Environmental Assessment Report

Initial Environmental Examination
Tbilisi Urban Environment and Gorgasali Road Rehabilitation
Project Number: 42414

Proposed Multitranche Financing Facility
Georgia: Sustainable Urban Transport Investment Program

CURRENCY EQUIVALENTS

(as of 3 March 2009)
Currency Unit – lari (GEL)
GEL1.00 = $0.6
$1.00 = GEL1.713

ADB	–	Asian Development Bank
CAS	–	Center of Archaeological Search of the Ministry of Culture and Sports
EIP	–	Environmental Impact Permit
EMP	–	Environmental Management Plan
FS	–	Feasibility Study
GIS	–	Geographical Information Systems
GOG	–	Government of Georgia
IEE	–	Initial Environmental Examination
MAC	–	Maximum Admissible Concentrations
MDF	–	Municipal Development Fund
MLHSP	–	Ministry of Labor, Health and Social Protection
MoA	–	Ministry of Agriculture
MoE	–	Ministry of Environmental Protection and Natural Resources
MoED	–	Ministry of Economic Development
NGO	–	nongovernment organization
RAP	–	Resettlement Action Plan
SPS	–	Safeguard Policy Statement

CONTENTS

I. INTRODUCTION

1. Upgrading and improvement of local transport and transport-related infrastructure plays a significant role in the development of Tbilisi city infrastructure. To this effect a number of important activities have been implemented and financed from the Tbilisi City budget and other sources. To reduce congestion on a major highway in the South-west of the city Tbilisi City Administration (The project proponent) proposes to construct a tunnel below the Gorgasali street and reconstruct access roads.

2. The goal of the present environment assessment report, prepared as a part of the feasibility study (FS) of the project, is to determine whether that the project will be environmentally sustainable at the project design, implementation and operation stages. Possible negative impacts on the environment are be identified, and measures to prevent, mitigate or manage these impacts are proposed

3. The Municipal Services Development Project funded by the Asian Development Bank (ADB). Presented project is one of various projects backed by international donor organizations to be implemented by the Municipal Development fund (MDF).
MDF aims at strengthening institutional and financial capacity of municipalities through investing financial resources in local infrastructure and services, and on improving on sustainable basis the primary economic and social services.

A. Current Situation

4. If the present situation was allowed to continue (considered by the FS as option 1), traffic congestion will occur as at present, and will worsen as traffic volumes increase in the future. It will therefore not be possible to remedy the situation by re-organization the traffic management.
As a result of implementation the project:

(i) From Metekhi Bridge towards Ortachala and from Ortachala towards the Metekhi Bridge the traffic flow will be unobstructed, which will improve the environmentally condition of the area (as there will be less pollution from idling vehicles engines);
(ii) Transferring the traffic from the road adjacent to the balneology health resort in to the new tunnel will significantly decrease the level of noise;
(iii) Though the vegetation will be removed on the project site (around 150 Oriental planes (Platanus “Italies” orientalis) of 50-60 years old will be cut), the project will plant twice as many trees in a new recreation zone to be provided on the top of the tunnel;
(iv) Project implementation will improve the social condition of the local community. In the recreation zone a car parking lot for 200 cars and a commercial space of 683m2 will planned to be provided.

B. Brief Outline of the Contents of the Report

5. The IEE was prepared in accordance with Georgia’s environmental legislation, ADB’s safeguard policy (2009) and MDF’s procedures and environmental guidelines. The objectives of the IEE are the following:

(i) Define potential positive and negative environmental impact in for various reviewed alternatives;
(ii) Provide technical information and recommendations to facilitate selection of the best alternative;
(iii) Prepare an Environmental Management Plan (EMP) including action for mitigation of likely damage, monitoring plan and description of institutional measures;
(iv) Ensure mechanisms for public participation and information dissemination on the basis of relevant legislation and existing procedures.

II. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

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

A. Environmental Permitting and Public Consultation

7. At present, the environmental permitting procedure in Georgia is set out in three laws: The project proponent, in implementing projects, will comply with (i) The Law on Licenses and Permits (2005); (ii) The Law on Environmental Impact Permits (EIP), and (iii) The Law on Ecological Examination (EE) 2008.

