



MUNICIPAL DEVELOPMENT FUND OF GEORGIA  
საქართველოს მუნიციპალური განვითარების ფონდი

# Mtskheta Sewerage System Rehabilitation Sub-Project

## **ENVIRONMENTAL IMPACT ASSESSMENT**

Regional Municipal Infrastructure Development Project-  
Additional Financing (RMIDP -AF)  
Co-financed by World Bank and Sweden International  
Development Agency (SIDA)

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## **EXECUTIVE SUMMARY**

The Government of Georgia requested World Bank support for the implementation of the Regional and Municipal Development Project (RMIDP) aimed at the improvement of urban infrastructure throughout the country on the priority basis. Municipal Development Fund (MDF) is a non-banking financial intermediary which finances and manages implementation of sub-projects supported with the World Bank credit for the implementation of RMIDP. Rehabilitation of the sewage system in the historical town of Mtskheta is the current subproject proposed for financing under the RMIDP.

Mtskheta is an old capital of Georgia carrying numerous historical and cultural monuments, including a UNESCO cultural heritage site. Mtskheta and its surroundings are a major tourism destination located near the capital city of Tbilisi. A number of monuments as well as the historical center of Mtskheta have been recently renovated and the Government continues to invest into urban development of this settlement.

The existing technical condition of the sewerage system in Mtskheta is not satisfactory and requires major improvement, including construction of a waste water treatment plant (WWTP) and upgrade of the sewerage collection system. The project design is developed with consideration of the vital needs of the population of Mtskheta and the perspectives of tourism development.

### **Environmental Screening**

The project triggers the World Bank OP/BP 4.01 Environmental Assessment. Other environmental safeguards are not triggered, as the project will be implemented in the degraded urban area. The volume of water supply will not change due to the subproject implementation and hence the overall amount of discharge will remain the same, while the load of pollutants in it will decrease. Therefore, construction of the plant will not have any negative impact on the trans-boundary river Mtkvari, though OP/BP 7.50 Projects on International Waterways is triggered. No land take is needed for the project purposes. The waste water plant will be constructed on the State owned plot which is in no formal or informal use by any person. Although core historical center of Mtskheta town is a cultural heritage site and a major tourist destination, triggering of OP/BP 4.11 Physical Cultural Resources was found unnecessary, because the location selected for the WWTP is not adjacent to the heritage sites and has very limited visibility from them. The WWTP will only be distantly visible from the Cross Monastery situated on the top of the mountain across the river. Roofing and landscaping (screening via trees) of the WWTP premises will harmonize with the general appearance of the nearby constructions and not stand out from the landscape observed from above. Any chance finds, if encountered in the course of earth works, will be handled according to the established procedure included in the Operations Manual of MDF.

The proposed activities include new construction and also works near the surface water body. According to the World Bank OP/BP 4.01 Environmental Assessment, the project is classified as environmental Category B, requiring Environmental Impact Assessment (EIA). The Georgian national legislation also calls for the EIA process as well as the conduct of the State ecological expertise and issuance of an Environmental Impact Permit.

### **Public Participation/Involvement**

The first public consultation meeting on the draft EIA report was held on June 16, 2011 in Mtskheta Municipality. Input received through the consultation meeting was then used for further elaboration of the EIA report. A more advanced draft of this document was re-disclosed in-country on December 10, 2011 and the second stakeholder consultation meeting was held on December 19, 2011. Public attitude to the rehabilitation of Mtskheta sewage system, including the WWTP, is positive. Mtskheta community has no major concerns about the WWTP and measures proposed for mitigating potential risks are accepted.

## **Sensitive environmental receptors and potential impact**

The project activities are planned in the significantly altered and degraded landscape, away from the protected areas and valuable natural habitats. The project site does not have a conservational value. The main sensitive receptors in the vicinity of the project site are the river Aragvi – a tributary of the trans-boundary river Mtkvari, and the heritage monuments of Mtskheta. Considering that the project intervention will not change the volume of water discharge and decrease contents of pollutants in it, the long term environmental impact on the aquifer is expected to be positive. The project will not deteriorate aesthetic values of the site and the surrounding area, because at present the site is polluted with construction waste and is heavily deteriorated. Therefore, construction of the WWTP and the access road will discontinue unauthorized dumping of waste in the area and will contribute to upgrading the site. No nuisance to local communities is expected from the odors of the WWTP; because the nearest household is located 300 meters away from the site and also the sludge generated during its operation will not be kept on site. Organic waste will be regularly out-transported to the officially designated disposal site near the city of Rustavi, away from Mtskheta.

Negative impacts of moderate severity are expected only temporarily during the construction phase, and will be confined to the project site. Environmental and social risks of the construction phase are associated with the disposal of the construction waste, movement and operation of the construction machinery, sourcing and transportation of the construction materials; construction activities in proximity to the residential area and the water body.

## **Project Alternatives**

The “no-project” scenario was rejected, as the positive impacts of the project implementation highly prevail over the possible negative impacts. The no-project option would cause failure to meet the increasing demand for proper sanitation in Mtskheta associated with the growth of economic activity and tourist visitation in this town.

The main alternatives considered were related to the choice of location for the WWTP and the technologies for water treatment. The selected location of WWTP is at the lowest point above the sea level and allows gravity flow operation of the scheme, which is an energy and operational cost saving option.

Selection of the water treatment technology was based on the targeted parameters of water purification determined by the plans for developing recreational and water sports areas within and nearby Mtskheta, on the banks of the river where the WWTP discharge will flow. Rolling bioreactors and modules of similar capacity and quality of water treatment were rejected as they would not satisfy the strict requirements of the quality of water discharge.

Technologies of water purification using constructed wetlands and aeration ponds were rejected as they require vast territories unavailable in the project area and would be aesthetically inappropriate in the vicinity of the heritage town of Mtskheta.

Based on the above, a modern technological system of full biological treatment on the basis of activated sludge was given priority over the other considered options. This scheme allows meeting the intended parameters of the discharged water. The selected technological solution and design of the WWTP is permissive for possible increase of WWTP capacity and application of additional stages of water treatment.

## Project Description

The project implies construction of the WWTP.

WWTP will be located in the outskirts of the town of Mtskheta, on the right bank of Aragvi River, on the territory between the newly constructed car parking lot and Aragvi River. The nearest residential house is situated in 300 meters upwind from the WWTP. The land plot allocated for the WWTP construction is State owned. User rights to it are with the Mtskheta municipality. The territory is uninhabited, does not carry any elements of infrastructure, and is in no formal or informal use by anybody. The area is polluted with the dumped construction waste.

The area allocated for the WWT construction is 9000 m<sup>2</sup>. The tallest point of the construction will be at 6.15 m. WWTP will consist of the discharge water pumping station, automatic treatment screen and sand holder, RAS-pumping station, aeration basin, treatment mechanism of horizontal circular current in compliance with ATV-DVWK A131 standards, and the Central Operational Building. Operational Building will carry the office space, water quality monitoring laboratory, change rooms, toilets, and storage. Mosaic mimic diagram illustrating the technical processes will be arranged in the office, which will ensure quick visualization of the working conditions concerning the treatment plant. The project will finance procurement and installation of the equipment, including laboratory devices and initial stock of consumables. The centrifuge for sludge dehydration will also be located in the Central Operating Building.

The main technical parameters of the WWTP are as follows:

- Population served – 9500 persons;
- Average daily water discharge – 2500 m<sup>3</sup>/24hr;
- Maximum hourly discharge – 237.5m<sup>3</sup>/hr (66l/sec);
- Daily (24hr) number of admixtures according to calculations of suspended solids per capita – 70g/person/24hr;
- Daily (24hr) consumption of admixtures according to calculations of BAO (biological activity of oxygen) per capita - 60g/person/24hr;
- Daily (24hr) consumption of admixtures according to calculations of CAO (chemical activity of oxygen) per capita - 120g/person/24hr.

The main parameters of the discharged water are:

- Temperature not exceeding 12<sup>0</sup>C
- Suspended Particles – 30 mg/l;
- BAO<sub>full</sub> (biological activity of oxygen) – 6 mg/l;
- CAO (chemical activity of oxygen) – 30mg/l;
- Ammonia Nitrogen – 0.39 mg/l;
- Nitrates – 45 mg/l;
- Nitrites – 3.3 mg/l;
- Polyphosphates – 3.5 mg/l

## Possible Impacts and Mitigation Measures

The results of EIA show that majority of the potential environmental impacts of the project are associated with the construction phase and are of the temporary in nature. The main approach of the EIA was to provide adequate recommendations for the prevention or mitigation of negative environmental impacts of the project. These recommendations are applicable to both construction and operation phases. Taking into account the specific location of the project site, which is characterized with the proximity to the cultural heritage monuments, residential buildings, and the water body, the following measures were developed for mitigating the main risks associated with the project implementation:

- Disturbance of local communities: Movement of construction machinery, location of the temporary work yard, and temporary storage of construction materials and waste will be planned to avoid or minimize barriers for free movement of the local population. Deterioration of the air quality near populated areas will be controlled through the oversight on the technical condition of construction machinery. For decreasing disturbance from noise and vibration, the construction equipment with the lowest level of associated noise will be chosen. Operation of engines in idle regime will be discouraged.
- Operation of work yard and access roads: A work yard will be located in the maximum possible distance from the river bank and the residential houses. It will be organized to have designated areas for storage of materials and waste. If the yard will be used for servicing and fuelling of machinery, then the ground lining and barriers preventing release of spillage will be provided. The existing access road to the project site is an earth road with no topping. It may get extremely muddy and almost impassable in bad weather conditions. This road will be paved for the construction purposes and kept in a sound condition throughout the project implementation period.
- Operation of construction machinery: Technical condition of the construction machinery will be checked on regular basis to minimize air pollution from exhausts and soil/water pollution from leakage of fuel. The risk of operational and emergency spills of fuel and lubricants will be mitigated by designation of special parking and servicing sites, to be located away from the river bank and residential buildings.
- Earth works: Prior to excavation the project site will be cleared from the solid waste dumped on the plot. Due to the location of the project site in the area of the historical town of Mtskheta, there is a likelihood of chance finds in the course of the earth works. In case the chance finds are encountered, the works will immediately be taken on hold and the National Agency for Cultural Heritage Preservation of Georgia contacted for further instructions. Excavation and conservation of artefacts will be undertaken following these instructions and the construction will resume upon formal consent from this Agency. After completion of works the area along the laid pipes and the constructed WWTP will be reinstated.
- Accumulation of construction waste: Waste management under the proposed project will include disposal of the pre-existing solid waste dumped on the allocated site and along the access road to it as well as the temporary storage and disposal of waste generated in the course of construction. On-site temporary storage of waste will be organized in the designated locations away from the river bank. Sites for the permanent disposal of waste shall be selected and authorized by the Mtskheta municipality and be sensible from the ecological viewpoint. Disposal of any waste or excess material into the river bed or in the immediate proximity to the river banks will be strictly prohibited.
- Operation of quarries and borrow pits: Purchase of inert construction materials will be allowed only from the licensed legal and/or physical bodies. Extraction of these materials will also be allowed on the grounds of a special license. Opening of new borrow pits will be avoided if those already in operation can be used instead. Operation of quarries and borrow pits, as well as extraction of gravel from river terraces will be carried out strictly in accordance with the conditions of a license issued by the State authority.
- Landscape harmonization: Immediately after completion of the construction of sewage collecting pipes and the WWTP the site reinstatement will be carried out to harmonize the project sites with the surrounding landscape in the way preserving its aesthetic value. Due to the existing solid waste pollution on the project site there is no certainty about the presence and condition of the top soil within the project site. If the topsoil is available on-site, it will be stripped, stored separately, and spread over the site upon completion of works. If the topsoil is not available or polluted placement of grass carpets be applied. The final reinstatement of the project site will include plating of 400 trees.

- Occupational health and safety: Workers and other personnel involved in the rehabilitation of the sewage system will be provided with personal protection equipment and gear. They will receive training on the safety rules and course of action in case of emergencies.
- Pollution from WWTP Operation: Pollution levels in the waste discharge from the WWTP will be closely controlled by the on-site laboratory. Designed parameters of the WWTP are permissive for achieving acceptable quality of waste water discharge. Sludge generated through WWTP operation will be removed on daily basis by special truck(s) and delivered to the sludge disposal site of Tbilisi-Rustavi Regional Complex Sewer Purification Structures operated by Georgian Water and Power Ltd. (GWP) handling the solid waste from the Tbilisi sewage collectors. Transportation of sludge will be provided by special trucks owned by United Water Supply Company of Georgia (UWSC). Furthermore, for ensuring permanent and safe out-transportation of sludge from the WWTP, the Mtskheta municipality will upgrade access road to WWTP along which the sludge trucks will move. Ensuring good maintenance of this road will also be the responsibility of the local municipality. UWSC will take care of all arrangements for sludge transportation and will guarantee quantitative and qualitative sufficiency of the vehicle fleet allocated for transportation of sludge.

### **Environmental Management Plan**

EIA report includes an Environmental Management Plan (EMP) which carries a full list of the potential negative impacts of the project at the construction and operation phases as well as the measures to be applied for mitigating these impacts. EMP includes an environmental monitoring plan, which sets out the monitoring indicators, methods for measuring environmental compliance using these indicators, and parties responsible various aspects of environmental monitoring. EIA report spells out responsibilities for record keeping and reporting on the environmental compliance at the construction and operation phases of the project.

### **Operation of the WWTP**

Upon completion of works under Mtskheta Sewage System Rehabilitation project, the constructed infrastructure will be handed over to the municipality of Mtskheta, which will be responsible for its operation. Likelihood of risks related to operation of the WWTP is very limited:

- a. Flooding – river flow is regulated by upstream and downstream dams that precludes flooding of river banks, including that section of river where the WWTP will be located;
- b. Power outage – power supply will be provided through two independent lines and a backup generator is included in the investment, that will exclude interruption of power supply;
- c. Chemical spill in the sewage network which would distort balance of micro organisms critical for the treatment technology – composition of sewage collected from Mtskheta is the one of a standard domestic waste water, as no industrial customers are connected; thus tangible concentrations of chemical pollutants in the sewage is not expected;
- d. Human error – contractor training program and quality management approach is planned during project implementation that will ensure flawless operation of the WWTP. Operational Guidelines will be developed for the WWTP operation by a design-build contractor and relevant training will be provided to the operator's staff as part of the WWTP contract.

Adherence to these instructions by the operating authority would be sufficient for avoiding significant damage to the WWTP and the surrounding physical and natural environment in case of contingencies. Staff training and routine control of the WWTP operating parameters would be essential maintaining adequate skills for the flawless operation of WWTP and timely reaction to any issues that may arise. Sludge generated as a result of waste water treatment will be removed from the WWTP.

In the operation stage of the project the sludge produced as a side product of the technological processes will undergo dehydration and the maximum amount of sludge produced will make 25m<sup>3</sup> per diem. Sludge will be placed in containers and regularly out-transported by UWSC with special vehicles owned by this company. The sludge from Mtskheta WWTP will be delivered to the sludge disposal site of the Tbilisi-Rustavi Regional Complex Sewerage Plant (environmental permit #00230 of 20.06.09; resolution of ecological expertise #65 of 19.06.2009).



## **1. Introduction**

The Government of Georgia requested World Bank support for the implementation of the Regional and Municipal Development Project (RMIDP) aimed at the improvement of urban infrastructure throughout the country on the priority basis. Municipal Development Fund (MDF) is a non-banking financial intermediary which finances and manages implementation of sub-projects supported with the World Bank credit for the implementation of RMIDP. Rehabilitation of the sewage system in the historical town of Mtskheta is the current subproject proposed for financing under the RMIDP.

Mtskheta is an old capital of Georgia carrying numerous historical and cultural monuments, including a UNESCO cultural heritage site. Mtskheta and its surroundings are a major tourism destination located nearly the capital city of Tbilisi. A number of monuments as well as the historical center of Mtskheta have been recently renovated and the Government continues to invest into urban development of this settlement.

The project provides additional capital recourses for existing local urban infrastructure such as roads, water supply and sewerage and outdoor lighting for economically justified finance of rehabilitation and repair works. Local governance bodies must possess ability to satisfy criteria of agreed creditability in order to be authorized to get finance. Investments must take their part in improvement of healthcare and formation of better living conditions in participant local governances of the project.

City of Mtskheta is partly canalized. Approximately 80% of utility and sanitary water is carried by trunk sewers and is flown in the rivers Mtkvari and Aragvi, which is inadmissible from sanitary viewpoint.

By implementation of the project sanitary as well as existing environmental condition of the city Mtskheta will significantly improve, especially with the viewpoint of water eco-system. The project will help formation of city Mtsketa as a tourist centre with the stand point of development of appropriate infrastructure.

## **2. Georgian Legislation on the Environmental Protection, World Bank Environmental Protective Procedures and Project screening**

### **2.1. Georgian Legislation and Policy on the Environmental Protection**

One of the key priorities of the state policy is to bring the national legislation, including the legislation acts related to GZS into compliance with the European standards, despite of the fact that certain progress is already obvious. Georgia has still to perform serious work for implementation of those procedures, which are defined in the following directives:

- The directive 85/337/EEC of the council of the EU issued on 27 June 1985 regarding the assessment of the affect on the environment of separate social and private projects and in the amendment to this directive – 97/11/EEC.
- The directive 96/61/EC of the council of the EU issued on 24 September 1996 regarding the integrated measures for prevention and control of pollution.

The basis of the environmental protective legislation of Georgia is the constitution of Georgia (1995). According to the article 37 of the mentioned constitution: “Every person has the right to live in the safe environment for health, use the natural and cultural environment. Everyone is obliged to take care of the natural and cultural environment ‘’ (paragraph 3) ; ‘‘In order to provide the safe environment for human health, in compliance with the ecological and economic interests of the society, in consideration of the interests of present and future generations, the state ensures protection of the environment and rational utilization of nature’’ (Paragraph 4).

For realization of such a right the whole number of the legislative and normative acts have been adopted, which reflect the position of the state in this sphere, considering the whole number of the requirements of the international conventions and involve the entire complex of the measures for protection of environment.

## **Legislation Related to Issuing the Permission for Environmental Impact**

Nowadays, the procedures for issuing the permission for environmental impact in Georgia are regulated under the three laws:

Laws of Georgia: “On the Licenses and Permissions”; “Regarding the Permission for Affecting the Environment” and “Regarding Ecological Expertise”.

**Law of Georgia on the Licenses and Permissions**’ was adopted by the Parliament of Georgia on 24 June 2005. The law regulates those actions, which require the licenses and permissions, define the resourceful list of the licenses and permissions and the procedures for issuing them, making changes to them and cancellation of them including the ones in conjunction with the environmental protective sphere. According to the law, the permission is issued within 20 days term from the receipt of the application.

### **Laws regarding the Environmental Impact and ecological expertise**

The permission for affecting the environment is issued by the Ministry of Protection of Environment (authorized government body), the process of its issuing involves the following: a) Assessment of the affect on the environment, b) ecological expertise and g) involvement of community. Detailed procedures are mainly reflected in the laws on the Ecological Expertise and on Permission for affecting the environment.

According to the law of Georgia on the **Ecological Expertise**, the expert’s conclusion is the necessary condition for issuing the permission for affecting the environment. Conducting the economic expertise is the obligation of the Ministry of Protection of the Environment of Georgia and it is implemented by in compliance with the bylaw “Regarding the Rules for Conducting the Ecological Expertise” and requirements of the normative-technical acts established under the legislation, through the expert commissions.

