigation Measures

262. There is a specific hazardous waste landfill in Georgia. However, prior to disposal appropriate consultation and agreement of MoENRP is 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.

Mitigation measures:

263. A separate Waste Management Plan needs to be developed by Contractor, endorsed by SC and approved by UWSCG and agreed with the MoENRP of Georgia. The Plan has to include information about type of generating wastes, procedure of their collection and disposal in accordance with the new Solid Waste Code of Georgia and per the SPS 2009. All waste should be processed following the waste hierarchy and be segregated, recyclables should be sent to recycle, only waste not recyclable should be compacted and sent to landfill.

E.9.5 Medical Waste

264. 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 (Sanitary).

E.11 Impacts on Archaeological Sites

265. 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

266. 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.
267. Therefore steps should be taken minimize the risk. This should involve:

- Contractor should put in place Chance Find Procedures and 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.

268. 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 initial budget necessary for the archaeological supervision and other agreed works should be fixed under the construction works appraisal, but the budget could be exceeded if a significant archaeological site will be identified.

E.12 Socio-Cultural Resources

Impacts during Construction

269. 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

270. 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

Water filled excavations will be fenced or the water pumped out immediately.

271. **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.13 Construction Camps

272. 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.

273. 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, flora and fauna and 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 safe 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.

274. Prior to establishment of the work camp(s) relevant SSEMP should be prepared by contractor, endorsed by SC and approved by the UWSCG. 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.14 Construction Related Impacts at the Quarrying Sites

275. 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

276. 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 above mentioned companies is a main mechanism to guarantee that most of impacts related to quarrying will be mitigated. License is provided by the Agency of Environmental protection of 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 supervision of construction.
277. 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.
278. Relevant SSEMP, including some level of Impact Assessment should be prepared by contractor about 10 days before starting quarrying activities

E.15 Existing Asbestos Pipes

279. At the construction stage, according to the contract the project is only considered as the installation of new pipes in the whole area of the city. During excavation works of trenches it is possible to damage as existing pipe network, also other legally or illegally water supply pipes. A large part of the existing pipes contains asbestos and any damage to these pipes may result in asbestos dust which is very dangerous for health. As such, all asbestos pipes will remain in place and will be covered by soil.
280. Asbestos management plan is attached to this IEE (see Annex D)

Mitigation Measures

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

- Special training for the personnel of the contractor;
- Environmental specialist of the consulting company 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.
- All workers and personal on the construction site should be equipped with PPE
- Usage of appropriate breathing apparatus and protective equipment by persons delegated to deal with the AC material;
- Suppress dust by spraying of water as necessary.

E.16 Cumulative Impacts

281. The following infrastructure projects are underway and are planned in Telavi: The Municipal Development Fund is implementing a rehabilitation project for the Telavi water supply system, funded by the EIB. It is also planned to build a Waste Water Treatment Plant, which will be implemented by MDF and financed by SIDA. Within the framework of two subprojects on water supply, installation of

water pipes will be carried out in different territories of the city of Telavi and at different times. Construction of WWTP will begin after the completion of the design of the project in about 5-6 months. Consequently, in the framework of these three projects, constructions will be carried out at different times and places.

282. On the other hand, it is clear that there is a certain link between these WWS projects and some cumulative effect is expected. As it was mentioned above the two Water Supply projects are planned to accomplish one after another and in fact, after one project is complete, another project will start, while Water Supply and WWTP projects may coincide in time. In fact, there will be disturbance of the population on the territory of the city of Telavi with noise, dust, vibration and street closure as well.
283. At the same time, if the two projects are uncoordinated, the negative impact on the population will be longer and the level of noise and vibration due to the project will be higher. In addition, an uncoordinated action of the two projects will lead to the increased amount of waste.
284. During the Telavi water-supply project, financed by EIB the road cover section was completely removed and the water drainage pipes were installed, but today, in some parts of the city road cover is to be removed again. Consequently, during the WS/ADB project, it will be necessary to remove the concrete cover and the trenches will be excavated twice leading to the closure of streets and disturbance of population once again.
285. Following the above-mentioned, in case of uncoordinated implementation of the two projects, the population of Telavi will be subject to the cumulative negative impact, which was possible to avoid provided the projects were planned expediently. These issues were discussed during the meeting with the mayor of Telavi and it was agreed that all activities will be coordinated on the Municipal level. Coordinated consultations with the local population on informing the public about planned activities will be carried out on a permanent basis to mitigate the effects of cumulative activities.

F. Analysis of Alternatives

286. During the preparation of the Project, no alternative options were discussed for reservoirs and network outline. All reservoirs will be built on the territory of existing reservoirs owned by the United Water Supply Company of Georgia and the new network will mainly follow an old one outlined in urban areas of Telavi.
287. As an alternative to boreholes may be considered the expansion of current Headworks of "Turdos Khevi" and "Jvari patiosani", but the water from these water intakes are very turbid and therefore needs treatment. This Headworks may be used during the Drought period as an additional water supply.

G. Information Disclosure, Consultation, and Participation

288. One of the main goals of the IEE is to facilitate the participation of all stakeholders and local communities at all stages of the project cycle: from the pre-construction phase and construction activities to its operation. In this regards, public consultations were held in Telavi to capture the stakeholders' opinions about the project, and agree on the project activities.
289. Prior to the public consultations, a meeting was held with the Telavi Mayor Mr. Platon Kalmakhelidze and the Vice Mayor Mr. Tengiz Mtvarelishvili. The mayor of the town underlined the need and importance of the Telavi WS project and said that currently Telavi's population is supplied with drinking water only 2-3 hours a day, and as the city is divided into 5 zones, in some areas water is supplied only two hours during the two-three days.
290. The mayor of the city asked the representatives of UWSCG and Ms. Ketevan Chomakhidze, an environmental specialist of USIIP and especially Mr. Parna Miriashvili, from the UWSCG project department to review the project of Telavi WS with such a way, that at the first stage the 1st zone was rehabilitated, since the 1st Zone is basically a multi-storey residential buildings.
291. As for the second zone it may be rehabilitated later, because it is mostly industrial zone and currently no industry is working in Telavi.

292. On June 23, 2017, a Public hearing was held in administrative buildings of Telavi. The photos and registration lists are presented in Annex A. The meetings were attended by more than 30 participants from the city of Telavi. Among participants were Vice Mayor of Telavi, citizens from the relevant settlements and NGO representatives. Besides them, consultation meeting was attended by the representatives of the UWSCG: Ms.Kate Chomakhidze, environmental consultant of USIIP; Mr. Parna Mikiashvili, Head, Unit of Internal Projects under Design Departement; Ms.Nino Bitsadze, Unit of Public Relations, Ms. Ketu Chumburidze, Unit of Protocol.
293. Ms Kate Khomakhidze provided a presentation about the Telavi water supply rehabilitation project to the audience. During the presentation, the project objectives and the main results of the environmental assessment, EMP, expected environmental impacts and mitigation measures developed, and GRM were discussed.
294. The consolidated comments and recommendations of the stakeholders on the project are the following:
- (i) The local population expressed concern about the current situation with water supply in Telavi, as the population is supplied with water for 2-3 hours a day, and in some areas only for a few hours during the 2-3 days.
 - (ii) Project work should be started with the shortest possible time as people experience a lot of problems due to the lack of the high quality drinking water.
 - (iii) Inconvenience and traffic disturbances due to construction work in the city should be minimized as much as possible.
 - (iv) Proper repairing of the roads in Telavi after completion of the civil works has to be implemented
 - (v) Timeline of project and the schedule of the construction activities
 - (vi) Road disturbances should be minimized
295. The suggestions, comments, recommendations will be incorporated in the final technical design and are reflected in EMP of proposed IEE.
296. Local population were informed that Contractors would develop an Informative Banner with information on project objectives, activities, implementers, schedule of construction works, deadlines, contact information and logbooks for complaints and suggestions on each construction site.
297. The main issues raised during the public consultation are presented in ANNEX C.
298. During the public consultations the GRM was discussed. Stakeholders were explained that GRM to be a continuous process that envisages a collaboration of the Implementation Agency with population during the entire project cycle. The detailed information on this mechanism was presented to the local populatin and is described in the chapter below - H. Grievance Redress Mechanism
299. This IEE incorporates comments and suggestions from all concerned stakeholders. The final IEE report will be made available on UWSCG and ADB's website.
300. In order to maintain the transparency of public disclosure process, the bi-annual environmental monitoring reports (EMRs) will be prepared and published on the ADB and UWSCG websites as well.
301. Future consultations for project stakeholders shall follow as mentioned below.
- (vii) During detailed design stage, in case of any major changes in the design/alignment/location, the IEE will be updated accordingly.
 - (viii) During construction, IPMO and UWSCG/PR department in close cooperation with the Supervision Company will conduct an intensive information, education and communication campaign to ensure the sufficient level of awareness/information among the affected communities regarding the upcoming construction, its anticipated impacts, the grievance redress mechanism, contact details and location of the IPMO, and status of compliance with the Government's and SPS 2009 environmental safeguard requirements. Among others, the information banners containing information about the subproject, implementation schedule and contact details of the executing agency and Contractors will

be installed at the strategic locations within the subprojects' main areas of intervention.

302. The main stakeholders, including vulnerable groups, have already been identified and/or 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 Telavi
 - UWSCG as implementing agency
 - Other government regulatory institutions
 - Municipality of Telavi
 - NGOs and CBOs working in the affected communities;
 - Other community representatives (prominent citizens, religious leaders, elders, women's groups);
 - The beneficiary community in Telavi in general; and
 - The ADB, as funding agency
303. 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 Telavi (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.
304. Stakeholder consultation and participation was an important process in the preparation of this IEE. The process engaging stakeholders and affected people during the conduct of the IEE included joint site visits of IA, design and supervising consultants, onsite discussions with local population and public hearings.

H. Grievance Redress Mechanism

305. 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.
306. After issuance of the special order, a GRM was first set up by UWSCG in Kutaisi under the REG-01 project of USIIP. The GRM allows affected people to appeal any disagreeable decision, practice or activity arising from project implementation.
307. 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. Than AP’s complaints are registered by the operator of the service center and AP get queue number. It should be mentioned also that complaints log. is available at each construction site and any affective person may fill the log. and submit to the contractor directly.
- 308.

