Initial Environmental Examination

August 2016

GEO: Urban Services Improvement Investment Program – Tranche 6
(Improvement of Chiatura Wastewater System Sub-project)

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

ABBREVIATIONS

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

TABLE OF CONTENTS

LIST OF ANNEXES

LIST OF TABLES

A. EXECUTIVE SUMMARY

1. The Government of Georgia wishes to improve and expand WSS services across urban centers by leveraging donor and private sector funds, and has requested ADB to develop an investment program to be financed through a multi-tranche financing facility (MFF). The proposed Investment Program will specifically address basic urban infrastructure and services management in the provincial capitals and secondary towns. The Investment Program will be implemented in various tranches; each tranche containing technically feasible and economically viable subprojects developed by UWSCG and agreed with ADB.

2. 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.

3. The present IEE document: „Improvement of ChiaturaWastewater System“describes the expected environmental impacts of the sub-project implementation and gives the developed relevant mitigation measures to avoid, mitigate and/or manage such impacts. The present document covers both, construction and operation stages.

4. Chiatura Municipality is located in the western Georgia, in the basin of the Kvirila River. It covers a part of Imereti highland. Sachkhere Municipality is located at North-East boarder of the municipality, Kharagauli, Zestafoni and Terjola Municipalities – at East and South-west, Tkibuli – to the West, Ambrolauri Municipality – to the North-West boarder of the Municipality. Chiatura town represents the administrative center of the Municipality. Total area of the municipality equals 542 km2.

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

6. The severage network of Chiatura town (45.5km) is outdated. The majority parts of network is filled with gravel and sludge (50%) and severage without treatment is discharged into the river Qvirila.

7. The existing network contains 150 and 500mm diameter pipes which permeatibility is extremely limited, however it still continues operation with limited capacity.

8. The existing waste treatment (mechanical and biological) facility is located to the southern part of Chiatura town in 4 km distance that previously was serving to whole town population including industries. Currently existing WWTP facility is completely amortized hence it does not function for long time of period. Currently this area belongs to private company. The access to the site is in bad condition.

9. Both, during the trench excavation and pipe installation, great amounts of inert waste will be accumulated. The Contractor, in agreement with the local authority, shall select due sites to locate the inert waste. A certain amount of inert waste will be placed on Sachkherelandfill, which is located 10 km from the town of Chiatura.

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

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

12. At the stage of developing the Initial Environmental examination (IEE) document, a number of consultation meetings will be held with the local population, local self-governing bodies and all concerned parties. On 08 June, 2016, 15:00pm, at the building of the Municipality of the town of Chiatura, under the organization of UWSCG, a public discussion of the

presentProject was held.It was attended by both, the representatives of the organizations engaged in developing the Project and other interested entities.

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

14. 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.

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

B. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

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

B.1 ADB Policy

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

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

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

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

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

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

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

20. The Chiatura WWTP 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.

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

B.2 Georgian Law

B.2.1 Framework Legislation

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

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

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

25. The **Law of Georgia on Environmental Impact Permit (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.

26. The **Law of Georgia on Environment Protection (1997)** regulates the legal relations between the state establishments and physical or legal entities in the field related to the use of territorial waters, air space, including continental shelf and special economic zones, environmental protection and natural resources on the territory of Georgia. The Law regulates the standards of the environmental protection and issues of environmental management; it describes the economic sanctions, standards and issues of environmental impact, different issues of protection of the natural eco-systems and biodiversity, and global and regional management issues. In addition to the 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.

27. 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

28. 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.

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

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

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

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

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

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

B.2.2 Environmental Quality Standards and Norms

34. In accordance with the Law on Public Health, environmental quality standards and norms, among them those of air quality and noise level, are set by Decrees No. 297/N dated 16.08.2001 of the Minister of Labour, Health and Social Affairs of Georgia (including the changes made to it by further decrees of the Minister Nos. 38/N of 02.24.2003, 251/N of 09.15.1006, 351/N of 12.17.2007).Atmospheric air quality standards (level of hazardous pollution) are also defined by the Decree of the Minister of Environment Protection and Natural Resources (#89, 23 October 2001) on approval of the rule for calculation of index of pollution of atmospheric air with hazardous pollutants.

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

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

35. 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.

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

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

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

37. 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.

38. In Georgia, soil quality evaluation criteria is determined by instructions on "Level of Chemical Contamination of Soil" (MM 2.1.7. 004-02). Information on maximum admissible concentrations of various substances and elements is soils are given in the Table 6.

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

Component	Unit	Level
Arsenic	mg/kg	2-10
Copper	mg/kg	3
Mercury	mg/kg	2.1
Nickel	mg/kg	4
Lead	mg/kg	32
Zinc	mg/kg	23
Compound Hydrocarbons	mg/kg	0.1
Phenol (Compound)	mg/kg	-
Cyanide	mg/kg	-
Sulphate	mg/kg	-
Chloride	mg/kg	-
Ammonium Nitrogen	mg/kg	-
Evaporable Organic Compounds		
Benzoyl	mg/kg	0.3
Toluol	mg/kg	0.3
Ethylbenzene	mg/kg	-
Compound Xylene (ortho-, meta-, para -)	mg/kg	0.3
Semi-Evaporable Compounds		
Benzoapiren	mg/kg	0.02
Izopropilen-benzol	mg/kg	0.5
Pesticides		
Atrazin	mg/kg	0.5
Linden	mg/kg	0.1
DDT (and its metabolite)	mg/kg	0.1

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

40. Potable water quality criteria are determined by technical regulations on potable water (Government Regulation N 58 from Jenuary 15, 2014 Potable water quality criteria are given in Table 7.

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

Table 7: Potable Water Criteria

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

41. Sanitary wastewater from industrial facilities may include effluents from domestic sewage, food service, and laundry facilities serving site employees. Miscellaneous wastewater from laboratories,medical infirmaries, water softening etc. may also be discharged to the sanitary wastewater treatment system. Recommended sanitary wastewater management strategies include:

- Segregation of wastewater streams to ensure compatibility with selected treatment option (e.g. septic system which can only accept domestic sewage);
- Segregation and pretreatment of oil and grease containing effluents (e.g. use of a grease trap) prior to discharge into sewer systems;
- If sewage from the industrial facility is to be discharged to surface water, treatment to meet national or local standards for sanitary wastewater discharges or, in their absence, the indicative guideline values applicable to sanitary wastewater discharges shown in Table 8;
- If sewage from the industrial facility is to be discharged to either a septic system, or where land is used as part of the treatment system, treatment to meet applicable national or local standards for sanitary wastewater discharges is required.
- Sludge from sanitary wastewater treatment systems should be disposed in compliance with local regulatory requirements, in the absence of which disposal has to be consistent with protection of public health and safety, and conservation and long term sustainability of water and land resources.

Table 8: Indicative Values for Treated Sanitary Sewage Discharges

Pollutants	Units	Standard
pH	pH	6-9
BOD	mg/l	35
COD	mg/l	125
Total phosphorus	mg/ l	2
Total nitrogen	mg/l	15
Oil and grease	mg/l	
Total suspended solids	mg/l	60
Total coliform bacteria	MPNb / 100 ml	

B.2.2 Licenses & Approvals Required

42. 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.

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

44. 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 town of Washington.

45. According to Article 10 of the Law, any activity, including hunting, fishing, extraction, cutting down and hay-mowing, except particular cases envisaged by the present Law, Law of Georgia 'On animal life' and legislation of Georgia, which may result in the reduction in number of the endangered species, deterioration of the breeding area or living conditions, is prohibited. The Red List of Georgia was approved by the Presidential Decree No. 303 'On approving the Red List of Georgia' (May 2, 2006).

Table 9: List of laws relevant to environmental protection

Framework Legislation	
1995	Constitution of Georgia (as amended 04.10.2013) Reg. No - 010.010.000.01.001.000.116

1996	Environmental Protection (as amended 26.12.2014) Reg. No - 360.000.000.05.001.000.184
Permitting Legislation	
2005	Licensing and Permitting (as amended 18.09.2014)
2007	Environmental Impact Permit (as amended 26.12.2014) Rag No - 360.160.000.05.001.003.078
2007	Ecological Expertise (as amended 25.03.2013) Reg. No - 360.130.000.05.001.003.079
2013	Regulation on EIA (as amended 15.05.2013 by the Decree No 31 of MoENRP)
Specific Environmental Laws	
1994	Soil Protection (as amended 26.12.2014 ფ) Reg. No - 370.010.000.05.001.000.080
1996	System of Protected Ares (as amended 30.04.2014) Reg. No - 360.050.000.05.001.000.127
2007	on Status of the Protected Areas (as amended 30.04.2014) Reg. No - 360.050.000.05.001.003.060
2014	Waste Management Code 26.12.2014 Reg. No -360160000.05.001.017608
1996	Minerals (as amended 26.12.2014) Reg. No - 380.000.000.05.001.000.140
1997	Wildlife (as amended 26.12.2014) Reg. No - 410.000.000.05.001.000.186
1997	Water Protection (as amended 26.12.2014) Reg. No - 400.000.000.05.001.000.253
1997	Transit and Import of Hazardous Waste within and into the Territory of Georgia as amended 11.03.2011) Reg. No - 300230000.05.001.016218
1998	Pesticides and Agrochemicals as amended 08.05.2012) Reg. No - 340120000.05.001.016723
1999	Atmospheric Air Protection as amended 5.02.2014) Reg. No - 420.000.000.05.001.000.595
1999	Forest Code as (amended 6.09.2013) Reg. No - 390.000.000.05.001.000.599
2003	Red List and Red Data Book of Georgia (as amended 6.09.2013) Reg. No - 360.060.000.05.001.001.297
Other Relevant Laws	
2007	On Cultural Heritage (as amended 26.12.2014) Reg. No - 450.030.000.05.001.002.815
2007	On Public Health (as amended 29.05.2014) Reg. No - 470.000.000.05.001.002.920
2005	On Fire Protection and Safety 24.06.2005 Reg. No - 140.060.000.05.001.000.355
2006	on Regulation and Engineering Protection of Coasts of Sea, Water Reservoirs and Rivers of Georgia – 27.12.2006 Reg. No - 330.130.000.11.116.005.130

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

46. 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

47. 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

48. 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.

49. 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). 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.

50. 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.

51. 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.

52. 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

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

54. 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.

55. 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).

56. 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 Banks guidelines requires EMPs for all categories of projects and provides detailed instructions on the content.

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

58. 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.

59. 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.