The law of Georgia on the **Permission for Affecting the Environment** defines the full list of the activities subordinated to the mandatory ecological expertise on the territory of Georgia (Article 4, paragraph 1) and the rule for affecting the environment in order to implement them, involvement of the community in the decision-making process on assessment of the affect on the environment and issuing the permission, as well as the legal basis for informing it.

We will separately review the following laws to be considered in the process of assessing the affect on the environment.

Draft law of Georgia on **Waste** has not yet been approved. The following legislative acts of the Ministry of Labor, Health and Social Protection of Georgia define the rules for wastes disposal, which shall be observed during process of the road rehabilitation projects implementation.

Law of Georgia (1999) on **Compensation of the Damage Caused by the Hazardous Substance** defines the rule for calculation of the amount of the damage imposed on the environment while using hazardous substances and/or detrimental impact on the environment, by the Ministry of Protection of Environment.

The law of Georgia on **Technical Hazard Control**, which regulates the processes, when the activity contains the possibility of explosion emission and intoxication and presents the excessive risk for the human health and environment.

The sphere of regulation of the law of Georgia on the **Protection of the Atmospheric Air** is protection of the atmospheric air from the harmful impact upon the entire territory of Georgia, which might have a negative influence upon the human health and natural environment.

The law of Georgia on the **Minerals** identifies the requirements for issuing the license in compliance with this law and the procedures of the law of Georgia ‘‘ Regarding Licenses and Permissions’’.

The law of Georgia on the **Animal World** identifies the implementation of the actions of regulating usage of the wild animals and protection of them by the Ministry of Protection of the Environment on the entire territory of Georgia, including the protected territories. This function is now also possessed by the Ministry of Energy and Natural Resources of Georgia.

The law of Georgia on the **System of Protected Territories** provides definition of the categories of protected territories and identifies the frameworks for the activities allowed on those territories. Permitted activities are defined in compliance with the purpose of the territories and relevant management plans, as well as those international conventions and bylaws of the agreements, to which Georgia has been joined.

The law of Georgia on the **Red List and Red Book of Georgia** regulates the legal relationships in the sphere of drafting the ‘‘Red List’’ and ‘‘Red Book’’ of Georgia, protection and usage of the varieties facing the danger of extinction, as the instrument for protection of such varieties. Red list of Georgia was approved by the decree # 303 of the President ‘‘Regarding the Approval of the Red List of Georgia’’ (2 May 2006), which is the legally binding document in the sphere of defining the varieties facing the danger of extinction. The Red List was drafted on the basis of the criteria and guiding principles of the World Union for Protection of Environment (IUCN).

According to the law: every action including hunting, cutting etc is restricted, except for the special cases established under the law. In addition to the others, such special cases are:

- If a plant is diseased and its existence in the nature causes the danger for disease proliferation, in this case the only way out is to cut the diseased plant. Additionally, in conjunction with the aforementioned, the joint conclusion of the scientific-research institutes should be available;
- In case of construction of the special political infrastructure and unit.

**Forest Code of Georgia** identifies protection, restoration of the forest fund of Georgia, as well as the legal basis for utilization of its resources. The law defines the property rights on the forests of Georgia, principles for protection and utilization of the natural resources and rules of licensing. At present the process of making changes to the law is underway.

The law of Georgia on **Water** regulates the issue of utilization of the water resources. It defines the rights and obligations of water users, as well as regulates the issues of water uptake and water intake.

The law of Georgia on **Soil Protection** identifies the requirements for prevention of soil pollution, protection from erosion, secondary swamping and saltiness, as well as open pit mining of mineral wealth and construction materials and prevention of soil losses as a result of incorrect farming activities. The law also identifies the standards and norms for the limited allowed concentration of soil pollutant substances, for the purpose of improvement of human health and environment.

### **The law of Georgia on Cultural Heritage**

According to the law on Cultural Heritage on the entire territory of Georgia, the decision with regard to construction of the object of special importance identified under the legislation of Georgia, is made by the body identified under the legislation of Georgia (Ministry of Economy and Stable Development of Georgia, Ministry of Protection of Environment of Georgia), on the basis of the positive decision made by the Ministry of Culture and Protection of Monuments. The law points out to conduct the necessary research for the conclusions and field works. In addition to that, according to the article 10.1 of this law, if a natural person or legal entity discovers the cultural heritage while performance of the works, continuation of those works might cause the damage to the mentioned heritage or create jeopardy, a

natural person, or legal entity is obliged to immediately stop the works and notify the ministry within 7 days with regard to stopping the works and discovered heritage.

## 2.2 World Bank Policy in regards on prevention of undesirable side effects during implementation of the investment projects

Policy and procedures of the international financial organizations, including the World Bank, are mandatory for those projects, which are implemented under the financing and support of those organizations. They are the example of the best international practice of the environmental and social standards.

Environmental Assessment is one of the ten environmental, social and legal security policies, which are applied for improvement of the decision-making process, in order the project sustainability to be ensured and providing consultations to those parts of the community, which might be affected by the project.

The World Bank’s environmental policy/procedures related to preparation of the documents of impact assessment are OP/BP 4.01 Environmental Assessment, OP/BP 4.04 Natural Habitats, OP/BP 4.09 Pest Management, OP/BP 4.36 Forests, OP/BP 7.50 Projects on International Waterways, and OP/BP 4.11 Physical Cultural Resources.

Only OP/BP 4.01 Environmental Assessment and OP/BP 7.50 Projects on International Waterways are triggered for the present subproject.

**OP/BP 4.01 Environmental Assessment** is the guiding document, which defines the key requirements for affecting the environment for various types of projects and the format of assessment. Mentioned document is applied for assessment of the impact upon the environment, if the project is classified under the category A.

According to the World Bank procedures, the consultations shall be provided to the interested groups at least twice: after the preliminary environmental assessment and drafting the report of assessment of the impact upon the environment. In addition to that, World Bank procedure stipulates the consultations with the interested groups during the project implementation period, too.

OP/BP 7.50 Projects on International Waterways provides guidance on the communication of the information pertaining activities on water bodies shared by several nation-states by the country in which such activity takes place with the other riparians.

### Key differences between the World Bank Policies and the national legislation of Georgia pertaining environmental impact assessment

World Bank Policy	National Legislation
Environmental classification implies categorization of activities into A, B, and C types, depending on the extent of their risks and potential impacts, out of which Category A and B activities usually require environmental assessment.	Environmental classification implies categorization of activities into those which require environmental assessment and those which do not require it.
Environmental impact assessment usually implies development of environmental management and monitoring plans.	Not required
For Category A activities public consultation is required at least twice – at an early stage of the environmental assessment (to discuss scope and methodology) and at the final stage (to discuss findings)	Public consultations for all types of activities subject to the environmental assessment are required once – upon delivery of the final draft report.

### **2.3 Result of the project screening**

The project triggers the World Bank OP/BP 4.01 Environmental Assessment and OP/BP 7.50 Projects on International Waterways. Other environmental safeguards are not triggered, as the project will be implemented in the degraded urban area. The volume of water supply will not change due to the subproject implementation and the overall amount of discharge will hence remain the same, while the load of pollutants in it will decrease. Therefore, construction of the plant will not have any negative impact downstream. Nonetheless, OP/BP 7.50 is triggered, as the treated water will be discharged to the trans-boundary river Mtkvari. No land take is needed for the project purposes. The waste water plant will be constructed on the State owned plot which is in no formal or informal use by any person. Although core historical center of Mtskheta town is a cultural heritage site and a major tourist destination, triggering of OP/BP 4.11 Physical Cultural Resources was found unnecessary, because the location selected for the WWTP is not adjacent to the heritage sites and has very limited visibility from them. The WWTP will only be distantly visible from the Cross Monastery situated on the top of the mountain across the river. Roofing and landscaping (screening via trees) of the WWTP premises will harmonize with the general appearance of the nearby constructions and not stand out from the landscape observed from above.

The proposed activities include new construction and also works near the surface water body. According to the World Bank OP/BP 4.01 Environmental Assessment, the project is classified as environmental Category B, requiring Environmental Impact Assessment (EIA). The Georgian national legislation also calls for the EIA process as well as the conduct of the State ecological expertise and issuance of an Environmental Impact Permit.

### **3. Project Description**

#### **Existing Conditions of Water Supply and Sewage Systems**

Water is supplied to the town of Mtskheta from the Natakhtari reservoirs, which are fed by ground water. The water is fed to the town's water pipeline from five pressure tanks with a total volume of 1300 m<sup>3</sup> and one interim pumping station (Pikris Gora settlement). Water pipeline system is partly amortized and requires to be renovated – with the purpose of reducing losses of water.

Main part of the town is served with a sewer system. Town's domestic-fecal sewage is discharged through the collectors and currently flows into the rivers: Mtkvari and Aragvi without previous treatment, which is not permissible according to sanitary regulations.

Rehabilitation of main sewer system collectors (total length of 1,838 m) implemented by Mtskheta Municipality is underway and will be completed before commencement of WWTP construction.

#### **Description of WWTP Project**

WWTP will be located in the outskirts of the town of Mtskheta, 550 m from the city center, on the right bank of Aragvi River, on an area between the newly constructed car parking lot and Aragvi River. The nearest residential house is situated in 300 meters from the WWTP. The land plot allocated for the WWTP construction is State owned. User rights to it are with the Mtskheta municipality. As confirmed through the site inspection, the territory is uninhabited, does not carry any elements of infrastructure, and is in no formal or informal use by anybody. The area is polluted with the dumped construction waste.

The area allocated for the WWT construction is 9,000 m<sup>2</sup>. The tallest point of the construction will be at 6.15 m above current ground level. The WWTP will consist of the waste water pumping station, automatic treatment screen and sand holder, Returned Activated Sludge (RAS)-pumping station, aeration basin, treatment mechanism of horizontal circular current in compliance with ATV-DVWK A131 standards, and the Central Operational Building. Operational Building will carry the office space, water quality monitoring laboratory, change rooms, toilets, and storage. Mosaic mimic diagram illustrating the technical processes will be arranged in the office, which will ensure quick visualization of the working conditions concerning the treatment plant. The project will finance procurement and installation of the

equipment, including laboratory devices and initial stock of consumables. The centrifuge for sludge dehydration will also be located in the Central Operating Building.

Key parameters of sewage purification structures are:

- Estimated number of connected and served population – 9 500;
- Average daily processing of sewage - 2500 m<sup>3</sup> /per day;
- Maximum processing of sewage per hour - 237,5 m<sup>3</sup> /per hour (66 liters/per second);
- Daily quantity of admixtures as per the weighted substances through calculation per capita – 70 gr/per capita/day;
- Daily quantity of admixtures Daily quantity of admixtures Biological Oxygen Demand (BOD), through calculation per capita – 60 gr/per capita/day;
- Daily quantity of admixtures Daily quantity of admixtures Chemical Oxygen Demand (COD), through calculation per capita – 120 gr/per capita/day;

Expected composition of the purified sewage, which is more stringent than international standards (*see table below*) due to “sensitive” cultural and environmental context of treatment plant site, is as follows:

Weighted particles – 30 mg/l;                      Nitrates - 45 mg/l;  
 BOD<sub>total</sub> - 6 mg/l;                                      Nitrites – 3,3 mg/l;  
 COD<sub>t</sub> - 30 mg/l;    Ammonium Nitrogen - 0.39 mg/l;  
 Polyphosphates - 3.5 mg/l

The Table below compares Georgian waste water treatment standards with some international standards (*Technical Report, Preliminary Assessment – Wastewater Sub-sector for small Cities and Towns; Preliminary steps towards a nationwide Wastewater Management Strategy; World Bank, December 2010*).

Wastewater Treatment Requirements							
Parameter	Raw Sewage – range			Treated Effluent Standards			
	Strong	Moderate	Mild	World Bank Env. Guidelines	UWWT/ WFD* (2,000-10,000 p.e.)	UWWT/ WFD* (>10,000 p.e.)	Georgia (Order N 745; 13.11.2008)
<b>BOD<sub>5</sub></b> (mg/l) Biochemical oxygen demand	350	250	150	50	25 (70-90% influent reduction)	25 (70-90% influent reduction)	<b>25</b>
<b>COD</b> (mg/l) Chemical oxygen demand	740	530	320	250	125 (70% influent reduction)	125 (70% influent reduction)	<b>125</b>
<b>TSS</b> (mg/l) Total Suspended Solids	450	300	190	50	35 (90% influent reduction)	35 (90% influent reduction)	<b>60</b>
<b>Total P</b> (mg/l) Phosphorous	23	16	10	2	-	2 (80% influent reduction)	<b>2</b>
<b>Total N</b> (mg/l) Nitrogen	80	50	30	10 (Ammonia)	-	15 (70-80% influent reduction)	<b>15</b>

\* European Union's Urban Wastewater Treatment Directive

The parameters of the purified water are achievable, when the temperature of the sewage exceeds or equals to 12°C. Detailed design of the WWTP will be adjusted to the local climatic conditions the way to

ensure keeping the temperature at the level permissible for the achievement of the established standards of treated water at all seasons.

Implementation of the mentioned project provides purification and neutralization of the domestic-fecal waters, after which the purified water will be flown into the river that satisfies maximum concentration of pollutants established with the rules of “protecting surface waters of Georgia (confirmed with the order № 130 of September 17, 1996 by the ministry of Environment and Natural resources of Georgia)”.

The volumes of the works intended for construction of Mtskheta sewer system collectors and purifying structure are as follows:

### Volumes of the construction works stipulated by the project

#	Name of the works	Unit	Quantity
1	Land excavation and removal works	m <sup>3</sup>	12776
2	Delivery of sand gravel	m <sup>3</sup>	8948
3	Spreading of the humus soil and grassing	m <sup>3</sup>	3800
4	Concrete works	m <sup>3</sup>	1459
5	Supports	t	234
6	Drilling of the piles D=60 cm	m	180
7	Installation of pipe-line	m	908
8	Fencing with the metal mesh through installation of the concrete and brick foundation	m	500
9	Asphalt installation on the access roads	m <sup>2</sup>	760
10	Planting the trees	pcs	400

### 3.1 Technological Scheme for the Operation of Purifying Structure

#### Inflow Pumping Station

In the inflow pumping station will be installed a manual-cleaned basket to filter coarse material to prevent the pumps for damage. The cleaning intervals depend on the quantity of screening material but should be approximately once a week.

One active pumps and one stand-by pump will be used.

Before passing the screen, the water flow is measured by a magnetic flow meter which will be installed in the rising pipe to the screen.

#### Screen/Grit Chamber

After being pumped towards the WWTP, the wastewater passes an automatic rake screens with spacing of 6 mm between the bars and an inclination of 80°. The screen and the grit chamber consist of a compact module



**Figure 1: Compact Module Screen/Grit channel, Noggerath Technologies**

The screen can be pivoted out for maintenance. A water level detector in front of each screen initiates the cleaning procedure. Channel penstocks upstream and downstream the screen will allow for easy maintenance in the dry channel.

The grit chamber will be cleaned automatically. The sand is conveyed by a screw into containers.

**RAS Pumping Station / Distribution Chamber 1**

The return activated sludge pump station (RAS-Pumping station) is designed for a maximum return sludge ratio of 80% of the inflow (190 m<sup>3</sup>/h). The pump station is equipped with two centrifugal pumps, one of them is on stand-by. The inflow of each clarifier can be controlled by vertically adjustable inflow pipes.

The flow rate should increase with increasing inflow to the WWTP. To achieve this, the pumps are switched on and off according to the inflow rate which is measured online.

In addition to this, the PS serves as an excess sludge pump station. One excess sludge pump is installed which is designed to convey the daily amount of excess sludge within one interval to the thickener. Both distribution chambers are equipped with adjustable penstock weirs made of inox. The width of the penstocks is chosen to allow for an overfall height of about 25 cm maximum.

**Aeration Tank/Thickener**

After being mixed with the RAS, the wastewater is distributed to one round aeration tank with intermittent de-nitrification. In the middle of the aeration tank the thickening tank is placed. One mammoth rotor in combination with two mixers will assure the required oxygen entry in the tank and a complete mixing. The length of the rotor machine is 9 m. The activated sludge tank volume is 3,500 m<sup>3</sup>, while the thickening volume in the centre is about 250 m<sup>3</sup>.

A second line can be constructed for the extension stage.

Since the aerators are shorter than the tanks width, additional walls are envisaged to carry one bearing of the aerator. Additional guide baffles are placed behind the aerators. These baffles deflect the bubbles downwards and by this increase the efficiency of the aerators.

Each aerator will have a power consumption of 22 kW. It is determined by the maximum hourly oxygen demand in the aeration tank, the specific oxygen input per meter shaft length of the aerators and the  $\alpha$ -factor of 0,95 for surface aerators.

A control of the aerators following the oxygen and/ or nitrogen content is not envisaged, but all aerators will be time controlled, to that they can be switched on and off according to a typical inflow curve. The aerators are covered by concrete bridges with covers made of glass fiber reinforced plastic or aluminum.

The inflow is placed behind the effluent in order to provide a long passage before some of the inflow can leave the tank.

The de-nitrification share should be 40% or higher, in order to achieve a good de-nitrification which helps to save electrical energy for the aerators.

For a complete mixing, especially during the phases without aeration, 2 mixers are installed in the aeration tank.



The thickener compresses the sludge up to a dry matter solid content of 2.5 %. The volume of the tank includes a thickening time of two days and a storage time of five days. Each two days (for instance Monday, Wednesday and Friday), the sludge will be pumped by a pumping station to the belt filter press. Prior to pumping the sludge out of the tank, the supernatant water is withdrawn by a vertically movable pump towards the aeration tank. Then the mixer is switched on and provides an evenly mixed sludge quality.

### Clarifier

The clarifier is designed as horizontal flow circular clarifier according to the standard ATV-DVWK A131. A circular scraper moves the settled sludge on the sloped floor towards a central sludge well, which is connected to the return sludge pump station.

Floating sludge is moved by a portable pump in the effluent device from where it is pumped into the RAS-pumping station.

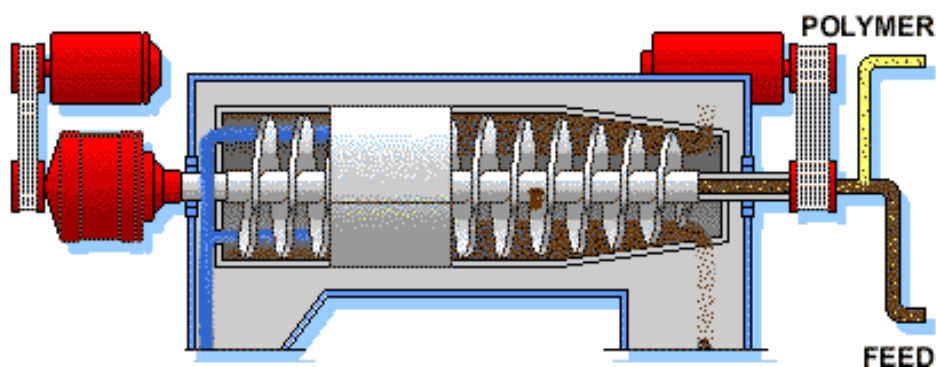
The clear water is withdrawn by a submersed Inox pipe with slots (see Figure 2).