Fig. 6: AP gets queue registration number at Local Service center

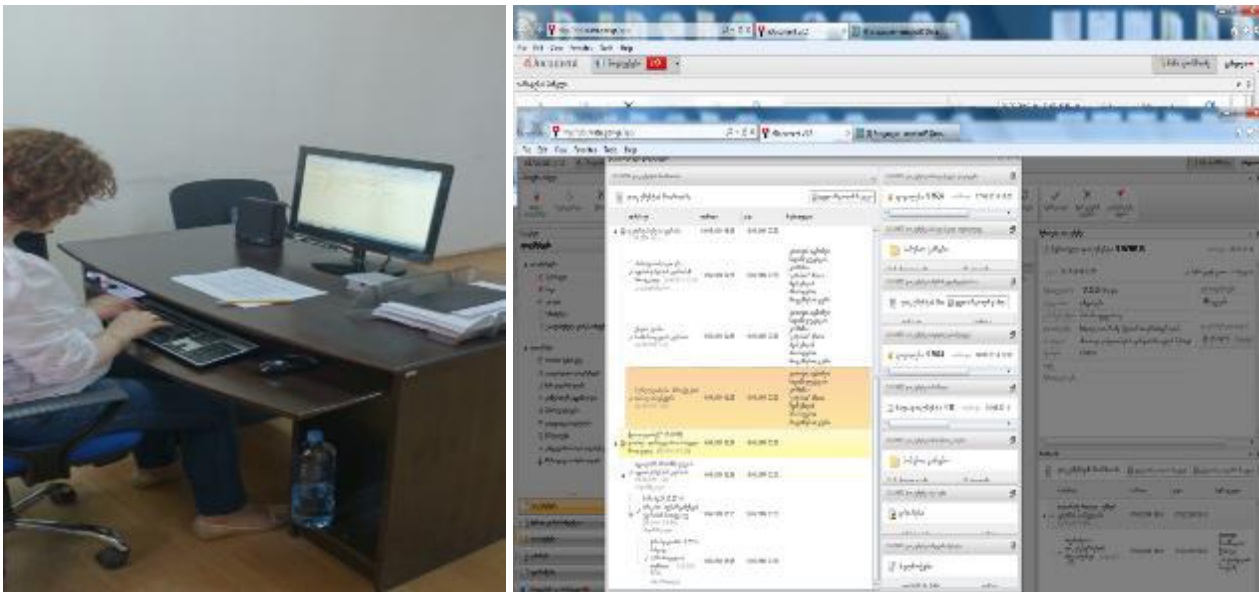


GRM in Telavi will operate in three stages:

309. During the first stage, complaints are discussed within two weeks of being received by the local service centre of UWSCG (e.g. Telavi 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.

310. The service centre operators, who are trained⁴ 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 system⁵ 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 Protection, Resettlement and Permits Department, Maka Goderdzishvili.

Fig. 7: The Service center operator registers grievances through eDocument – Task Management System



311. 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.

312. 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)

⁴ 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.

⁵The **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 eDocument service offers an opportunity to manage, find, and track documents 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.*

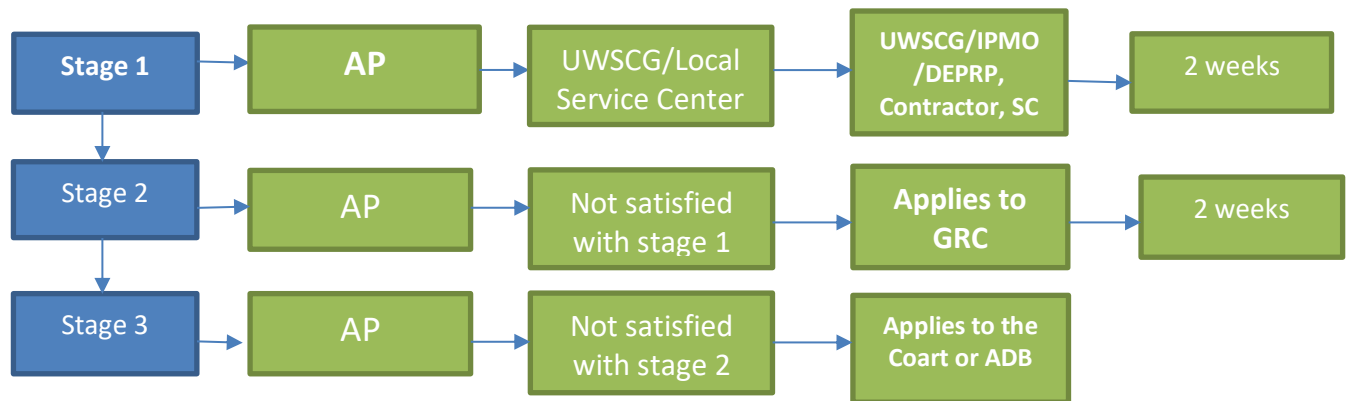
- Brief description of the actions proposed for the grievance resolution at the first stage and the reasons why these actions were denied
- Minutes of meetings conducted at the first stage

313. 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.

314. 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.

315. There is a third stage in case there is a failure to resolve the grievance. APs can also apply to the ADB Complaints Review Officer through the Accountability Mechanism.

Fig 8: GRM Mechanism



316. 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

317. 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.
318. 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.1 Environmental Impacts, Mitigation and Monitoring Plans

319. The environmental impacts associated with Tranches 3 - the Development Program, have been detailed above in the relevant sections of this IEE. Mitigation measures required to address the impacts identified in the IEE 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 25, which includes time frames, responsibilities and where applicable, estimated costs for each measure.
320. 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.
321. An environmental monitoring plan outlines the activities and responsibilities associated with monitoring the effectiveness of the proposed mitigation plan and ensuring compliance with the recommendations of the IEE.

I.2 Implementation Arrangements and Responsibilities

322. The main institutions that will be involved in implementation of the EMP are UWSCG the USIIP executing agency (EA), Supervision Consultant (SC) the Contractor and to a lesser extent the Ministry of Environment and Natural Resources Protection (MoENRP).
323. Investment Program Management Office (IPMO) established within UWSCG will be responsible for the day to day management of the project including implementation of the EMP. The IPMO currently has one Environmental Specialist who is responsible for management of the environmental and social aspects of USSIP.
324. The IPMO (Environmental 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) Assist to obtain necessary permits and/or clearance, as required, from MoENRP and other relevant government agencies, ensuring that all necessary regulatory clearances are obtained before commencing any civil work on the project and .
 - (iii) Ensure that contractors have access to the EMP and IEE 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 (SSEMP) 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 MoENRP, any other relevant government agencies, and ADB.

325. The SC will include a part time international environmental specialist and fulltime site-based national environmental specialist to assist the IPMO supervise and monitor implementation of the EMP during construction.

326. A Non Compliance Notice will be issued to the contractor if the SC 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 SC. 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.

327. 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).

328. 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

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

- (i) Preparing the site specific environmental management plan (SSEMP) for endorsement by SC approval by the Employer (IPMO) prior to the Contractors taking possession of the construction site (see below)
- (ii) Ensuring the SSEMP is 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 or grievance log.
 - 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

1.3 Site Specific Environmental Management Plan (SSEMP)

330. 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

331. The SSEMP will also include a monitoring plan and a reporting program corresponding to the requirements of the EMP. The SSEMP will be submitted to UWSCG/IPMO for approval at least 10 days before taking possession of any work site.

1.4 Site Induction

332. 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 with the 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.

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

1.5 Reporting

334. 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.

335. 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.

336. 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.6 Implementation Costs

337. 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.

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

339. Baseline for some of these parameters has not yet been taken for the IEE. This should be collected before considering about taking readings during monitoring.

Table 32: Environmental Management Cost

Item	Quantity ⁶	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.
Monthly Water Quality testing	108	300 USD	32 400	To be conducted by the Contractor for air emissions, dust, vibratio measurements
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.
Environmental specialist (Contractor)	36 months	1500 USD	54.000	The costs will be included in the contract signed between UWSCG and Contractor.
International Environemntal Consucltant (Contractor)	36 months	-	-	The costs will be included in the contract signed between UWSCG and Contractor.

⁶To be established by CS Consultant and international environmental specialist.

Item	Quantity ⁶	Unit Cost	Total Cost	Remarks
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 Telavi 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			60,080.00	Total for above

Table 33: Environmental Impacts and Mitigation Measures

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost	Monitoring of Mitigations
Pre-construction					
Biological study of the project area	Prior to start construction activities, construction should carry out additional biological study of the project area. Results of the work submitted for consideration UWSCG.	Contractor	City “Telavi” Reservoir site; transmission mains	6 000 USD	Check the quality of report and identified mitigation measures, review & approval of report
Aquatic ecology survey of water bodies	Prior to start construction activities, contractor should carry out aquatic ecology survey of any water bodies likely to be directly or indirectly affected during the construction	Contractor	Project area	Included in Project price	Check the quality of report and identified mitigation measures, review & approval of report
Consultations	Consultation should be carried out prior to the start of works to inform residents of upcoming activities, including noise, dust vibration and to make them aware of the GRM System	PA Specialist of Contractor PA Specialist of SC With cooperation of UWSCG/IPMO and PA department	City “Telavi” Reservoir site;	Included in Project price	Check the number of consultations carried out, photos, issues discussed