60. 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 10: Activities and responsibilities in EIA for national law and ADB policy

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

B.4 Harmonization of the ADB and Georgian Legislation Requirements

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

C. DESCRIPTION OF THE PROJECT

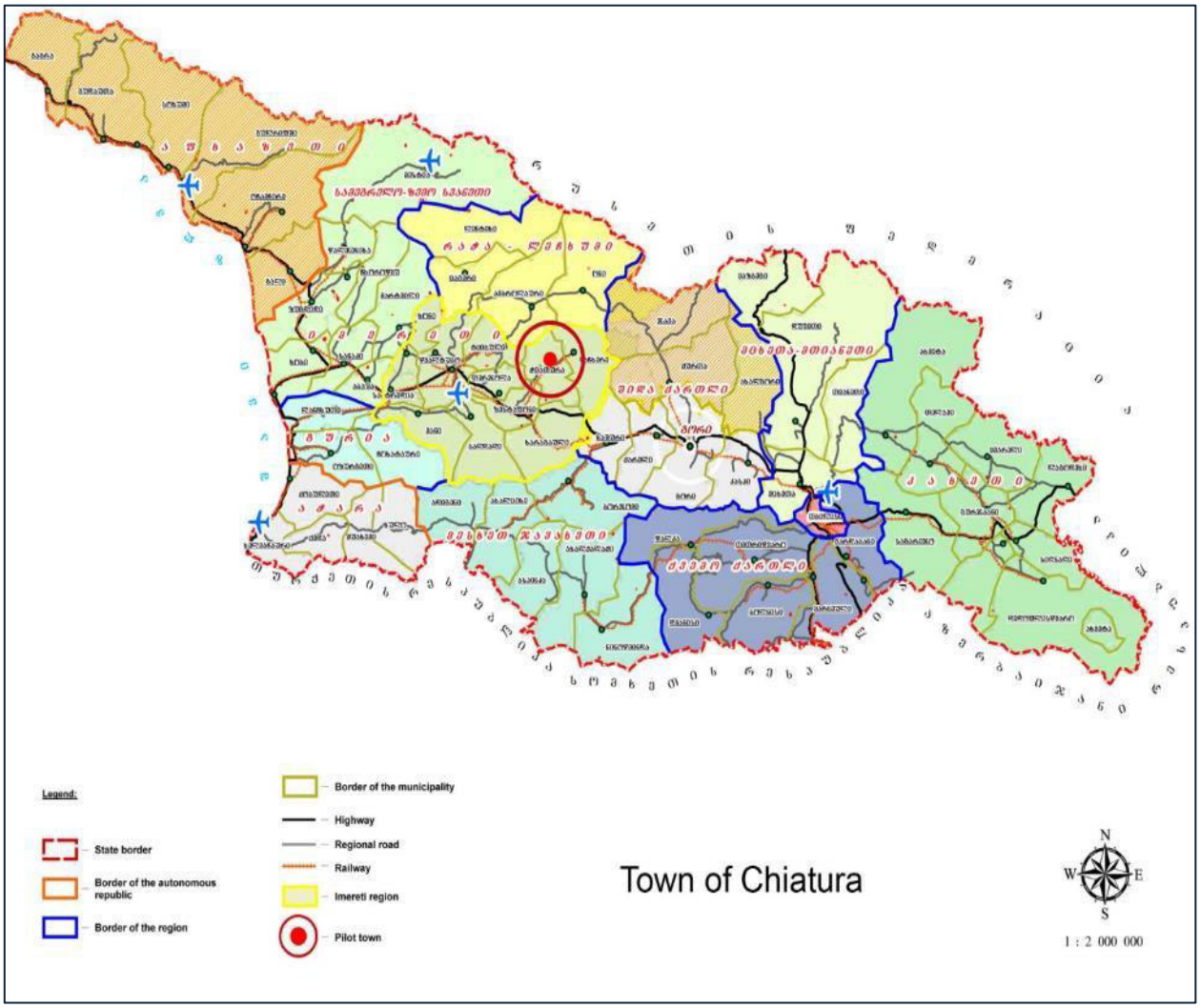
C.1 Type of the Project

62. Chiaturawastewater sub-project involves the construction of a new wastewater treatment plant.

C.2 General Information

63. The project is located in Chiatura. The town is located in inland Georgia Country, on the banks of the Qvirila River. The total population of Chiatura is estimated at 18,800 people. A population growth of 20% is considered for water consumption.Most of the population are ethnic Georgians.

Map 1: Project Area on the Map of Georgia



C.3 Existing Situation

64. The severage network of Chiatura town (45.5km) is outdated. The majority parts of network is filled with gravel and sludge (50%) and severage without treatment is discharged into the river Qvirila.

65. The existing network contains 150 and 500mm diameter pipes which permeatibility is extremely limited, however it still continues operation with limited capacity.

66. The existing waste treatment (mechanical and biological) facility is located to the southern part of Chiatura town in 4 km distance that previously was serving to whole town population including industries. Currently existing WWTP facility is completely amortized hence it does not function for long time of period. The access to the site is in bad condition.

C.4Population

67. Population of Chiatura municipality – up to 55,000 and population density – 184 persons per km2. The town was established in 1879, when the extraction of manganese started in the region. On the basis of official data, the number of population of the municipality is stable. Currently, town population is 18.800.

C.5Design of Future Sewerage System

68. The design of future wastewater system includes construction of new WWTP facility with capacity 4950 m3/day. The new WWTP will be located on public land in Chiatura. The site is located near to QvirilaRiver.

69. The nearest communities from the planned WWTP is in the distance about 1km.

Figure 1: Location of WWTP

70. Pictures of location of Chiatura New WWTP

C.6 Treatment Process

71. For those wastewater treatment plants in the project towns with a capatown over 30,000 Population Equivalents (PE), the activated sludge technology with separate anaerobic sludge digestion is chosen. This process comprises the following treatment steps with its design horizon:

- Screens
- Aerated grit chambers
- Primary sedimentation tanks
- Aeration tanks
- Final sedimentation tanks
- Sludge thickener
- Digestion
- Sludge dewatering
- Gas storage
- Gas torch

72. The first stage in the wastewater treatment plant is the screening for the removal of coarse material that would damage the subsequent equipment and reduce process effectiveness. Generally, coarse and fine screens are applied before grit removal units. Grit chambers are designed to remove grit consisting of sand, gravel and other heavy solid materials that have subsiding velocities or specific gravities substantially greater than organic putrescible solids.

73. The second stage in the wastewater treatment plant is the activated sludge process. This process is a common treatment method and has been implemented worldwide. The

aeration tanks are dimensioned for the carbonaceous BOD and COD removal (removal rates up to 90 - 95%) and for nitrification. Basic system adjuncts include phosphorus removal and microbial de-nitrification.

74. After some time, the mixture of biological solids is passed from the aeration tanks into the final sedimentation tank, where some of the settled sludge is recycled to maintain the desired concentration of organisms in the aeration tanks. The remaining sludge is removed from the system.

75. The final sedimentation tank will be designed under the following considerations:

- good separation of activated sludge from the reactor basin effluent;
- partial consolidation of the settled solids for return to the reactor basin;
- intermediate storage of activated sludge which is expelled from the aeration tank.

76. The sludge treatment will have the following units:

- primary thickening of primary and excess sludge;
- anaerobic stabilisation of sludge;
- conditioning and dewatering of sludge in a centrifuge.

77. The dewatered sludge will be disposed on a landfill.

C.7 Sewage Sludge Management

78. After the sludge treatment and dewatered. The sludge quality allows its disposal on a landfill or use in agriculture.

79. Sludge from sanitary wastewater treatment systems should be disposed in compliance with local regulatory requirements, in the absence of which disposal has to be consistent with protection of public health and safety, and conservation and long term sustainability of water and land resources. The sluge should be tested for suitability for agricultural use or land application.

80. There is a temporary sludge storage area at the WWTP that has sufficient volume to store the sludge for some weeks. From time to time the sludge shall be transported to the landfill of Chiatura. A new landfill is in the project pipeline. UWSCG will provide transportation from the WWTP to the landfill. Information related with wastewater flow for Chiatura submitted in the table.

81. Another alternative for the disposal of the sludge is its use as fertilizer in the agriculture after testing. As there is no industry in Chiatura the sludge quality is expected to be suitable for this usage. The WWTP is equipped with a storage place where sludge is temporarily stored and can be collected by interested farmers. UWSCG would give away the sludge for free; transportation would have to be provided by the farmers. After some weeks of operation, when UWSCG will have a better understanding of the quality and quantity of the sludge, UWSCG will announce the possibility to collect sludge from the site of the WWTP. Depending on the seasonal demand for fertilizer, the UWSCG will manage the temporary storage at the WWTP in such a way that a potential demand can be best served.

82. In view of the lack of Georgian legislation with regard to the use of sludge in agriculture, European regulations shall be considered in case the sludge will be used as fertilizer.

83. They provide that the use of sludge is prohibited:

- on grassland or forage crops if the grassland is to be grazed or the forage crops to be harvested before a certain period has elapsed (this period may not be less than three weeks);

- on fruit and vegetable crops during the growing season, with the exception of fruit trees;
- on ground intended for the cultivation of fruit and vegetable crops which are normally in direct contact with the soil and normally eaten raw, for a period of ten months preceding the harvest and during the harvest itself.

84. USA regulations related with the federal biosolids (treated sewage sludge) rule described in the EPA publication is contained in 40 CFR Part 503. Biosolids that are to be land applied must meet these strict regulations and quality standards. The Part 503 rule governing the use and disposal of biosolids contain numerical limits, for metals in biosolids, pathogen reduction standards, site restriction, crop harvesting restrictions and monitoring, record keeping and reporting requirements for land applied biosolids as well as similar requirements for biosolids that are surface disposed or incinerated. Most recently, standards have been proposed to include requirements in the Part 503 Rule that limit the concentration of dioxin and dioxin like compounds in biosolids to ensure safe land application.

D. DESCRIPTION OF THE ENVIRONMENT (BASELINE DATA)

D.1. General

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

D.2 Physical Resources

D.2.1 Relief and Geology

86. Generally there were determined 3 ground layers in Chiatura. First one, from the surface is clay layer, with resistivity between 5-30 ohm and with less water permeability. Second one- main aquafer layer was divided for three sub layers, first, located in up position sub-layer “dry sand” with resistivity between 450-2500 ohm, under first second “wet sand” with resistivity between 150-450 ohm and lower “saturated sand” with resistivity between 30-150 ohm. Third layer contains again clay with resistivity between 5-30 ohm this layer extends depth 170 m.

87. According 3D model was determinate aquifer thickness and spreading area. Aquifer contain sand layer which is spreading on the all territory and covered by thin clay layer (about 1 m). Biggest thickness of aquifer was fixed in North-East part of territory (12-15 m). Its thickness is reduced to West (2 m) and South direction (6 m).

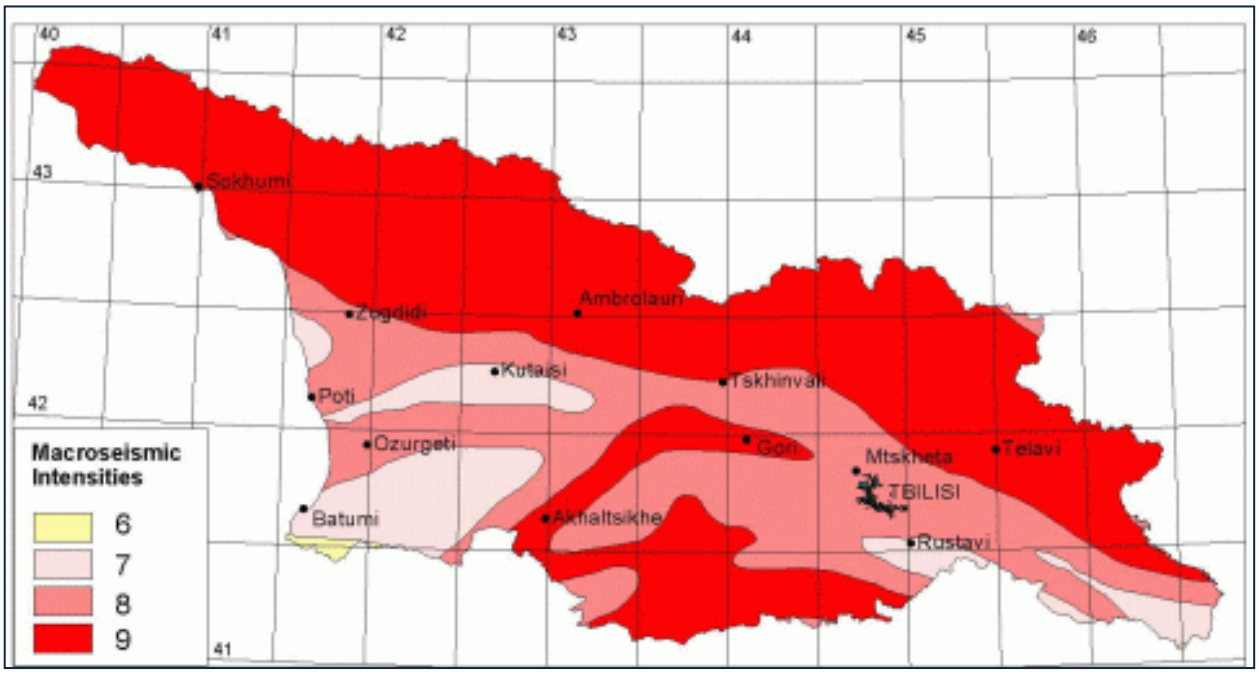
88. Aquifer layer is partly permeated by water. Geophysical surveys outlined the three sublayer in aquifer: dry, partially wet and totally saturated by water. North- East territory, of study area recharged by water from the river Kvirila and Lashura, that why there saturated sub-layer has biggest thickness.