*Figure 2: Effluent Pipe, Huber Technology SE*

### Sludge Dewatering

A centrifuge has been chosen for sludge dewatering. It will be placed in the operation building together with the polymer station.



*Figure 3: Centrifuge (Alfa Laval, Germany)*

Polymers are added to the thickened sludge and centrifugal forces inside the rotating machine separate the sludge from the liquid.

Sludge dewatering will be done every second day. The centrifuge is dimensioned accordingly.

- Sludge production (2.5% TS): 25 m<sup>3</sup>/d

- Throughput of the centrifuge: 12 m<sup>3</sup>/h (2.5% TS)

As far as the volume of the sludge generated as a result of dehydration, is not large, that is why, for the purpose of its temporary allocation, it is not necessary to install the separate storage. The sludge, which will be placed into special containers, will be taken out (removed) on a daily basis by special trucks and allocated on the sludge sites of Tbilisi-Rustavi Regional Complex Sewer Purification structures. The sludge will be placed into the containers and allocated at Gardabani sludge sites. This issue will be agreed with gwp (Georgian Water and Power Ltd.).

### ***Operations Premises***

In the operations premises the space is detached for one office, laboratory and rooms for changing the clothing, toilets and storage. In one office the mosaic mimic diagram will be arranged, which provides the quick visualization of the working status related to the purification structure. Mimic diagrams reflect the existing real general situation at any time, in case of any mal-functioning or switch on/switch off system is out of order. Within the framework of the project, it is considered to purchase and install the necessary equipments for it, including the equipment of the laboratory with the necessary preparations. For the necessity of the technological processes it is intended to purchase the material sufficient for 3 months, as well as the material for the laboratory analysis sufficient for 6 months.

### ***Power Supply to the Purifying Structure***

*For power Supply to the purifying structure it is intended to use the two independent sources and diesel generator as an emergency energy supply source, which will be used only if both power supply will be out of working condition*

### ***Quality of the water streaming out of the purifying structure***

Quality of the purified water streaming out of the purifying structure complies with the approved limited allowed norms, in particular:

#	Ingredients	Allowed concentration mg/l	Maximum permissible discharge g/h
1.	Weighted particles	30	7125
2.	BOD <sub>-total</sub>	6	1425
3.	COD	30	7125
4.	Nitrogen Ammonium	0,39	93
5.	Nitrates (NO <sub>3</sub> )	45	10688
6.	Nitrites(NO <sub>2</sub> )	3,3	784
7.	Polyphosphates (PO <sub>4</sub> )	3,5	831

## **3.2 Requirement for the Construction Materials**

The construction contractor will propose to MDF for approval the access roads. Contractor must obtain written instructions from local authority for waste disposal in the designated landfill. If contractor wishes to open/operate quarries and/or extract gravel rather than purchase these materials from the licensed vendors, the contractor must hold or obtain licenses for extraction. During the process of the project implementation not a single illegal source will be used.

Maintenance of the quarries shall be performed by the licensed company or the construction contractor, which will receive its own license. There are potential impacts caused due to the utilization of the quarries upon the status of the river bed and the grove. In order to avoid the impact, it is necessary to meet the conditions of the license in a detailed manner, as well as the EMP requirements.

Licensed gravel sand quarries existing near the treatment facility are shown in the table below:

N	License number	Total extracting volume m <sup>3</sup>
1.	100764	50000
2.	00880	34500
3.	100335	45300
4.	0000035	910000
5.	0000015	900000

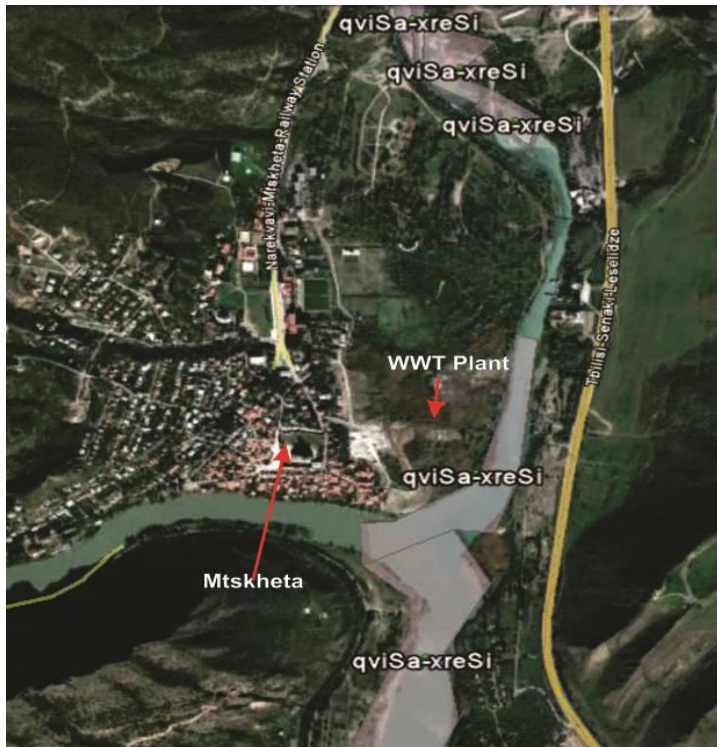


Fig. 3.1 Gravel sand quarries near the treatment facility

### 3.3 Expected Types of the Construction Debris

Pre-construction clean-up of the WWTP site will be carried out by the Mtskheta municipality and would imply removal of the deposited construction and municipal waste. This activity is outside the scope of the project, but represents a pre-requisite for mobilization of the works contractor to be hired under the project.

Quantity of the construction debris is dependent upon the scope of the works to be performed, as well as the types and quantities of the used materials.

Minimization of the construction debris will be possible in compliance with their classification. According to the project, it is planned to construct the necessary premises for the sewer system and purifying structure (sewage pumping station, sewage purifying structures etc). Below is given the classification of the presumable construction debris:

- Defective and damaged details and materials (block, brick panels etc), non-conditioned construction materials, the debris generated during the performance of the installation works etc);
- Metal waste (ferrous and non-ferrous);
- Wooden materials;
- Polymeric waste (packing and insulation materials)

- Waste of the machines and mechanisms, including hazardous wastes (fuels, lubricants, solvents, cleaners, and oil absorbent chemicals [used in case of spills and leaks of oil products]).

Domestic waste generated on the territory of the construction camp will be temporarily stored in special containers and finally will be disposed at the official garbage dump, in compliance with the agreement signed with the relevant service of the local government, which will be held responsible for removal of the debris and disposal at the garbage dump.

It is considered to sort the inert solid construction debris and temporarily store as per the types on the construction sites, from which the inert construction debris will be removed to the site of the construction debris, or to the garbage dump, which will be done by the aforementioned relevant service of the local self-governing body, in compliance with the agreement signed with them. As for the hazardous waste (e.g. soil polluted with oil products, other material and absorbent chemicals) will be neutralized and disposed as per the established rule. Hazardous waste will be removed by a specialized and licensed company, which will be required to be sub-contracted for this purpose by the general Contractor.

### 3.4 Expected Types of the Waste in the Phase of Operation

In the phase of operation, together with the domestic waste, generation of **solid residue** (sludge) surplus is also expected:

#### **Solid residue**

##### Pumped out of the settlement reservoir

- Dry component approximately 0,7%
- Quantity approximately 78 m<sup>3</sup>/per day

##### Thickened in the thickener

- Dry component 2 %
- Quantity approximately. 27,5 m<sup>3</sup>/per day = 10 000 m<sup>3</sup>/per annum

##### Thickened within the sludge chamber

- Quantity approximately. 22 m<sup>3</sup>/per day = 8 100 m<sup>3</sup>/per annum

##### In the belt filter press

- Dry component approximately 25 %
- Quantity approximately. 2,6 T/per day = 950 T/per year

There are several options for management of the mentioned waste (for waste recycle/utilization):

- Removal and cover at the garbage dump.
- Use in agriculture.
- Use in landscape architecture (for instance, for planting of greenery)
- Use in timber growing, where the timber is subsequently used as firewood or in the construction industry.
- Use as a fuel, instead of the fossil fuel (for instance, in the cement production).

In case of Mtskheta WWTP, the sludge placed in special container trucks, will be removed every day and delivered to the regional sludge depository serving Tbilisi-Rustavi sewer treatment facility. This facility is located in Gardabani (near Tbilisi) and has 10 sludge drying fields, each of them of 2 ha. That makes total of 20 ha area allocated for sludge drying. Dried sludge remains on site as capacity of the existing fields is currently underutilized and permissive for accumulation of the dried sludge for years to come. By 2018 GWP company plans reconstruction of the Gardabani facility and solutions for the final disposal of material will be worked out by that time.

## **4. Baseline Environmental Data**

### **4.1. Physical environment**

#### **4.1.1 Population**

Mtskheta municipality is located in the Eastern part of Georgia and belongs to Mtskheta-Mtianeti by historical-geographical division. Area of its territory makes 805.5 square kilometers and includes mostly flat-hilly plain, low and medium altitude uplands. The municipality includes 1 city and 55 villages that are ordered into 13 territorial bodies of self-government. The city of Mtskheta is located at a distance of 10km from Tbilisi.

The number of population of the municipality was stable in 2002-2006, it has grown insignificantly (by 0,4%) and according to the existing data amounts to 65,2 thousand people. In the city of Mtskheta itself the number of population is 12,000 people.

According to the data of the general census of the population of 2002, 90,7 % are Georgians, 3,4% - Azeris, 2,2% - Ossetians and the rest of people belong to other nationalities.

#### **4.1.2 Infrastructure**

The infrastructure is determined by the location of the region and the city of Mtskheta, its physical environment and the activities of its population.

Livestock farming has been the main agricultural activity during many centuries. This traditional agricultural activity still is considered a priority in the region, since land use is largely agricultural, with natural pastures and meadows constituting 78% of the whole territory, out of which 88% are occupied with pastures and 12% with meadows.

Employment indicators show a general upwards trend in the period 2002-2005 by 35%, out of which 81% is attributed to agriculture and 25,6% to industry.

It is to be mentioned that Mtskheta is considered as a “city-museum” with many historical monuments and places that are attractive for local as well as for foreign tourists. Tourism is facilitated by the proximity to the capital city of Tbilisi. Tourist flow is spontaneous and it is not regulated. The municipality has tourism development potential that is expected to be beneficial for the local government and population.

Based on the above, the infrastructure is accordingly developed and is mainly directed towards tourism – historical and cultural objects preservation and better access. Also developed are small enterprises. Recently the Government’s attention is focused on roads, energy (gas), water, and tourist infrastructure development in the region.

#### **Strategic directions are:**

##### **Infrastructure development for better living conditions and support of entrepreneurial activities**

Mtskheta municipality internal roads rehabilitation;  
Uninterrupted supply of Mtskheta and villages population with water;  
Full gasification of Mtskheta municipality;  
Repair and improvement works in Mtskheta municipality;  
Improvement of address service.

##### **Agriculture development support in order to increase level of employment for the Municipality population and revenues of households**

Assistance in arrangement of agricultural equipment station and service center  
Assistance in arrangement of seed grain and pest-killer chemicals service center

##### **Tourism development in order to employ population and revenues**

Tourist routes study and accurate definition;  
Bringing into order approach roads to historical, cultural and religious tourist places of interest and the infrastructure;  
Advertising of historical, cultural and religious places of interest;  
Attraction of human resources in tourism, training-retraining.

#### ***4.1.3 Land ownership and usage***

Despite the fact the biggest part of the total municipal land resource is in the State ownership, 52,7% of agricultural lands are privately owned, including plough-land – 63,9%, perennial plant – 93,8%, fruit gardens – 98,3%, vineyards – 89,1% as well as small amount of meadows (19,4%) and pastures (15,3%).

The land allocated for project activities is in State ownership.

#### ***4.1.4 Cultural heritage***

Mtskheta is considered a “city-museum” with many historical monuments and places that are attractive for local as well as for foreign tourists.

Historically, the territory of Mtskheta and its circumscription was populated from the early and middle Bronze Age (III-II millenia B. C.). In the late Bronze Age and early Iron Age (II-I millenia B. C.) it was already heavy populated territory (Samtavro, Zemo Avtchala, Tsitsamuri, Narekvavi, Tserovani, Nabagrevi ancient settlements).

It is to be mentioned that according the Project, construction works shall be completed on the territories where the cultural monuments are not located. The above mentioned monuments are located at significant distance from the construction object. However likelihood of chance finds in the course of earth works does exist. Procedures for handling them are well established and have been part of the Operations Manual of MDF for years. In case of a chance find, works contractor is required to immediately take all physical activity on hold and promptly notify MDF. MDF communicate the information to the Ministry of Culture and Monument Protection. This Ministry takes lead in assessing situation on site and determining further course of action, which may imply conduct of excavations, on-site conservation of artifacts, their out-transporting from the site, etc. Once the site is clear for resumption of civil works, the Ministry of Culture formally communicates this message to MDF and MDF formally authorizes works contractor to proceed.

### **4.2. Physical and biological environment**

#### ***4.2.1 Soils***

The following main types of soils are in the region of the Project implementation: alluvial soil, meadow brown soil, humus-carbonate soil, brown soil, rendzina-gray, gray, mountain-meadow, mountain-meadow secondary and primitive soils.

On the terraces of Aragvi River, where the project will be located alluvial soils are prevailing which are characterized by low content of fines and organic substances and big amount of fluvial sediments (sand and well rounded pebbles, gravel, stones). These soils commonly have a low fertility and are not used for agricultural activities.

Meadow brown soils occur in foothills valleys on the first and second terraces of Aragvi in enclaves. They are characterized by well defined humic profile and clays.

Humus-carbonate soils are widespread and the area is connected with carbonate strata spread. Humus-carbonate soils are characterized by dark color and heavy mechanical contents.

Brown soils are widespread at 1000 meters from the sea level. The soil is brown and is characterized by heavy mechanical contents.

#### **4.2.2 Hydrology**

There are many full-flowing rivers in the region. At Mtskheta there is the place of confluence of the rivers Mtkvari and Aragvi.

##### **Characteristics of the river Mtkvari**

The riverhead of Mtkvari is in Turkey, on the North-East slope of Kyzyl-Ghaydyk Mountains at 2700 meters altitude. The length of the river is 1,364km and the area of the basin is 188,000 km<sup>2</sup>. The length of the river on the territory of Georgia is 360 km. Basin area on Georgian territory is 26,000 km<sup>2</sup>. The river is fed by snowmelt, rain and ground waters. The highest level of water is in spring, with about 53% of yearly discharge. Summer discharge makes 25% of yearly discharge. Low is the indicator in autumn and winter, when the seasonal discharge amounts to 12 and 10% of yearly discharge accordingly.

Sediment transport is connected with river discharge. Maximum daily average load varies between from 470kg/sec to 32,000kg/sec at different monitoring stations. Water turbidity is also important; its registered level varies from 2,700 g/m<sup>3</sup> to 12,000 g/m<sup>3</sup> at different monitoring stations.

The Mtkvari river is fed chiefly by snow (36 percent) and ground water (30 percent); it is also fed by rain (about 20 percent) and glaciers (14 percent). The average annual discharge is about 205 cu m per sec at Tbilisi. The maximum flow occurs in spring (60–69 percent). In Mtskheta spring high water begins in late March, reaches its maximum in May, or sometimes in June, and subsides by late July.

Utility nets of almost every city and town in South and Central Georgia are connected with the basin of Mtkvari. Utility waste waters of the towns situated by the river are discharged into the river almost without treatment.

##### **Characteristics of the river Aragvi**

The river Aragvi is created by confluence of White and Black Aragvi near town of Pasanauri at 1040 meters. The river flows into the river Mtkvari from the left bank at a distance of 906km from the mouth, at Mtskheta.

The length of the river is 66km, total fall – 597m, average slope 9,1%. Volume of water catchment area – 270sq. meters and average height – 1600m.

716 rivers are considered to be in the river basin, with total lengths of 1926km. Out of those the biggest tributaries are: White Aragvi (length – 41km), Black Aragvi (length – 30km), Arakala (length – 12km), Kerkhi (length – 15km), Pshavis Aragvi (length – 56km), Dushetis Khevi (length – 15km), Abanos Khevi (length – 12km), Akhatnis Khevi (length – 16km), Tedzami (length – 28km), Narekvavi (length – 41km), the average frequency of rivers net is 0,70km/km<sup>2</sup>.

The river is fed by snow, rain and ground waters, glaciers, despite of their decreasing size, still play insignificant role in feeding the river.

Jinvali HPP rezervuare is located upstream of Project site and water flow of aragvi river is regulated by HPP. Therefore it never dries.

In the river mode there are floods during hot period of the year, occasional occurrence of low flow in autumn, and a permanent low flow in winter.

In accordance with the last data of Environmental Agency of Georgia (former Center of Environmental Monitoring and Forecast), concentration of polluting substances in the water of r. Aragvi is the following:

#	Determining ingredients	mg/l
1	BAO5	1.78
2	Dissolved oxygen	8.1
3	Ammonium nitrogen	0.008
4	Nitrate nitrogen	0.130
5	Nitrite nitrogen	0.342
6	Phosphate	0.031

#### 4.2.3 Atmospheric air

There are no industries or/and other atmospheric air pollution objects located on the Project territory. Quality of atmospheric air in terms of pollution with hazardous substances are, probably the following:

Table 10.4.1

Name of substance	Code of substance	MAC, mg/m <sup>3</sup>	Maximum value of relative ground concentration, C <sub>m</sub> /MAC
nitrogen dioxide, NO <sub>2</sub>	0301	0,085	< 0,1
nitrogen oxide, NO	0304	0,150	< 0,1
carbon black, C	0328	0,500	< 0,1
sulfur dioxide, SO <sub>2</sub>	0330	5,000	< 0,1
carbon monoxide, CO	0337	1,000	< 0,1
hydrocarbons (paraffin)	2732	1,2*	< 0,1
summation (0301+0330)	6009		< 0,1

\* **RSLI** - reference safe level of impact

In accordance with the mentioned, the project will be implemented in the area with no pollution category.

The project object has no stationary sources of atmospheric air pollution and, accordingly, there will be no emission of hazardous substances during the operation.

Thus the object does not need development of technical report for inventory of the atmospheric air pollution sources and emitted hazardous substances and project for maximum allowed norms of emission of hazardous substances.

#### 4.2.4 Flora and Fauna

##### Vegetations

The territory for construction is the habitat of low conservation value, namely: the territory is littered with construction wastes. There are no trees and, correspondingly, no species, included into the Red List of Georgia. Vegetation is made up of grass cover and single bushes of low conservation value on the small area.

##### Vulnerable areas

Based on the review of reference data and field investigations there are no areas of high and medium vulnerability identified on the territory of the construction site location. Field investigations included on-site estimation of the territory in order to identify sensitive areas and species there.



As a result of review of reference data of biodiversity at the region of activities, the following vulnerable areas were identified in the region that are located at a significant distance from the construction site and there is no risk of any impact from the activities.

1. **Saguramo ridge** that is covered by oak, (*Quercus iberica*), hornbeam (*Carpinus caucasica*), and beech (*Fagus orientalis*) forests. Beech forests often with evergreen underbrush dominate on the crest of the ridge. The underbrush consists of butcher's-broom (*Ruscus hypophyllum*), ilex (*Ilex colchica*), cherry laurel (*Laurocerasus officinalis*), spindle tree (*Euonymus armasica*), hyrkanian species of ivy (*Hedera pastuchovii*).
2. **Colchis box tree** (*Buxus colchica*) groves can be found in oak- hornbeam forests near **village Saguramo**.
3. Fragments of flood-plain forests (*Salix australior*, *Populus canescens*, *P. nigra*, *Quercus pedunculiflora*, *Tamarix spp.*, *Hippophaë rhamnoides* and others) extend along the **river Aragvi till Pasaauri**.