8. The Laws on Environmental Impact Permit and on Ecological Examination have been published on 14.12.2007 and entered in force on 01.01.2008. These new laws integrate all the amendments introduced in legislation of Georgia during recent years.

9. The 6th clause of the law of Georgia on the Environmental Impact Permit provides detailed requirements and procedures for conducting public consultations and established timeframes for information disclosure and discussion, namely:

10. According to article 6, a developer is obliged to carry out public discussion of the EIA before its submission to the administrative body responsible for issuing a permit.

B. Other Environmental Laws relevant to the project

11. **The Law on the Environmental Protection Service (Agency).** In accordance with the 'Law on the Environmental Protection Service of 2008, an environmental protection control system has been established to ensure the following: (a) state control in the field of environmental protection and ecological systems safety, (2) observance of the proper laws by the subjects of regulation, (3) population's trust in the system and in state organs, generally in respect of performance of state obligations and transparency in the field of environmental protection. Under the same Law, there an environmental protection agency established (on the basin of a former environmental protection inspection of MoE) and the functions of its employees specified by regulations of MoE. In particular, they are authorized to conduct an environmental inspection of the required agencies (physical and legal entities, state authority and local self-governing bodies) and monitoring of their activities. Besides, the prerogative of the environmental protection agency is to calculate the damage to the environment to compensate it to the state, put forward the requirement to compensate for the damage, and in case of non-compliance, file a proper appeal before the court.

12. **The "Georgian Law on Ambient Air Protection**" was put into effect from 1 January 2000. The scope of this low is to protect ambient air in Georgia from harmful human impact. This law does not govern the field of air protection in work places. The main competences of governmental authorities in the field of ambient air protection are; (a) Development of environmental monitoring (observation) system; (b) Development and implementation of common policies and strategies; and (c) Development of integrated ambient air pollution control.

13. **The Law of Minerals** of (1996) provides provisions for the mineral resource exploration and management and establishes the requirement to obtain a license according to the procedures established under this law. The Law on Licensing and Permits (June 25, 2005) establishes the most recent regulations for licensing. According to the current legislation all quarries and borrow pits require to obtain a license from Ministry of Economic Development (MoED)

14. **The 'Law of Georgia on Cultural Heritage' (2007).** Article 14 of the Law specifies the requirements for 'large-scale' construction works. According to this Article, a decision on career treatment and ore extraction , as well as on construction of an object of a special importance as defined under the legislation of Georgia, is made by a body designated by the legislation of Georgia based on the positive decision of the Ministry of Culture, Monument Protection and Sport of Georgia. Also according the article 10.1 of this low "If physical or legal person finds out cultural heritage during the working activities and continuation of these activities can damage, destruct or represent a danger for it, physical or legal person should immediately stop working activities and inform the Ministry by the letter during 7 days about the ceasing of working activities as well as about the cultural heritage which has been revealed, discovered or there is a reasonable assumption related it".

C. ADB Environmental Guidelines

15. All projects funded by ADB must comply with ADB Safeguard Policy as set out in the Safeguard Policy Framework (2009) . The purpose of the environmental safeguards to establish an environmental review process to ensure that projects undertaken as part of programs funded under ADB loans are environmentally sound, are designed to operate in compliance with applicable regulatory requirements, and are not likely to cause a significant environmental, health, or safety hazards.

16. Safeguard policies are generally understood to be operational policies that seek to avoid, minimize, or mitigate adverse environmental and social impacts, including protecting the rights of those likely to be affected or marginalized by the development process.

17. ADB's safeguard policy statement (SPS) sets out the policy objectives, scope and triggers, and principles for three key safeguard areas:

(i) The Involuntary Resettlement Policy (1995);
(ii) The Policy on Indigenous Peoples (1998), and
(iii) The Environment Policy (2002).