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost	Monitoring of Mitigations
A detailed pre-construction survey of building in the narrow streets of Telavi	Prior to start construction activities contractor should carry out Building survey in the streets of Telavi where there is potential for damage to houses from vibration.	Contractor	City "Telavi"	Included in Project price	Review and approve building Survey report
Roads condition survey	Prior to start of construction Contractor will conduct condition survey for the roads likely to be heavily used and damaged by the project prior to the start of construction.		City "Telavi" Reservoir site;	Included in Project price	Review and approve Road Condition Survey report
Survey of all new infrastructure locations including quarry, camp, construction yard etc.	(i) Prioritize areas within or nearest possible vacant space in the project location; (ii) If it is deemed necessary to locate elsewhere, consider sites that will not promote instability and result in destruction of property, vegetation, and drinking water supply systems; (iii) Do not consider residential areas; (iv) Take extreme care in selecting sites to avoid direct disposal to water body (river near intake) which will inconvenience the community. (v) For excess spoil disposal, ensure (a) site shall be selected preferably from barren, infertile lands. In case agricultural land needs to be selected, written consent from landowners will be obtained; (b) debris disposal site shall be at least 200 m away from surface water bodies; (c) no residential areas shall be located within 50 m downwind side of the site; and (d) site is	Contractor		Included in Project price	(i) List of selected sites for construction work camps, stockpile areas, storage areas, and disposal areas. (ii) Written consent of landowner/s for reuse of excess spoils to agricultural land

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost	Monitoring of Mitigations
	minimum 250 m away from sensitive locations like settlements, ponds/lakes/ river or other water bodies				
Sources of Materials	To obtain a written approval from the MoENRP of Georgia.	Contractor		Included in Project price	(i) List of approved quarry sites and sources of materials
Poaching during construction	Workers will be located and housed in specific camps away from local communities and vulnerable habitats. Workers will be briefed on their obligations regarding behavior in the project area, with sanctions for inappropriate behavior or illegal activities including poaching.	Contractor, SC	Project Sites	Included in Project price	List of awareness activities carried out Observation of location of camps and living houses
Utilities	(i) Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction phase; and (ii) contractor to prepare a contingency plan to include actions to be done in case of unintentional interruption of services. (iii) Contractor to prepare spoils management plan and traffic management plan	Contractor		Included in Project price	(i) List of affected utilities and operators; (ii) spoil management plan; (iii) and traffic management plan
Preparation of "Inert Waste Management Plan"	Prior to start construction activities, contractor should choose the areas for disposal inert waste and prepare "Inert waste management plan". Prepared plan should be submitted to SC for endorsement and to UWSCG for approval.	Environmental Specialist of Contractor	City "Telavi" Reservoir site;	Included in Project price	review & approval of Inert waste management plan

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost	Monitoring of Mitigations
		Environmental Specialist of SC Approved by UWSCG			
SSEMP	Prior to start construction activities, construction contractor should prepare SSEMP and submit to SC for endorsement and to UWSCG for approval.	Environmental Specialist Of Contractor ES of SC	Project Area	Included in Project price	review & approval of SSEMP
Social Issues	Contractor to hire local workers in case similar qualification to give priority local representatives.	Contractor	Contract documents	Project price	Number of local workers employed by contractor
Possible removal of Terrestrial habitat. Loss of the top soil	<p>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:</p> <ul style="list-style-type: none"> • 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 	Environmental Specialist Of Construction Company	<p>Construction and labour camp, storage area.</p> <p>WW Pipe construction</p>	Part of construction cost	<p>Number of replanted red list species</p> <p>Changes in design to avoid cutting of trees</p> <p>Developed Compensatory planting plan</p> <p>Amount of sum paid for compensation</p>

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost	Monitoring of Mitigations
	<p>approval, if it is unavoidable to cut down the trees.</p> <ul style="list-style-type: none"> • Pay compensation sum identified by the MoENRP of Georgia 				
<p>A negative impact on soil, water and air may be caused because of an incorrect management of the generated inertial waste. Also the generated noise, dust and vibration during demolition may cause a negative impact on the surrounding buildings and population.</p>	<ul style="list-style-type: none"> • Prohibited use of blasting equipment during the demolition process of reservoirs; • No use of heavy duty equipment is allowed; • Prior to the commencement of any activity, the Contractor shall identify whether any machinery or planned action will cause significant vibration. If 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 stable conditions when winds could nevertheless direct dust towards adjacent communities; • Using a water truck for dust suppression on all exposed areas as required; 	Contractor	City "Telavi" Reservoir sites; Borehole sites	Included in Project price	Monitoring of noise, dust and vibration, details are provided in table 33

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost	Monitoring of Mitigations
	<ul style="list-style-type: none"> • Active areas adjacent to residents should be kept damp at all times; • Establish and enforcing vehicle speed limits to minimize dust generation; • Using tarpaulins to cover fugitive loads (for demolition concrete materials) on haul trucks moving off-site; • Select plant and equipment, design work practices, and limit hours of operation to minimize potential impacts as far as practicable; • Operators of noisy equipments or any other workers in the vicinity of excessive noisy equipment are to be provided with ear protection equipment; • Under noisy conditions, do not allow operators or other workers to be exceed the threshold that has been establish for exposure to noise; • Schedule construction so as to minimize the multiple use of the most noisy equipments near sensitive receivers; • Ensure that all equipments is in good repair and operated in the correct manner; • Consult with local residents and building owners the address community concerns; 				
Construction					

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost	Monitoring of Mitigations
Ambient Air and Local Dust ⁷	<ul style="list-style-type: none"> • 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 <p>Don't allow access in the work area except workers to limit soil disturbance and prevent access by fencing</p>	Contractor	Excavation areas for trenches at Telavi town;	Part of construction cost	(i) Location of stockpiles; (ii) Complaints from sensitive receptors; (iii) Heavy equipment and machinery with air pollution control devices; (iv) Certification that vehicles are compliant with Air Act

⁷Environmental 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 Impacts	Negative	Mitigation measures	Responsibility	Location	Cost	Monitoring Mitigations of
Vibratiuon		<ul style="list-style-type: none"> • 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 	Environmental Specialist	Project Area	Part of construction cost	(i) Complaints from sensitive receptors; (ii) Equivalent day and night time vibration levels
Surface water quality		(i) Prepare and implement a spoils management plan as the part of the Construction Management Plan. (ii) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets; (iii)				(i) Areas for stockpiles, storage of fuels and lubricants and waste materials; (ii) Number of silt

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost	Monitoring of Mitigations
	Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies; (iv) Laying of pipelines during dry season and closing of all trenches before rainy season and avoid any chances of collecting the water in the trenches or pumping. (v) Place storage areas for fuels and lubricants away from any drainage leading to water bodies; (vi) Dispose any wastes generated by installation of pipeline in designated sites; and (vii) Conduct surface quality inspection according to the Environmental Management Plan (EMP).				traps installed along trenches leading to water bodies; (iii) Records of surface water quality inspection; (iv) Effectiveness of water management measures; (v) No visible degradation to nearby drainages, nallahs or water bodies due to civil works
Work Camps and worksites Temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants Unsanitary and poor living conditions for workers	(i) Consult with UWSCG/IPMO before locating project offices, sheds, and construction plants; (ii) Minimize removal of vegetation and disallow cutting of trees; (iii) Provide drinking water, water for other uses, and sanitation facilities for employees; (iv) Ensure conditions of liveability at work camps are maintained at the highest standards possible at all times; (v) Prohibit employees from poaching wildlife and cutting of trees for firewood; (vi) Train employees in the storage and handling of materials which can potentially cause soil contamination; (vii) Recover used oil and lubricants and reuse or remove from the site; (viii) Manage solid waste according to the preference hierarchy: reuse, recycling and	Contractor	Project area		Site observation

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost	Monitoring of Mitigations
	disposal to designated areas; (ix) Ensure unauthorized persons especially children are not allowed in any worksite at any given time.				
Quarry and Borrow Sites.	<p>Utilize readily available sources of materials. If contractor procures materials from existing borrow pits and quarries, ensure that these conform to all relevant regulatory requirements;</p> <p>Borrow areas and quarries (if these are being opened up exclusively for the project) must comply with environmental requirements, as applicable and ensure satisfactory reinstatement of the site after the completion of the project;</p> <p>If additional quarries will be required after construction has started, obtain written approval from IPMO and MoENRP</p>	Contractor	Telavi	Part of construction cost	<p>Monitoring of agreements with MoENRP and other relevant authorities</p> <p>Site Observation</p>
Noise Pollution ⁸	<ul style="list-style-type: none"> • 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 Telavi town close to the Project area prior to commencement of the construction phase. 	Environmental Specialist	Project Area	Part of construction cost	<p>(i) Complaints from sensitive receptors;</p> <p>(ii) Use of silencers in noise-producing equipment and sound barriers; (iii) Equivalent day and</p>

⁸The 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	Monitoring of Mitigations
	<ul style="list-style-type: none"> • 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. • Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and portable street barriers the sound impact to surrounding sensitive receptor; and 				night time noise levels
<p>Nuisance/ disturbance to sensitive areas</p> <p>Schools, hospitals and religious places due construction work in the proximity (within 250 m of such place)</p>	<ul style="list-style-type: none"> • No material should be stocked in this area; material shall be brought to the site as and when required • Conduct work manually with small group of workers and less noise; minimize use of equipment and vehicles • Material transport to the site should be arranged considering school timings; material should be in place before school starts; Notify concerned schools, hospitals etc. <p>2 weeks prior to the work conduct a 30 minutes awareness program at on nature of work, likely disturbances and risks and construction work, mitigation measures in place, entry restrictions</p>				<p>Site observation,</p> <p>Number of Public Awareness activities</p>

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost	Monitoring of Mitigations
Asbestos Cement Pipes Health risk due to exposure to asbestos materials	(i) Follow instructions provided in ANNEX D of this IEE - AC pipe Management plan (ii) Require all personnel (including manual labourers) to undergo training as per AC management plan (iii) Left AC pipes in-situ. (iv) Training of all personnel (including manual laborers) (v) Site-specific OH&S Plan including AC pipe protocol (vi) Development and application of a detailed OH&S procedure to protect both workers and citizens. This should comply with national and international standards for dealing with asbestos, and should include: (a) removal of all persons to a safe distance; (b) usage of appropriate breathing apparatus and protective equipment by persons delegated to deal with the AC material; and (c) Procedures for the safe removal and long-term disposal of all asbestos-containing material encountered.	Contractor Supervision Consultant		Part of construction cost	(i) Site-specific OH&S Plan including AC pipe protocol (iii) record of OH&S orientation on AC Cement Materials Protocol (iv) personal protective equipment for AC materials (v) sign boards for pipe alignment identified as AC pipes.
Impact on surface water bodies due to construction	<ul style="list-style-type: none"> • In case of heavy rain, protect open trenches from entry of rain water by raising earthen bunds with excavated soil • Confine construction area including the material storage (sand and aggregate) so that runoff from upland areas will not enter the site • Ensure that drains are not blocked with excavated soil 	Of Construction Company	Project area	Part of construction cost	