## **Fauna**

There are many animals in the region of activities, among them – 118 species of butterflies, 93 species of nematodes. In the region are found: 84 species of fish, 15 of them are endemic for Georgia; 52 species of reptiles, 15 of them endemic to Caucasus, 13 species of amphibians, 3 of them endemic to Caucasus, 322 species of birds, 15 of them endemic to Caucasus.

In the specific project area itself, there was no evidence of wild animals, except field mice (several holes were seen) and feral dogs. No bird nests and any other evidence of systematic groups of animals are seen on the territory. This is natural due to the low conservation value of the construction territory and its deteriorated condition (littered).

## **Fish**

Vertical zoning has big impact on the distribution of ichthyofauna in the basin of river Aragvi, its characteristics affect on fish ecology and species.

The following fish species are in the region (including Mtkvari): trout (*Salmo trutta form – fario*); khramulya (*Capoeta capoeta*); Kura barbel (*Barbus lacerta*); barbus mursa (*Barbus mursa*); Caucasian chub (*Squalius cephalus*); spirlin (*Alburnoides bipunctatus*); Blackbrow bleak (*Acanthalburnus microlepis*); alburnus alborella (*Alburnus filippi*); Kura gudgeon (*Romanogobio persus*); Kura cobitis (*Oxydemachilus brandti*); cobitis aurata (*Sabanejewia aurata*); round goby (*Neogobius melanostomus*); vimba bream (*Vimba vimba*); Kura nase (*Chondrostoma cyri*); Bulatmai barbel (*Barbus capito capito*).

## 5. Analysis of Alternatives

The option “no implementation of the Project” was considered environmentally less favorable than construction of a WWTP, as the positive impacts due to the implementation of the Project significantly prevail over the possible negative impact. In case of no implementation of the Project, the increasing need of Mtskheta in sewage system cannot be met. Normal operation of this system is necessary not only for improvement of life conditions of the permanent residents of Mtskheta, but as well for creation conditions for tourism development. Without development of the mentioned infrastructural systems, Mtskheta will have no perspective to develop as tourist object of international or national level. Implementation of the Project is not connected with the any specific and significant impact on the environment. The range of possible negative impact of the Project does not exceed limits of typical impacts during construction and operation of sewage systems. Regulation of these impacts is fully possible in case if the due standards and norms and requirements of this EIA are met.

The main technical alternative is connected with selection of location for the treatment facility and technological system. The selected place is the lowest in relation to the rest of the city and allows the system to work with gravity flow. Alternatively, a pump station would have to be added that would cause increase of the Project cost and additional negative impact on the environment due to noise, emission and visual impacts.

During review of alternatives of the technological scheme of the treatment facility, the determining factors are: requirements to parameters of treated water, location of the facility, engineer-geological and topographical conditions.

As the water discharge is to be conducted within the city, on the section of the river, where development of recreation and tourist areas is project in future, requirements to the quality of treated water are strict. It is possible to reach such parameters only using of certain technologies.

Location of the treatment facility within the historical center of the city, near the cultural and historical monuments, limits usage of facilities like aerated ponds, phytoremediation, etc. These technologies require big areas and open territories in order to create ponds or artificial swamps that are unacceptable for Mtskheta conditions from visual and aesthetical point of view.

Alternative treatment technologies, such as rotary bioreactors or modules do not meet strict requirements of the Project on efficiency and water purification quality.

Taking the above mentioned into consideration, priority was given to the contemporary full biological purification scheme, based on the activated sludge principle. In case of implementation of this scheme, the required parameters of treated water shall be reached. For future, in case of need, possibility of treatment facility expansion, increase of efficiency and usage of additional steps of treatment is considered as well.

As alternative variants for the management of the residual solids, the following types of international best practice in reuse/utilization were considered:

- Disposal-covering the landfill.
- Using in agriculture.
- Using in landscape architecture (e.g. planting trees on erosive soil of the region)
- Using them in cultivating tree-woods where trees will be afterwards used as burning material or in construction industry.
- Using them as burning material, instead of fossil fuel (e.g. in cement production).

The current operational plan foresees to transport the residual solids to the complex sewerage systems of the cities Tbilisi and Rustavi and process it with their own waste, because:

The maximum quantity of the solids generated by the plant will be only 25 m<sup>3</sup> a day. The volume of the sludge is comparatively small and therefore it is not necessary to organize separated depots. The process of transporting the sludge, which will be placed in special containers, will be carried out daily with the help of special cars and will be located on the sludge squares of regional complex sewage system of the cities Rustavi and Tbilisi. The abovementioned fact will be carried out by the company GWP, which has a permit for this type of activity (№00230, dated 20. 06. 2009, see annex).

To treat the solids on-site would mean storage on platforms for drainage and dehydration for subsequent utilization. This would entail the following process steps:

- Balancing production of waste and demand for them, which will be changeable according to the season.
- Providing with depot volumes that gives opportunity to define demand for landscape architecture and partial farms which requires time.
- Guarantying hygienization of sediment.

In addition, organizing waste depot will increase the danger of noxious smells creating a nuisance and health risk to the adjacent population. Given the above, as well as small amount of solids expected from the operation of the WWTP, the alternatives of managing solids on site were declined..

## 6. Environmental Impact Evaluation and Analysis

### 6.1. Works to be done and range of possible impacts

Works to be done	Anticipated impact
<b>Construction Phase</b>	
<b>Arrangement of Contractor's camp and preparation of rehabilitation areas for works :</b> Arrangement of external access roads and approaches; Arrangement of warehousing and production plant; Preparation of social-residential facilities; Arrangement of temporary buildings and facilities for construction needs; Fencing of construction sites and areas (protective and warning); Cutting of topsoil to be used for recultivation of soils and storage at special allocated places; Drainage works (for the period of construction); Arrangement of permanent and temporary site roads (access, haulage); Temporary power supply; Stop industrial areas of the objects to be rehabilitated.	Emissions of combustion products, dust generation; Noise emissions, and perceptible vibrations; Damage of local roads pavement; Creation of solid and liquid wastes (used accumulators, tires, oils); Risk of fuel and oil spills;  Potential risks, connected with the safety of population (e.g. traffic and pedestrian safety).
<b>Construction works for the objects included into the treatment facility infrastructure:</b> Construction-installation works; Fueling of means of transportation, special construction technical equipment and machinery; Construction of temporary roads; Operation of temporary construction base.	Emissions of combustion products, dust generation; Noise emissions, and perceptible vibrations; Risk of spills of fuel and oils; Creation of hazardous wastes; Damage/disturbance of the components of biodiversity.
<b>Construction of sewer net to admit service sewage discharge waters to the treatment facility:</b> Earthworks; Process of construction-installation works; Working of the means of transportation, special construction technical equipment and machinery; Construction of temporary roads; Operation of temporary construction base (including construction technical equipment maintenance site).	Emissions of combustion products, dust generation; Noise emissions, and perceptible vibrations; Traffic disturbances, traffic and pedestrian safety; Damage of local roads pavement; Potential risks, connected with the safety of population: <ul style="list-style-type: none"><li>• Risk of spill of fuel and oils;</li><li>• Creation of hazardous wastes;</li></ul>

## Operation Phase

### Routine maintenance of sewage systems

Spread of dust, products of combustion in the atmospheric air;

Spread of noise;

- Risk of spill of fuel and oils;
- Potential risks, connected with the safety of population.

### Operation of sewage systems

- Improvement of sanitation and ecological situation in Mtskheta and the nearby territories.
- Risks due to emergency situations.

## 6.2 Construction Phase Impacts

### 6.2.1 Impacts on the Physical Environment

#### Emissions into the Atmospheric Air

The Project object (treatment facilities for discharge waters from Mtskhets) have no stationary sources of the atmospheric air pollution and, accordingly, on the stage of operation there will be no emission of hazardous substances.

Due to the above mentioned the objects do not need development of technical report for inventory of the atmospheric air pollution sources and emitted hazardous substances and project for maximum allowed norms of emission of hazardous substances.

The possibility of atmospheric air pollution during the construction phase works is reviewed.

From the listing of the mentioned works, the anticipated emissions into the atmospheric air from the technological processes, such as earthworks (excavation of trenches, pipe welding, pipe placement into trenches, backfill of trenches, etc.) are evaluated and calculated. Operation of number of machines and equipment and use of other needed material resources, including welding electrodes is provided for these operations.

Due to the above mentioned, the following sources of pollution are identified: excavator, bulldozer, pipe-laying crane and tractor based welding machine. Due to the works conducted on the construction site, emission of hazardous substances into the atmospheric air is expected from mobile (means of construction transportation: bulldozer, excavator, dumper) sources that cause spread of dust, carbon monoxide, nitrogen oxides, sulfur dioxide, carbon-black, hydrocarbons.

Values of maximum allowable concentrations for these hazardous substances are given in the table below.

Substance	Maximum permissible cocentration (MAC) mg/m <sup>3</sup> /average time
Azote dioxide	0,085/30 minutes
	0,04/24 hours
Sulphur dioxide	0,5/ 30 minutes
	0,05/24 hours
Carbon Oxide	5,0/30 minutes
	3,0/24 hours
Inorganic dust	0,3

**Qualitative norms of the atmosphere air:** According to the Chapter VI, paragraph 22 of Social Health Security Rule of Georgia (27.06.2007) According to the aim of social health protection The Georgian Ministry of Health, Labor and Social Defense creates and establishes the safe environment qualitative norms for the mankind that includes the admissible concentrations and unhealthy influence norms. According to the mentioned rule, the rules of air pollution protections and the norms of unhealthy influence concentrations are given in the decree about "Affirmation of the environment qualitative condition norms and their affirmations" issued on August 16, 2001 Decree # 297/N by the Minister of Georgian Ministry of Health, Labor and Social Protection. (Georgian Law Herald # 90 24.08.2001) with some changes and additions that have been placed in the decree of the same ministry #38/N (24.02.2003). The norms of the atmosphere pollution are given also in the decree # 89 (October 23, 2001). This is a decree about calculation of the air pollution index.

**Maximum permissible cocentration of the Pollutants over the Above-Ground Layer of the Atmosphere**

**Noise standards:** The standards about the noise are allowed according to the Decree # 297/N of Georgian Ministry of Health, Labor and Social Defense about "affirmation the norms over the qualitative norms of the environment" issued on August 16, 2001. There are defined as the admissible norms of noise as the maximum of the admissible norms for several zones of the territories

Time	The average allowed size of noise (DCB)	The maximum allowed norms of noise (DCB)
7am – 11 pm	55	70
11pm – 7am	45	60

Sound maintenance of machinery shall be provided during the activities within the established period of time, in order not keep them in good working condition and emissions into the atmosphere below the established maximum allowable concentration.

**Noise**

The main sources of noise during the works are movement of transport and construction equipment and working at the construction site and access roads. The nearest household is at a distance of 300 meters away from the construction site. Estimates were made that noise levels at the closest recipients will be below 60 db (decibel) and thus below internationally accepted levels.

**Impact on aquatic environment**

During the completion of works on the treatment facilities impact is anticipated on the surface as well as on the ground waters. Pollution of surface waters is possible in the following cases :

- Accidental spills of oil and fuel products during their storage and setup of the construction technical equipment and during transportation;
- Pollution of surface and groundwater during earthworks by fuel/lubricants and turbidity;
- Due to spill of machines or equipment washing;
- During implementation of works on sewage collectors and pump stations (temporary service interruptions);
- In case of incorrect management of construction wastes.

Pollution of ground waters is possible:

- During sewage pipe works (sub-grade works that might expose the groundwater);
- During pump stations and treatment facilities construction (again due to sub-grade works).

In case of implementation of targeted environmental management and planned mitigating activities, significant impact on the aquatic environment can be excluded. In addition it is necessary to prepare the document on Maximum Permissible Discharge, required by the legislation.

The risk of flood damage to the project area is deemed low. As known, the territory of treatment facility is located in Mtskheta at the point of confluence of the rivers Aragvi and Mtkari, on the right bank of Aragvi. The mentioned section is in the reservoir area of ZAHPP weir, which regulates the river level in this area. At this area, the bank of Aragvi is protected with concrete slabs. In addition, it is to be considered that Aragvi maximum water charge is regulated by Zhinvali water reservoir, that is located at about 40 km from the project facility and the volume of which is about 500 mln m<sup>3</sup>.

### **Soil damage**

As mentioned in the previous chapters, the project area is already littered by construction wastes and, accordingly, the soil in the most of cases has lost its original structure and ecological function. Nevertheless, types of impacts and actions to be performed for enhancement of the situation are given below.

During construction works, soil contamination can be caused by:

- Spill of oil products during their storage and setup of the construction technical equipment and means of transportation;
- Damage of benign layer of soil during setup of the construction site and warehousing base;
- Incorrect management of residential and construction wastes (packaging material, stone and sandstone, cement, concrete and timber wastes, etc.). In order to avoid the mentioned, appropriate measures are to be conducted that are given below, in the according chapter.
- After project completion all wastes will be removed from the site, topsoil spread and the areas not occupied by infrastructure will be landscaped and greened. Tree planting will be undertaken to minimize the facility's visual impact.

## **6.2.2 Impacts on the Natural Environment**

### **Impact on vegetation**

The preliminary visual estimation as well as evaluation of the existing written reference in the area of the construction object did not reveal any significant floristic component. There were no species included into the Red Book of Georgia found on the territory.

### **Impact on fauna**

During the visual evaluation of the project implementation territories, no presence of significant animal species had been revealed which would need application of any special protective measures.

There can be negative impact on the ichthyofauna in case of implementation of activities without meeting the environmental requirements.

The positive anticipated impact on the ichthyofauna is to be mentioned that is connected with bringing into order of the city sewage collectors and minimization of the surface water contamination due to arrangement of the appropriate treatment facilities.

It is necessary to reflect the issue of impact on the ichthyofauna, including impact on the species included in the Red Book of Georgia in the Plan of Monitoring, in order to plan activities to avoid or mitigate impact and plan compensation measures.

### **Impact on Soil**

Given that the selected WWTP site represents a littered brownfield, the construction cannot have tangible negative impact on its soil. In case after clean-up some layer of non-contaminated topsoil is revealed, it

will be removed and stored for reinstatement of the site. After completion of construction additional fertile soil will be brought and rehabilitation will be conducted in accordance with the legislation.

### **Impact on the Protected Areas**

During completion of works provided by the Project of rehabilitation of Mtskheta sewage systems, there is no significant negative impact anticipated on the Tbilisi National Park, due to the distance and its location.

### **6.2.3 Impacts on Physical Cultural Heritage**

The construction areas are not located near the known above ground monuments or areas of archeological interest. Hence, during completion of works provided by the Project of rehabilitation of Mtskheta sewage systems, there is no negative impact anticipated on them. However, likelihood of chance finds cannot be excluded. Procedures for their handling are described in the section 4.1.4 above.

### **6.2.4 Social Impacts**

#### **Human health and safety**

Construction sites are likely to have health and safety impacts. There will be a potential for diseases to be transmitted, exacerbated by inadequate health and safety practices. There will be an increased risk of work crews spreading socially transmitted diseases such as HIV/AIDS. Mitigation measures include: (i) provision of adequate health care facilities within construction sites; (ii) an health and safety manager, appointed by the contractor for each site, and first aid facilities will be made readily available; (iii) training of all construction workers in basic sanitation and health care issues (e.g., how to avoid transmission of sexually transmitted diseases such as HIV/AIDS), general health and safety matters, and on the specific hazards of their work; (iv) personal protection equipment for workers, such as safety boots, helmets, gloves, protective clothing, goggles, and ear protection; (v) clean drinking water and safe sanitation for all workers; (vi) adequate protection to the general public, including safety barriers and marking of hazardous areas; (vii) safe access across the construction site to people whose settlements and access are temporarily severed by road construction; (viii) adequate drainage throughout the work sites to ensure that disease vectors such as stagnant water bodies and puddles do not form; and (ix) Septic tank and garbage box will be set up in construction site, which will be periodically cleared by the contractors to prevent outbreak of diseases.

Intensive movement of heavy trucks is required to deliver required amount of materials to the needed sites within the construction corridor. The impacts anticipated in this regards are noise and vibration, traffic congestion, air pollution, dust and risks associated with refueling and vehicle cleaning. The construction sites impose certain safety risks for the population and, therefore, compliance with safety rules is important. The contractor is responsible for ensuring that all construction vehicles observe speed limits on the construction sites and on public roads and to provide adequate signage, barriers, and flag persons for traffic control. All vehicles should be fitted with audible warning devices when reversing.

During the sewage systems construction works human health is regulated by the appropriate standards, construction norms and rules as well as by sanitation norms and rules. In conditions of regulated conduct of the construction and rehabilitation works, no direct negative impact on human health and safety is expected.

In case of emergency situations due to violation of the established regulation (e. g. incorrect management of means of transportation or/and construction equipment) as well as other reasons, indirect as well as secondary negative impacts are possible (trauma, casualties). But level of risk of the mentioned impact during construction of sewage objects does not differ from the risk, connected with any other activity, where similar means of transportation and construction equipment is used. Indirect impact (for example, increased risk of trauma) and secondary impact (for example, worsening of quality of atmospheric air, noise) that are anticipated, will be short-term here.



Cumulative negative impact on human health and safety during rehabilitation works means summation of direct/indirect and secondary impacts (that is not expected) as well as summation with impacts of similar (e. g. during construction, use of means of transportation and construction equipment for other activities) or/and different activities, that is possible during the works in regulated (regular) mode as well as in emergency situations.

### **Possibility of change of social conditions**

Any negative social impact that is connected with rehabilitation or construction activities will be short and localized. The impact can include: danger for society members (e.g. pedestrians on access roads) and negative impact on the local infrastructure (road damage, water / wastewater service interruptions).

The following factors are to be considered while reviewing the anticipated impact on the social-economical conditions of the rehabilitation works:

- Possible demographical changes;
- Employment of population.

Due to the limited nature of construction activities, significant impact on the traditional life style or local demographical situation is not anticipated, as during the works mainly the local workers will be employed, which is expected to have a temporary positive impact.

### **Land ownership and usage of land during the works**

Construction and rehabilitation works, planned within the project area, shall be conducted on the State (Municipality) owned territories. Usage of land portions in private ownership is not planned.

### **Impact on employment and economical activities**

During the project works the construction contractor shall use certain number of local specialists and workers that is positive impact on the employment of population.

### **Impact on traffic flow and traffic safety**

Temporary impact on traffic flow is anticipated only during the time of construction. Impact on traffic flow shall be in the areas, where the construction and rehabilitation works shall be conducted. The main load is expected during transportation of construction materials and sewage pipes to construction sites. Some issues of traffic and pedestrian safety, possible impacts and mitigation measures are covered in the EMP.

Detailed traffic plan have to be prepared by contractor prior to mobilization and agreed with MDF and the Traffic Police to avoid any accident.