D. Environmental Impact Assessment (EIA)

18. The process of EIA evaluates the potential environmental risks and impacts of a specific project in its area of influence, examines alternatives to the project, identifies ways of improving project selection, sitting, planning, design, and implementation by preventing, minimizing,

mitigating, or compensating for adverse environmental impacts and enhancing positive impacts. EIA includes the process of mitigating and managing adverse environmental impacts during the implementation of a project

19. According to the ADB policy environmental assessment report should include:
A. Executive Summary
B. Policy, Legal, and Administrative Framework
C. Description of the Project
D. Description of the Environment (Baseline Data)
E. Anticipated Environmental Impacts and Mitigation Measures
F. Analysis of Alternatives
G. Information Disclosure, Consultation, and Participation
H. Grievance Redress Mechanism
I. Environmental Management Plan
J. Conclusion and Recommendation

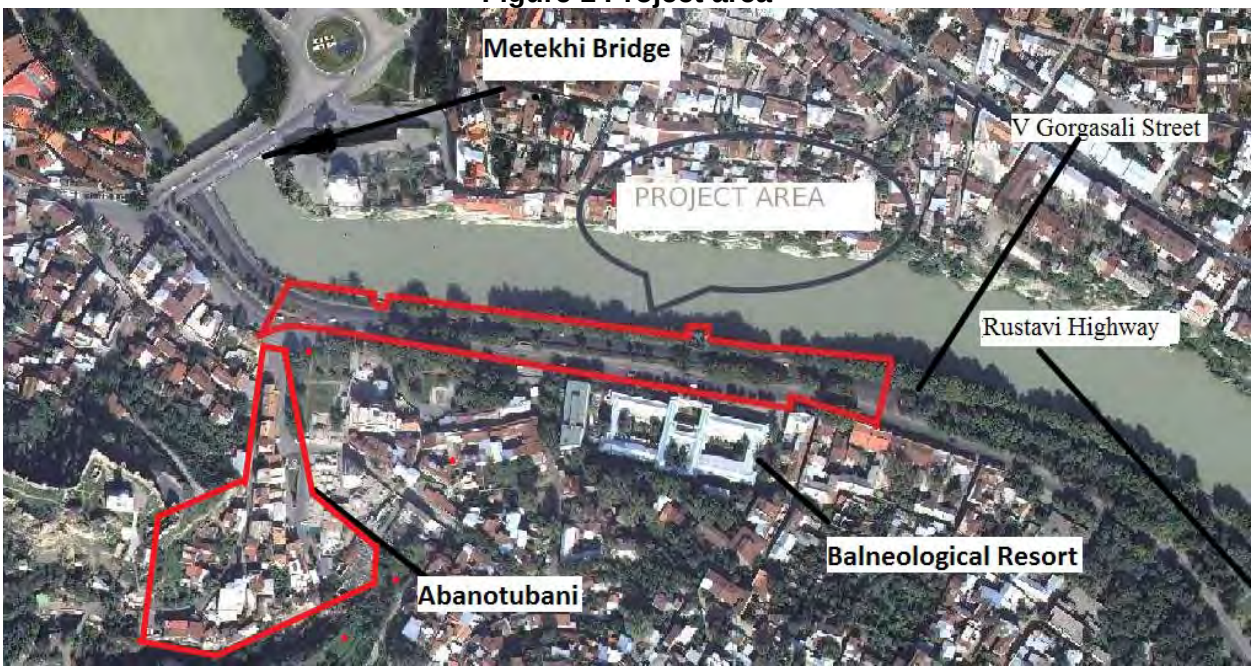
E. Public consultation

20. This process is intended to involve the public in project design and exchange information with stakeholders to the benefit of the project. The IEE and EIA reports should: (i) recommended measures for continuing public participation; (ii) summarize major comments received from beneficiaries, local officials, community leaders, NGOs, and others, and describe how these comments were addressed; (iii) list milestones in public involvement (e.g., dates, attendance, topics of public meetings), and recipients of the report and other project-related documents; (iv) describe compliance with relevant regulatory requirements for public participation; (v) if possible summarize public acceptance or opinion on the proposed project; and (vi) describe other related materials or activities (e.g., press releases, notifications) as part of the effort to gain public participation. This section will provide of summary of information disclosed to date and procedures for future disclosure.