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost	Monitoring of Mitigations
Soil Contamination	<ul style="list-style-type: none"> The contractors will be required to instruct and train their workforce in the storage and handling of materials and chemicals that can potentially cause soil contamination. Solid waste generated during construction and at campsites will be properly treated and safely disposed of only in demarcated waste disposal sites. Construction chemicals will be managed properly Clearly labelling all dangerous products, Fuel tanks (diesel or oil) should be placed in a concrete pool which its perimeter walls will be at least 1.0 m high with the concrete or plastered masonry wall, A proper floor drain should be installed on the slab of the concrete pool for safely discharging the leakages. 	Environmental Specialist Of Construction Company	Construction sites Camp	Part of construction cost	
Impact on Traffic	<ul style="list-style-type: none"> 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 	Environmental Specialist Of Construction Company	Construction site Access Road	Part of construction cost	(i) Traffic route during construction works including number of permanent signages, barricades and flagmen on worksite (Appendix 5); (ii) Complaints from sensitive receptors; (iii) Number of

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost	Monitoring of Mitigations
	<p>Traffic Management Plan should be part of the Construction Management Plan.</p> <p>(i) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites;</p> <p>(ii) Schedule transport and hauling activities during non-peak hours;</p> <p>(iii) Locate entry and exit points in areas where there is low potential for traffic congestion;</p> <p>(iv) Keep the site free from all unnecessary obstructions; (v) Drive vehicles in a considerate manner;</p> <p>(vi) Coordinate with Traffic Police for temporary road diversions and with for provision of traffic aids if transportation activities cannot be avoided during peak hours;</p>				signages placed at project location.
Hazardous Materials	<ul style="list-style-type: none"> • 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. 	<p>Environmental Specialist</p> <p>Of Construction Company</p>	<p>Construction site</p> <p>Storage Area</p>	Part of construction cost	Waste Management Plan review & approval

Potential Impacts	Negative	Mitigation measures	Responsibility	Location	Cost	Monitoring Mitigations of
		<ul style="list-style-type: none"> Any accidental chemical / fuel spills to be corrected immediately. 				
Solid Waste		<ul style="list-style-type: none"> 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. <p>The personnel involved in the handling of hazardous and non-hazardous waste will undergo specific training in:</p> <ul style="list-style-type: none"> Waste handling Waste treatment; and Waste storage. 	Environmental Specialist Of Construction Company	Project area Storage Area Construction camp	Part of construction cost	Waste Management Plan review & approval
Loss of top soil		<ul style="list-style-type: none"> 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	Site observation

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost	Monitoring of Mitigations
Erosion due to excavation/refilling	<ul style="list-style-type: none"> • 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	Site observation
Impact on air quality due to emissions from construction equipment/vehicles	<ul style="list-style-type: none"> • 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	Telavi town City “Telavi” Reservoir site;	Part of construction cost	
Socio-economic benefits from employing local people in construction work	<ul style="list-style-type: none"> • 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	
SocioEconomic Income. Impede the access of residents and customers to nearby shops	<ul style="list-style-type: none"> (i) Prepare and implement spoils management plan (ii) Leave spaces for access between mounds of soil; (iii) Provide walkways and metal sheets where required for people; (iv) Increase workforce in front of critical areas such as institutions, place of worship, business establishment, hospitals, and schools; (v) Consult businesses and institutions regarding operating hours and factoring this in work schedules; and (vi) Provide sign boards for pedestrians to inform nature and duration of 				<ul style="list-style-type: none"> (i) Employment records; (ii) Records of sources of materials (iii) Compliance to core labor laws (See appendix 4 of this IEE)

Potential Impacts	Negative	Mitigation measures	Responsibility	Location	Cost	Monitoring of Mitigations
		construction works and contact numbers for concerns/complaints				
Occupational Health and Safety Occupational hazards which can arise during work		<ul style="list-style-type: none"> (i) Comply with all national, state and local labor laws (ii) Develop and implement site-specific occupational health and safety (OH&S) Plan, and include in the Construction Management plan. The OH & S plan will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use personal protective equipment like helmet, gumboot, safety belt, gloves, nose mask and ear plugs; (c) OH&S Training for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents; (iii) Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site; (iv) Provide medical insurance coverage for workers; (v) Secure all installations from unauthorized intrusion and accident risks; (vi) Provide supplies of potable drinking water; (vii) Provide clean eating areas where workers are not exposed to hazardous or noxious substances; (viii) Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; (ix) Provide visitor orientation if visitors to the site can gain access to areas where hazardous 				(i) Sitespecific OH&S Plan; (ii) Equipped first-aid stations; (iii) Medical insurance coverage for workers; (iv) Number of accidents; (v) Supplies of potable drinking water; (vi) Clean eating areas where workers are not exposed to hazardous or noxious substances; (vii) record of H&S orientation trainings (viii) personal protective equipment; (ix) % of moving equipment outfitted with audible backup alarms; (x) permanent sign boards for hazardous areas such as energized electrical devices and lines, service rooms

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost	Monitoring of Mitigations
	conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted; (x) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas; (xi) Ensure moving equipment is outfitted with audible back-up alarms; (xii) Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and (xiii) Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.				housing high voltage equipment, and areas for storage and disposal. (xi) Compliance to core labor laws
Community Health and Safety. Traffic accidents and vehicle collision with pedestrians during material and waste transportation	(i) Plan routes to avoid times of peak-pedestrian activities. (ii) Liaise with UWSCG/IPMO in identifying high-risk areas on route cards/maps. (iii) Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure. (iv) Provide road signs and flag persons to warn of on-going				(i) Traffic Management Plan; (ii) Complaints from sensitive receptors

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost	Monitoring of Mitigations
<p>Work Camps and worksites</p> <p>Temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants Unsanitary and poor living conditions for workers</p>	<p>(i) Consult with UWSCG/IPMO before locating project offices, sheds, and construction plants; (ii) Minimize removal of vegetation and disallow cutting of trees; (iii) Provide drinking water, water for other uses, and sanitation facilities for employees; (iv) Ensure conditions of liveability at work camps are maintained at the highest standards possible at all times; Prohibit employees from poaching wildlife and cutting of trees for firewood; (v) Train employees in the storage and handling of materials which can potentially cause soil contamination; (vi) Recover used oil and lubricants and reuse or remove from the site; (vii) Manage solid waste according to the preference hierarchy: reuse, recycling and disposal to designated areas; (viii) Ensure unauthorized persons especially children are not allowed in any worksite at any given time</p>				<p>(i) Complaints from sensitive receptors; (ii) Drinking water and sanitation facilities for employees</p>

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost	Monitoring of Mitigations
Impacts due to import of labour and establishment of temporary labour camps	<p>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:</p> <ul style="list-style-type: none"> • Establish temporary labour camps in consultation with the local authority • Shall be located away from water bodies • No clearance of trees vegetation shall be allowed for establishment of camp • Provide all basic amenities (water supply and 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 	<p>Environmental Specialist</p> <p>Of Construction Company</p>	Temporary labour camps	Part of construction cost	

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost	Monitoring Mitigations of
Safety risk – public and worker	<ul style="list-style-type: none"> • 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	
Land use Environmental Issues due to land use change Not applicable	The impact due to change in land use will be negligible due to this project.				
Historical, archaeological chance finds during excavation	<ul style="list-style-type: none"> • Contractor shall put in place a protocol for conducting any excavation work, to ensure that any chance finds are recognized and measures are taken to ensure they are protected and conserved. This should involve: <ul style="list-style-type: none"> ○ Having excavation observed by a person with archaeological field training; 	Environmental Specialist Of Construction Company	All construction sites	Part of construction cost	Records of chance finds

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost	Monitoring of Mitigations
	<ul style="list-style-type: none"> 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.. 				
Cumulative impacts – repeated disturbance to roads and people	<ul style="list-style-type: none"> 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	Developed plan reviewed and approved by SC and UWSCG
Postconstruction clean-up Damage due to debris, spoils, excess construction materials	(i) Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and (ii) All excavated roads shall be reinstated to original condition. (iii) All disrupted utilities restored (iv) All affected structures rehabilitated/compensated (v) The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc. and these shall be cleaned up. (vi) All hardened surfaces within the construction camp area shall be ripped, all imported materials removed, and the area shall be top soiled and regrassed using the guidelines set out in the revegetation specification that forms part of this document. (vii) The contractor must arrange the cancellation of all temporary services. (viii) Request PMU/CSS to report in writing that	Contractor			Supervision Consultants report in writing that (i) worksite is restored to original conditions; (ii) camp has been vacated and restored to pre-project conditions; (iii) all construction related structures not relevant to O&M are removed; and

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost	Monitoring of Mitigations
	worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.				
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	Records of implemented measures
Operation Phase					
Operation & Maintenance of Water supply system in Telavi	UWSCG shall ensure that all water supply pipelines are maintained well and water is treated to the required Drinking Water Standards	UWSCG	Well field, water network	Part of operating costs	
Water Quality Monitoring	Treated water shall be tested for drinking water quality standards – parameters on regular basis and residual chlorine, E-coli to be tested at consumer end point.				