## **6.3 Impacts of the Operation Phase**

### **6.3.1 Impact on Physical Systems**

During the period of treatment facility systems operation, negative impact is expected during routine repairs that will be connected with noise, dust and combustion products spread in the atmospheric air. The mentioned impact is short-term and will not be significant.

Possible emergency situations on sewage collectors can have significant impact on the environment.

### **6.3.2 Impact on Biological System**

The fact that there are no sewage treatment facilities in the Mtskheta municipality and waste-water flows into the river directly without cleaning causes negative environmental and sanitary conditions. This imposes the river pollution and spreading of infectious diseases.

The discharge parameters of untreated sewage into the river are shown in the table below:

**Table 6.3.2.1**

#	Ingredients	Existing concentration	Unit
1.	BOD <sub>5</sub> (biological oxygen demand)	60	g/PE/d
2.	COD (chemical oxygen demand)	120	g/PE/d
3.	Suspended solids	70	g/PE/d
4.	BOD-concentration	171	mg/l
5.	COD-concentration	343	mg/l
6.	Filterable solids	200	mg/l
7.	Kjeldahl-Nitrogen concentration	34	mg/l

On the bases of the existing situation it was decided to construct waste water treatment plant that will ensure improvement of discharged sewage quality. Namely, the ecology and sanitary conditions of the river and its surroundings will become better due to the technological scheme, in addition, activities to avoid impact and emergency situation management activities will be implemented. It will decrease the risk of river pollution and spreading of infectious diseases.

After treatment the waste water, the discharge parameters into the river are shown in the table below:

**Table 6.3.2.2**

#	Ingredients	Allowed concentration mg/l	Maximum permissible discharge g/h
1.	Weighted particles	30	7125
2.	BOD <sub>total</sub>	6	1425
3.	COD	30	7125
4.	Nitrogen Ammonium	0,39	93
5.	Nitrates (NO <sub>3</sub> )	45	10688
6.	Nitrites(NO <sub>2</sub> )	3,3	784
7.	Polyphosphates (PO <sub>4</sub> )	3,5	831

According to following indexes, positive impact is accepted to the aquatic biology of the river during the lifetime of the project.

There is no negative impact on biological systems expected during the period of sewage systems operation. The impact is mainly expected on the aquatic biodiversity, in case if for some reason untreated waste waters get to the river.

### **6.2.3 Evaluation of impact on social system**

During the period of sewage systems operation, negative impact is expected during routine repairs that could mean temporary disturbance of the population. Also in case of incorrect waste management (such as sludge, accumulated in a treatment facility and its incorrect management, i. e. violation of terms and time of disposal from the area) it is expected that the population will suffer from noxious odors.

Significant positive social impact is anticipated in case of implementation of the Project, namely:

- Prevention of service-sanitary sewage discharge to surface water objects without treatment.
- Implementation of the sewage systems project provides stable development of resort infrastructure that is of big importance for social-economical development of the city and the region.

### **6.3.4. Emergency Situations and Their Anticipated Results**

Based on the analysis of technological regulation data, given in the Project of waste water treatment plants, possible alternatives of occurrence of emergency situations were developed, according to which prevention of emergencies shall be provided based on development of necessary measures. Prior to development of the measures, evaluation of the emergency risk-factors shall be conducted that aims to support decision making based on feasibility of the Project on the one hand and, as it was mentioned above, create the basis for prevention of the negative impact on the environment or establish significant mitigation activities on the other hand.

In addition, the condition is important that risk evaluation does not directly depend on the contents of the complex of measures.

Impact on the receptors of environmental direction is the last link of the causative chain, the main components of which are:

- Occurrence fires, oil products spills from means of transportation and construction or from technical equipment;
- Negative impacts may be caused by leaking of flammable materials and other chemicals from storage areas, on the sensitive receptors (atmospheric air, soil, ground or surface waters, certain types of habitats).

Characteristics of negative impact are possibility, quality and volume of pollution sources (impact sources possibility can be high but value of impact – medium).

Accordingly, the activities can be directed towards minimization of possibility of error of any link of this chain i. e. to minimization of possibility of impact on the one hand and the aim of these measures is to minimize the values of impact on the other hand. The best direction of the types of measures is, as possible, to drive the negative impact to zero.

In general it can be said that technical requirements of safety standards acting in Georgia shall be met in order to prevent accidents. General and specific requirements for hazardous materials, explosion safety, biological safety, electrical safety, safety requirements for construction equipment, safety requirements for loading-unloading works and movement of loads are provided.

## **7. Mitigation Measures Against Negative Impacts**

### **7.1 Construction Phase**

#### **Emissions in the Atmosphere and Noise**

For minimization of the negative impact upon the atmospheric air caused due to construction the following shall be considered:

- Strict observance of the agreed routes of transport traffic;
- To provide proper operation of the vehicles, as well as water the territory in the hot days, in order the emissions should not exceed the allowed limited norm of the emissions, dust formation;
- Observance of the schedule for performance of the construction works in order to avoid exceeding the emission levels;
- Taking the fire protection measures;
- Obligatory observance of the boundaries of the construction areas (including the sites temporarily allocated for the construction purposes);
- Meeting the requirements of the environmental protective service in compliance with the environmental protective plan.

#### **Delay of the car traffic in the town of Mtskheta due to movement of the trucks and machinery**

For the purpose of softening the affect upon the transport flows, the transport traffic schedule will be elaborated (in the process of constructing the treatment structure and scheduled repair heavy machinery and construction materials carrier, as well as the vehicles intended for transportation of the waste during functioning of the treatment structure), which defines the established terms for their transportation, for the purpose of avoiding the car traffic delay in the city of Mtskheta.

#### **Environment Pollution with the fuel-lubricant materials**

The machinery intended for construction works and vehicles will be allocated at the specially separated area. The service to the machinery will be provided in such a way that the accidental spill and the pollution of the territory with the fuel-lubricant materials should be avoided, inspection of the vehicles and machinery on a daily basis, immediately after the spillage is noticed to stop it and the reason will be eradicated.

#### **Construction Debris Management**

Amount of the construction debris is dependent upon the scope of the works to be performed and the types and quantities of the used materials.

Construction debris minimization will be possible proceeding from their classification. According to the project, it is planned to conduct the restoration-rehabilitation works of the water supply and sewer systems, restoration of the existing communications, as well as construction of the new entities (drinking water back-up reservoir, sewage pumping station, sewage and storm water treatment structures etc). Below is given the classification of the presumable construction debris:

- Rejected and damaged details and materials(block, brick panels etc), non-conditioned construction materials, the debris arising from the installation works performance etc;
- Scrap metal (black, color);
- Inert waste (ground, stone, gravel);
- Wood materials waste;
- Polymeric waste (packing and hermetic materials)

Sorting of the construction debris and temporary storage as per the types is intended to take place at the construction site, from where the inert construction debris will be transported to the garbage dump agreed with Mtskheta Municipality, but removal of the hazardous materials, its neutralization and permanent allocation shall be conducted in compliance with the agreement by the contractor having the relevant permit. Cremation of any types of waste in the open environment is categorically prohibited.

## **Impact on the Flora and Fauna**

Whereas the territory intended for the operations is deprived of the vegetable cover, as well as it is contaminated with the construction debris, the grass cover will be the subject of the main affect and on the small area. That is why, as a softening measure, the top soil will be removed (where the soil is not contaminated with the waste and degraded), storage and further re-cultivation. In addition to that, the grass cover will be rehabilitated. It is also possible to import the “grass carpets”; In case of availability of top soil, hydro-planting can be implemented for the purpose of rehabilitation of the grass cover. In addition to the aforementioned, 400 trees will be planted on the project territory.

For the purpose of avoiding the impact on the animals and softening it, the following actions shall be taken:

The measures shall be taken for mitigation of the amount of dust during the work performance.

The measures shall be taken for mitigation of the noise and vibration level during the work performance.

House waste and construction debris shall not be accumulated on the open garbage dump or on the territory and shall not be dumped into water.

Spill of the oil products onto the water and soil shall be controlled.

Holes, trenches etc. shall be confined with some obstacles to avoid the animals to fall into it for the small animals all types of flat materials shall be applied, such as - tin, polyethylene etc. Long wooden boards shall be placed into the trenches and holes at night times, as well as the wooden beams, in order the small animals should not have any chance to climb out of there. The holes and trenches shall be inspected before backfilling with soil.

Bio-diversity of water might be affected due to the damage of treatment structure for some purpose, or in cases of accidents, and in order to avoid them it is necessary to undertake the permanent monitoring, as well as the observance of the established rules for avoiding the emergency situations (see the relevant chapter

## **Mining of the Inert Construction Materials**

Final selection of the location of the quarries will be made by the construction contractor, however, the data of the existing five quarries located close to the site, is given in the chapter 3.1. The constructor can apply the existing licensed quarries and receive the inert material from the licensed company or obtain the license for processing of its own quarry. There are potential impacts caused due to use of the quarry upon the river bed and the grove location.

The following impacts have been identified:

- Noise and vibration;
- Air pollution (dust; emissions);
- Urgency for the construction equipments and machinery, motorways and their planning;
- Traffic jams (discomfort) on the local roads;
- Dirt on the roads;

Fuelling, repair and cleaning of vehicles, to which the soil and water contamination hazard is related.

## **Archaeological findings**

In case of a chance find, works contractor is required to immediately take all physical activity on hold and promptly notify MDF. MDF communicate the information to the Ministry of Culture and Monument Protection. This Ministry takes lead in assessing situation on site and determining further course of action, which may imply conduct of excavations, on-site conservation of artifacts, their out-transporting from the site, etc. Once the site is clear for resumption of civil works, the Ministry of Culture formally communicates this message to MDF and MDF formally authorizes works contractor to proceed.

## **Damage of the Esthetic Value of the Landscape**

After completion of the construction works and dismantlement of the temporary premises the complex of works shall be performed, which involves the technical and biological re-cultivation, including:

- Condensation of the mineral ground;
- Backfilling of the top soil and leveling of the re-cultivation plots;
- Planting of greenery on the re-cultivated land in the areas stipulated by the project.

In addition to installation of the main technological structures, the project stipulates the improvement of the territory, fencing it with the metal constructions and brick fence, which shall comply with the architectural image of restored center of the town of Mtskheta. Visibility of the water treatment structure from the touristic bases located in Mtskheta and the surrounding areas caused the urgency for roofing the operations premises of the water treatment structure with the materials of the similar nature, which will match with the architectural image of the town and natural environment. On the territory of the water treatment structure it is intended to plant 400 trees, restore the soil layer and plant the grass.

## **7.2 Operation Phase**

### **Emergency Situations**

#### ***Definition of the probability of the possible emergency situations and assessment of the expected results***

During the performance of the rehabilitation works the emergency situations are expected:

- Spillage of the oil products from the back-up reservoir, vehicles and construction machinery;
- Causing fire and its proliferation.

During the period of maintenance the following emergency situations might take place:

- Damage of the pressurized sewer collectors;
- Damage of the treatment structure or pumping stations, as well as emergency inflow of the sewage.

According to the requirements of the environmental protection legislation of Georgia, in case of danger of spillage of the oil products and their proliferation in the environment, it is necessary to elaborate the “Plan for Response in Case of the Emergency Cases of Oil Spillage”. Every aspect of rapid, due and effective response in case of spillages caused due to the emergency cases shall be documented in the plan.

The basis for the plan for responding to the emergency cases is the definition of the legal and normative base for elaboration of the action zone and the plan for responding to the oil products spillage. In addition to that, in order to elaborate the plan, it is necessary to provide the economic characteristics of the layout of the construction site, definition of particularly sensitive eco-system, which has been fulfilled within the framework of the present assessment of the impacts upon the environment.

The plan shall contain the recommendations regarding the methods and inputs for removal of the spilt oil products, as well as the fire preventive measures. The significant aspect is to plan and form the network of notification with regard to the incident, as well as to define the forms of the contact information. The plan shall define the technical provision for responding to the incident and action: ways of identification of the amount of spillage, localization of the spilt oil products and the inventory intended for the liquidation, as well as the issues of the receipt, storage and utilization of the water, soil contaminated with oil products and other recovered materials.

During the course of the rehabilitation works, the zone of action of the plan for responding to the emergency cases is confined with the territory of the construction site. The zone can be expanded only in case of conflagration.

Key resources, of which might be seriously and irrecoverably damaged by the emergency case, is represented by the eco-systems of the land and fresh water (biological environment), as well as the existing settlements and transport infrastructure on the neighboring territory.

### ***Notification about the Accident***

The following is important in the plan for response to the emergency cases:

- In case of accident to form the network of notification:
  - Notify the government structures including the regional services of the Ministry of the Environmental Protection and Natural Resources;
  - Notify the population;
  - Notify the services of the neighboring entity.
  
- Processing of the forms of the contact information, which shall stipulate the following:
  - Assessment of the situation caused as a result of the accident and commencement of the responsive measures;
  - Definition of categories of responding;
  - Mobilization of the service liquidation of the results of the accident to be on the alert;
  - Situational scheme of the location of the emergency cases (possible pollution of the environment);
  - Quantitative assessment of the possible pollution of the environment and assessment of the possible proliferation;
  - Assessment of the safety requirements related to the emergency cases;
  - Elaboration of the strategy of response;
  - Assessment of the existing resources and its mobilization;
  - Management of the on-going responsive works;
  - Definition of the conditions for completion of the liquidation works;
  - Termination of the actions of the liquidation service;
  - Inspection of the status of the mobilized resources;
  - Notify the government and interested bodies and persons with regard to completion of the liquidation works
  
- Documenting of the emergency situation
  - Date, time and class of the emergency case (as per the possible/ discovered contamination of the environment);
  - Identity of the person, who discovered/provided the information;
  - Status of the pollution of the environment (for instance, the spilt lubricant), its proliferation and the hectare of the contaminated territory;
  - Meteorological conditions (wind speed, direction etc);
  - A write-up of the contamination as per the type;
  - Source of the contamination;
  - Data of the other observers.

### **Sludge accumulation**

In view of the fact we have already mentioned above, it is not expedient to use open areas of great spaces because of location of sewage system, it is not foreseen in the project to organize open sludge squares for drying the sludge. Dehydration of the sludge left as a result of technological processes will be carried out with the help of centrifuges located in operation building, in which the maximum quantity of the sludge will be 25m<sup>3</sup>/ a day. The volume of the sludge is not big; therefore it is not necessary to organize separated depots. Transportation of sludge will be provided by special trucks owned by UWSC. Access road to be used for movement of the sludge transportation trucks will be upgraded and maintained in good operational condition by the Mtskheta municipality. UWSC will guarantee quantitative and qualitative

sufficiency of the vehicle fleet allocated for transportation of sludge and will use them for regular out-transporting of sludge to the disposal site operated for Tbilisi and Rustavi municipalities (see attached letter N2498/1, 16.05.2012). Acceptance of sludge at the Gardabani facility is guaranteed through an agreement concluded between Mtskheta municipality and GWP (see attached letter №00230 20.06.11).

### **Defining rehabilitating ways and means of environment to previous condition**

#### ***Short-term stopping or repair works of communications of treatment facility***

In case of temporal stopping or repairing works (ongoing and capital), exploitation service of the objects is obliged to carry out operation plan connected with temporal stopping or repairing of work, which must in the first place, include security requirements and must be agreed with all interested legal persons.

#### ***Long-term stopping or conservation of operation of treatment facility***

In case of long-term stopping or conservation of exploitation, exploitation service is obliged to form liquidation body, which will work on long-term stopping or conservation of the exploitation. The plan of long-term stopping or conservation of exploitation must be agreed with plenipotentiary bodies. The essential content of the plan represents safety requirements.

#### ***Liquidation of sewage systems***

In case of liquidation of systems or their partial objects, special project must be carried out for defining rehabilitating ways and means of environment before previous condition.

Water-pipe and sewage operation service is responsible for carrying out the mentioned project. In accordance of the existing rule, special project of liquidation of objects must be agreed by plenipotentiary bodies and information must be send to all physical and legal persons.

Rules and regulations of stopping technological processes, dismantling buildings and equipments, rules and terms of carrying out dismantling works, environmental activities and security protection, rules and terms of render harmless and location of hazardous wastes, re-cultivation works and others must be foreseen in the project.

### **Residual impact**

According to the present estimation, residual impact of high or middle level on environment caused by rehabilitation works is not expected. In accordance of international methodology, waste impact of low level is not submitted to be discussed.

### **Cumulative impact**

Cumulative impact is not expected, there are no other facilities which may have impacts on the same “receptors” in vicinity of the project area.

### **Motor-car access roads**

Existing road is used during construction of treatment facilities, which will be graveled in order to prevent further damage to the soil and improve the safety level. The construction site will be graveled during construction period and after the construction of temporary access roads will be cancelled roads necessary for operation will be left only.

## **8. Informing Society and Studying Public Opinion**

On June 16, 2011 in c. Mtskheta in administrative building of Mtskheta Municipality Governance public discussion of the project named “Rehabilitation of sewage system of c. Mtskheta” about the calculation of Environmental Impact Assessment (EIA) was held. Information about the scheduled public discussion



was published in the newspaper “24 saati” (#89, 28.04.2011 sec), as well as the Municipal Development Fund, Ltd. Gergili and Aarhus Center web pages.

The followings were present: representatives of Municipal Development Fund of Georgia (MDFG); “Gergili” LTD- environmental consultation firm; Mtskheta Municipality Governance; “Mtskheta Water” LTD, Non-government sector (NGOs) - association “Development of Civil Society”; association “Green Alternative”; representatives of local population. After presentation of calculation of estimation of impact on environment participants of public discussion had opportunity to express their opinions and remarks. Representatives of local municipality as well as representatives of non-government sector took active part in the discussion. Participants noted, that fulfillment of the project is important in the view of development of infrastructure and improvement of ecological and sanitation condition of c. Mtskheta. Though notes connected with fulfillment of the project and preliminary calculation prepared by EIA were also expressed, in particular these notes referred to analysis of alternatives of the placement of clean-up, location of replacement of collector, differences between EIA and Project resume, presented at the public review in terms of number of population and the treatment facility efficiency parameters and possibility of flooding, fire emergency or man mistake. Participants of discussion were given explanations, and their remarks were foreseen in the present estimation. Protocol expressing results of public discussion is enclosed with the EIA.

The information obtained as a result of the public review was processed and reflected in the final version of the document. In this regard additional public consultation was held for the revised version of this report taking the World Bank requirements into consideration. A more advanced draft of this document was re-disclosed in-country through daily newspaper “24 saati” 2011.12.10, also information was published on the Web-sites of MDF, Ltd. “Gergili” and Aarhus Centre Georgia, and another consultation meeting was held on 19th December, 2011. The Meeting Minutes for both public consultations are attached on this EIA report.

The detailed information about issues discussed during above mentioned public hearings is presented in attachment #2 (Minutes of public consultation meetings 1 and 2).

## **9. Environmental Management Plan**

### **9.1 Institutional set-up for EMP Implementation**

MDFG is responsible for the implementation of the Environmental Management Plan (EMP). This responsibility includes obligation of qualitative and timely implementation of all mitigation measures included in the plan, supervision on implementation, documentation of the results of the supervision and calculations about these results in presence of supervision board of MDFG, regional development and the World Bank. MDFG will be responsible for local environmental bodies as well, local community and for communication with constructing contractors about cases such as environmental problems connected with implementation of environmental activities and manual principles for contractors.