D.2.2 Seismisity

89. Chiatura area is located in the active seismic zone. Accordingly, reserviours and pumping stations shall be designed and constructed in compliance with the requirements stipulated in the applicable Georgian construction standard Seismic Resistant Construction (PN

01.01-09). The area selected for construction of the project facility is located in the seismic intensity zone 8 (MSK 64 scale), which dimensionless seismic coefficient 'A' equals to 0.15.

Map 2: Seismic Zone Map of Georgia



D.2.3 Soil Covers

90. In the **Chiatura Municipality** dominant types of soils are raw humus calcareous soils that are developed on the limestone and carbonate sandstone denudation substrates. At an altitude of 1,300-1,500 m forest brown and forest brown podzolized soils are spread. On the younger lower terraces of the river Kvirila and its tributaries alluvial soils are spread and on the old terraces – sub-tropical grey podzol (greysols) and sub-tropical podzol (stagnicacrisols) are spread. In terms of soil types of various landscapes, they are as follows: forest brown acid and raw humus calcareous soils are specific to hilly plateau with oak-hornbeam forest cover; raw humus calcareous and forest brown soils are specific to the flat plateau with oak and beech forest groves; raw humus calcareous soils are specific to low karst mountains with hornbeam-oak forest cover; forest brown soils are specific to middle mountains with beech forest cover; raw humus calcareous, yellow and sub-tropical podzol soils are specific to plain-hilly foothill (piedmont) landscapes with Colchic forests.

91. Details tasks of investigation were determination the characteristics of the subsoil in the study area located in the alluvial of Kvirila and Lishura rivers. This research will be up to a depth of about 150 m in order to determine the characteristics of alluvial, its connections, and its different thicknesses and, finally, identify the most interesting sectors to propose conducting surveys of groundwater abstraction for them to be more productive.

D.2.4 Hydrogeological Investigation

92. The municipality is rich with internal waters. The River Kvirila represents the main river that flows for about 16 km-s and almost seperates in two halves the Chiatura region area. The tributaries to the right are: Buja, Katskhura, Rganisghele, Nekrisa, Ghruchua and others. The rivers are fed through rain, snow and underground waters. There are plenty of karst and Underground Rivers there. Vaucluse flow Ghrudo has to be mentioned (maximum flow – 346 l/sc, minimum – 150 l/sc) Goliati and Lezhubani springs of monastery (Mghvimevi) mills, that are used for town water supply purposes. The River Kvirila originates from the North SlopeofRacha, Ertso Lake valley from 1711 meters height

and crosses the river Rioni from left bank at the north of Vartsikhe village. The length of the is 140 km, an average inclination is 11.6, the catchment area - 3630 km 2, the average height - 750 m. The River is fed by snow, rain and ground waters (ground water share in the feeding process of the river is negligible). Maximal Water consumption is observed mainly in flood period and at Chiatura town equals 268 m3 / sc. Minimum water consumption at Chiatura town is observed in summer and equals 0.8 m3 /sc. Average annual water flow is 20.7 m3 /sc. The average speed of the river equals 1.2 m / sec, and the average depth - 0.9 m.

93. In order to identify the geometry, depth and limits of the alluvial aquifers of river Kviirila and define the area to perform the drilling works, a geophysical prospecting by Vertical Electrical Sounding (VES), has been done.

94. According the results, and from the hydrogeological point of view, the best option is to place the drilling boreholes between profiles #3 and #4 (please see drawing below). Observation boreholes should be placed about 25 and 50 m from the exploration borehole in the west direction along the river bank (water level in the aquifer is decreasing in the mentioned direction).

95. The area above has been visited in order to look for some public land, but according the cadastral map all the area show private properties.

96. The last decision about the negotiation with the land owners shall be taken by the members of the UWSCG. Once it has been decided, the next works for the hydrogeological investigations are:

- Drilling three investigation wells (observation and exploration);
- Testing process for assessment of the hydrodynamic characteristics of aquifers;
- Monitoring and numerical modelling of aquifer with design of production-exploitation wells

D.3 Meteorology and Climate

97. There is a humid climate in Chiatura Municipality, it is characterized with averagely cold winter and hot, drier summer. For the area up to 400-700 height, the average air temperature annually is 20-30 C, in January 2.4-4.00 C, in July 22-40 C; absolute minimum – 200 C, Absolute maximum 40-42 C. Average annual precipitation equals1100-1200 mm (maximum observed in autumn and winter). The higher the zone gets, the more the airs temperature reduces, and the more the precipitation is increasing significantly. In winter, the north-east winds are dominant, and as for summer –the south-west winds are dominant. Background winds are frequent as well. The Climatic characteristics of the investigation area are presented in the tables and diagrams below. Chiatura meteorological observation data is given in the tables (source: Construction norms and standards "Building Climatology PN 01.05-08").

D.4 Status of Atmospheric Air Pollution with harmful substances

98. The complete assessment of the Chiatura atmospheric air including all parameters last time was done by the end of 1980-s. The absolute share of the industrial emissions included the following harmful substances: suspended particles, sulfur anhydride, carbon monoxide, nitrogen oxides, hydrocarbons, hydrogen sulfide, and SO2. It has to be mentioned, that the meteorological conditions, mostly speed and direction of Chiatura wind significantly defines (affects) the quality of the emission impact. During the last years, the opportunity to observe the condition of the atmospheric air of Chiatura town has significantly been reduced, as a result of which no data could be retrieved regarding harmful substances from ongoing investigation areas. Because of the mentioned fact, the recommended data considering the number of population is defined as a background polluting concentration (see. Table 5.3.2.1.). As the investigation area is located beyond

Chiatura town – nearby Darkveti village, according to the table, we should get the data for less than 10 000 number of population as atmospheric air background definitions.

Table 11: Background Concertation (mg /m^3) Estimatedmeaning

Population (10 man)	Dust	Sulfur Dioxide	Nitrogen Dioxide	Carbon Monoxide
250-125	0.2	0.05	0.03	1.5
12-50	0.15	0.05	0.015	0.8
50-10	0.1	0.02	0.008	0.4
<10	0	0	0	0

Table 12: Atmospheric Air Temperature 2014

Month Average	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Mid Annual.	Absolute Min Annual	Max Annual.
°C	2.4	3.6	6.9	12.0	17.4	20.5	23.1	23.5	19.8	14.9	9.1	4.4	23.1	-20	42

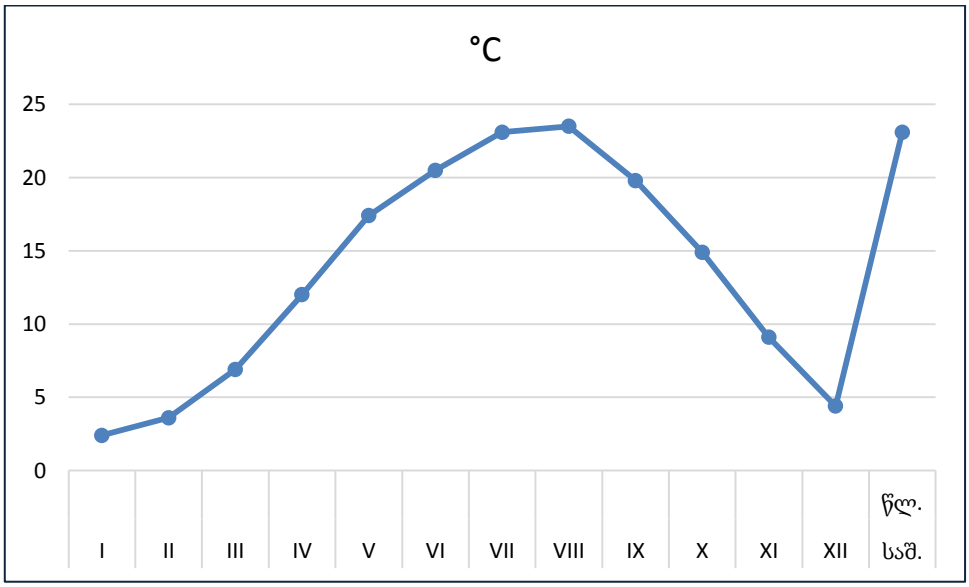
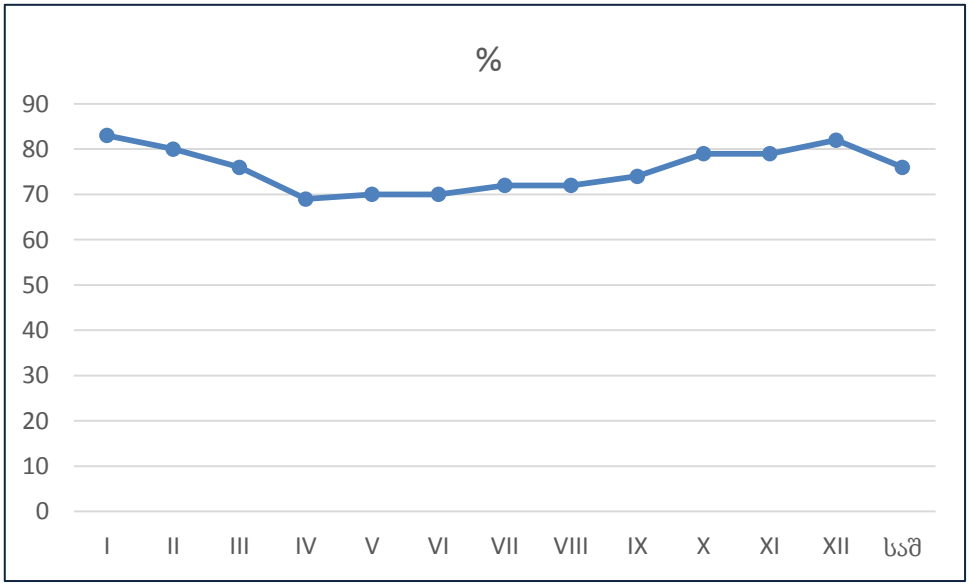


Table 13: Relative Humidity

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Aver.
%	83	80	76	69	70	70	72	72	74	79	79	82	76



Average relative humidity 13 h		Average relative humidity. Circadian amplitude	
The coldest month	The hottest month	The coldest month	The hottest month
70	55	20	30

Table 14: Quantity of rainfall

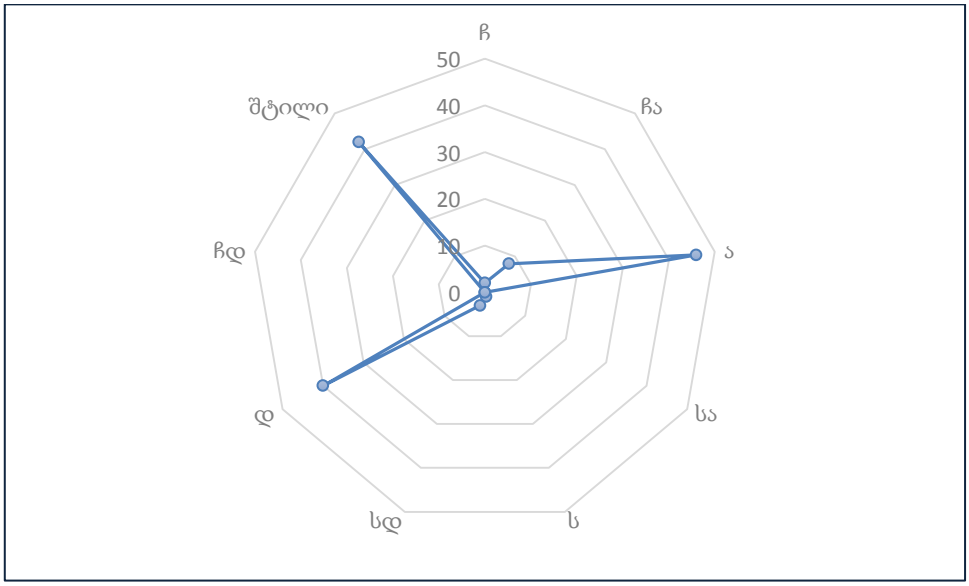
Annual precipitation mm	Maximum daily precipitation mm
1237	100

Table 15: Wind charachrestics

The highest wind speed possible 1,5, 10, 15, 20 years, in m/s				
1	5	10	15	20
19	23	25	27	28
The average wind speed for the smallest and the largest m / s				
January		July		
4.0/0.7		3.6/1.1		

Wind direction and windless repeatability (%) per year								
North	North/East	East	South/East	South	South/West	West	North/West	windless

2	8	46	0	1	3	40	0	42



D.5 Biodiversity

D.5.1 Flora

99. Forest is destroyed and vegetation represents a result of secondary origin within Chiatura structural plateau. Agricultural land plots represent the most part of the area. The main forest stands preserved at Racha and Imereti slopes. The prevailing forest species are: beech, oak, hornbeam, chestnut, maple, ash, lime; rare coniferous. There are plenty of wild forest fruit: mazhalo trees, cranberries and more. Enterprise area is very poor in terms of vegetation. There is only grassy vegetation under the area. Several alder trees are observed under the river Kvirila banks, however a direct negative impact is not expected as a result of the type of planned activities.