III. DESCRIPTION OF THE PROJECT

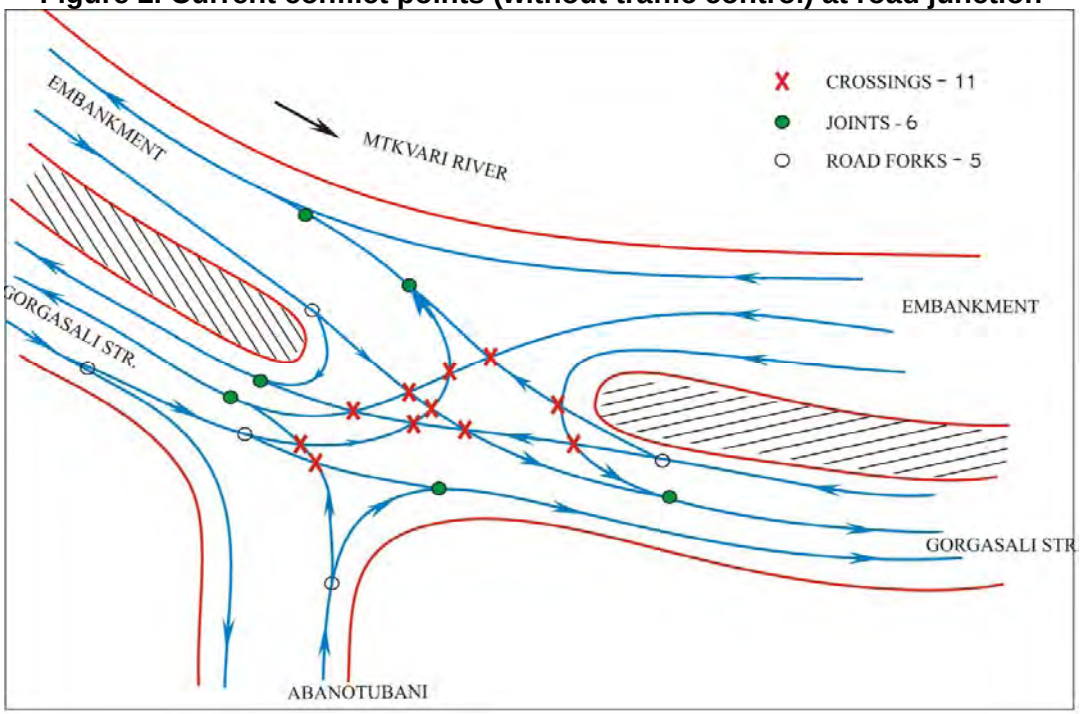
21. Vakhtang Gorgasali Street starts at V. Gorgasali Square going towards Abanotubani, the oldest part of the city, and joins Rustaveli highway, which is a significant main route at present. The street is includes by four access routes and three blind alleys.

Figure 1 Project area



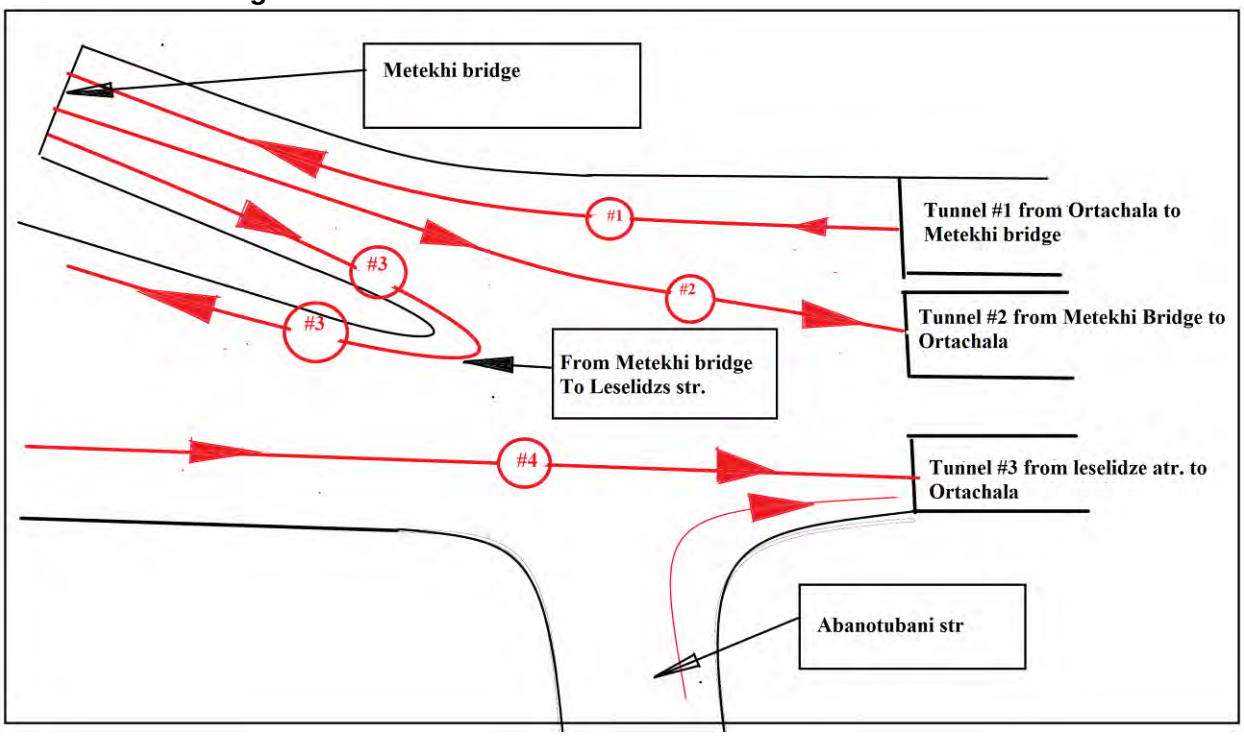
22. The highway along the riverbank on the Gorgasali Street segment is represented currently by two wide traffic lanes and a wide median reset lane (with vegetation) between them. Figure 2 is shows current conflict points at road junction. There is no other highway with such developed transport parameters on the other section of the River bank.