## **9.2 Responsibilities of Construction Contractor**

MDFG shall obtain Construction Permit (including conclusion of ecological expertise) associated to construction activities. If any additional licenses, permits, consents required (e.g. inert material etc) construction company shall obtain such license, permits, and consents within its capacity. This will also apply to sitting of the concrete or (and) asphalt factory.

In addition to the permit prior to mobilization, contractor shall coordinate with Mtskheta Municipality and obtain written instructions about allocation of the territory (should not be near reservoir, in the gorge, on a highly damp territory, etc) on temporary or permanent storage of the wastes later agreed and/or approved by MDF.

If during construction works water –pipes are directed and interfered with walking pavements and along the streets, constructing contractor has to develop Pedestrian and Transport Safety Method Statement and submit it to MDF for review and approval.

Contractor is responsible during performance of earth works to pay special attention to archaeological fact findings and immediately inform MDF on any chance finds.

## **9.3 Monitoring of EMP implementation**

MDFG carries overall responsibility for the implementation of Environmental Management Plan (EMP) and for organizing environmental monitoring of works. This function of MDFG will be supplemented with external expertise to be provided by a consultant hired for technical supervision of works. Environmental monitoring of works shall be undertaken according to the Environmental Monitoring Plan attached to the present EIA report and the outcomes of monitoring shall be documented in monthly environmental supervision reports. Such reports must contain information on what mitigation measures were applicable to works performed in the report period, if and how where they applied, what problems have been encountered, and what guidance/recommendation were given to works contractor for addressing identified issues. Reports should be supported with photo material. MDFG shall provide cumulative results of monthly environmental MDFG to the World Bank through the general progress reporting on the project implementation. Files with monthly progress reports must be stored at MDFG office and made available to the World Bank upon request. In case of incurring significant environmental damage, encountering unexpected environmental issues or emergencies, MDFG is obligated to immediately inform the World Bank, regardless timeline of reporting.

## **9.4 Measurements against neglecting requirements of management of environmental impact**

MDFG is obligated to include EMP in tender documentation of construction works and then attached it to the contract agreement for the provision of construction works. Accordingly, constructing contractor is obligated to fulfill all requirements of the EMP and a failure to do so will be regarded as non-fulfillment of contractual obligations. MDFG, as the client of construction works, controls implementation of contract terms by contractor. In case of minor violation of environmental mitigation measures provided in the EMP which results in insignificant and temporary damage to the environment, MDFG allows 48 hours for the contractor to address the issue and restore environmental compliance. If corrective action is successfully delivered on time, no penalty applies to contractor. If corrective action is not undertaken within the set time and/or is not satisfactory to the client, MDFG will hire another entity to address the environmental damage and the amount paid to such entity will be deducted from the next upcoming payment to the works contractor. In case of significant, long term, and/or irreversible damage to the environment, construction contractor will be fined with 1% of the total price of the contract and this sum will be added to expenses of rehabilitation of the condition of environment (which represent the expenses of construction contractor as well). Consultant to MDFG providing technical supervision of works is responsible for revealing and registering any violations of the EMP by work contractor through the environmental monitoring process; and advising MDFG on the nature and scope of the environmental damage, based on which MDFG will make decision on sanctions to be applied.

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## 11. Attachments

### Attachment 1. Environmental Management Plan

Activity	Potential Impact	Mitigation Measure	Indicator of Mitigation	Cost of Mitigation	Responsibility for Mitigation
<b>Construction phase</b>					
Provision of construction materials	Delivery of substandard materials which may cause risks to the safety of constructed structure and to health of people operating it	Purchase of construction materials from the licensed providers	Delivery of standard quality construction materials carrying relevant certificates of origin	None	Construction contractor
Transportation of construction materials and waste  Movement of construction machinery	- Pollution due to poor technical condition of vehicles and movement of uncovered truckloads  - Nuisance to local residents from noise and dust	- Adequate technical condition of vehicles and machinery - Confinement and protection of truck loads with lining - Respect of the established hours and routes of transportation	- Vehicles and machinery found in decent technical condition during inspections - No uncovered truck loads found during inspections - No activity ongoing out of working hours which may be disturbing for nearby population - No complaints from nearby residents	No specific extra cost: common responsibility of works contractor	Construction contractor
Operation of construction equipment on site	- Pollution of environment with emissions and leakages - Nuisance for nearby population	- Adequate technical condition of construction equipment <ul style="list-style-type: none"> <li>• no excessive exhaust</li> <li>• no fuel and lubricant leakage</li> </ul> - Observation of working hours	- Vehicles and machinery found in decent technical condition during inspections - No heavy vehicles and machinery found operational out of the established working hours - No complaints from nearby population	No specific extra cost: common responsibility of works contractor	Construction contractor

Maintenance of construction equipment	<ul style="list-style-type: none"> <li>- Pollution of water and soil with oil products due to operation of equipment</li> <li>- Damage in case of fire</li> </ul>	<ul style="list-style-type: none"> <li>- Cars and construction equipment washed outside the construction site or on maximum distance from the river</li> <li>- Refueling or lubrication of construction equipment and outside the construction site or at the predetermined arranged point.</li> <li>- Technical order at the construction equipment maintenance point <ul style="list-style-type: none"> <li>• solid impenetrable floor or adsorbent (sand fine gravel, membrane) cover</li> <li>• enough area and impenetrable barriers around fuel containers</li> </ul> </li> <li>- Provision of work site with basic fire extinguishing means</li> </ul>	<ul style="list-style-type: none"> <li>- No direct entry of runoff from car-wash to water bodies</li> <li>- No spillages of fuel and lubricants found on the ground within and nearby the construction site</li> <li>- Presence of basic fire extinguishing means on site</li> </ul>	No specific extra cost: common responsibility of works contractor	Construction Contractor
Earth works	<ul style="list-style-type: none"> <li>- Loss of vegetations due to ground piling and minimization of pollution of surface water reservoirs with particles</li> <li>- Pollution with probably contaminated soil of surface and ground waters</li> <li>- Loss of cultural heritage</li> </ul>	<ul style="list-style-type: none"> <li>- Topsoil removal and temporary storage at a separate place at the beginning of works (to dispose to landfill in case of pollution and for re-cultivation of the land if it is good)</li> <li>- Temporary storage of excavated soil at determined and allowed places in compliance with ground piling parameters.</li> <li>- Backfilling of the excavated ground as needed and disposal of the excess mass to the places, approved in writing.</li> <li>- Immediate termination of activities in case of unexpected archaeological findings and providing of full information to the Agency of Cultural Heritage</li> </ul>	<ul style="list-style-type: none"> <li>- Excess material disposed at the agreed upon safe permanent storage sites with no threat of erosion and no blocking of waterways</li> <li>- No remnants of excess material at the construction site upon completion of works</li> <li>- No damage to chance finds if encountered</li> </ul>	65 000USD	Construction Contractor

Extraction of inert material	<ul style="list-style-type: none"> <li>- Slopes erosion and landscape damage</li> <li>- River banks erosion, pollution of water flow with weighted particles, and disturbance of aquatic life</li> </ul>	<ul style="list-style-type: none"> <li>- Purchase of inert materials from the existing suppliers, if there is such opportunity</li> <li>- Obtaining of the license for production of inert materials and strict compliance with the license</li> <li>- Terrace working on quarries, backfill on the worked areas and harmonization with the landscape</li> <li>- Working out of gravel outside water flow, arrangement with separating ridges and without putting equipment into water flow</li> </ul>	<ul style="list-style-type: none"> <li>- Construction contractor (if mining) or an external provider of inert materials able to present relevant license for mining upon inspection</li> <li>- Mining activity of construction contractor (if being undertaken) found technically sound and compliant with the license conditions</li> </ul>	74 000 USD	Construction Contractor
Generation of construction waste	<ul style="list-style-type: none"> <li>- Pollution of soil, surface water and ground water,</li> <li>- Accidents at the construction site due to scattered fragments of construction materials and debris,</li> <li>- Deterioration of esthetic appearance of the construction site and its surroundings</li> </ul>	<ul style="list-style-type: none"> <li>- Temporary storage of construction waste in especially allocated areas;</li> <li>- Timely disposal of wastes to the formally designated locations</li> <li>- Hand-over of larger amounts of hazardous wastes to the companies having license for decontamination and placement of hazardous materials.</li> </ul>	<ul style="list-style-type: none"> <li>- Construction waste found at the work site piled up in designated locations</li> <li>- No excessive amount of construction waste stored on site</li> <li>- Documents present on the handover of larger amounts of hazardous waste to companies licensed for its disposal</li> </ul>	No specific extra cost: common responsibility of works contractor	Mtskheta Municipality  Construction contractor
Production of household waste	Pollution of soil and water with domestic waste	<ul style="list-style-type: none"> <li>- Placement of waste collection containers at the construction site and construction base (if any)</li> <li>- Agreement with Mtskheta Municipality on regular disposal of domestic wastes</li> </ul>	<ul style="list-style-type: none"> <li>- Waste collection containers found at the construction site</li> <li>- No pollution of the construction site with household waste</li> </ul>	No specific extra cost: common responsibility of works contractor	Mtskheta Municipality  Construction contractor

Production of liquid wastes	<ul style="list-style-type: none"> <li>- Flooding of the construction site and complication of activities</li> <li>- Pollution of surface and ground waters</li> </ul>	<ul style="list-style-type: none"> <li>- Arrangement and maintenance of toilets in compliance with sanitation norms at the construction site and construction base (if any)</li> <li>- Arrangement and regular cleaning of drainage system for storm water collection and drain</li> <li>- Arrangement of sedimentation pond for water used for domestic and machinery washing purposes</li> </ul>	<ul style="list-style-type: none"> <li>- Toilets provided at the construction site and found in good sanitary condition</li> <li>- No water logging of construction site</li> </ul>	No specific extra cost: common responsibility of works contractor	Construction contractor
Operation of asphalt-concrete plant	<ul style="list-style-type: none"> <li>- Population disturbance near the construction site</li> <li>- Atmospheric air and surface water pollution</li> </ul>	<ul style="list-style-type: none"> <li>- Obtaining of environment impact permit by the construction contractor and strict compliance with it</li> <li>- Selection of a place for the plant that provides minimal disturbance of population with noise, dust and exhaust</li> <li>- Arrangement of sedimentation pond for waste water from the plant</li> </ul>	<ul style="list-style-type: none"> <li>- Construction contractor holding permit for operating asphalt-concrete plant and found compliant with its conditions</li> <li>- Adequate placement of a plant, which is least harmful for the environment and disturbing for population</li> <li>- Presence of sedimentation pool for a plant runoff.</li> <li>- No complaints from nearby residents</li> </ul>	242 000 USD	Construction contractor
Construction site re-cultivation and landscaping	<ul style="list-style-type: none"> <li>- Loss of aesthetical value of the landscape due to the water treatment facility construction</li> <li>- Damage to touristic attractiveness of Mtskheta</li> </ul>	<ul style="list-style-type: none"> <li>- Dismantlement of construction base (if any) and temporary access roads to the site (if any) and asphalt-concrete plant and harmonization of the areas with the landscape</li> <li>- Final cleaning of the construction site and permanent access roads and landscaping-greening of the area (grass cover)</li> <li>- Planting of 400 trees and other vegetation at the construction site</li> </ul>	<ul style="list-style-type: none"> <li>- No remnants of a work camp left behind after demobilization of contractor</li> <li>- Temporary access roads harmonized with landscape and enabling conditions provided for natural regeneration of vegetation</li> <li>- Landscaping of the construction site and grass seeding</li> <li>- 400 trees planted and being tendered at work site</li> </ul>	28 000 USD	Construction Contractor

Labor safety	Traumas and accidents at work site	<ul style="list-style-type: none"> <li>- Provision of construction workers with working clothes and PPE</li> <li>- Strict compliance with the rules of construction equipment operation and usage of PPE</li> </ul>	<ul style="list-style-type: none"> <li>- Construction workers found wearing uniform clothes and adequate protective gear during inspections</li> <li>- No violations of equipment operation and use instructions registered during inspections</li> </ul>	No specific extra cost: common responsibility of works contractor	Construction Contractor
<b>Operation Phase</b>					
Water discharge after treatment	Pollution Mtkvari river with improperly treated waste water	<ul style="list-style-type: none"> <li>- Water samples collection and testing with strict compliance with technical guidelines.</li> <li>- Existence of emergency plan for cases of revealing of incompliance with waste water parameters and immediate implementation of the plan</li> </ul>	<p>Water released into Mtkvari river after treatment in WWTP meeting the following parameters:</p> <ul style="list-style-type: none"> <li>Weighted particles - 30mg/l</li> <li>BOD<sub>-total</sub> -6mg/l</li> <li>COD - 30 mg/l</li> <li>Nitrogen Ammonium – 0.39mg/l</li> <li>Nitrates (NO<sub>3</sub>) - 45 mg/l</li> <li>Nitrites(NO<sub>2</sub>) - 3.3mg/l</li> <li>Polyphosphates - 3.5 mg/l</li> </ul>	65 USD/per 1000 m <sup>3</sup>	WWTP Operator
Accumulation of sludge	<ul style="list-style-type: none"> <li>- Missing or technical unfit means of transportation for regular disposal of sludge from WWTP</li> <li>- Accumulation of sludge at WWTP in difficult weather conditions due to impassable access roads</li> </ul>	<ul style="list-style-type: none"> <li>- Presence and good technical condition of sludge transportation vehicles</li> <li>- WWTP access roads maintained passable for sludge transportation vehicles under any weather conditions</li> </ul>	No accumulation of sludge at the WWTP site	To be included in the municipal budget for local road maintenance	UWSC GWP Mtskheta Municipality
Emergency situations at WWTP	<ul style="list-style-type: none"> <li>- Pollution of environment</li> <li>- Health damage or casualties among WWTP personnel</li> </ul>	<ul style="list-style-type: none"> <li>- Existence of Emergency Management Plan and its exact execution</li> <li>- Training and instructing of water treatment facility personnel for emergency situations</li> </ul>	No damage to the environment and/or human health due to accidents at the WWTP	To be included in the WWTP operation and maintenance budget	WWTP Operator



## Attachment 2. Environmental Monitoring Plan

<b>Activity</b>	<b>What</b> (Is the parameter to be monitored?)	<b>Where</b> (Is the parameter to be monitored?)	<b>How</b> (Is the parameter to be monitored?)	<b>When</b> (Define the frequency / or continuous?)	<b>Why</b> (Is the parameter being monitored?)	<b>Who</b> (Is responsible for monitoring?)
<b>Construction phase</b>						
Provision of construction materials	Purchase of construction materials from the licensed provider	In the provider's office or warehouse	Verification of documents	During conclusion of supply contracts	Provide technical order of facility and its safety for human health	MDF, Construction supervisor
Transportation of construction materials and waste  Movement of construction machinery	<ul style="list-style-type: none"> <li>- Technical condition of vehicles and machinery</li> <li>- Confinement and protection of truck loads with lining</li> <li>- Respect of the established hours and routes of transportation</li> </ul>	<ul style="list-style-type: none"> <li>- Construction site</li> <li>- Routs of transportation of construction materials and wastes</li> </ul>	Inspection of roads adjacent to the construction object in the direction of the movement rout	Undeclared inspections during work hours and beyond	<ul style="list-style-type: none"> <li>- Limit pollution of soil and air from emissions;</li> <li>Limit nuisance to local</li> <li>- Communities from noise and vibration;</li> <li>- Minimize traffic disruption.</li> </ul>	MDF, Construction supervisor, Patrol Police
Operation of construction equipment on site	<ul style="list-style-type: none"> <li>- Technical condition of construction equipment <ul style="list-style-type: none"> <li>• excessive exhaust</li> <li>• fuel and lubricant leakage</li> </ul> </li> <li>- Observation of working hours</li> </ul>	Construction site	Inspection of activities	During and off working hours	<ul style="list-style-type: none"> <li>- Prevent pollution of air and soil due to operation of equipment</li> <li>- Prevent population disturbance with noise and vibration</li> </ul>	MDF, Construction supervisor

Maintenance of construction equipment	<ul style="list-style-type: none"> <li>- Washing of cars and construction equipment outside the construction site or on maximum distance from the river</li> <li>- Refueling or lubrication of construction equipment and outside the construction site or at the predetermined arranged point.</li> <li>- Technical order of the construction equipment maintenance point <ul style="list-style-type: none"> <li>• solid impenetrable floor or adsorbent (sand fine gravel, membrane) cover</li> <li>• enough area and impenetrable barriers around fuel containers</li> <li>• basic fire extinguishing means</li> </ul> </li> </ul>	Construction site and construction base adjacent to it (if any)	Inspection of activities	During operation of equipment	<ul style="list-style-type: none"> <li>- Avoid pollution of water and soil with oil products due to operation of equipment</li> <li>- Timely localize and decrease expected damage in case of fire</li> </ul>	MDF, Construction supervisor
Earth works	<ul style="list-style-type: none"> <li>- Topsoil removal and temporary storage at a separate place at the beginning of works (to dispose to landfill in case of pollution and for re-cultivation of the land if it is good)</li> <li>- Temporary storage of excavated soil at determined and allowed places in compliance with ground piling parameters.</li> <li>- Backfilling of the excavated material as needed and disposal of the excess mass to the places, approved in writing.</li> <li>- Immediate termination of activities in case of unexpected archaeological findings and providing of full information to the Agency of cultural heritage</li> </ul>	Construction site	Inspection of activities	During earth works	<ul style="list-style-type: none"> <li>- Limit loss of vegetations due to ground piling and minimization of pollution of surface water reservoirs with particles</li> <li>- Limit pollution with contaminated soil of surface and ground waters</li> <li>- Avoid loss of cultural heritage</li> </ul>	MDF, Construction supervisor Agency of Cultural Heritage

Extraction of inert material	<ul style="list-style-type: none"> <li>- Purchase of inert materials from the existing suppliers, if there is such opportunity</li> <li>- Obtaining of the license for production of inert materials and strict compliance with the license</li> <li>- Terracing of quarries, backfilling of exploited areas and harmonization with the landscape</li> <li>- Excavating gravel outside water flow, arrangement of separating ridges between water flow and excavation area, banning entrance of watery by vehicles and machinery</li> </ul>	Quarries of inert materials	<p>Inspection of documents</p> <p>Inspection of activities</p>	During excavation and reclamation at quarries	<ul style="list-style-type: none"> <li>- Limit slope erosion and landscape damage</li> <li>- Limit erosion of river banks, pollution of water flow with weighted particles and disturbance of aquatic life</li> </ul>	MDF, Construction supervisor, Agency of Natural Resources
Generation of construction waste	<ul style="list-style-type: none"> <li>Temporary storage of construction waste in especially allocated areas;</li> <li>- timely disposal of wastes to the formally designated locations</li> <li>- Hand-over of larger amounts of hazardous wastes to the companies having license for decontamination and placement of hazardous materials.</li> </ul>	Construction site; Waste disposal site	Inspection of activities	Periodically during construction and upon its completion	<ul style="list-style-type: none"> <li>- Prevent pollution of soil, surface water and ground water,</li> <li>- Avoid accidents at the construction site due to scattered fragments of construction materials and debris,</li> <li>- Retain esthetic appearance of the construction site and its surroundings</li> </ul>	MDF, Construction supervisor, Mtskheta Municipality
Production of domestic wastes	<ul style="list-style-type: none"> <li>- Placement of waste collection containers at the construction site and construction base (if any)</li> <li>- Agreement with Mtskheta Municipality on regular disposal of domestic wastes</li> </ul>	Construction site and construction base (if any)	Visual observation	Total period of construction	Prevent pollution of soil and water with domestic waste	MDF, Construction supervisor, Mtskheta Municipality