D.5.2 Fauna

100. Caucasian deer, roe deer, chamois, bear are spread on Racha slope southern areas; There are wolves, foxes, jackals, Caucasian marten, wild cat, rabbit, squirrel, lynx; as for birds, there are plenty of ravens, Eurasian jackdaws, ravens, orioles, blackbirds, jays, nightingales, hoopoes, woodpeckers; Reptiles: snakes, lizards; in the Rivers: barbell, chub, goby, and in the upper parts of the river - trout. In ichthyofaunal point of view, the river Kvirila is very poor at Chiatura areas. Taking in consideration high techno genic load, there may be observe only Sinan tropic animal species.

D.6Social Surroundings, Social-Economic Description

D.6.1 Location

101. Chiatura municipality from the north is bordered by Ambrolauri municipality, from the east – by Sachkhere municipality, from the south – by Kharagauli municipality and from the west – by Tkibuli, Terjola and Zestaphoni municipalities. Its total area is 542km2. The municipal center is located in the town of Chiatura. The town is stretched on Chiatura plateau and narrow gorge of the river Kvirial at an elevation of 340-500m above the seal level. The distance from Tbilisis is 220 km.

D.6.2 Population

102. Population size – up to 55,000 and population density – 184 persons per km2. The town was established in 1879, when the extraction of manganese started in the region.On the basis of official data, the number of population of the municipality is stable. Currently, town population is 18.800.

D.6.3 Industry

103. Obtaining and processing of magnum ore represents the main industrial field of the region. Most of the population of the Chiatura town and Chiatura region were employed in the mining and processing enterprises of magnum ore. During the 90-s of the last century, as a result of the well-known events developed in the country, obtaining of the magnum was decreased to minimum and only small enterprises continued activities. During the last 6-7 years, rehabilitation of magnum ore mines and refineries (enrichment) as well as obtaining and processing of the ore has significantly become more intensive. Industry of construction materials has to be mentioned among the industries developed in the region (mostly quarts sand mining and enrichment) as well as transport.

D.6.4Transport Infrastructure

104. Chiatura Municipality is represented by railway and vehicle main roads. Zestaponi-Sachkhere railway main road crosses Chiatura town as well as Gomi-Sachkhere-Zestaponi car road that represents a state significance. The internal roads connecting to the villages is well developed and most of them require surface rehabilitation. As for internal town transportation, buses and cableways provide service, through which mostly all the town areas are connected to the center. A ground car road is provided from the central vehicle road to the industrial enterprise area that crosses the railway line located next to the enterprise.

D.6.5Cultural Heritage

105. Chiatura municipality at many historical, architectural monument, which is a town near the following: The medieval castle and the caves "jarbela" Kldekari caves (in the village. Sveri vicinity), Sveri John the Baptist Church (XIX century), Sveri fortress (VII c.) and others. The town's health care, educational and cultural institutions (Pushkin Drama Theatre, Museum, House of Artists, Tbilisi State University and the Technical University of branches).

106. There are many historical, architectural monuments located in Chiatura Municipality, and among them, the following items are located near the town: Mghvimevi Monastery (XII c.) The medieval castle and the caves "Jarbela", Kldekari caves (nearby the village. Sveri), Sveri John the Baptist Church (XIX century.), Sveri fortress (VII c.) and others. There are health care, educational and cultural institutes in the town, (AkakiTsereteli Drama Theatre, Local Museum, House of Artists, branches of Tbilisi State University and the Technical University).

D.7 Health and Education

D.7.1 Education

107. There are branches of Tbilisi State and Georgian Technical Universities, communication division, station of young technicians, as well as mining metallurgical institute of Chiatura in the town. There are 9 public schools and a boarding school (7), 1 private school, 1 theological school, 1 gymnasium, 3 sport schools, 3 music and 2 art schools, 13 kindergartens in the town. There are approximately 4000 pupils in Chiatura town, and about 500 teachers teach there.

D.7.2 Health

108. The following health care facilities are active in town: the town policlinic, sanatorium and preventive care clinic, dispensary, medical rehabilitation center for disabled and elder residents of Chiatura-Sachkhere region, 5 dental clinics, the children's polyclinic, a birth center, psycho neurological clinic, a massage center, TB dispensary, 3 old and a new multi-functional hospitals.

D.8 Proceduresin Response to the Artifact Findings

Chance Finds Procedure

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

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

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

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

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

- Construction workers are obliged to stop works and immediately report to the Archaeological Supervisor.
- Archaeological supervisor reports to the Chief Engineer at site and requests to stop activities at the site of finding. Archaeological supervisor executes first checking of the finding and the site where finding was made
- In case the finding has no potential archaeological value, the Archaeological Supervisor reports to the Chief Engineer and the works are restarted. Appropriate record regarding the case is made in record book.
- In case if the finding is estimated as potential archaeological relic, the Archaeological Supervisor reports to Chief Engineer of the Contractor and to UWSCG Environmental Team (and supervising company / Engineer) requesting to stop construction activities and to inform the Ministry of Culture and Monument Protection about the incident.
- Chief Engineer of the Contractor also reports to UWSCG informing about the stopped operations and requesting immediate engagement of the Ministry of Culture and Monument Protection.
- Ministry of Culture and Monument Protection will assign expert or group of experts and conduct necessary archaeological works at the site to identify the problem.
- In simpler cases, after removal of the movable artefacts, fixing materials and conducting other required works, the experts of the Ministry of Culture and

Monument Protection will issue decision on recommencement of stopped construction works.

- In exclusive cases of valuable and spatially spread findings, the Ministry of Culture and Monument Protection may issue request to relocate the RoW shifting it on a safe distance from the archaeological site.

D.3 Information About the Background Pollution

114. The analyses of background noise, radiation and levels of vibration were conducted.

D.3.1 Existing Data About the Air Quality

115. On the territory of the city of Chiatura, no air quality monitoring is undertaken by the Environmental Agency of Georgia.

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

117. At the Project implementation stage, in respect of air pollution (noise, dust), the most sensitive is WWTP construction area.

D.3.2 Natural Radiation Background

118. The existing radiation background was conducted at theWWTP project area by using Russian appliance RADEX. The measurement data is provided in Table 15 below.

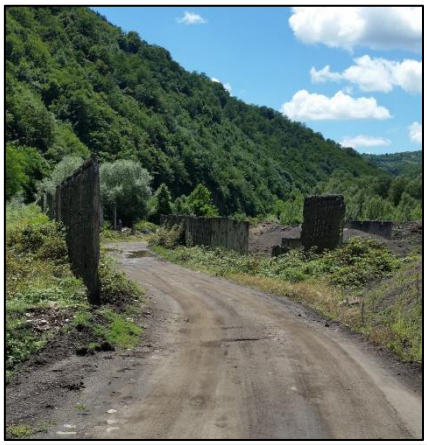
D.3.3 Noise

119. The noise level was measured at the same points where the measurements of radiation were conducted. The noise level was measured with South Korean equipment „Digital Sound Level Meter".Noise levels were measured at the WWTP construction site only.This equipment measures noise with As already mentioned there is no source of noise on the territory. The measurements at all points were done in 2 hours interval. The results of the measurements are given in Table below.

Table 16: Measurement of Noise and Radiation in Chiatura (13.07.2016)

#	Place of measurement Chiatura	Coordinates	Radiation *Microrendg en/hr*	Noise *Dba* Daytime,	Noise *Dba* Daytime	Noise *Dba* Nighttim

				Nighttime 07:00 - 22:00 Industrial	07:00 - 22:00 Residential	e 22:00 - 07:00
	National Environmental Standard (Maximum Permissible Level)		60	70	55	45
	Measurement Time			10:00AM	15:00PM	18:00PM
1.	WWTP Construction Site	N 4216497 E 4315429	17	59,7	60,6	63,8



E.ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

E.1 Summary of Activities and Anticipated Impacts

120. Proposed wastewater treatment plant 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, necessaryequipment stacks and the site preparation
  - Construction of the Treatment Plant per tender drawings

121. Environmental effects likely to occur during the construction of the Project are noise, dust, solid and liquid wastes. Effects likely to occur during the construction phase are short term effects and they cannot deteriorate the existing conditions.

- **B. Operational Phase**
  - Commissioning and Operation of the Wastewater Treatment Plant
  - Use of treated effluent for irrigation or/and dispose of on the landfill.

122. The most sensitive receptor both, during the construction and operation of ChiaturaWWTP adjacent to the Project zone is the the river Qvirila and Forest area. The relevant mitigation measures are given in Chapter E.3

123. P
ossible environmental effects during operational phase arise from effluent discharge, solid and hazardous wastes, sludge disposal and odor and do not include any adverse

environmental effects as long as monitoring and mitigation measures, if needed, are executed.

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

Table 17: Site-Specific Impacts

#	Pre-Construction Phase. Potential Impacts During Construction site preparation works	Risk	Sites
1.	Loss of Topsoil	Moderate	WWTP project Area
	Construction Phase. Potential Impacts During Construction Works	**Risk**	**Sites**
1	Dust, noise, vibration	High Risk	WWTP project area
2	Pollution of surface water during construction and rehabilitation works	Moderate Risk	WWTP construction site
3	Flooding	Moderate Risk	Flooding may occur during construction time; the present location is naturally ensured against flooding with an annuity of 10 years.
3	Impacts on Archaeological Sites	Low Risk	No damage to any archaeological site shall be expected
4	Impacts on traffic	Moderate Risk	Special problems might be created in the narrow streets of the town when transporting construction materials
5	Landslides, slumps, slips and other mass movements	Low Risk	No large scale earthworks are planned under the Project.
6	Impacts on flora and fauna	Low Risk	Project site is located within the area have been experiencing the severe human impacts. Therefore, no influence on major flora and fauna shall be expected during implementation of the Project
7	Pollution risk for ground waters	Moderate Risk	No major spills of fuel and lubricates at construction sites due to leakages are expected The spills, which are likely to cause groundwater contamination, may 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 project area
10	Hazardous Construction Wastes	Low Risk	Small quantities of hazardous wastes will be generated as a result of vehicle operations and the maintenance activities

#	Pre-Construction Phase. Potential Impacts During Construction site preparation 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.

E.2. Developing environmental documents

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

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

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

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

- Following the specifics of the work to be accomplished, the Contractor must develop the Site Specific Waste Management Plan. This document must describe the methods to prepare the construction site and manage the waste originated during construction (collection, transportation, recycling/reuse and placement).
- Following the location of the construction site, the Contractor prior to the onset of the construction must develop the Site Specific Noice Management Plan. This document must give the model of the sources and distribution of the

noise originated at the construction stage, and possible impact on the adjacent facilities, as well as all mitigation measures and methods to monitor them.