Figure 2. Current conflict points (without traffic control) at road junction



23. Construction of three tunnels is proposed in the prepared option. Main flows of traffic are passed through the tunnels. On the upper level of the tunnel (7000 m2) is possible to create recreational area and establish car parking area.

Figure 3. The traffic flow after construction of the tunnels



24. All types of vehicles are allowed through the tunnels 1 and 2. The height of 1 and 2 tunnels is 5 m. and width of the carriage way is 8 m. Through tunnel 3 is allowed only public transport of city and Passenger cars the height is 4 meter, and Width is 6.5 m.

IV. DESCRIPTION OF THE ENVIRONMENT (BASELINE DATA)

A. Geology

25. Geologically the project area is situated on the rocky areas which are intended to middle eocenial geological age layer. Lithologically they are represented by medium and thick layers of medium and thick-layer sandstones – so called “mixed layer set”. The project area is stable and does not contain geo-hazards.

B. Topography

26. Tbilisi is located in the South Caucasus at 41° 43' North Latitude and 44° 47' East Longitude. The city is situated in East Georgia on both banks of the Mtkvari River. The elevation of the city ranges from 380-770 meters above sea level. Topography of the Tbilisi Gorge is very diverse because creates a complex geological structure, as well as erosion-denudation and accumulation processes. The morphological diversity of Tbilisi Gorge is a result of the asymmetrical positions of the left and right banks of the gorge.

27. The project area is situated an altitude of 390-394 m above sea level. It is located at the right terrace of the r. Mtkvari bank between the river and the slopes following the right bank, The area is flat, with slight inclination from Balneological resort (East) and from the bridge (West) towards the lowest point, which is the area near the sulfur bath, between the bridge and Balneological resort (Figure 1)

C. Seismology

28. According to the corrected scheme of zoning of the territory of Georgia, the project territory is included in the point 8 earthquake zone. The intensity of tectonic zones are calculated for 2% probability (expectation time 50 years) according to the Richter scale. The risk of activation of exogenous processes on the territory of Tbilisi has significantly increased after the earthquake of April 25, 2002 weakening the stability of the landslide-gravitational slopes to the critical tension and areas structured with weak erosive-settling grounds.

D. Climate

29. The climate of Tbilisi is humid subtropical. The city's climate is influenced both by dry (Central Asian/Siberian) air masses from the east and humid subtropical (Atlantic/Black Sea) air masses from the west. Tbilisi experiences relatively cold winters and hot summers. The average annual temperature in Tbilisi is 12.7 °C (54.9 °F). January is the coldest month with an average temperature of 0.9 °C (33.6 °F).The average annual wind speed is 2.4 m/sec and the maximum speed is 22 m/ sec. Strong winds (>15m/ sec) occur in March and April; November and December are the most peaceful months.