Production of liquid wastes	<ul style="list-style-type: none"> <li>- Arrangement and maintenance of toilets in compliance with sanitation norms at the construction site and construction base (if any)</li> <li>- Arrangement and regular cleaning of drainage system for rain water collection and drain</li> <li>- Arrangement of sedimentation pond for water used for domestic and machinery washing purposes</li> </ul>	Construction site and construction base (if any)	Visual observation	<p>Total period of construction</p> <p>In case of waste precipitations</p>	<ul style="list-style-type: none"> <li>- Prevent flooding of construction site and disruption of works due to water logging</li> <li>- Reduce pollution of surface and ground waters</li> </ul>	MDF, Construction supervisor
Operation of asphalt-concrete plant	<ul style="list-style-type: none"> <li>- Obtaining of environment impact permit by the construction contractor and strict compliance with it</li> <li>- Selection of a place for the plant that provides minimal disturbance of population with noise, dust and exhaust</li> <li>- Arrangement of sedimentation pond for waste water from the plant</li> </ul>	Construction site and construction base (if any)	<p>Inspection of documents</p> <p>Inspection of activities</p>	Total period of plant operation	<ul style="list-style-type: none"> <li>- Limit population disturbance near the construction site</li> <li>- Limit atmospheric air and surface water pollution</li> </ul>	MDF, Construction supervisor, Environment Protection Agency
Construction site re-cultivation and landscaping	<ul style="list-style-type: none"> <li>- Dismantlement of construction base (if any) and temporary access roads to the site (if any) and asphalt-concrete plant and harmonization of the areas with the landscape</li> <li>- Final cleaning of the construction site and permanent access roads and landscaping-greening of the area (grass cover)</li> <li>- Planting 400 trees and other vegetation in established amount</li> </ul>	Construction site, construction base and temporary access roads (if any)	Inspection of activities	Final period of construction	<ul style="list-style-type: none"> <li>- Reduce loss of aesthetical value of the landscape due to the water treatment facility construction</li> <li>- Preserve touristic attractiveness of Mtskheta</li> </ul>	MDF, Construction supervisor, Mtskheta Municipality
Workers' health and safety	<ul style="list-style-type: none"> <li>- Provision of constructors with working clothes and PPE</li> <li>- Strict compliance with the rules of construction equipment operation and usage of PPE</li> </ul>	Construction site	Inspection of activities	Total period of works	Reduce probability of traumas and accidents to constructors	MDF, Construction supervisor

Operation Phase						
Water discharge after purification of sewage mass	Compliance of treated water with the following parameters: Weighted particles - 30mg/l BOD <sub>-total</sub> -6mg/l COD - 30 mg/l Nitrogen Ammonium – 0.39mg/l Nitrates (NO <sub>3</sub> ) - 45 mg/l Nitrites(NO <sub>2</sub> ) - 3.3mg/l Polyphosphates - 3.5 mg/l	Laboratory of the water treatment facility	- Collection and testing of water samples with strict compliance with technical guidelines. - Existence of emergency plan for cases of revealing of incompliance with waste water parameters and immediate implementation of the plan	Total period of operation of the facility	Prevent river water pollution	WWTP operator, Environment Protection Agency
Accumulation of sludge	- Availability and technical order of transportation means for regular disposal of sludge from the water treatment facility - Maintenance of possibility of access roads to the WWTP in any weather conditions	WWTP operator's premises  Access road to WWTP	Inspection of documents  Inspection of road	Total period of operation of the facility	<ul style="list-style-type: none"> <li>• Avoid disturbance of local population with odor and spread of infectious diseases</li> <li>• Limitation of soil, surface and ground water pollution with organic material</li> </ul>	WWTP operator, Mtskheta Municipality
Emergency situations on the water treatment facility	-Existence of Emergency Management Plan and its exact execution - Training and instructing of water treatment facility personnel for emergency situations	Office of the water treatment facility operator	Inspection of documents  Inspection of activities	Total period of operation of the facility	Safety of water treatment facility personnel during emergencies and limitation of pollution of environment	Water treatment facility operator Emergency Situations Department

## Attachment 2

### The Minutes of the Meeting of the Public Discussion of the Environmental Impact Assessment Report of the “Mtskheta Sewage System Rehabilitation” Project

Mtskheta

16th June, 2011

On 16th June 2011, the public discussion of the environmental impact assessment (EIA) report of the “Mtskheta Sewage System Rehabilitation” project has been held at the administrative building of the Mtskheta Municipality Board

Members Present:

The representatives of the Georgia Municipal Development Fund (GMDF):

- Nino Patarashvili – the senior specialist of the Environmental Analysis and Resettlement Division (EARD)
- Davit Baidurashvili – the specialist of EARD
- Nikoloz Soselia – the specialist of EARD

The representatives of the Ltd “Gergili” Environmental Consulting Firm

- Shalva Bosikashvili – technical director
- Ilo Mtskhvetadze - expert

The representatives of the Mtskheta Municipality Board

- Temur Abashidze – the governor of the Mtskheta Municipality
- Leri Tkemaladze
- Ketevan Bedianashvili
- Ina Akhalbedashvili
- Lia Kandelaki
- Natia Natradze
- Mamuka Khizanishvili
- Levan Kituashvili
- Giorgi Machkhaneli
- Avtandil Peradze

The representatives of the Ltd “Mtskhetis Tskali”:

- Giorgi Kurdgelashvili
- Jandi Babunashvili

The residents of Mtskheta:

- Natia Nikoladze
- Ketevan Kobaladze
- Natia Gelashvili
- Lia Khuberashvili
- Tamuna Khachapuridze

The representatives of the Non-governmental Sector:

- Guliko Shoshitaishvili – The association “Development of the Civil Society”, the chairman of the board
- Nino Gujaraidze – The association “Mtsvane Alternativa”, the acting director

The meeting was opened by Nino Patarashvili, the representative of GMDF, who reviewed the importance of the „Mtskheta Sewage System Rehabilitation” project on the health improvement of the population and guests of the town of Mtskheta as well as on the development of the infrastructure. The reporter noted that the Ltd “Municipalproecti” worked on the project and the Ltd “Gergili” worked on EIA report under the order of GMDF. Nino Patarashvili distributed a brief summary of planned activities’ to the participants.

Shalva Bosikashvili, the representative of Ltd “Gergili”, delivered the presentation of the Sewage System Rehabilitation Project’s EIA report. The reporter briefly reviewed the current condition of the Mtskheta sewage system, the project’s construction & rehabilitation works and the types of possible impact on the social environment while carrying out these works. He noted that the sewage collectors of the town failed and those are inactive. There is no treatment facility for service-fecal waters and the waste water is discharged to the surface water objects (Aragvi river, Mtkvari river) without purification-disinfection.

The rehabilitation project of the sewage system includes the rehabilitation of “A” and “B” sewage collectors (with the total length of 1838m) and the construction of the treatment facility. The implementation of the designed schemes of the sewage collectors ensures the purification and disinfection of the service-fecal waters, after which the purified water will be discharged to a river.

While the preparation period of the environmental impact assessment report the current baseline condition of the physical and social environment of Mtsketa and its adjacent areas have been studied. In particular: the quality of the atmospheric air (the pollution by hazardous materials, the natural background radiation, noise propagation), the quality of the surface water, bio-diversity, the cultural heritage, the social aspects and other.

With taking into account the works to be performed, the project foresees the types of the possible impact, the quality of impact and the necessary mitigating measures. The plans of the environmental management and the monitoring of the planned activity are prepared.

With taking into account the above, the “Mtskheta Sewage System Rehabilitation” project is acceptable ecologically and the implementation will not cause a harm to the environment and the population health, if the mitigating measures of EIA report and the deliberate environmental management conditions are met.

At the end, the reporter informed the audience about the conclusions, made during the environmental impact assessment period.

- The Sewage System Rehabilitation ensures the total drainage of the waste water from the territory of the town of Mtskheta and this will significantly improve the sanitary condition of the town.
- After the arrangement of the waste water treatment facility, it is possible to drain the treated and disinfected waste water to the surface water objects; this will significantly improve the ecological condition of the Aragvi and Mtkvari rivers.
- The project implementation will ensure infrastructure’s sustainable development, which is important for the socio-economic development of the city and municipality.
- The socio-economic, also the gender effect and the impact on population’s health is positive

- While rehabilitation period, the deterioration of the atmospheric air quality, the pollution of the surface waters, underground waters and soil will not be important within the conditions of the deliberate environmental protection management
- The expected negative impact on fauna bears temporary character and is expressed by antropogenic load of the animal species at the adjacent area of the rehabilitation objects and by temporary worries caused by the noise propagation
- Taking into account the planned compensating measures (laying of the soil fertile layer, re-cultivating and grass-brush-planting activities on the damaged areas) an impact on flora will not be important

After the presentation of the environmental impact assessment report, the participants were able to show their comments and opinions during the public discussion. The representatives of the local municipality and the non-governmental sector have been actively involved in the discussion. The participants noted that the project implementation is important for the development of the Mtskheta infrastructure and for the improvement of the sanitary-ecological condition. Temur Abashidze, the governor of the Mtskheta municipality, Nino Gujaraidze, the acting director of the association “Mtsvane Alternativa” and Guligo Shoshitaishvili, the chairman of the board “The Association for the Civil Society”, showed their own opinions.

Nino Gujaraidze delivered remarks about the preliminary review document of EIA report. She underlined the fact that the document did not show the analysis of the alternatives of the treatment arrangements and the information about the location of the sewage collectors’ arrangement was missing. The representatives of the consulting firm informed that the remarks will be taken into account in the report’s final version.

Guliko Shoshitaishvili mentioned that there were incompliance between the numbers of the population and the capacities of the treatment facilities in the public discussion version EIA report of the “Mtskheta Sewage System Rehabilitation” project and the public discussion version brief summary of the project. The representatives of GMDF, Mtskheta Municipality and Ltd “Gergili” explained that before the public discussion there were consultations regarding the project between these three organizations and they defined the number of the Mtskheta population as well as the capacity of the treatment facility and this will meet waste water treatment requirements in Mtsketa, with taking into account the tourism potential.

Initially they defined the number of Mtskheta population as 18 000, with taking into account the population rise. The project was including the construction activities of two aggregates (with 2000m<sup>3</sup>/d capacity for each) of the water treatment facility. It was mentioned that the current number of the Mtskheta population approximately equals 7000, accordingly, they defined 9500 as the number of population (with taking into account the population rise and the tourism development potential) and calculated with this number the maximum capacity of the treatment facility as 2500m<sup>3</sup>/d. This will meet the Mtskheta’s requirement on the waste water treatment.

The decision has been made to construct at the first stage only one aggregate (with capacity 2500m<sup>3</sup>/d) out of two, within the treatment facility project, which will fully meet the Mtskheta’s waste-water-treatment requirement. In addition, the lower capacity treatment facility’s construction and operation will reduce expenses and, which is most important, this will cause less harm to the environment. If this is taken into account, only half allocated area will be used for construction of the treatment facility. The second part (the reserve) will be used when the Mtskheta population as well as the waste-water-treatment requirements are increased.



The organizers of the public discussion noted that the project & environmental document processing goes on and this will be submitted for the review to the relevant agencies

Nino Gujaraidze delivered remarks about EIA report and received the explanation that the similar remarks delivered the representatives of the World bank before the public discussion and the part of remarks already are taken into account in the report. Nino Gujaraidze asked GMDF representatives for a copy of the revised EIA report and she got a consent. With the purpose to respond timely, the GMDF employees asked the leaders of non-governmental organizations to deliver the remarks regarding EIA report.

The attachment shows the comments and proposals delivered at the public discussion as well as the information regarding this

**Signatures:**

1. T. Abashidze
2. L. Tkemaladze
3. N. Patarashvili
4. D. Baindurashvili
5. N. Soselia
6. Sh. Bosikashvili
7. I. Mtskhvetadze
8. G. Shoshitaishvili
9. N. Gujaraidze
10. K. Kobaladze
11. N. Nikoladze

**Meeting Minutes  
for  
Environmental Impact Assessment Report’s next Public Discussion for “Mtskheta Sewage  
System Rehabilitation” Project**

Mtskheta

19<sup>th</sup> of December, 2011

On 19<sup>th</sup> of December 2011, the next public discussion of the environmental impact assessment (EIA) report of the “Mtskheta Sewage System Rehabilitation” project was conducted at the administrative building of the Mtskheta Municipality Board.

Presented Members:

Representatives of the Municipal Development Fund of Georgia (MDFG):

- Nino Patarashvili – Senior specialist of the Environmental Analysis and Resettlement Division (EARD)
- Nikoloz Soselia – Specialist for EARD

Representatives of” Environmental Consulting Company “Gergili” Ltd.

- Rezo Enuqidze –Director of “Gergili” Ltd;
- Ilo Mtskhvetadze – Expert;

Representatives of Mtskheta Municipality

- Leri Tkemaladze
- Mamuka Khizanishvili
- Levan Kituashvili
- Merab Tuxareli;
- Shalva Qemoklidze;
- Davit Osefashvili;
- Giorgi Mamulashvili;
- Zura Marsagishvili

Rezo Enuqidze, representative of “Gergili” Ltd. opened the meeting and delivered the presentation for the Sewage System Rehabilitation Project’s EIA report. The reporter reviewed briefly the current condition of Mtskheta sewage system, project’s construction & rehabilitation works and types of possible impacts on the natural and social environment while carrying out these works. He noted the amendments made to the EIA report after first public hearing according to existing comments before and during the workshop.

The current baseline condition of the physical and social environment of Mtsketa and its adjacent areas was discussed that had been studied during the environmental impact assessment report preparatory period. In particular, the quality of the atmospheric air (pollution by hazardous materials, natural background radiation, noise propagation), quality of surface water, bio-diversity, cultural heritage, social aspects etc.

Considering the works to be performed, the project foresees the types of possible impact, quality of impact and essential mitigating measures. The plans of the environmental management and the monitoring of the planned activities are prepared and they represent an integral part of the EIA report.

Taking all above mentioned into consideration, the “Mtskheta Sewage System Rehabilitation” project is acceptable ecologically and implementation will not harm the environment and health of population, in case the mitigating measures of EIA report and deliberate environmental management conditions are met.

After the presentation of the environmental impact assessment report, participants were able to express their comments and opinions during the public discussion. They noted that the project implementation was important for development of Mtskheta infrastructure and improvement of sanitary-ecological condition.

Public discussion organizers noted that the project & environmental document processing is almost completed and in near future it will be submitted to relevant agencies for review.

During the meeting the participants emphasized their opinions regarding construction site of Waste Water Treatment Plants. It was noted that the soil contains lots of water and needs relevant design and construction planning activities. Regarding this task the audience was informed that this issue had already been considered in the project design and construction process and it will be managed in a way any potential negative results to be avoided.

Public hearing organizers noted that the design and environmental documentation is almost completed and will be submitted in near future to the relevant authorities.

In the process of the public review for the EIA there were no remarks or suggestions from the attending auditory.

### **Signatures:**

12. L. Tkemaladze

13. N. Patarashvili

14. N. Soselia

15. R. Enukidze

Attachment 3. Agreement on the acceptance of sludge at the authorized disposal site



№ 6487/09

D 26. 10. 11.

საქართველოს მუნიციპალური  
განვითარების ფონდის აღმასრულებელი  
დირექტორის პირველ მოადგილეს  
ბატონ დავით სირაძეს

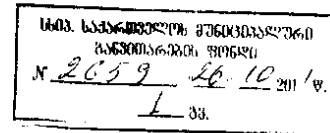
ბატონო დავით,

კომპანიამ "ჯორჯიან უოთერ ენდ ფაუერი" განიხილა თქვენი წერილი N2673-გ დათარიღებული 25.10.2011 რომელშიც ითხოვთ კომპანიის მოსაზრებას მცხეთის კანალიზაციის გამწმენდ ნაგებობებზე ჩამდინარე წყლების დამუშავების შედეგად წარმოქმნილი გაუწყლოვანებული ლამის განთავსებასთან დაკავშირებით.

მიგვაჩნია რომ მცხეთის კანალიზაციის გამწმენდი ნაგებობებიდან გაუწყლოვანებული ლამის გატანა შესაძლებელია ქ. თბილისი - რუსთავის რეგიონალური კომპლექსური საკანალიზაციო გამწმენდი ნაგებობების სალამე მოედნებზე.

ომარ გოცირიძე  
ტექნიკური დირექტორი

შემსრ. მერაბ კანდელაკი



შპს ჯორჯიან უოთერ ენდ ფაუერი GEORGIAN WATER AND POWER LTD

# GWP

#6487/09 D

26.10.11

To: David Siradze  
First Deputy of Executive Director  
Municipal Development Fund of Georgia

Mr. David,

The “Georgian Water and Power” company received your letter #2673g dated 25.10.2011. With this letter you have asked about our company’s views how it is possible to dispose during Mtskheta WWTP operation generated dewatered sludge on disposal site of Tbilisi-Rustavi Regional Complex Sewer Purification Structures operated by gwp.

We consider that it is possible to dispose during Mtskheta WWTP operation generated sludge on disposal site of Tbilisi-Rustavi Regional Complex Sewer Purification Structures.

Omar Gotsiridze (signature) Technical Director

Executor: Merab Kandelaki



საქართველოს გაერთიანებული  
წყარმომარაგების კომპანია  
UNITED WATER SUPPLY COMPANY OF GEORGIA

N 2498/1  
16/05/2012

2498-1-2-201205161009



სსიპ საქართველოს მუნიციპალური განვითარების  
ფონდის აღმასრულებელ დირექტორს  
ბატონ ლევან ჭიჭინაძეს

ბატონო ლევან,

თქვენი 2012 წლის 14 მაისის, №1078-გ წერილის პასუხად გაცნობებთ, საქართველოს გაერთიანებული წყარმომარაგების კომპანიის შიდა ქართლისა და მცხეთა-მთიანეთის რეგიონულ ფილიალს გააჩნია სპეციალური საასენიზაციო მანქანები, რომელთა გამოყენება შესაძლებელი იქნება მცხეთის საკანალიზაციო გამწმენდი ნაგებობის ექსპლუატაციისას.

პატივისცემით,

დავით მაჭავარიანი

დირექტორის მოადგილე

სსიპ. საქართველოს მუნიციპალური  
განვითარების ფონდი  
N 1217 16-05 2012  
L - გვ.

შ 3 ს

საქართველო, ქ.თბილისი 0186  
ანა პოლიტკოვსკაიას 5;  
ტელ: (995 32) 2 91 90 60  
ფაქსი: (995 32) 2 91 90 61

e-mail: info@water.gov.ge  
www.water.gov.ge

L.L.C.