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost	Monitoring of Mitigations
Health and Safety Hazards for UWSCG workers and the public	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	
Grievance redressal during O & M	Appropriate registers shall be maintained to record complaints and Junior Engineer/s from ULB shall be assigned to track follow up action to ensure that the complaint is addressed in a timely manner by the contractor. - If the complaint is such that it cannot be dealt with at his level, it can be referred to higher authority to take the required decision and followed up with the contractor for the compliance. - Concerned engineer from ULB shall do frequent vigilant checks at the areas from where maxim				

Potential Impacts	Negative	Mitigation measures	Responsibility	Location	Cost	Monitoring Mitigations of
Disturbance/ noise due to activity	nuisance/ operation	<ul style="list-style-type: none"> 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.7 Monitoring

340. More detailed 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 are provided in table 33 below. All parameters (Water quality, noise) should be monitored against international standards.
341. 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.
342. 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 Telavi is needed.

Table 34: Environmental Monitoring Plan for general construction activities in Telavi

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	UWSCG, 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	UWSCG, SC
Contract documentation with construction contractor	Social Issues	Once before contract with construction company signed	Ensure relevant section of contractors responsibilities to hire local population have been included in contract.	50 % of workers should be hired from local population.	UWSCG, 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.	UWSCG, SC
Construction work camps, hot mix plants, stockpile areas,	Environmental Issues	After the Signature of Contract	(i) List of selected sites for construction work camps, hot mix plants, stockpile		Contractor

Item	Parameter	Frequency	Action Level	Response When Action Level Exceeded	Responsibility
storage areas, and disposal areas.			areas, storage areas, and disposal areas. (ii) Written consent of landowner/s (not lessee/s) for reuse of excess spoils to agricultural land		
Surface water quality	Environmental Issue	After the Signature of Contract	Areas for stockpiles, storage of fuels and lubricants and waste materials; (ii) Number of silt traps installed along trenches leading to water bodies; (iii) Records of surface water quality inspection; (iv) Effectiveness of water management measures; (v) No visible degradation to nearby drainages, nallahs or water bodies due to civil works		Contractor
Construction					
Ambient Air	Dust	Continual Dust should be monitored on the regular bases as well as during the peak operation of	Visual assessment during the Works Measuring at nearest potentially sensitive receivers.	If dust levels are above acceptable visual levels, implement dust suppression techniques (wetting down area) and/or assess weather conditions and maybe temporarily cease works until conditions ease	Contractor

Item	Parameter	Frequency	Action Level	Response When Action Level Exceeded	Responsibility
		Construction Equipment and Machinery			
Noise	(15 minute) Noise Levels	Periodic attended Monitoring at hourly Intervals. Noise, should be monitored on the regular bases (weekly) 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.	Contractor
Vibration	(15 minute) Vibration 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 Machinery	Measuring at nearest potentially sensitive receivers.	If vibration level is exceeded then review work practices, maintenance of equipment.	Contractor

Item	Parameter	Frequency	Action Level	Response When Action Level Exceeded	Responsibility
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 accidents of licence (of applicable) to issuing authority.	Contractor
Waste Management Implications	Segregation, Storage and transport of wastes	Daily Monthly inspection	<ul style="list-style-type: none"> - 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.	contractor
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	Contractor
Ecological Resources	Fauna and Flora	Continual	Minimal ecological impacts Impact Monitoring	Required to ensure the recommended mitigation measures are properly implemented.	Contractor
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	Contractor

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

343. The process described in this document has assessed the environmental impacts of all elements of the Telavi Water Supply System project. All potential impacts were identified in relation to pre-construction, construction, and operation phases. Planning principles and design considerations have been reviewed and incorporated into the site planning process whenever possible. Environmental impacts as being due to the project design or location were not significant. However, the social impacts (access disruptions) due to construction activities are unavoidable, as the residential and commercial establishments exist along the project corridor.
344. During the construction phase, impacts mainly arise from the need to dispose waste soil and from the temporary disturbance of residents, businesses, traffic and important buildings by the construction work. These are common impacts of construction in urban areas, and there are well developed methods for their mitigation. Since the pipe line works are conducted along the roads, there is potential to create disturbance. To minimize this, the contractor should develop a Method Statement, which should be approved by the UWSCG/IPMO prior to start of work, and should conduct the work strictly in line with the Method Statement.
345. There were limited opportunities to provide environmental enhancements, but certain measures were included. For example it is proposed that the project will employ in the workforce people who live in the vicinity of construction sites to provide them with a short-term economic gain; and ensure that people employed in the longer term to maintain and operate the new facilities are residents of nearby communities.
346. Anticipated impacts during operation and maintenance will be related to detection and repair of leaks and pipe bursts. These are, however, likely to be minimal, as proper design and selection of good quality pipe material shall mean that leaks are minimal. Leak repair work will be similar to the pipe-laying work.
347. Mitigation will be assured by a program of environmental monitoring conducted during construction and operation to ensure that all measures are implemented, and to determine whether the environment is protected as intended. This will include observations on- and off-site, document checks, and interviews with workers and beneficiaries, and any requirements for remedial action will be reported to the UWSCG/IPMO.
348. The public participation processes undertaken during project design ensured stakeholders are engaged during the preparation of the IEE. The planned information disclosure measures and process for carrying out consultation with affected people will facilitate their participation during project implementation.
349. The project's grievance redressal mechanism will provide the citizens with a platform for redressal of their grievances, and describes the informal and formal channels, time frame, and mechanisms for resolving complaints about environmental performance.
350. A copy of the EMP/SSEMPS shall be kept on-site during the construction period at all times. The EMP shall be made binding on all contractors operating on the site, and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document shall constitute a failure in compliance.
351. The citizens of the Telavi will be the major beneficiaries of the improved water supply, as they will be provided with a constant supply of high quality water, 24 hours. In addition to improved environmental conditions, the project will improve the over-all health condition of the town.
352. The Telavi Water Supply System subproject is unlikely to cause significant adverse impacts. The potential impacts that are associated with design, construction, and operation can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures.

353. Based on the findings of the IEE, the classification of the Project as Category “B” is confirmed, and no further special study or detailed EIA needs to be undertaken to comply with ADB SPS (2009) or Georgian regulations.
354. 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.
355. 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.
356. When operating, water supply components will have overall beneficial impacts to human health and the environment as it will provide the inhabitants of Telavi with a new water supply system.
357. The main beneficiaries of the improved system will be the citizens of Telavi, 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.
358. 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.
359. The proposed subprojects – Improvement of the Water Supply Systems in Telavi is unlikely to cause significant adverse impacts. The potential impacts that are associated with design, construction and operation can be mitigated to standard levels. Based on the findings of the IEE, there are no significant impacts as all project components including reservoirs and boreholes will be built on the territory belonging to UWSCG where water supply facilities already exist.

K.2 Conclusion

360. The subproject is unlikely to cause significant adverse impacts. The potential adverse impacts that are associated with design, construction and operation can be mitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures.
361. Based on the findings of the IEE, the classification of the Project as Category “B” is confirmed, and no further special study or detailed EIA needs to be undertaken to comply with ADB SPS (2009) or national legislation of Georgia.

ANNEX A: PHOTOS OF PROJECT AREA (A)

Photo of Central Reservoir #1 and access road



Photo of Borehole #1 near the Central Reservoir #1



Photo of Water Treatment Plant in the vicinity of the Central Reservoir #1



Photo of 1000m3 Rezervoir on the University Street



Photo of Gigo Gori reservoir



PHOTOS OF OUBLIC CONSULTATIONS (B):



ANNEX B: REGISTRATION LIST

Registration List, Public Hearings 23 June 2017

ქველავის წყალმომარაგების სისტემის რეაბილიტაციის პროექტი

წინასწარი ეკოლოგიური კვლევის ანგარიშის
საჯარი განხილვა

Construction of Water Supply System in Telavi

Public Consultations

23 ივნისი, 2017

სახელი, გვარი	ორგანიზაცია	საკონტაქტო ინფორმაცია	ბელომწერა
ქეთევან ჭიჭიშვილი	"საქ. პერიოდული საქონლის მფლობელთა კავშირი"	Chomakhidze@yandex.ru 577 380305	ჭიჭიშვილი
მარიამ ჭიჭიშვილი	"საქ. პერიოდული საქონლის მფლობელთა კავშირი"	Kchamakhidze@water.gov.ge 574-28-28-28	ჭიჭიშვილი
ნინო ბერიძე	საქ. პერიოდული საქონლის მფლობელთა კავშირი	n.beridze@water.gov.ge 599141004	ნ. ბერიძე
მამია დ. ს. ს. ს. ს. ს.	საქ. პერიოდული საქონლის მფლობელთა კავშირი	571-10-61-52	მ. დ. ს. ს. ს. ს.
გიორგი ბერიძე	საქ. პერიოდული საქონლის მფლობელთა კავშირი	573 45 45 11	გიორგი ბერიძე

საბუღალტრო	ორგანიზაცია	საკონტაბულო	ხელმოწერა
ბიზნესი	საქონლის მფლობელი	598-999-177	ბ. ბიზნესი
საბუღალტრო	საქონლის მფლობელი	555-32-7171	ბ. ბიზნესი
საბუღალტრო	საქონლის მფლობელი	551 51 4545	ბ. ბიზნესი
საბუღალტრო	საქონლის მფლობელი	593-555-626	ბ. ბიზნესი
საბუღალტრო	საქონლის მფლობელი	555 57 5700	ბ. ბიზნესი
საბუღალტრო	საქონლის მფლობელი	599-51-64-54	ბ. ბიზნესი
საბუღალტრო	საქონლის მფლობელი	598-48-35-42	ბ. ბიზნესი
საბუღალტრო	საქონლის მფლობელი	595 81 9345	ბ. ბიზნესი
საბუღალტრო	საქონლის მფლობელი	599 24 4545	ბ. ბიზნესი

სახელი, გვარი დაბად.	თარიღი დაბადების	მრგვალი ნიშნები	საკონტაქტო ინფორმაცია	ხელმოწერა
ქადაგი დავითი	1980.01.15	დავითი ქადაგი	0500 34 165	ქადაგი
დავითი დავითი	1980.01.15	დავითი ქადაგი	0500 34 165	დავითი
დავითი დავითი	1980.01.15	დავითი ქადაგი	0500 34 165	დავითი