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

E.3Air Quality

E.3.1 Noise and Dust

Construction Phase

129. Noise and emissions of harmful substances are typical impacts of construction. Air quality will be affected during construction by emissions from vessels, equipment, and land vehicles in work activities at work locations. During the pipe replacement stage the rehabilitation works are to be carried out in Bolnisi 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.

130. Also, WWTP is located near the settled area, therefore construction process is expected to cause noise and generate dust.

131. Assessment of the noise, caused by construction activities is based on existing information about operation of various equipments at various stages of construction.

132. 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 18: 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 19: 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

133. As a rule, noise caused by moving equipments is reduced at some distance. Such reduction has logarithmic properties. In case of noise caused by construction activities, noise spread pattern from the noise point is used, that can be determined as: Noise level1-Noise level 2=20 log r2/r1, meaning that by doubling of distance noise is reduced by 6dBA.

Table 20: 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

134. Noise sources generated by excavation for WS pipes during construction period in scope of Chiatura town 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).

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

- 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.
- Any operation by such equipment as a percussion piling machine or pneumatic hammer shall be prohibited.
- The working time and construction schedule must be arranged rationally, and all engineering entities shall make reasonable arrangements for working time, and engineering activities after 22:00 hours through 8:00 hours the next day shall be strictly prohibited, except as required by the proposed project.

136. Prior to start construction activities contractor should prepare Noice SSEMP for Chiatura town. Prepared plan should be submitted to SC for endorcemnet and to UWSCG for approval.

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

138. The noise impact will be the case not only during the WWTP construction, but also during the unit operation. The noise impact during the WWTP operation is augmented by the problem of possible spread of odor.

139. In order to avoid this impact, a number of mitigation measures are necessary allowing minimizing the expected impact of construction and operation phases of the Project implementation.

Mitigation Measures

140. Together with noise attenuating barrier the additionally standard approaches shall be employed to reduce the noise pollutions during maintenance works as follows:

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

141. Also, after the detailed design of WWTP will be developed, the construction company with relevant qualification has to define the level of noise and its spreading area at the operation stage. If it is required, additional changes have to be inserted in the design and relevant noise reducing barriers have to be arranged in order to avoid noise exceeding the allowed level for the buildings located along the WWTP. According to the Georgian Legislation, during the noise level survey, it has to be considered that the equipment will work 24/7.

142. **Foul Odor Off-site Migration**. Mitigations shall include the following: (i) close monitoring of the aerobic units to ensure the conditions are not an oxic (without enough oxygen), (ii) landscaping with trees and shrubs around the facility shall be done to position them as wind breaks, and (iii) conduct of WWTP"s annual odor audit to identify operational measures that can prevent odor problems The role of reliable power supply to the mechanical equipment is very important in ensuring adequate odor control and management. The lack of power supply will cause the lack of air input to the aerobic units. If the situation persists for an extended period of time, the resulting an oxygen (without enough oxygen) condition will generate foul odor. In order to prevent this situation, an emergency power generator is foreseen in the Tender Documents. Furthermore there are standby aggregates (as redundant technical solutions) for the mechanical equipment (e.g. pumps, blowers) in order to ensure sound WWTP-operation, and to avoid technical failures, which could lead to foul odor migration.

143. In the operation phase, in order to avoid the distribution of the unpleasant smell of the sewage sludge temporarily placed on the territory of WWTP and treated with high quality, the following measure is necessary:

- A zone of green plantations should be arranged between the sewage sludge location and the river.
- Conduct of WWTP"s annual odor audit to identify operational measures that can prevent odor problems. The role of reliable power supply to the mechanical equipment is very important in ensuring adequate odor control and management.

Operation Phase

144. As already mentioned, noise propagation is expected in the operation phase, as well.

145. In order to minimise the odour nuisance of the untreated wastewater the inlet part of the WWTP is enclosed (integrated in the building).

146. As one can see from the Project description, WWTP technological line is of a quite high standard. The full mechanical and biological treatment of the sewage sludge is mainly undertaken in the closed area minimizing the unpleasant smell typical to the given type of plant.

147. The digested sludge is stored temporarily. However, since the sludge is already digested, the odor nuisance is neglectable.

Figure 2: ChiaturaWWTP project area

E.4 Water Quality

E.4.1 Contaminations of Surface Water

Construction Phase

148. During implementation of the Project the risk of surface water contamination is of medium level.

149. 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.

Mitigation Measures

150. 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 100m away from water bodies.
- Topsoil stripped material shall not be stored where natural drainage will be disrupted.
- Solid wastes will be disposed of properly (not dumped in streams).
- Guidelines will be established to minimize the wastage of water during construction operations and at campsites.
- During construction, machinery and transport will be used by the contractor; both have potential of causing contamination to underground and above ground water assets. There is need to compile temporary drainage management plan before commencement of works.
- Proper installation of temporary drainage and erosion control before works within 50m of water bodies should be done

Operational Phase

151. In general, operation of the WWTP will have large positive impact on the quality ofthe groundwater, the bottom sediment and the most of all on the water quality of the River Qvirila;The operation of the WWTP will have positive impact on the restoration andmaintaining of the aquatic fauna in the River Qvirila;There are large positive impacts on the Social Environment elements: improvedwater supply of the downstream populated areas due to good quality of thegroundwater, and improved health of the downstream population as a result of theimproved quality of drinking water.

152. The operation of the wastewater treatment plant involves various processes:

- Screening
- Sedimentation
- Aeration
- Final sedimentation
- Sludge thickening

153. The wastewater treatment will generate waste, which will comprise of the following:

- Screenings from coarse and fine screen;
- Grit from aeration;
- Sludge from biological treatment.

154. As far as operation failure of WWTPs are concerned, there should be provisions for zero tolerance on failures during operations. During normal operations once the processes are stabilized, one can't foresee a longer failure of operations, and the failures are largely due to failure of mechanical or electrical parts, which can be rectified very easily. And most of the instances, such failures not necessarily brings down full operation (e.g. failure of one aerator, or a pump), as there is always sufficient standby built in WWTP design. For this purpose, there has to be 100% power back-up, and sufficient spare parts to rectify any

such failures within shortest possible time. The same has been included in the design of WWTPs. Since these WWTPs are being bid out on design-build-operate basis, the operator will have responsibility to operate and maintain the WWTP to meet the discharge standards. It is also proposed to procure routine spare parts, and any additional spare parts (that bidder will propose in his bid) before commissioning of WWTP as a part of construction cost, which will be financed from the loan.

155. The operation of the wastewater treatment plant will generate treated wastewater. The treated wastewater will be discharged into QvirilaRiver. The quality of the surface water will significantly improve. The quality of the effluent is according to European and Georgian regulations and can be discharged into the surface water without harm. Georgian legislation requires the preparation of a Report on the Maximum Allowable Discharge into QvirilaRiver. The permissible concentrations were determined as shown in the table below. They are based on calculations of the concentration of effluent in the receiving water body. The calculations take into account the background concentration existing in the water object for each indicator, the category of the water object, the maximum permissible concentrations of substances in the water and their assimilation capability. The report confirms the applicability of the norms for QvirilaRiver. The design of the wastewater treatment plant is in line with these effluent quality parameters.

Table 21: Maximum Permissible Discharge

N°	Ingredients	Permissible concen-tration, Mg/l
1	Suspended solids	60
2	BOD_5	35
3	COD	125
4	Total Nitrogen	15
5	Total Phosphorus	2

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

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

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

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

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

161. A
s already mentioned, the probability of complete breakdown of WWTP is very low and even it is the case, the calculations evidence that the level of pollution for the major components is within the admissible limits.

E.4.3 Downstream Users

162. A
fter the project implementation Wastewater water will be discharged in the river Kvirila that flows into the Black sea in about 150km away.The nearest downstream village is located in 5km distanse from the discharge point. Kvirila river water is not used for drinking purposes in any of the villages. However the river water is drunk by the domestic animals. As at today the collected wastewater of Chiatura is discharged in the river Kvirila without any treatment.

163. L
ocal Administration representatives informed us that wastewater is directly discharged in the river and the worst side of the fact is that not only private individuals discharge the wastewater but also all big and small companies or commercial structures located in Chiatura. As a result, high risk liquid waste is discharged in the river Kvirila from Industry, from hospitals, policlinics, car wash, gas station and etc.

164. B
ased on the information mentioned above it is obvious that the project implementation is fundamental/vital for the population located at the lower side of the river Kvirila. It is expected to reduce the pollution level of the river significantly. The project efficiency is demonstrated at the level of modeling. In this case,. No permanent analysis of the river water was done, and therefore, we have no exact data about the present pollution of the river.

E.4.2 Contamination Underground Water

165. G
roundwater 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 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.5 Soils Quality and Topsoil Management

Construction Phase

166. D
uring construction, impacts on soils are mainly due to earthworks and the operation of the contractor's yard.

167. Construction of the pumping station and WWTP 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
- Subject to advance consent of the local self-governance authorities, the excess topsoil remained after construction of the new pumping station and reservoir will be used at other Project sites or handed over to the appropriate authorities.

Mitigation Measures

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

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

Operation Phase

169. Operation of the WWTP will generate sludge from the treatment processes. The sludge has to be removed regularly to maintain good operational performance. The sludge cannot simply be disposed without proper treatment since it may cause land pollution.

170. Sludge disposal. After the sludge treatment, the sludge is stabilised, it is not digesting anymore and it has also been dewatered. As there is industry in Chiatura, heavy metals might be in the treated sludge. The sludge quality and consistency will allow its disposal on a landfill.

171. There is a temporary sludge storage area at the WWTP that has sufficient volume to store the sludge for 30 days. From time to time the sludge shall be transported to the landfill of the town of Sachkhere that is 10 km distance from Chiatura. This is a certified landfill. It is regulated by the Solid Waste Management Company under the Ministry of Regional Development and Infrastructure. UWSCG will provide transportation from the WWTP to the landfill.

172. Another alternative for the disposal of the sludge is its use as fertilizer in the agriculture. As there is industry in Chiatura Lab testing is required for sludge further application in the Agriculture. The WWTP is equipped with a storage place with a volume of about 1000 m^3 where sludge is temporarily stored and can be collected by interested farmers. UWSCG would give away the sludge for free; transportation would have to be provided by the farmers. After some weeks of operation, when UWSCG will have a better understanding of the quality and quantity of the sludge, UWSCG will anunounce the possibility to collect

sludge from the site of the WWTP. Depending on the seasonal demand for fertilizer, the UWSCG will manage the temporary storage at the WWTP in such a way that a potential demand can be best served.

173. Sludge and soil on which it is used must be sampled and analyzed. Sludge shall be analyzed for heavy metals every 6 months. The limit values are given in the Table 29.

Table 22: Limit Values Heavy Metals (EU)

	Limit values for concentrations of heavy metals in soils	Limit values for heavy metal concentrations in sludge	Limit values for amounts of heavy metals which may be added annually to agricultural land
	mg/kg of dry matter	mg/kg of dry matter	kg/ha/yr
Cadmium	1-3	20 – 40	0.15
Copper	50 - 140	1,000 - 1,750	12
Nickel	30 -75	300 – 400	3
Lead	50 - 300	750 – 1,200	15
Zinc	150 - 300	2,500 – 4,000	30
Mercury	1 - 1.5	16 - 25	0.1

Mitigation Measures

174. 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.

175. Depending on the class of WWTP, it is required to develop a plan for disposal of sludge to the dump site. The plan has to be agreed with the Ministry of Environment and Natural Resources of Georgia and as well with the waste management company of Georgia.

E.6 Biological Environment

Impacts during Construction

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

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

Impacts During Operation

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

E.7 Traffic

Impacts during Construction

178. Implementation of the following best construction measures will reduce the inconvenience and disturbance:

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

179. 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 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

180. As the operation and maintenance activities would be conducted within the existing facilities no impact is envisaged on economic resources. In fact, the improvements to the waste water 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.7 Hazardous Construction Wastes

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

Mitigation Measures

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

E.8 Other Wastes from Construction Activities

E.8.1 Inert Waste

183. Inert construction waste is accumulated during excavation of WWTP construction site.

184. The inert waste accumulated at the construction site should be disposed at the authorized location in prior agreement with local authority. The Contractor should define the amount of inert waste that could be used for backfilling/reinstatement purposes.