5, Ana Politkovskaja str.,  
Tbilisi 0186, Georgia;  
Tel: (995 32) 2 91 90 60  
Fax: (995 32) 2 91 90 61

## United Water Supply Company of Georgia

#2498/1

16.05.12

To: Levan Chichinadze  
Executive Director  
Municipal Development Fund of Georgia

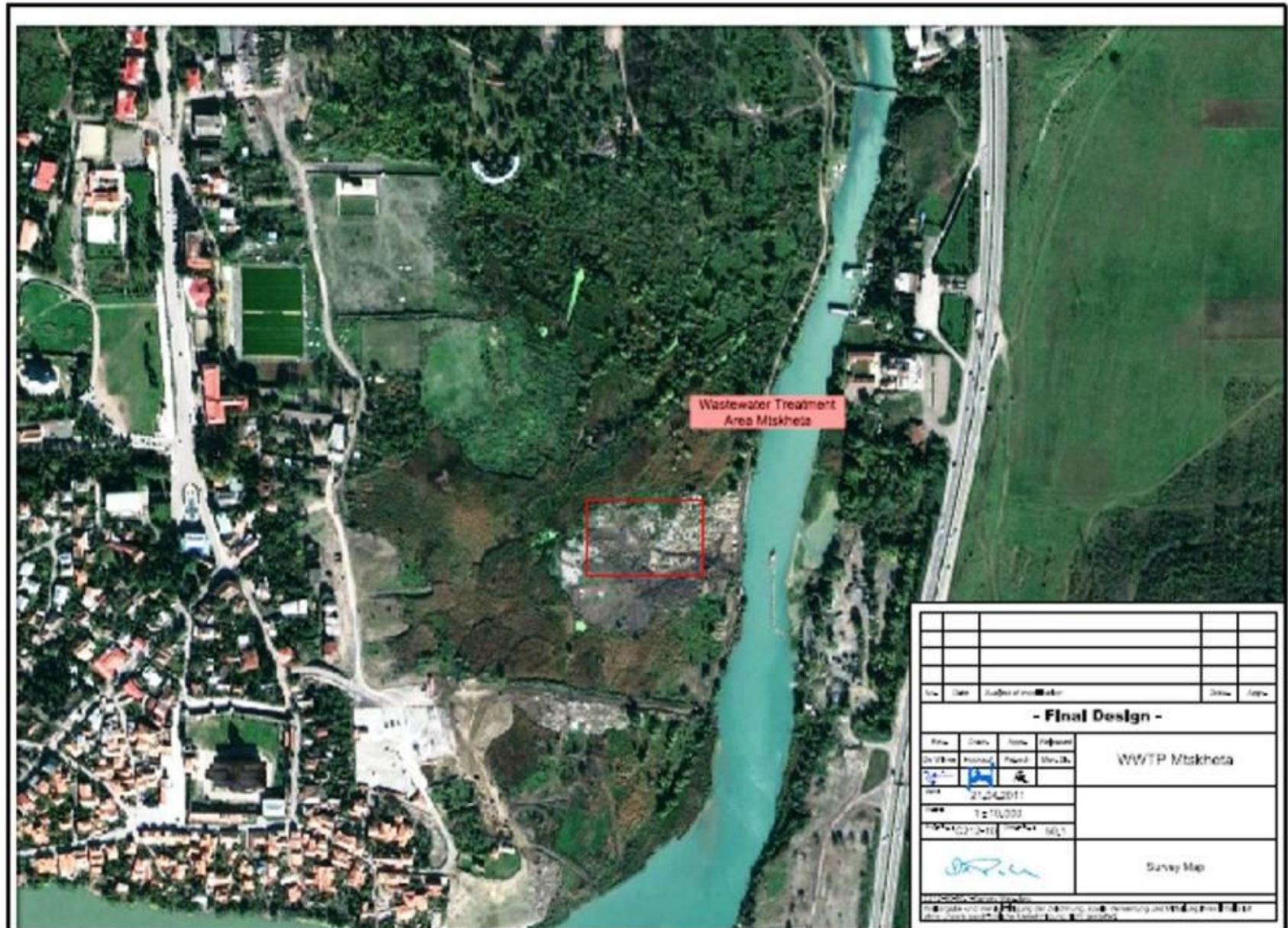
Mr. Levan,

In response of your letter #1078g dated 14.05.2012. Shida Kartli and Mtskheta-Mtianeti regional branch of United Water Supply Company of Georgia (UWSCG) possess special cesspool emptiers, which can be used during the operation of the Mtskheta Waste Water Treatment Plant (WWTP) (for sludge transportation).

David Machavariani (signature)

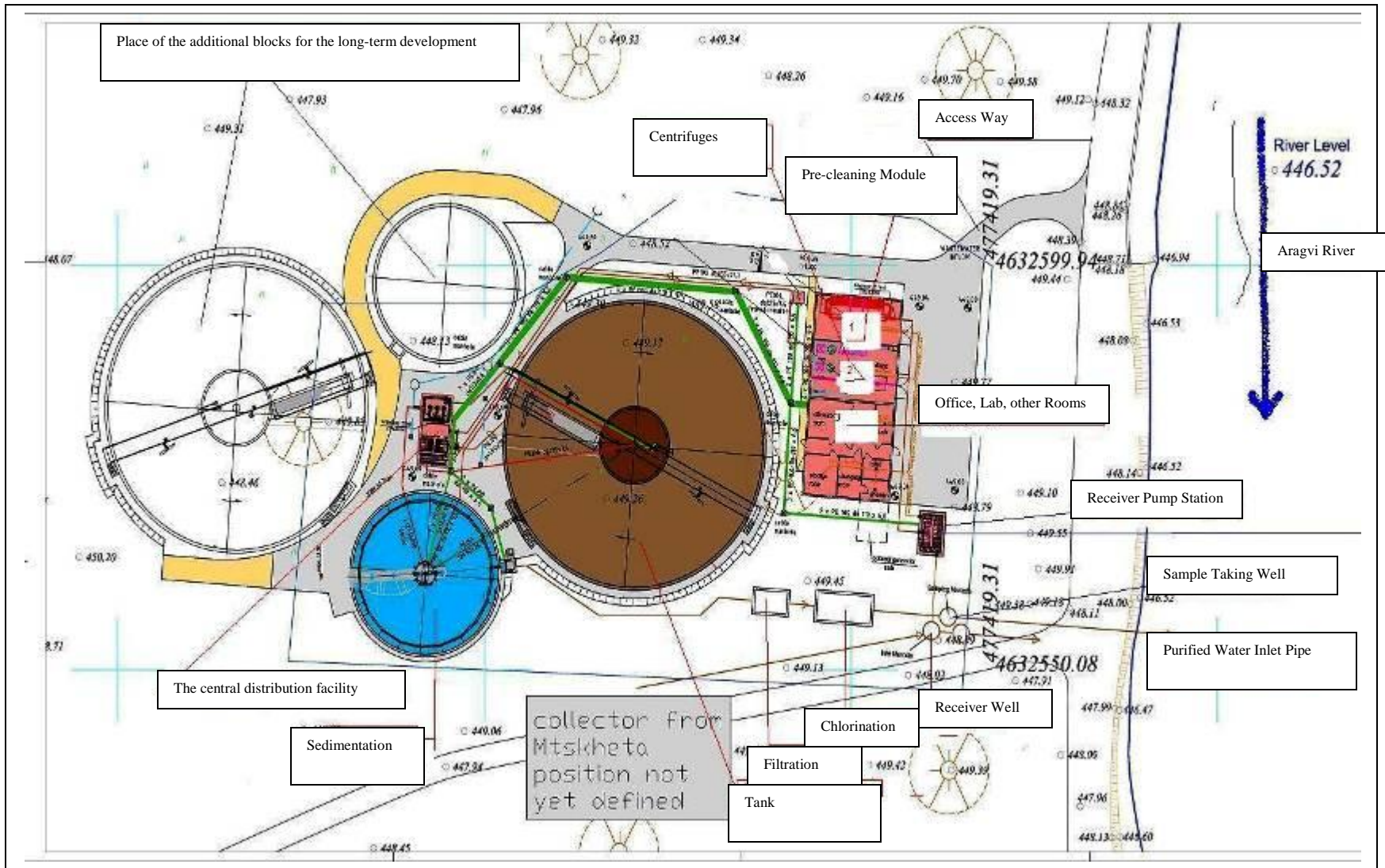
Deputy Director

Attachment 4. Illustrations and drawings

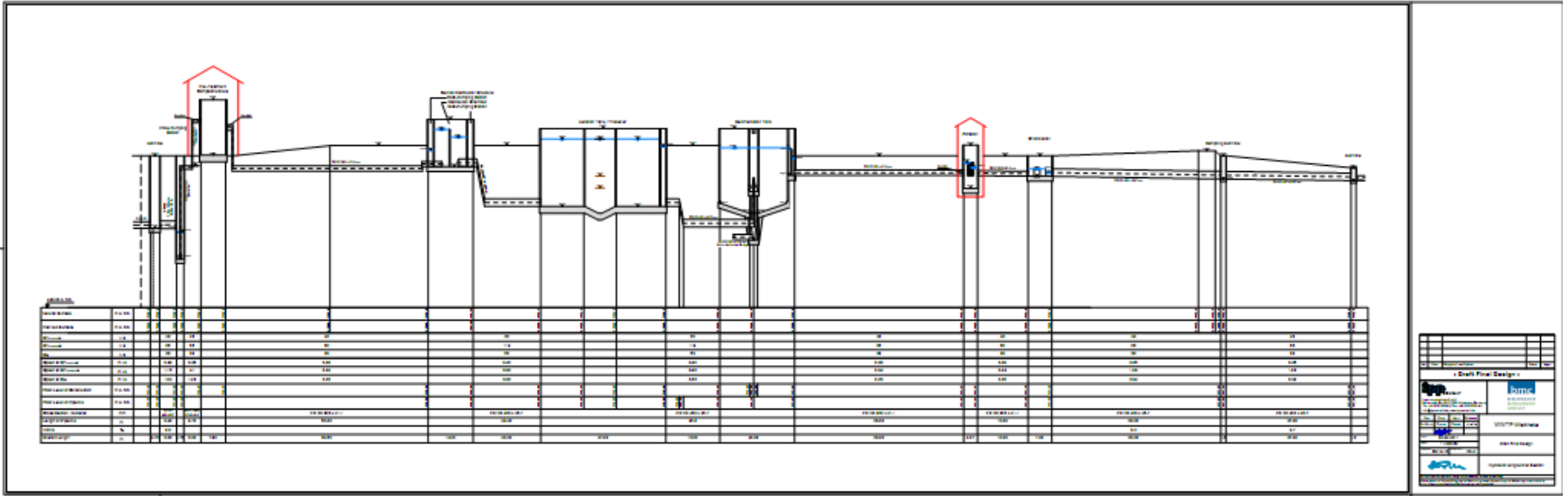


No.	Date	Number of modifications	Drawn	Approved
<b>- Final Design -</b>				
Drawn	Checked	Reviewed	Approved	WWTP Mtskheta
Date	Scale			Survey Map
21.04.2011	1:10,000			
<small>                 Project: WWTP Mtskheta, Georgia. Prepared by: [Company Name]. Drawing No: [Number]. Scale: 1:10,000.             </small>				





Attachment 2





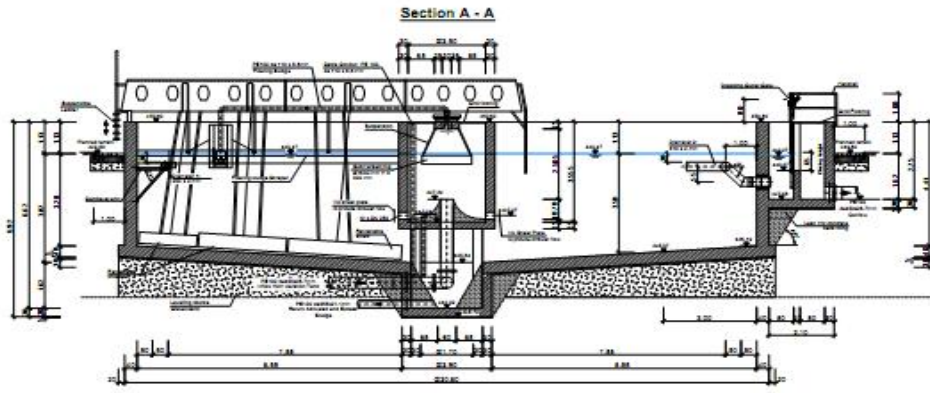
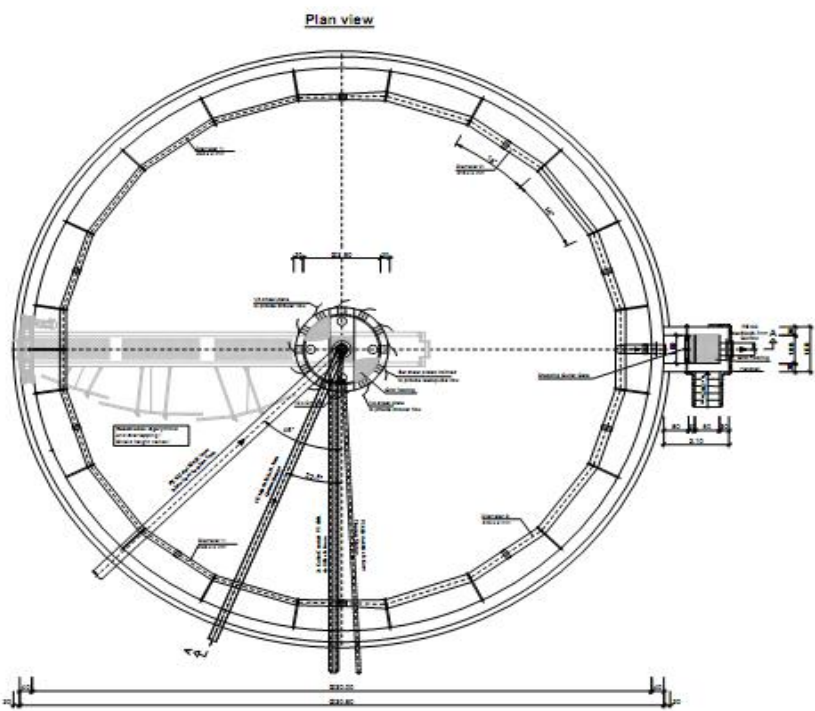


Fig. 2

#	Layer depth	Quantity	Unit	Remarks
1	0.30	0.30	0.30	Gravel
2	0.30	0.30	0.30	Clay
3	0.30	0.30	0.30	Gravel
4	0.30	0.30	0.30	Gravel
5	0.30	0.30	0.30	Gravel
6	0.30	0.30	0.30	Gravel
7	0.30	0.30	0.30	Gravel
8	0.30	0.30	0.30	Gravel
9	0.30	0.30	0.30	Gravel
10	0.30	0.30	0.30	Gravel
11	0.30	0.30	0.30	Gravel
12	0.30	0.30	0.30	Gravel
13	0.30	0.30	0.30	Gravel
14	0.30	0.30	0.30	Gravel
15	0.30	0.30	0.30	Gravel
16	0.30	0.30	0.30	Gravel
17	0.30	0.30	0.30	Gravel
18	0.30	0.30	0.30	Gravel
19	0.30	0.30	0.30	Gravel
20	0.30	0.30	0.30	Gravel
21	0.30	0.30	0.30	Gravel
22	0.30	0.30	0.30	Gravel
23	0.30	0.30	0.30	Gravel
24	0.30	0.30	0.30	Gravel
25	0.30	0.30	0.30	Gravel
26	0.30	0.30	0.30	Gravel
27	0.30	0.30	0.30	Gravel
28	0.30	0.30	0.30	Gravel
29	0.30	0.30	0.30	Gravel
30	0.30	0.30	0.30	Gravel
31	0.30	0.30	0.30	Gravel
32	0.30	0.30	0.30	Gravel
33	0.30	0.30	0.30	Gravel
34	0.30	0.30	0.30	Gravel
35	0.30	0.30	0.30	Gravel
36	0.30	0.30	0.30	Gravel
37	0.30	0.30	0.30	Gravel
38	0.30	0.30	0.30	Gravel
39	0.30	0.30	0.30	Gravel
40	0.30	0.30	0.30	Gravel
41	0.30	0.30	0.30	Gravel
42	0.30	0.30	0.30	Gravel
43	0.30	0.30	0.30	Gravel
44	0.30	0.30	0.30	Gravel
45	0.30	0.30	0.30	Gravel
46	0.30	0.30	0.30	Gravel
47	0.30	0.30	0.30	Gravel
48	0.30	0.30	0.30	Gravel
49	0.30	0.30	0.30	Gravel
50	0.30	0.30	0.30	Gravel
51	0.30	0.30	0.30	Gravel
52	0.30	0.30	0.30	Gravel
53	0.30	0.30	0.30	Gravel
54	0.30	0.30	0.30	Gravel
55	0.30	0.30	0.30	Gravel
56	0.30	0.30	0.30	Gravel
57	0.30	0.30	0.30	Gravel
58	0.30	0.30	0.30	Gravel
59	0.30	0.30	0.30	Gravel
60	0.30	0.30	0.30	Gravel
61	0.30	0.30	0.30	Gravel
62	0.30	0.30	0.30	Gravel
63	0.30	0.30	0.30	Gravel
64	0.30	0.30	0.30	Gravel
65	0.30	0.30	0.30	Gravel
66	0.30	0.30	0.30	Gravel
67	0.30	0.30	0.30	Gravel
68	0.30	0.30	0.30	Gravel
69	0.30	0.30	0.30	Gravel
70	0.30	0.30	0.30	Gravel
71	0.30	0.30	0.30	Gravel
72	0.30	0.30	0.30	Gravel
73	0.30	0.30	0.30	Gravel
74	0.30	0.30	0.30	Gravel
75	0.30	0.30	0.30	Gravel
76	0.30	0.30	0.30	Gravel
77	0.30	0.30	0.30	Gravel
78	0.30	0.30	0.30	Gravel
79	0.30	0.30	0.30	Gravel
80	0.30	0.30	0.30	Gravel
81	0.30	0.30	0.30	Gravel
82	0.30	0.30	0.30	Gravel
83	0.30	0.30	0.30	Gravel
84	0.30	0.30	0.30	Gravel
85	0.30	0.30	0.30	Gravel
86	0.30	0.30	0.30	Gravel
87	0.30	0.30	0.30	Gravel
88	0.30	0.30	0.30	Gravel
89	0.30	0.30	0.30	Gravel
90	0.30	0.30	0.30	Gravel
91	0.30	0.30	0.30	Gravel
92	0.30	0.30	0.30	Gravel
93	0.30	0.30	0.30	Gravel
94	0.30	0.30	0.30	Gravel
95	0.30	0.30	0.30	Gravel
96	0.30	0.30	0.30	Gravel
97	0.30	0.30	0.30	Gravel
98	0.30	0.30	0.30	Gravel
99	0.30	0.30	0.30	Gravel
100	0.30	0.30	0.30	Gravel

1. Gravel layer
  2. Clay with grey with thin layers of sandstone (R-100)
  3. Sandstone with grey, full with thin thin layers (R-100)
  4. Pieces of medium and the bottom, with sand filter (R-100)
  5. Stone of medium and the bottom with sand filter (R-100)
  6. Sandstone with grey, stone included
  7. Sandstone with grey, stone included
- Ground water level (A 2010)  
Ground water level (A 2010)  
Ground water level (A 2010)



- Draft Final Design -	
<b>APP</b> CONSULT	<b>bmc</b>
Representative of the Client (Name): The Client (Name): The Client (Address):	WWTW Makhala
Date: 02.02.2011	Draft Final Design
Scale: 1:100	Sheet No: 03.1
Sheet No: 03.1	







## The Calendar Schedule of the Civil-Erection & Arrangement Works