ANNEX C: ISSUES RAISED DURING PUBLIC HEARINGS IN TELAVI

Issues raised	Response	Addressed in IEE
Information on the timeline of Telavi subproject and the schedule of the construction activities	Telavi water supply sub-project will start in early 2018 and will be implemented within the two years	
Scope of the project activities, including type of works to be implemented within the project	Detail information on requested information was provided	Details provided in para 11 of the proposed project
What will be final result of the project implementation and how the Water Supply System will be improved	Local population will be provided with high quality drinking water for 24 hours	
Proper repairing of the roads in Telavi after completion of the civil works is required	After completion works all roads shall be rehabilitated at least up to condition of pre-construction stage	
Monitoring of the water quality after the completion of project implementation	Regular monitoring of the water quality will be undertaken by the UWSCG and its laboratories	Details provided Table 26
Life time of pipes	Polyethylene pipes characterized by extremely low roughness coefficient will be used for the construction of the water network, which ensure more than 40 years life time	
How many streets will be involved in the project and will it completely cover the city?	Within the proposed project I, II and III zone will be fully rehabilitated	
Who will supervise and monitor construction of the proposed project?	UWSCG and Supervision Consultant	

Who is responsible for the restoration after completion of the rehabilitation works and who will do it?	Contractor will carry out restoration works under the supervision of SC and UWSCG	
What type of impact on environment is associated with the project?	<p>Environmental impacts that are associated with the project are only site specific.</p> <p>Impacts are mostly confined to the construction stage of the project and are therefore temporary.</p> <p>For permanent environmental impacts during operation stage, suitable mitigation measures will be implemented.</p>	
What will be Socio Economic Impacts of the Project?	<p>Project will generate new job opportunities.</p> <p>Standard of individual and public health will improve as a result of the project.</p>	
Who is implementing and sponsoring the Project?	Project is Financed by the Asian Development Bank (ADB) and the Government of Georgia and implemented by the United Water Supply Company of Georgia (UWSCG).	
What type of impact on environment is associated with the project? And what mitigation measures will be taken?	The potential overall adverse environmental impact of the Project is moderate and the identified issues can generally be managed and the potential impacts reduced to acceptable levels through the implementation of the set of proposed mitigation measures during construction, operation and monitoring.	

ANNEX D: Asbestos-Containing Material Management Plan

Waste Asbestos-Containing Material Management Plan

Definitions

Asbestos means the asbestiform varieties of: Chrysotile (serpentine); crocidolite (riebeckite); amosite (cummingtonitegrunerite); anthophyllite; tremolite; and actinolite.

Asbestos-containing material (ACM) means any material or product which contains more than 1 percent asbestos.

Asbestos-containing building material (ACBM) means surfacing ACM, thermal system insulation ACM, or miscellaneous ACM that is found in or on interior structural members or other parts of a school building.

Asbestos debris means pieces of ACBM that can be identified by color, texture, or composition, or means dust, if the dust is determined by an accredited inspector to be ACM.

Airborne Asbestos Fibers Any material that contains greater than one percent asbestos, and which can be crumbled, pulverized, or reduced to powder by hand pressure. This may also include previously non-friable material that becomes broken or damaged.

Abbreviations

ACM	Asbestos-Containing Material
ACBM	Asbestos-Containing Building Material
ADB	Asian Development Plan
GIIP	Good International Industry Practice
EHS	Environmental Health & Safety
EMP	Environmental Management Plan
EA	Executive Agency
ILO	International Labor Organization
MoE	Ministry of Environmental and Nature Resource Protection of Georgia
UWSCG	United Water Supply Company of Georgia

1. Legislative Requirements

1.1. Georgian Legislation

The hygienic requirements, sanitary rules and standards related to asbestos and ACM (asbestos-containing materials) on the territory of Georgia are regulated by Decree No. 2004 of the Minister of Labour, Health and Social Affairs of Georgia “**The hygienic requirements for the sanitary rules and standards for asbestos and asbestos-containing materials**”.

The said law regulates packing, storing and transportation of the asbestos-containing materials, as well as collecting, storing and utilization processes of asbestos-containing industrial and municipal waste.

The maximum admissible concentrations of fibrous aerosols with diverse actions and metals in the working zone is regulated by Decree No. 262/N of September 18, 2002 of the Minister of Labour, Health and Social Affairs of Georgia.

In line with the said law, the ACMs belong to the class of highly hazardous substances.

1.2 IFI Group Approach to Asbestos Health Risk

The WBG EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP)⁹. When one or more members of the WBG are involved in a project, the EHS Guidelines are applied as required by their respective policies and standards.

The WBG’s EHS Guidelines¹⁰ specify that the use of ACM should be avoided in new buildings and construction or as a new material in remodeling or renovation activities. Existing facilities with ACM should develop an asbestos management plan that clearly identifies the locations where the ACM is present, its condition (e.g., whether it is in friable form or has the potential to release fibers), procedures for monitoring its condition, procedures to access the locations where ACM is present to avoid damage, and training of staff who can potentially come into contact with the material to avoid damage and prevent exposure. The plan should be made available to all persons involved in operations and maintenance activities. Repair or removal and disposal of existing ACM in buildings should be performed only by specially trained personnel¹¹ following host country requirements or, if the country does not have its own requirements, internationally recognized procedures¹². Decommissioning sites may also pose a

⁹Defined as the exercise of professional skill, diligence, prudence, and foresight that would be reasonably expected from skilled and experienced professionals engaged in the same type of undertaking under the same or similar circumstances globally. The circumstances that skilled and experienced professionals may find when evaluating the range of pollution prevention and control techniques available to a project may include, but are not limited to, varying levels of environmental degradation and environmental assimilative capacity as well as varying levels of financial and technical feasibility

¹⁰

[http://www.ifc.org/ifcext/enviro.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS/\\$FILE/Final+-](http://www.ifc.org/ifcext/enviro.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS/$FILE/Final+-)

+General+EHS+Guidelines.pdf (pp. 71, 91, 94)

¹¹ Training of specialized personnel and the maintenance and removal methods applied should be equivalent to those required under applicable regulations in the United States and Europe (examples of North American training standards are available at: <http://www.osha.gov/SLTC/asbestos/training.html>)

¹² The ASTM International E1368 - Standard Practice for Visual Inspection of Asbestos Abatement Projects; E2356 - Standard Practice for Comprehensive Building Asbestos Surveys; and E2394 - Standard Practice for Maintenance, Renovation and Repair of Installed Asbestos Cement Products.

risk of exposure to asbestos that should be prevented by using specially trained personnel to identify and carefully remove asbestos insulation and structural building elements before dismantling or demolition¹³.

1.3 International Convention and Standards for Working with Asbestos

The International Labor Organization (ILO) established an Asbestos Convention (C162) in 1986 to promote national laws and regulations for the “prevention and control of, and protection of workers against, health hazards due to occupational exposure to asbestos.”¹⁴ The convention outlines aspects of best practice: Scope and Definitions, General Principles, Protective and Preventive Measures, Surveillance of the Working Environment, and Workers’ Health. As of March 4, 2008, 31 countries had ratified the Convention;¹⁵ 17 of them have banned asbestos.

Some of the ILO asbestos convention requirements:

- work clothing to be provided by employers;
- double changing rooms and wash facilities to prevent dust from going home on street clothes;
- training of workers about the health hazards to themselves and their families;
- periodic medical examinations of workers,
- periodic air monitoring of the work environment, with records retained for 30 years;
- development of a work plan prior to demolition work, to protect workers and provide for proper waste disposal; and
- protection from “retaliatory and disciplinary measures” of workers who remove themselves from work that they are justified in believing presents a serious danger to health.

2. Risk Assessment

The asbestos risk assessment process involves identifying, analyzing, evaluating, controlling and monitoring sources of asbestos within buildings or other structures. The presence of asbestos within a building is considered a hazard, but the level of risk associated with the hazard is related to the presence of airborne fibers. The identification of asbestos within a building doesn’t automatically necessitate its immediate removal. Asbestos that is in a stable matrix, or effectively encapsulated or sealed, and remains in a sound condition while left undisturbed, represents low risk to health.

Asbestos becomes dangerous when the fibers are released into the air and inhaled or ingested in high concentrations over a prolonged period of time. Individuals face the risk of inhaling or ingesting airborne fibers when asbestos containing products are worn down, disturbed, or damaged.

There are some classifications to determine the risk of the ACMs, but the principal evaluation indicators are the same with all of them. The degree of risk increases as a result of the following factors:

1. High degree of the physical damage of the ACMs.
2. High probability of the future damage of the ACMs.

¹³

[http://www.ifc.org/ifcext/enviro.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS/\\$FILE/Final+General+EHS+Guidelines.pdf](http://www.ifc.org/ifcext/enviro.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS/$FILE/Final+General+EHS+Guidelines.pdf) (pp. 71, 91, 94)

¹⁴www.ilo.org/ilolex

¹⁵<http://www.ilo.org/ilolex/english/convdisp1.htm>

3. High degree of contact of the damaged ACMs with air.

The ACMs located in an uncontrolled manner in the project zone, besides being virtually fractured, are subject to daily impact of the following factors:

1. The project area is the driving route for the cattle of the nearby villages (the cattle is driven across the project area twice a day). The cattle use the waste in the area as a feed. Consequently, the ACMs in question are subject to further impact every day.
2. The local population permanently dispose the waste in the said area in an uncontrolled manner what is another source of damage for the ACM.

As already mentioned, the area where the ACM waste is placed, is an open area and is in direct contact with air.

Following the above-mentioned, the existing situation can be evaluated as highly risky. ACM is friable and not in a stable condition, and there is a risk to health, it must be removed by a certified asbestos removalist as soon as practicable.

Within the scope of the project, it is necessary to ensure the separation/collection, transportation and safe disposal of the AC waste by the Contractor prior to the preparatory works.

3. Waste Asbestos-Containing Material Management Plan

3.1 Project Goals and Objectives

The goal of the presented „**Waste Asbestos-Containing Material Management Plan**“ is to avoid, reduce or manage any potential adverse impact on the environment and/or humans caused by the project implementation.