E.8.2 Municipal Waste

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

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

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

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

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

E.8.3 Medical Waste

188. Medical waste is generated in the Medical Care and Control Point and belongs to hazardous waste category. This waste is collected in special plastic boxes and is

transferred to a contractor for farther incineration. It is recommended that the medical waste is directly transferred to a contractor from the place of its consolidation. While disposal of the medical waste the following requirements are to be met:

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

E.8.4 Non-Hazardous Construction Waste

189. N
on hazardous construction waste may be generated on the storage and construction area and will be collected by contractor's workers. Waste disposed first on the sites of origin, and then moved to construction waste temporary storage facility before transferred to a contractor.

190. D
isposal construction wastes both on the sites and at the temporary storage facilities the following requirements are to meet:

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

E.9 Impacts on Archaeological Sites

191. L
and 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

192. T
o 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.

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

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

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

E.10Socio-Cultural Resources

Impacts during Construction

195. 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
- Increasing the workforce in to complete the work quickly

196. 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:

- Excluding public from the site - enclosing the construction area and provide warning and sign boards, and security personnel
- Providing adequate fencing and 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

197. *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.11 Construction Camps

198. 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.

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

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

the water body. Such facilities will be bounded and provided with impermeable lining to contain spillage and prevent soil and water contamination.

- These plans will be approved by the Engineer prior to beginning of construction activities.

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

E.12 Construction Related Impacts at the Quarrying Sites

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

Mitigation Measures

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

203. The measures aimed on mitigation of the dust and emission impacts, as well as potential river contamination due to improper fuelling and vehicle operation should be the same as above described pollution prevention measures, but control on this sensitive site should be stricter. Contractor's environmental personnel shall pay attention to this site during monitoring.

E.13Existing Asbestos Pips

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

205. Best practice only requires the removal of asbestos cement pipe that is exposed and will be disturbed during repair or replacement activities.

206. When a section of asbestos cement pipe is being repaired or replaced, the remaining

portions of that pipeline are not required to be removed, provided that they are not exposed by excavation activity.

207. Additionally, if a section of asbestos cement pipe that is being actively used (e.g., utility conduit) is exposed by excavation but will not be impacted by the repair or replacement work, it may be left in place and backfilled.

Mitigation Measures

208. 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.14 Cumulative Impacts

209. On the territory of Chiatura, there will bethe following ongoing infrastructural projects or the ones planned in the near future:

- Improvement of ChiaturaWater Supply System Sub-project;
- Improvement of ChiaturaWastewater System Sub-project
- Rehabilitation of the road in the town

210. Implementation of the first two projects is planned in the townof chiaturaand its adjacent area.

211. ChiaturaWastewater and Water Supply Systems sub-projects are considered as different sub-projects and within the scope of each of the sub-projects, two different tenders are planned to declare to select construction companies. The wastewaste system sub-project will have no major interlink with another Water supply system subproject that will rehabilitate whole water supply system in the town including rehabilitation of network in the center of the town.

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

- ChiaturaWater Supply and Wastewater System Sub-projects to be merged as a separate lot and two tendersare to be declared with two winning contractors.

- The contractors winning both sub-projects to develop the working schedule and submit it to Sakrebuloof the town of Chiatura and UWSCG.

213. The third infrastructural project will be accomplished in the town of Chiaturaand will be implemented by the Municipality of Chiatura that will be started before implementation of these sub-projects. As mentioned, the Project is being implemented 4 km east of the town of Chiatura. This sub-project will not coincide with the water supply or wastewater sub-projects and will not take place near the construction camps or construction sites. However, within the scope of the project accomplished in the field of power supply, the construction techniques move across the town of Chiatura. Consequently, all three projects have a cumulative impact due to the movement of the heavy techniques across the town of Chiatura.

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

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

E. 15 Climate Change Impact

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

E.16 Natural Threats

E. 16.1 GHG Emissions from Waste Water Systems

217. Wastewater can be a source of methane (CH_4) when treated or disposed anaerobically. It can also be a source of nitrous oxide (N_2O) emissions. Domestic wastewater is defined as wastewater from household water use, while industrial wastewater is from industrial practices only[2.]

218. Methane(CH_4) Wastewater as well as its sludge components can produce CH_4 if it degrades anaerobically. The extent of CH_4 production depends primarily on the quantity of degradable organic material in the wastewater, the temperature, and the type of treatment system. With increases in temperature, the rate of CH_4 production increases. This is especially important in uncontrolled systems and in warm climates as it is in Chiatura case. Below 15°C, significant CH_4 production is unlikely because methanogens are not active. However, when the temperature rises above 15 C^0, CH_4 production is likely to resume. The principal factor in determining the CH4 generation potential of wastewater is the amount of degradable organic material in the wastewater. Common parameters used

to measure the organic component of the wastewater are the Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD). Under the same conditions, wastewater with higher COD, or BOD concentrations will generally yield more CH4 than wastewater with lower COD (or BOD) concentrations.

219. Nitrous oxide (N_2O) is associated with the degradation of nitrogen components in the wastewater, e.g., urea, nitrate and protein. Domestic wastewater includes human sewage mixed with other household wastewater, which can include effluent from shower drains, sink drains, washing machines, etc. After being processed, treated effluent is typically discharged to a receiving water environment. Direct emissions of N_2O may be generated during both nitrification and denitrification of the nitrogen present. Both processes can occur in the plant and in the water body that is receiving the effluent.

Table 23: CH_4 and N_2O Emission Potentials for Wastewater and Sludge Treatment and Discharge Systems

Types of treatment and disposal				CH_4 and N_2O emission potentials
Collected	Untreated	River discharge		Stagnant, oxygen-deficient rivers and lakes may allow for anaerobic decomposition to produce CH_4. Rivers, lakes and estuaries are likely sources of N_2O.
		Sewers (closed and under ground)		Not a source of CH_4/N_2O.
		Sewers (open)		Stagnant, overloaded open collection sewers or ditches/canals are likely significant sources of CH_4.
	Treated	Aerobic treatment	Centralized aerobic wastewater treatment plants	May produce limited CH_4 from anaerobic pockets. Poorly designed or managed aerobic treatment systems produce CH_4. Advanced plants with nutrient removal (nitrification and denitrification) are small but distinct sources of N_2O.
			Sludge anaerobic treatment in centralized aerobic wastewater treatment plant	Sludge may be a significant source of CH_4 if emitted CH_4 is not recovered and flared.
			Aerobic shallow ponds	Unlikely source of CH_4/N_2O. Poorly designed or managed aerobic systems produce CH_4.
		Anaerobic treatment	Anaerobic lagoons	Likely source of CH_4. Not a source of N_2O.
			Anaerobic reactors	May be a significant source of CH_4 if emitted CH_4 is not recovered and flared.

Wastewater Treatment

220. Wastewater treatment systems are designed to remove soluble organic matter, suspended solids, pathogenic organisms, and chemical contaminants in wastewaters before the

water can be discharged into natural water systems. Wastewater treatment systems used to treat household wastewater and sewage are referred to as municipal wastewater treatment systems. Wastewater treatment systems used to treat wastewater generated at an industrial facility are referred to as industrial wastewater treatment systems.

221. When considering CO_2 emissions from wastewater treatment systems, there are two primary classes of biological treatment units: aerobic treatment units and anaerobic treatment units. Regardless of the type of biological treatment employed, the biochemical reactions are similar, with organic carbon compounds being oxidized to form new cells, CO_2 and/or CH_4, and water. For those wastewatertreatment plants in the project towns with a capatown of over30,000 Population Equivalents (PE), the activated sludge technology with separateanaerobic sludge digestion is chosen. This technology was compared to alternativesin the feasibility study and determined to be the most feasible option.

E.16.2 Recommendations

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

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

223. As the data of the above-stated group suggest, the natural threats in the Municipality include: Strong storms, landslides, droughts, avalanches and earthquakes represent characteristic of the territory under Chiatura Municipality. Landslide is considered to be the most important threat among the hazard events, activity of which is linked to mining works under mining enterprises. Risk of erosion and landslide may as well be increased as a result of overgrazing and forest cutting. There is approximately 150 hectares of land included in the landslide zone as well as 8 village residential houses and agricultural land

plots. The estimated damage during the last 10 years as a result of landslide and earthquakes equals 300 000 GEL.

E.16.3 Conclusions

224. The following measures are recommended for adaptation to the climate change of the municipality:

- Windbreaks recovery, forest rehabilitation and development, as well as systematization of the cutting process, in order to reduce landslide risks and also contribute to temperature regulation during hot weathers and maintaining soil humidity during drought events;
- Work out irrigation system development project, that will reduce the damage caused by the droughts and will support (food) catering safety.

225. The following activities are required to be done for sustainable development of catering-breeding:

- evaluation of the grass and grazing lands in order to work out several norms for avoiding overgrazing
- Prepare and implement long term program for maintenance and rehabilitation of the grass and graze land
- Overview the catering-breeding feeding system and spread the information among the farmers
- In order to protect the municipality areas from erosion and pollution, development of a long-term strategy for proper close-out and re-cultivation of already mined mountainous carriers, as well as planning short-term projects and implementation for that field

226. Register a database including natural hazards and the damages caused by them, regarding agriculture, water resources, forest resources and waste management, in order to have a complete picture of the challenges and have ability to plan activities responding the challenges.

F. ANALYSIS OF ALTERNATIVES

F.1 Sewage system

F.2 Wastewater Treatment Plant

227. Different treatment processes of the WWTP were compared. While the construction of the new WWTP will be tendered as design-build contract and the contractor will be responsible for the detailed design of the plant, in the following, different technical options for the treatment process were compared and a rough preliminary design was presented.The new WWTP will remove the carbon compounds and also nutrients and phosphorus contained in the wastewater to the greatest possible extent. For this purpose, a number of different wastewater treatment processes applied in various WWTPs across the globe, adapted to the particular conditions of each site and wastewater quality are known. Examples are the activated sludge and biofilm process or the membrane technology.

228. The membrane technology, the bio filtration and the anaerobic process are sophisticated wastewater treatment processes that require much experience in the design and in the construction of the plants. Particularly the operation of such systems demands a highly qualified and experienced work force in order to ensure the proper treatment of the wastewater.

229. Other treatment alternatives are the activated sludge (aeration) and the biofilm process (trickling filter). These treatment methods have been successfully applied for many decades and in many countries of the world. These two processes have a good treatment performance and a high buffer capatown with regard to the wastewater quality as well as the wastewater inflow quantities. Furthermore, the treatment process is easy to operate and monitor. Most maintenance works can be carried out by the staff of the wastewater treatment plant. For these reasons, the aeration and biofilm processes were chosen for a more detailed comparison of technical options. In order to determine the most feasible option for the WWTP the following three alternatives of the aeration and biofilm process were investigated and compared in technical and financial terms:

- Aeration tank with secondary sedimentation
- Sequencing-Batch-Reactor(SBR) process
- Trickling filter (biofilm process)

230. Dimension of each alternative was based on the design criteria and the allowable effluent quality. As a result, the aeration system with the secondary sedimentation was considered the most economical solution for the WWTP Chiatura. In the table 21 you can see the dimension of each alternative was based on the design criteria and the allowable effluent

quality. As a result, the aeration system with the secondary sedimentation was considered the most economical solution for the WWTP Chiatura.

Table 24: Design Criteria and the Allowable Effluent Quality

	Financial Aspects		Environmental Aspects		
Technology	**Investment**	**O&M-costs**	**Effluent Quality / Operability**	**Land Requirement**	**Odor**
Aeration Tank with Secondary Sedimentation	+	+	++	0	+
SBR	-	-	0	+	+
Trickling Filter	0	+	+	+	0

G. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

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

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

232. Stakeholder consultation and participation was an important process in the preparationof this IEE. The process engaging stakeholders and affected people during theconduct of the IEE included joint sites visits of IA, design and supervising consultants, onsite discussions with local population and public hearings.