E. Air quality

30. Before the breakdown of the Soviet Union, the State Hydro meteorological Services were responsible for regularly measuring the concentrations (3 times daily) of the basic air pollutants. Today there are no regularly available data on air quality. It is known that transport sector is accountable for most of the urban air pollution. Four-fifths of the Tbilisi air pollution results from road transport.

31. Dust, nitrogen, dioxide, carbon monoxide and soot all exceeded the maximum permitted concentration (MPC) at certain locations, whale SO2 concentration generally within the expected norms, this confirms that air pollutions is caused primarily by motor-transport emissions because there are no industrial enterprises in these areas (with the exception of the area all Mining Chemistry building, where four petrol stations are located).

F. Noise

32. Noise in Tbilisi is not monitored and the assessment is based only on the outward appearance. Tbilisi is a rather noisy city, particularly the central part of it which is mainly caused by the transport: the city main roads are narrow and the traffic is heavy there. In spite of the fact that most of the establishments are concentrated in the centre of the city, the "rush hours" are not distinctly visible at definite times.

G. Surface water

33. River Mtkvari represents main hydrographic element for the city of Tbilisi and the surrounding area. Several tributaries connect with the Mtkvari in the City. Its right tributaries

are: Rivers Digmistskali, Vere, Dabakhana and Tabakhmela. Its left tributaries are: Rivers Gldanula, Khevdzmara and Satskhenistskali. This project is located below Dabakhana tributary, on the right bank of Mtkvari.
There are also numbe of small lakes around the city: The Tbilisi sea or Tbilisi reservoir, Turtle Lake and Lisi lake.

H. Groundwater

34. The relief of the city, in particular, the lithological content of the constituent rocks and their bedding elements, negative humidity balance and other conditions, do not support the feeding of underground waters.

35. According to their chemical content, the underground waters associated with the Middle Eocene rocks, are mainly of two types: Thermal curative waters and the outcrops of the cold waters.

36. In November 2007 Kavtrans Project Ltd carried out engineering-geological research at the project area 4 exploration wells, each 10 m deep, were dug along the riverbank. At the project area groundwater was dissolved in the refuse soil only at one, #4 well at 4.3 meter depth. Also were done analyses of the groundwater (see annex A).

I. Flora

37. The woods surrounding Tbilisi were cut down a long time ago and now there are mostly trees and plants (including the coniferous trees) artificially planted growing both in the inhabited areas of the city and its adjacent slopes, hills and mountain slopes. Around the settlement areas there are steppe grass vegetation and thorny shrubs, and in the remote areas, on the slopes of the mountain ridge there are secondary broad-leaved deciduous woods. There are 150 Oriental planes represented on the project site whose age is 50-60 years. Which are close to the maximum age for the species.
Fauna

38. Not a single species found in the project area is protected by either the national legislation of Georgia or any other international agreements and treaties. Besides, the project site is not a wintering, feeding or migrating place for the mentioned species. The birds (mainly seagulls and cormorant) which mostly flock on this site in the winter time (November-March) can move upstream or downstream of the Riv. Mtkvari without any problem

J. Protected areas

39. In Georgia the history of Protected Areas dates back many centuries. The first Protected Area – Lagodekhi Strict Nature Reserve was established in1912.

40. At present the total area of Protected Areas is 495 892 hectares, which is about 7 % of the country’s territory. About 75 % of the Protected Areas are covered by forests.

41. There are 14 Strict Nature Reserves, 8 National Parks, 12 Managed Nature Reserves, 14 Natural Monuments and 2 Protected Landscapes in Georgia.

42. The nearest protected area from us project site is Tbilisi National Park, established on the basis of Saguramo Strict Nature Reserve, which was created in 1957. The Park is located at a distance of 25 km from Tbilisi.

K. Historical protected areas

43. Near the project area there are locations of historical importance, including Abanotubani sulfur baths and other spa baths dating from the 17th century. However these and the protected area are outside the project boundary, which lies entirely within the footprint of the existing road. Old Tbilisi is principally centered on what is commonly referred to as the Tbilisi Historic District, which, due to its significant architectural and urban value, as well as the threat to its survival, was previously listed on the World Monuments Watch (1998, 2000, 2002)
Industries

44. Georgia left the Soviet Union in 1991 as like many former Soviet republics. The economy worsened during the first few years in the absent of Soviet financed support and market. The main economic parameters started to improve as of 2001. As a result of comprehensive social and economic reforms of the new Government the Gross Domestic Product (GDP) started to increase at a high rate as of 2003. A significant share of the economic growth comes from economic activities in Tbilisi. The industry, construction, transport and telecommunications compose the economic foundation of Tbilisi Much more than half of the products produced in Tbilisi come from these fields.