In order to achieve this goal, the following measures are necessary:

- The quantity and content of the waste placed in the project zone in an uncontrolled manner is to be identified;
- The degree of risk of the negative impact of the existing situation on the environment is to be identified;
- A duly qualified project-implementing organization is to be identified through a tender;
- A detailed „**Waste Asbestos-Containing Material Management Plan**“ is to be developed;
- The separation/collection, transportation and safe disposal of the AC waste is necessary;
- The monitoring plan is to be developed and implemented.

3.2 Rights and Responsibilities

The companies and organizations engaged in the AC waste have the following rights and obligations:

Executive Agency (UWSCG):

- Approve AMP risk assessment and Waste ACM Management plans

- Ensure resources are allocated to enable thorough application of Debris ACM Management plan on site
- Ensure employees are made available for asbestos awareness training and asbestos removal work
- Ensure an Asbestos Removal Business Certificate is maintained for the site where applicable
- Ensure the Waste ACM Products Register is maintained for the site
- Ensure the Asbestos Exposure Register is maintained for the site
- Ensure compliance with Waste ACM Management plan

Contractors:

- Submit risk assessment and Waste ACM Management plans when performing wasteseperation (asbestos removal), transportation and disposal works;
- Develop a site-specific waste separation (asbestos removal) control plan prior to performing the separation works;
- Undergo site induction;
- Ensure no asbestos is removed or disturbed without prior notification to RD
- Ensure legislative requirements and appropriate procedures are complied with.
- Upon job completion ensure all products are labelled using the correct identification stickers and disposed in safe manner.
- Report immediately to RD any perceived asbestos risk

4.3 Awareness Training

4.3.1 Asbestos Separators/Removalists

Persons carrying out asbestos removal work are to be trained so they can carry out this work safely and without risk to their own health or the health of others. This training must reflect the specific type of asbestos work to be undertaken. Asbestos Separators/Removalists are to keep written records of all training provided to their asbestos removal workers and these records should be requested before awarding the contract for any site removal work.

4.3.2 Site employees

Any UWSCG employees and others who may come into contact with ACM on the site, either directly or indirectly, must be provided with adequate information and training. Depending on the circumstances the asbestos awareness training may include:

- the purpose of the training;
- the health risks of asbestos;
- the types, uses and likely occurrence of ACM at the specific construction site;
- the trainees' roles and responsibilities under the project Waste ACM Management plan;
- where each site-specific register of ACM is located and how it can be accessed;
- the timetable for removal of ACM from the particular construction site;
- the processes and procedures to be followed to prevent exposure, including exposure from any accidental release of asbestos dust into the workplace;

- where applicable, the correct use of maintenance and control measures, protective equipment and work methods to minimize the risks from asbestos, limit the exposure of workers and limit the spread of asbestos fibers outside any asbestos work area;
- control levels for asbestos; and
- the purpose of any air monitoring or health surveillance that may occur.

4.3.3 Local population

The awareness building training about the negative impact of the ACM waste on the environment should be held for the population living or working adjacent to the project zone. Depending on the circumstances the asbestos awareness training may include:

- the purpose of the training;
- the health risks of asbestos;
- the types, uses and likely occurrence of ACM at the specific construction site;
- where each site-specific register of ACM is located and how it can be accessed;
- the timetable for removal of ACM from the particular construction site;
- the processes and procedures to be followed to prevent exposure, including exposure from any accidental release of asbestos dust into the workplace;

4.4 Waste Separation

4.4.1 General requirements

Management of disaster debris and demolition waste illegally disposed must be properly separated to remove problem materials if the bulk of the debris or waste is to be managed at appropriate solid waste facilities and/or to be recycled. Careful waste separation is essential to expedite disaster clean up and removals, hold down costs, reduce waste, and protect human health. Recycling certain materials will help hold down costs. Poorly separated waste or debris may not be managed as inert waste and may be subject to further waste evaluation and disposal costs as municipal waste, asbestos waste or even hazardous waste. Problem loads may be rejected and contractors may be asked to do additional work.

Wastes should be carefully separated into categories described below and properly managed at approved recycling, processing or disposal facilities in accordance with International, national and local requirements. Keep records on the amount removed from each unit, how it is segregated and eventually managed, recycled or disposed:

Electronic waste (E-Waste) including monitors, stereos, mercury devices and fluorescent lighting equipment such as thermostats, mercury switches, fluorescent fixtures and bulbs, light ballasts and similar materials. Please package fluorescent bulbs and other fragile materials to avoid breaking.

Hazardous waste includes, but is not limited to: paints, solvents, varnishes, stains, cleaners, degreasers, spot removers and similar ignitable products; aerosol cans, and compressed gas containers or cylinders; ammunition including unused shells, lead shot, bullets, powder loading supplies, etc; oils, fuels, automotive additives, fluids (transmission, hydraulic, brake, etc.); batteries (including lead, mercury, ni-cd, etc.); acids and bases – often labeled corrosive (store acids separately from bases and do not mix!); toxics, poisons, pesticides (includes insect, rodent and weed killers); electronics (computers and screens, TVs, stereo equipment, etc.);

mercury devices (switches, fluorescent lighting, mercury bulbs, thermometers, etc.); light ballasts and transformers; antifreeze; fertilizers; and other ignitable, corrosive, reactive, toxic, pcb, problem or unknown wastes. Label containers and do not mix materials.

Medications and infectious waste including pills, medicines, dressings, needles, sharps, human blood or tissue, isolation waste, pathological waste, infectious human or animal waste, etc.

Asbestos-containing material from individual all sources may include asbestos pipe wrap, boiler coatings, loose insulation, transit (older cement type siding and electrical backing), vermiculite (light, platy insulating material) and other materials APPENDIX 1. SOME ALTERNATIVES TO ASBESTOS-CONTAINING PRODUCTS). Please label all bags or containers "Asbestos Waste." Asbestos Waste must be disposed at approved solid waste facilities.

4.4.2 Fencing the working area

The ACM found in the project area is severely damaged and the degree of damage is increasing day after day following the existing surroundings. In addition, these materials are scattered in the open area creating the most favorable conditions for asbestos dust to originate and move to certain distances.

Consequently, any additional intervention by a human further boosts the risk of origination and movement of the asbestos dust to certain distances.

For safety reasons, aiming at avoiding the distribution of the asbestos dust originated in the process of separation, the area of the waste disposal must be divided into smaller areas and bordered with approximately 2-metre-high fences in the separation process. Plastic must be used as fences, as dust is easy to remove from it.

To the extent possible, the process of separation shall be started when the number of people is minimal in the project area.

Safety marks and signals shall be provided at the locations preventing foreign people from penetrating the area.

The works are inadmissible to accomplish in windy weather to prevent the asbestos dust from spreading.

All personnel participating in the separation and packing of the ACM shall have PPE, and all workers shall be equipped with respirators.

4.5 Personal Protective Equipment (PPE)

The PPE requirements for work involving ACM at construction sites are to be based on the relevant risk assessment conducted by a suitably qualified person. Section 9.7 and Appendix C of the Code of Practice for the Safe Removal of Asbestos [NOHSC:2002(2005)] must be consulted to determine the PPE needs, as well as AS/NZS 1715 and AS/NZS 1716 for specific respiratory protection requirements. See NOHSC: 2002 (2005) Appendix C – Guide to the selection of respiratory protection.

Protective clothing and equipment is to be worn at all times during work in the asbestos work area, prior to the final clearance inspection. Any PPE worn during asbestos disposal is to be treated as asbestos waste and disposed of in the approved waste bags. The laundering of contaminated protective clothing in workers' homes is strictly prohibited.

The employees, who are obliged to use the respirators, should be proficient of the rules of their exploitation. The training programs and labour protection guidance of the employees engaged in the operations with asbestos should cover the following questions:

- (a) Surroundings when the use of respirators is necessary and the identification of such surroundings;
- (b) The rules of exploitation and examination of the respirator's close attachment to one's face;
- (c) The rules of the right functioning, examination and right storage of the respirator.

Prior to the removal/separation, the asbestos materials must be wetted. The removal works must be accomplished with caution to avoid mechanical damage to the ACMs.

4.6 Packing Asbestos-Containing Materials

Asbestos waste, including contaminated PPE and cleaning materials (e.g. cleaning rags and plastic sheeting used to fencing the asbestos work area) are to be removed and disposed of into bags.

Loose asbestos waste is not to be allowed to accumulate within the asbestos work area. It must be collected and disposed of in asbestos waste bags and/or in a solid, sealable asbestos waste container, such as a bin or drum, as storage is required.

Controlled wetting of asbestos waste is to be done to reduce the possibility of dust emissions during the bagging or other containment of the waste. If asbestos waste cannot be disposed of immediately (e.g. because of volume requirements for disposal), it is to be stored in a solid waste drum, bin or container or skip and sealed and secured upon the completion of each day's work so that unauthorized access is prevented.

Waste Bags: - asbestos waste is to be collected in heavy-duty 200 µm (minimum thickness) polythene bags that are no more than 1,200 mm long and 900 mm wide. The bags are to be labelled, with an appropriate warning, clearly stating that they contain asbestos and that dust creation and inhalation should be avoided.

Asbestos should be packed and marked in tough, hermetic and dust-proof bags, with the marking or annotation about the safety with the following data:

- Name of the waste;
- Address of the product manufacturing company; chemical designation or common names of all components of the asbestos-containing production;
- Percentage ratio of asbestos in the mixture;
- Information about the asbestos properties dangerous for health;
- Indications about the necessity to use the PPE (respirators, protective clothing, etc.);

The bags should be hermetically closed with a thermal welded joint or stitched thread. In case of the damage to the bags, the damaged spots should be soldered with a joint tape, placed in the impermeable bags, sealed and marked.

4.7 Waste Transportation

The routes used for removing waste from the asbestos work area are to be designated in the Asbestos Removal Control Plan before the commencement of each removal. A competent person, following discussions with the asbestos removalist, should determine the methods used to transport wastes through a building. In occupied buildings, all movements of waste bags should occur outside normal working hours.

Once the waste bags have been removed from the asbestos work area, they are to be either:

- be placed in a solid waste drum, bin or skip; or
- be removed from the site by an approved and licensed carrier.