233. At the stage of developing the IEE document, a number of meetings were held with the representatives of ChiaturaWater Company to consider theelements of the Project design and actions to be accomplished in the field of environmental protection

234. The Public Hearing was held on June 8, 2016, 15.00pm in Chiatura municipality and commenced at 14:00. The Public Hearings was organized with representatives from the local government of Chiatura, local population and representatives of UWSCG and Supervision Company.

235. 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 Chiatura(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.

236. The public consultation showed a support for the Chiatura subproject by the localpopulation. During public consultation importance of a good cooperation between thelocal population, the contractor and UWSCG has been discussed. Local populationwere aware of the need to improve the sanitation system services in Chiatura.Residents also were of the view that the proposed project will improve the publichealth, the environment, and the socio-economic development of Chiatura.

237. The residents were mainly in the planned social safeguardmeasures. UWSCG explained the schedule of works and underlined that impacts aremainly limited to construction works and temporary. The Contractor will have tofollow an Environmental Management Plan and SSEMP to minimize impacts and carry outmitigation measures.

Figure 3: Meeting with Chiatura UWSCG's representatives

238. By giving advertisements in advance at ChiaturaService Centre, attendance of a wide range of related people to the meetings was encouraged. During the public hearing, citizens were informed about the activities to be carried out within the scope of the Chiatura sub-project,The following topics were discussed during the meeting:

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

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

H. GRIEVANCE REDRESS MECHANISM

240. F
or 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.

241. A
ny 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.

242. G
RM in Chiaturawill operate in three stages:

243. D
uring the **first stage,** complaints are discussed within two weeks of being received by the local service centre of UWSCG (e.g. Chiatura 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.

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

245. W
hen a grievance is solved positively in the first stage, the grievance is closed through an Agreement Protocol, which is reflected in the Document – Task Management System.

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2 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.

3The **eDocument - Task Management System** was developed by LEPL Financial-Analytical Service of the Ministry of Finance of Georgia. It is an innovative electronic document and task management mechanism for electronically processing of documents. Used by almost all the major budgetary organizations in Georgia, the eDocumentservice offers an opportunity to manage, find, and trackdocumentsfor 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 uncompleteddocuments.*eDocument service is used by almost all the major budgetary organizations in Georgia.*

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

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

247. 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.

248. 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.

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

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

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

I. ENVIRONMENTAL MANAGEMENT PLAN

I.1 Introduction

257.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.

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

I.2 Environmental Impacts, Mitigation and Monitoring Plans

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

360. 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.

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

I.3 **Implementation Arrangements and Responsibilities**

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

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

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

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

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

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

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

367. 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).

368. 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

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

(i) Preparing the site specific environmental management plan (SEMP) for approval by the Employer (PIU) prior to the Contractors taking possession of the construction site (see below)

(ii) Ensuring the SEMPis implemented effectively throughout the construction period.
(iii) Coordinating community relations issues through acting as the Contractor's community relations focal point (proactive community consultation, complaints investigation and grievance resolution)
(iv) Establishing and maintaining site records of:
- weekly site inspections using checklists based on SEMP,
- environmental accidents/incidents including resolution activities
- environmental monitoring data,
- non-compliance notifications issued by the DSC
- Corrective action plans issued to the DSC in response to non-compliance notices.
- Community relations activities including maintaining complaints register
- Monitoring reports
- Routine reporting of SEMP compliance and community liaison activities (see below).
- Adhoc reporting to the Employer's Engineer of environmental incidents/spillages including actions taken to resolve issues

I.4 Site Specific Environmental Management Plan (SEMP)

370. 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

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

I.4 Site Induction

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

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

Reporting

374. 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.

375. 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..

Table 25: Environmental Management Cost

Item	Quantity[5]	Unit Cost	Total Cost	Remarks
Baseline Parametric Measurements	6	200 USD	1,200	To be conducted by the Contractor for air emissions, dust, vibratio measurements
Monthly Parametric Measurements (at least 3 sites) Noise, vibration and dust	108	200 USD	21 600	Tests to be conducted by the Contractor at 3 sites x 36 months monthly monitoring. Noise, dust and vibration should be monitored on the regular bases as well as during the peak operation of Construction Equipment and Machinery.
Environmental Management Specialist (SC)	36 months	2,500 USD	90 000	The costs are included in the contract signed between UWSCG and SC and no additional costs will occur.
Environmental specialist (Contractor)	36 month	1500 USD	54.000	The costs will be included in the contract signed between UWSCG and Contractor.
E&HS Trainings	2	2500 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.
Safety Specialist	12 month	2.500	30.000	Specialist will be hired in scope of three projects took place in Chiatura at the same time

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

International Environmental Consultant	50 Man/day	700	35.000	To be hired by contractor as a senior environmentalist for site env.supervision
Miscellaneous			251.80	10% for above Items
Subtotal			**276980.00**	**Total for above**

Table 26: Environmental Impacts and Mitigation Measures

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost
Pre-Construction				**Part of Construction Cost**
Biological study of the project area	Prior to start construction activities, construction contractor should carry out the biological study of the project area. Results of the work submitted for consideration UWSCG.	Env. Specialist of the contractor	WWTP area	Included in Project price
Preparation of "Inert Waste Management Plan"	Prior to start construction activities, construction contractor should choose the areas for disposal inert waste and prepare "Inert waste management plan". Prepared plan should be submitted to UWSCG for approval.	Env. Specialist of the contractor	WWTP area	Included in Project price
SSEMP	Prior to start construction activities, construction contractor should prepare SSEMP and submit toSC for endorcemnet and to UWSCG for approval.	Env. Specialist of the contractor	Project Area	Included in Project price
Possible removal of Terrestrial habitat. Loss of the top soil	If at the stage of the detailed biological study, there are rare or red-listed species are fixed in the project area, the Construction Contractor is obliged to: • Replant the rare or red-listed species found in the Project area and return them to their original site after the completion of the Project. • Attempt to avoid cutting down the trees in the Project zone (by considering the Project alternatives). • Develop a compensatory planting plan and submit it to the relevant bodies for approval, if it is unavoidable to cut down the trees.	Env. Specialist of the contractor	WWTP	Part of construction cost
Social Issues	Put in the contractors resposobilities at workers hiring stage in case similar qualification to give priority local representatives.	CS	Contract documents	Project prise
Construction				

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost
Ambient Air and Local Dust[6]	• Cover or damp down by water spray on the excavated mounds of soil to control dust generation; • Apply water prior to levelling or any other earth moving activity to keep the soil moist throughout the process; • Bring the material (aggregate and sand) as and when required; • Ensure speedy completion of work and proper site clearance after completion; • Damp down unsatisfied /bad condition roads to avoid dust generation while using for transport of waste/material • Use tarpaulins to cover loose material that is transported to and from the site by truck • Control dust generation while unloading the loose material (particularly aggregate and sand) at the site by sprinkling water/unloading inside barricaded area • Clean wheels and undercarriage of haul trucks prior to leaving construction site Don't allow access in the work area except workers to limit soil disturbance and prevent access by fencing	Env. Specialist of the contractor	Excavation WWTP construction area	Part of construction cost
	The Contractor shall coordinate with local Traffic Management Department to minimize construction traffic impact in the following topics: • Temporary parking restrictions, • Pedestrian and cyclist diversion routes where construction prevents access, • Temporary traffic signals, • One way scheme,	Env. Specialist of the contractor	Transportation routes of construction materials	Part of construction cost

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

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost
	• Maintaining local residential access at all times, • General traffic diversion routes where roads are closed. • Sound barriers should be erected at schools and hospitals if the distance to the construction site is less than 50 m			
Noise Pollution[7]	• 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 Chiatura town close to the Project area prior to commencement of the construction phase. • Vehicles and machinery that are used intermittently should not be left idling condition for long period of time. • Equipment used on site will be quietest reasonably available. • Haul routes for construction traffic entering and leaving the site will be selected to ensure noise levels at noise sensitive receptors are kept at a minimum.	Env. Specialist of the contractor	Excavation WWTP construction area	Part of construction cost
Impact on surface water bodies due to construction[8]	• Confine construction area including the material storage (sand and aggregate) so that runoff from upland areas will not enter the site • Ensure that drains are not blocked with excavated soil	Env. Specialist of the contractor	Project area	Part of construction cost
Soil Contamination	• The contractors will be required to instruct and train their workforce in the storage and handling of materials and chemicals that can potentially cause soil contamination. • Solid waste generated during construction and at campsites will be properly treated and safely disposed of only in demarcated waste disposal sites. • Construction chemicals will be managed property	Env. Specialist of the contractor	Construction site Camp	Part of construction cost

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

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

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost
	• 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. •			
Impact on Flora and Fauna	• Avoid tree cutting • In unavoidable cases, plant four trees of same species for each tree that is cut for construction • The Contractor shall ensure that the work site be kept clean, tidy and free of rubbish that would attract animals.	Env. Specialist of the contractor	Construction sate Camp	Part of construction cost
Impact on Traffic	• Informing all residents and businesses about the nature and duration of any work well in advance so that they can make necessary preparations if necessary; • Providing wooden walkways/planks across trenches for pedestrians and metal sheets where vehicle access is required • Increasing workforce to complete the work in minimum time in these stretches • Initial situation of private properties has to be re-established after construction	Env. Specialist of the contractor	Construction site Access Road	Part of construction cost
Hazardous Materials	• Comply with all national, regional and local legislation with regard to the storage, transport, use and disposal of petroleum, chemical, harmful and hazardous substances and materials. • Establish an emergency procedure for dealing with spills or releases of petroleum. • Storage of all hazardous material to be safe, tamper proof and under strict control. • Petroleum, chemical, harmful and hazardous waste throughout the	Env. Specialist of the contractor	Construction site Storage Area	Part of construction cost

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost
	site must be stored in appropriate, well maintained containers. • Any accidental chemical / fuel spills to be corrected immediately.			
Solid Waste	• Place of disposal of the waste concerned must be enclosed. • The waste must not have access to drainage water. • Waste must be immediately removed from the working sites. • Waste must be placed in secondary protective basins. • This waste can be transferred only to a certified contractor. The personnel involved in the handling of hazardous and non-hazardous waste will undergo specific training in: • Waste handling • Waste treatment; and • Waste storage.	Env. Specialist of the contractor	Project area Storage Area Construction camp	Part of construction cost
Loss of top soil	• Top soil of about 1 ft depth (0.3 m) shall be removed and stored separately during excavation work. Soil shall be replaced at the reinstatement phase	Env. Specialist of the contractor	WWTP site	Part of construction cost
Erosion due to excavation/refilling	• Ensure proper compaction of refilled soil and there shall not be any loose soil particles on the top; the material shall be refilled in layers and compacted properly layer by layer.	Env. Specialist of the contractor	All construction sites	Part of construction cost
Impact on air quality due to emissions from construction equipment/vehicles	• Ensure that all equipment & vehicles used for construction activity are in good condition and are well maintained • Ensure that all equipment & vehicles confirms to emission and noise norms	Env. Specialist of the contractor	Chiatura town, WWTP construction area	Part of construction cost
Socio-economic benefits from employing local people in construction work	• To the extent possible labour force should be drawn from the local community	Env. Specialist of the contractor	WWTP site	Part of construction cost

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost
Impacts due to import of labour and establishment of temporary labour camps	• In unavoidable case of sourcing labour from other areas, provide adequate housing facilities so that there are no impacts and conflict with the local people: ○ 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	Env. Specialist of the contractor	Temporary labour camps	Part of construction cost
Safety risk – public and worker	• 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	Env. Specialist of the contractor	All construction sites	Part of construction cost
Historical, archaeological chance finds during excavation	• 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: • Having excavation observed by a person with archaeological field training; • Stopping work immediately to allow further investigation if any finds are suspected; • Calling in the state archaeological authority if a find is suspected, and taking any action they require to ensure its removal or	Env. Specialist of the contractor	All construction sites	Part of construction cost