L. Infrastructure

45. Sewage and drainage systems cover 100% of the city. At the same time current infrastructure is very old and in need of repair. As for the existing situation in the water supply of Tbilisi, 70% of the city is supplied with no interruption, while 30% is supplied with water according to a set schedule.

46. Throughout 2005- 2006 extremely important reconstruction and rehabilitation works were carried out on the Tbilisi water supply network. The majority of central water pipelines were replaced, which has significantly decreased the number of emergency shut-downs of the system and, accordingly, losses of water

M. Cultural Heritage

47. There are mostly religious constructions concentrated in Tbilisi – the Georgian Orthodox churches (the eldest – Anchiskhati is dated as of the 5th century), some Russian churches, the Armenian Gregorian church, the German church, Catholic church, the Mosque and the Synagogue placed at the old city area, (only one Moslem and one Jewish religion memorials survived). The eldest temporal memorials survived are dated as of the end of the 18th century (almost everything was destroyed by the Agha-Mahmad-Han invasion in 1795).

48. Second part of the 19th century is characterized with the eclectic style. It is dominated in Sololaki, Plekhanov area where the modern architectural details of the 20th century are harmonized with the old style. The buildings of the modern style are especially interesting.

49. There are 45 museums in Tbilisi, 2 of them exist at the scientific academy, 6 – state arts institution, 14 of municipal subordination, 27 house-museums (both the ministry and the municipality subordinate) etc

N. Waste management

50. Poor conditions at waste treatment facilities jeopardize the environment and the health of the population. In this respect it should be mentioned that the system of solid waste management in Tbilisi is wholly inefficient and does not meet any contemporary requirements or standards. There is no experience of waste separation, recycling or secondary treatment; the landfills surrounding environment is polluted; the population's knowledge about sanitation is very low and areas of unsanitary conditions are common.
Municipal waste management in the districts of Tbilisi are carried out by five private companies. All type of wastes (Industrial, domestic, Medical) are collected together in metal containers (capacity 1.1 m3). Technological line of collection and removal of the solid domestic waste does not provide separation of wastes. There are two municipal landfills for nonhazardous wastes serve the city. City has not special hazardous waste storage area.

51. Up to 2500 street workers are cleaning the capital city. There are official bins and streets with special aromatizes with various fruity aromas.

O. Land use

52. Tbilisi stretches 33 km along the Mtkvari River and covers an area of 500 square kilometers. The river divides the city into two parts from which the left side of the city exceeding the right in both territory and population. At the beginning of 2007, Tbilisi expanded its territory significantly, incorporating surrounding suburban and urban areas.

53. There are no private or/and state commersial facilities at the project site. Only few medium size commercial facilities are located at the nearby territory of the construction site at Gorgasali Avenue.

P. Power sources and transmission

54. During the last 6 years the electric power supply has been significantly improved and 24 hour supply is now available for all residential houses, public buildings and industrial plants or commercial facilities

55. The Joint-Stock Company Telasi is one of the largest distribution companies in Georgia which owns high (110kw) tension the middle (35-10kw) tension and the short (6-0,4kw) tension current networks in Tbilisi and its near areas, including
Population and demographics

56. Tbilisi is a multicultural city. Which is home to more than 100 different ethnic groups. Around 80% of the population is ethnically Georgian, with significant populations of other ethnic groups which include Armenians, and Azeris. Along with the above mentioned groups, Tbilisi is also home to various other small ethnic groups including Ossetians, Abkhazians, Ukrainians, Greeks, Jews, Russians, Estonians, Germans, Kurds, Assyrians, and others. As a result of the conflicts in Abkhazia and Tskhinvali region, around 258,000 thousand people became internally displaced persons (IDPs). In August 2008, after the war with Russian Federation, the number of IDPs in Georgia increased by some 26,000. Total nomber of refugees in tbilisi is 93 445 (Source: ministru of Refugees and accommodation http://www.mra.gov.ge).