Waste bags should not be stored at the asbestos removal site if they are not placed in an asbestos waste drum, bin or skip. Drums or bins used to store asbestos waste should be stored in a secure location when they are not in use.

4.8. Offsite Waste Disposal

Transport and final disposal of asbestos waste material shall be carried out by a competent person who carries certification as a transporter of hazardous materials in asbestos waste and in a manner that will prevent the liberation of asbestos dust to the atmosphere.

All asbestos waste material shall be buried at an approved landfill site and in a manner approved by the local and state authorities. Prior to payment of invoices RD must receive copies of waste disposal receipts, as provided by the approved landfills. All details of offsite disposal are to be included in the asbestos removal control plan.

No building materials are to be re-used or recycled unless they have undergone full successful decontamination. If this can't be achieved then the building materials are to be treated as asbestos waste and disposed of accordingly. All waste disposals shall be recorded (date, quantity, disposal contract etc) in an appropriate register (e.g. within the sites waste management plans for disposal of regulated wastes).

The waste unloaded on the landfill should be buried under at least 25-cm-thick soil layer. Leaving asbestos-containing waste open on the landfill is inadmissible.

During the trench conservation, the final layer covering the asbestos-containing waste, should be at 2 m thick.

a. Asbestos Exposure Register

Contractor will maintain an asbestos exposure register that records persons that have been exposed, have potentially been exposed or have worked in close proximity to asbestos materials. Workers are to complete Form S0268 Asbestos Exposure Questionnaire and give a submit a copy to RD who will update the site register accordingly. A copy of the Form S0268 is to be kept by contractor.

5. Project Supervision and Monitoring

5.1 General Conditions

During any large asbestos removal jobs or the removal of any high-risk ACM, the RD representative is to maintain a presence at the removal site, and liaise with the appointed asbestos removal contractor, to ensure that the removal process runs according to requests of legislation and/or the **Debris Asbestos-Containing Material Management Plan** developed by the removal contractor.

It might also be decided that an appropriately qualified occupational hygienist, with experience in asbestos abatement works, shall be engaged for the duration of the removal project, depending on the size of the removal job and level of risk associated with it.

5.2 Air Monitoring

Air monitoring is being performed wherever ACM are being removed/Separated, to ensure the control measures are effective. The competent person for the asbestos removal/separation control plan is to determine all air monitoring requirements. Following the physical state of ACM and location of their placement, permanent monitoring of asbestos dust content in the air is necessary. The monitoring shall be arranged at the following locations:

- On the site of the waste separation/removal;
- On the adjacent land plots used for agricultural purposes by the population;
- At the nearby residential buildings.

A documented air-monitoring program is to be developed. The air-monitoring program is to include requirements for clearance monitoring. An air-monitoring program is recommended for the removal of non-friable ACM, as it is good occupational hygiene practice. The air monitoring is to be performed in accordance with the NOHSC Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibers [(NOHSC: 3003 (2005))].

Asbestos removal work must not commence until the air monitoring has commenced.

If an enclosure is used, air monitoring is to occur:

- Prior to any work (background monitoring);
- At least 3 times daily at the boundary of the asbestos work area;
- At least once a day at the nearby residential houses and agricultural lands;
- As part of preliminary clearance monitoring, following a satisfactory visual inspection;
- During dismantling of the enclosure, and
- As part of the final clearance inspection.

If an enclosure and a decontamination unit are used, air quality must be monitored at the following locations:

- The clean side of the decontamination unit;
- The change area;
- The lunch room (where applicable);
- The laundry; and
- The surroundings of the asbestos work area including in the vicinity of the negative air exhaust (where possible).

The results of all air monitoring are to be provided to all relevant parties as soon as possible.

Construction contractor shall submit detailed Monitoring Plan before commencing construction activities. The following information is to be included in the asbestos removal/separation monitoring:

1. **Identification** - Details of the ACM to be removed (e.g. the location(s), whether it is friable or non-friable, type, condition and the quantity to be removed;
2. **Preparation** – (i) Consultation; (ii) Assigned responsibilities for the removal; (iii) Program of commencement and completion dates (iv) Emergency Plans; (iv) Asbestos removal boundaries, including the type and extent of isolation required and the location of any signs and barriers; (v) Control of electrical and lighting installations; (vi) Personal protective equipment (PPE) to be used, including; (vii) respiratory protective equipment (RPE); (viii) Details of air monitoring program; (ix) Waste storage and disposal program;
3. **Removal/Separation** – (i) Methods for removing the ACM (wet or dry methods); (ii) Asbestos removal equipment (spray equipment, asbestos vacuum cleaners, cutting tools, etc); (iii) Details on required enclosures, including details on their size shape structure, etc, smoke testing enclosures, and the location of negative pressure exhaust units' (iv) Details on temporary required by the asbestos removals (e.g. decontamination units), including details on water, lighting and power requirements, negative air pressure exhaust units and the locations of decontamination units; (v) Other control measures to be used to contain asbestos within the asbestos work area;
4. **Decontamination** - Detailed procedures for workplace decontamination, the decontamination of tools and equipment, personal decontamination and the decontamination of non-disposable PPE and RPE;
5. **Waste Disposal** - Methods of disposing of asbestos wastes, including details on the disposal of: (i) disposable protective clothing and equipment, and (ii) the structure(s) used to enclose the removal area;
6. **Air Monitoring** – (i) Location, types and methods, for monitoring airborne fibres and dusts; (ii) Ways of communicating monitoring results to workers;
7. **Training** – (i) Training that reflects the specific types of asbestos work to be undertaken; (ii) Keeping written records of inductions and asbestos awareness training;
8. **Health Surveillance** – (i) Details on any exposures to asbestos by workers; (ii) Details on all asbestos workers health records.

5.3 Control Levels for monitored airborne asbestos fibers

“Control levels” are airborne asbestos fiber concentrations, which, if exceeded, indicate there is a need to review current control measures or take other action. These control levels are occupational hygiene “best practice” and are not health-based standards.

The control levels shown in the table below are to be used to determine the effectiveness of control measures:

Table 1 Control levels and required actions

Control Level	Control/Action

(airborne asbestos fibres/mL)	
<0.01	Continue with control measures
>0.01	Review control measures
>0.02	Stop removal work and find the cause

5.4 Clearance Inspections

Clearance to re-occupy an asbestos work area is determined by a thorough clearance inspection conducted by a competent person. All of the barriers, warning barricade tape and warning signs are to remain in place until the clearance certificate to re-occupy has been granted.

A clearance certificate is to be provided to UWSCG by the asbestos removal contractor at the completion of the work and monitoring.

The need for clearance monitoring will be assessed as part of asbestos removal control plan and for undertaking any maintenance work involving ACM. It will be undertaken by a competent person, independent of the person conducting the asbestos work, after cleaning has been completed and the area dried.

Air samples are to be taken in the asbestos work area. For jobs involving an enclosed area, this is to be done within the enclosed area, following the completion of the work but prior to the removal of the enclosure and again after the removal of the enclosure.

The removal, cleaning and clearance work will not be considered completed until an airborne fiber level of less than 0.01 fibers/mL has been achieved, as determined by the clearance monitoring.

5.5 Settled Dust Sampling

This sampling only provides an indication of cleanliness following disturbances of ACM and should not be used as an indicator of risk to health. Any settled dust sampling criteria are to be developed by discussion with a competent person undertaking a visual inspection of the area.

6. Emergency Response Procedures

6.1 Evacuation Event

An emergency associated with the potential for exposure to airborne asbestos fibers across the project area site may necessitate the need to evacuate. Site procedures for evacuation are to be conveyed to contractors and employees during the site induction. The risks associated with any

asbestos removal work should be assessed and include contingencies in the case of an emergency.

Decontamination procedures can be temporarily waived in the event of an emergency requiring evacuation. This is to be based on an informal risk assessment conducted at the time.

Persons involved in asbestos removal must evacuate to the evacuation assembly point but remain downwind to ensure any fibers remaining on clothes, as a result of not decontaminating completely, do not enter the breathing space of others.

Upon arrival at the evacuation point, emergency wardens and health and safety personnel are to be notified of the status of the asbestos removal work and the assessed level of risk associated, as well as the assessed level of risk associated with asbestos removal person not undergoing the complete decontamination process.

6.2 Damage of ACM

Where damage has occurred to asbestos material the following is to be implemented:

- The site emergency contact number is to be used to report the location of the potential contamination.
- Asbestos trained workers are to respond (wearing suitable respiratory protection, gloves and disposable coveralls), assess the risks associated with the spill and secure the affected area, plant or equipment using asbestos warning tape and signs,
- Ensure fans, wind sources are controlled to prevent further spread of the contamination,
- The areas below and adjacent or above are secured and barricaded with asbestos warning tape to prevent materials dropping or passing into those areas
- Use surface soaking sprays to wet down the material and obtain a bagged sample of the suspect material, or
- Use plastic sheeting and adhesive tape to seal or encapsulate the affected area or plant,
- Use materials such as plastic drop sheets, binding material and or suitable adsorbent material to contain the water spray and run off,
- Clean up the affected areas using suitable tools (soft brushes, mops, dust pans etc.) and if necessary vacuum using HEPA filters,
- Apply sealant or repairs to the damaged areas to prevent further contamination,
- Inspect the work to ensure all suspect materials have been removed,
- All contaminated articles and clothing are to be bagged in suitable asbestos disposal bags and be disposed off as asbestos waste,
- Set up an air monitor in the work area to monitor airborne fiber concentrations and secure the work area until the results are obtained,
- Send the sample off for testing and determine if it contains asbestos,
- Undertake further asbestos removal work to make the area safe using a safe work method statement and an asbestos removal specialist;
- Provide details of the material sample results and monitoring results to the workers involved who may have been exposed,
- Undertake medical assessments of the workers involved who may have been exposed and provide copies of the assessments to the workers.

- Have the workers who were potentially exposed to uncontrolled asbestos fibers complete a Form S0268 – Asbestos Exposure Questionnaire (see Annex 2)
- Maintain records of the incident reporting, investigation and health assessments with the Asbestos Exposure Register.