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost
	protection in situ.			
Cumulative impacts – repeated disturbance to roads and people	• Schedule the construction activities in harmony with the other on-going works • Schedule works before road work	Env. Specialist of the contractor	Works on waste water system	Part of construction cost
Climate Change	• Restoration of the wind break belts in the area adjacent to the Project zone what will reduce the soil erosion potential and will help regulate the temperature regime during the high air temperatures; • Extend river protection works by erection double gabion walls as currently been contracted at the opposite edge of the future WWTP location; This would be the most efficient measure to avoid gushing of water in WWTP land during floods;	Env. Specialist of the contractor	Construction area	Part of construction cost
Operation Phase				
Risk of accidental release of untreated wastewater at the WWTP	• As far as operation failure of WWTP are concerned, there should be provisions for zero tolerance on failures during operations. During normal operations once the processes are stabilized, one can't foresee a longer failure of operations, and the failures are largely due to failure of mechanical or electrical parts, which can be rectified very easily. And most of the instances, such failures not necessarily brings down full operation (e.g. failure of one aerator, or a pump), as there is always sufficient standby built in WWTP design. For this purpose, there has to be 100% power back-up, and sufficient spare parts to rectify any such failures within shortest possible time. The same has been included in the design of WWTPs. Since these WWTPs are being bid out on design-build-operate basis, the operator will have responsibility to operate and maintain the WWTP to meet the discharge standards. It is also proposed to procure routine spare parts, and any additional spare parts (that bidder will propose in his bid) before commissioning of WWTP as a part of construction cost, which will be financed from the loan. • Before operation Phase will be started the “Emergency plan” Should be prepared. • provision of dual power supply;	UWSCG	WWTP site	Part of operating costs

Potential Negative Impacts	Mitigation measures	Responsibility	Location	Cost
	• spare parts for key components; • regular inspection and proper maintenance of the WWTP; • automated on-line, real-time monitoring of influent and effluent quality			
Foul Odor Off-site Migration from WWTP	• close monitoring of the aerobic units to ensure the conditions are not anoxic(without enough oxygen), • landscaping with trees and shrubs around the facility shall be done to position them as wind breaks, and • conduct of WWTP"s annual odor audit to identify operational measures that can prevent odor problems	UWSCG	WWTP	Part of operating costs
Disturbance/ nuisance/ noise due to operation activity	• Consulting company has to define the noise level and its spreading area generated at the stage of WWTP 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, WWTP area	Part of operation costs
land pollutioncause from sludgedispose	Plan for Sewage sludge disposal on the dump site has to be prepared before starting the operation. The plan has to be agreed with the Ministry of Environment and natural resources of Georgia and also waste management company.	UWSCG	ChiaturaMunicipal Landfill	Part of operation costs

I.5 Monitoring

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

252. 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.

253. 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 Chiaturais needed.

Table 27: Environmental Monitoring Plan for general construction activities in Chiatura

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
Contract documentation with constriction 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
Contract documentation with contractor	Environmental Issues	Once before contract signature	Environmental audit of contract documents to ensure relevant sections of Noice SSEMP for city Chiatura have been included.	The contract document shall reflect all environmental mitigation measurements	UWSCG
Contract documentation with contractor	Social Issues	Once before contract with construction company signed	Ensure relevant section of contructorsresposobilities to hire local population have been included in contract.	50 % of workers shoul be hired from local population.	UWSCG
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
Construction					

Item	Parameter	Frequency	Action Level	Response When Action Level Exceeded	Responsibility
Ambient Air	Dust	Continual	Visual assessment during the Works Impact Monitoring Compliance Monitoring	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
Noise	(15 minute) Noise Levels	Only as required: Periodic attended Monitoring at hourlyintervals at nearestpotentially sensitivereceivers Noise, should be monitored on the regular bases as well as during the peak operation of Construction Equipment and Machinery	+20 dBA for short term (1 Month)	If noise action level is exceeded then review workpractices and noisecontrol procedures,including maintenance ofequipment, installation ofsilencers, provisionof noise barriers andmodification of workhours.	Contractor
Dust	Dust Levels	Dally (At the nearest receptors. Dust should be monitored on the regular bases as well as during the peak operation of Construction Equipment and Machinery	Measurement	If noise action level is exceeded then review work practices and noise control procedures,	Contractor

Item	Parameter	Frequency	Action Level	Response When Action Level Exceeded	Responsibility
Vibration	Vibration Level	Vibration should be monitored on the regular bases as well as during the peak operation of Construction Equipment and Machinery	Measurement	If vibration action level is exceeded then review work practices and vibration control procedures,	Contractor
Water Quality	Quality/ Contaminant concentrates	Continue In rain weather after 10-15 minits rain stats.	Guideline / licence requirements (whichever is Applicable) Impact Monitoring Compliance Monitoring	If contaminant concentrations/licence conditions are exceeded, review disposal options and decide on most applicable. Report any accidences of licence (of applicable) to issuing authority.	Contractor
Waste Management Implications	Segregation, Storage and transport of wastes	Monthly inspection	- Visual assessment during the Works; - Field inspection, - Report of waste volumes generated. - Report and record all leakages and spills - Impact Monitoring. - Compliance Monitoring	Solid waste cycled as 0 % of movement of solids or liquid waste through the soil, rocks, water, atmosphere.	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	Required to ensure the recommended mitigation measures are properly	Contractor

Item	Parameter	Frequency	Action Level	Response When Action Level Exceeded	Responsibility
			Monitoring	implemented.	
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
Operation					
WWTP quality monitoring, inflow	BOD5, COD, Nitrogen, Phosphorus	weekly	Compare with design parameters		UWSCG
WWTP quality monitoring, aeration tank	Oxygen	daily	Compare with design parameters	Adjust treatment process	UWSCG
WWTP quality monitoring, aeration tank	Sludge volume	daily	Compare with design parameters	Adjust treatment process	UWSCG
WWTP quality monitoring, aeration tank	Dry matter contents	Thrice per week	Compare with design parameters	Adjust treatment process	UWSCG
WWTP quality monitoring, aeration tank	Dry matter contents of return sludge	Weekly	Compare with design parameters	Adjust treatment process	UWSCG
WWTP quality monitoring, aeration tank	Microscopical analysis	Twice per week	Compare with design parameters	Adjust treatment process	UWSCG
WWTP quality monitoring, outflow	Temperature, pH, suspended solids	daily	compare with permission	Adjust treatment process	UWSCG
WWTP quality monitoring, outflow	BOD5, COD, NH4-N, NO3-N, Pgesamt	weekly	compare with permission	Adjust treatment process	UWSCG
WWTP quality monitoring, outflow	NO2-N	monthly	Compare with design parameters	Adjust treatment process	UWSCG

Item	Parameter	Frequency	Action Level	Response When Action Level Exceeded	Responsibility
WWTP quality monitoring, outflow	Coliforms	monthly	Monitor development		UWSCG
WWTP quality monitoring, sludge treatment	temperature, pH	daily	Compare with design parameters	Adjust treatment process	UWSCG
WWTP quality monitoring, sludge treatment	dry matter contents	monthly	Compare with design parameters	Adjust treatment process	UWSCG
WWTP quality monitoring, sludge treatment	loss on ignition	monthly	Compare with design parameters	Adjust treatment process	UWSCG
WWTP quality monitoring, sludge treatment	sludge gas	daily	Compare with design parameters	Adjust treatment process	UWSCG
WWTP quality monitoring, sludge treatment	sludge production (watered, de-watered)	as required	Compare with design parameters	Adjust treatment process	UWSCG
WWTP quality monitoring	energy consumption	daily	Compare with design parameters	Adjust treatment process	UWSCG
WWTP quality monitoring	Methane	monthly	Check occurrence	Check sludge treatment installations	UWSCG
Chkhoushiriver water quality monitoring	Suspended particles, BODoverall, COD, Total Nitrogen, Total Phosphorus	weekly	Sample taking, water analysis, compare with baseline data	Compare with effluent quality, adjust treatment process	UWSCG
WWTP operation	Noise	monthly	Compare with Georgian standards for noise control	Inspect installations	UWSCG
WWTP operation	Odor	monthly	Compare with normal odor levels	Inspect installations	UWSCG

Item	Parameter	Frequency	Action Level	Response When Action Level Exceeded	Responsibility
Infrastructure	Breaks / Deteriorations/ Leakage	Monthly inspection	Visual Assessment Public Complaints Compliance Monitoring	If breaks/ failures occur, close isolation valves (or plug manholes)immediately and repair / replace to an acceptable standard.	Operational Unit
Qvirila River during failure of WWTP	O_2	Twice per day			Operational Unit

K. CONCLUSION AND RECOMMENDATION

K.1 Recommendation

254. The environmental impacts of infrastructure elements proposed in the waste water system improvement subproject in Chiatura have been assessed and described in the previous sections of this document. Potential negative impacts were identified in relation to design, location, construction and operation of the sub project components. Mitigation measures have been developed to reduce all negative impacts to acceptable levels.

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

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

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

258. The main beneficiaries of the improved system will be the citizens of Chiatura, who will be provided with a new waste water 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.

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

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

K.2 Conclusion

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

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

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

APPENDIX 1

"United Water Supply Company of Georgia", LLC

Public Hearing Meeting

Construction of Sewerage System and Wastewater Treatment Plant in Chiatura (Tranche VI)

Initial Environmental Examination

(ChiaturaTown Hall; 8 June, 2016; 15:00 PM)

Minutes of Meeting

The following persons attended the meeting:

- Ketevan Chomakhidze– "United Water Supply Company of Georgia, LLC" (UWSCG), USIIP, Environmental Specialist

264. The Public Hearing was held on June8, 2016 in ChiaturaTown Hall and commenced at 15:00. The Public Hearings was organized with representatives from the local government of Chiatura, local population and representatives of UWSCG.

265. By giving advertisements in advance at ChiaturaService Centre, attendance of a wide range of related people to the meetings was encouraged. During the public hearing, citizens were informed about the activities to be carried out within the scope of the Chiaturasub-project, environmental effects of the project and measures to be taken against these effects. Opinions, ideas and suggestions of the local residents and related people were received during the meeting.

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

267. The following topics were discussed during the meeting:

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

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

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

270. The following questions were asked from the local population.

#	Questions from Local residents	Answers from UWSCG
1	Who is responsible for repair and maintenance of WWTP in case of damage?	United Water Supply Company of Georgia
2	Who will supervise and monitor construction and operation of the project?	UWSCG and Supervision Consultant
3	When will start and finish project implementation	2017-2019
4	What is the social economic benefit of the project	UWSCG will ensure that local population are involved in the construction activities
5	Who will implement the project	Based on tender the implementing company will be selected
6	Who is responsible for the restoration after completion of the rehabilitation works and who will do it?	UWSCG is responsible for the rehabilitation works while contractor will carry out restoration works
7	What is duration, date of start and completion of the construction of the project?	Project will start in 2016 and finish in 2018.
8	Who is implementing and sponsoring the Project?	Project is co-financed by the Asian Development Bank (ADB) and the Government of Georgia and implemented by the United Water Supply Company of Georgia (UWSCG).

271. Representative of Chiaturamunicipality was asked to provide accurate time schedule of the planned works within the proposed sub-projects.Attendies expressed their positive attitude tovards the project and its value for the whole municipality.

ჭიათურის წყალმომარაგების სისტემის გაუმჯობესების ქვეპროექტი
Improvement of Chiatura Water Supply System Sub-project
საჯარო განხილვა
Public Hearing
(ჭიათურის მუნიციპალიტეტის გამგეობა)

8 ივნისი 2016

სახელი,გვარი Name	თანამდებობა Position	საკონტაქტო ინფორმაცია Contact information	ხელმოწერა Signature
[illegible]	[illegible]	khatuna_ts@yahoo.com 577 38-11-83	[signature]
[illegible]	[illegible]	temurchumburidze@gmail.com 599 34 32 30	[signature]
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