Q. Socio-economic Situation

57. Unemployment level in Tbilisi is very high. During nearest last year's it's had achieved 29-30%.
Education

58. A complete secondary education in Georgia takes 12 years. The minimum age for entering the first stage of education is 6 years.
In institutions of higher education it is possible to achieve a higher education on the basis of a stage one, stage two, or a stage three education. The period of a stage three higher education includes the bachelors, the masters, and doctorate levels.

59. There are as state so the private Universities in Tbilisi that provide undergraduate and postgraduate education. The largest university is considered to be Ivane Javakhishvili State University which offers number of faculties and degrees. Ivane Javakhishvili State University was established in 1918. There are other state universities for a various other faculties including teachers' training, technology, medicine, agriculture, languages and culture and veterinary. Education is cheaper In Tbilisi than in other countries. There are 208 public schools in Tbilisi.

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES: CONSTRUCTION

60. This section presents key environmental issues and mitigation measures associated with the proposed Project. The long-term impact of the Project is mainly beneficial. Short-term impacts during the construction phase can be mitigated with proper planning, good engineering and construction practices, and implementation of specific mitigation measures.

A. Resettlement Issues

61. Based on the documnt (cadastrial code: 011804001009) issued by National Agency of Public Registry (www.reestri.gov.ge) and visual observation it is clear show there satellite map there are no legal or illegal buildings or economic activities located in the project area or in the auxiliary area that will used during the construction period. It is therefore not necessary to prepare a resettlement plan under the project.

B. Noise and Atmosphere Emissions

62. Noise will be produced by construction equipment, but will be intermittent, localized, and temporary in nature. The major sources of noise pollution are from construction vehicles, the haulage of construction materials to the construction site, and noise generating activities at the site itself. Concrete mixing and material movements are the primary noise generating activities and will occur through hour the construction period. Construction activities are expected to produce noise levels in the range of 80–95 decibel acoustic.

C. Mitigation Measures

63. Mitigation measures will include:

(i) Damping down using water browsers with spray bars or other technical means; Sheeting of construction materials and storage piles;

(ii) Use of defined haulage routes and reductions in vehicle speed where required. Materials will be transported to site in off peak hours;
(iii) Materials transported to site will be covered wetted down to reduce dust. Protective equipment will be provided to workers as necessary;
(iv) All vehicles will be checked and repaired when need to eliminate increased emission due to damaged parts;
(v) Existing trees on site should also be retained as much and as long as possible as they will also help to intercept dust;
(vi) Installation of screens around the construction site.

D. Inert Construction Wastes

64. The following types of inert waste are anticipated to be produced from the excavation activities:

(i) Natural materials (soil and rock): according to preliminary data there will be produced significant volumes of cut materials (soil and stones or rocks) approximately 80 000 -85 000 m3. Part of this will be reused and recycled; the other part will disposed of on the Iagluja landfill (22 km distance from construction site) as inert waste;
(ii) Metal constructions (most part of metal pillars of the power line and reconstruction of pedestrian subway) Metals (including scrap metal and wire) – negligible amount of other metal waste is expected.

E. Mitigation Measures

65. Mitigation measures should:
(i) Some of the waste should be used to cover the waste deposited daily on the landfill which will use estimated 14 600 m3 of material each year. According the management plan of Iagludja landfill, it's will be closed after two years.
(ii) Some of the waste should be used to finally close down Iagludja Landfill by covering all sells, estimated to require 30 000 m3;
(iii) Some of the waste should be used to finally close down of Iagludja landfill by covering all waste sells estimated to require 30 000 m3;
(iv) 4 Rocky inert waste should be crushed and provided to companies involved in construction of new roads (10 000 m3).

66. Any materials will be transported to the nearest spoil disposal sites and landfill agreed in consultations with the environmental services of the local authority, as well as Regional services of the MoE. For the rock disposal licensed borrow pits could be used as be agreed with the MoE. Spoil material could be used for improving relief and reinstatement of eroded sites. The costs for disposal of the rocks within the private borrow pits should be agreed with the concrete owners. The spoil disposal in eroded sited will cost only the price of work related to transportation of spoil and reinstatement of eroded sites.

F. Soil and water Pollution

67. Potential pollutants from a project of this nature include the following:
(i) Diesel fuel, lubrication oils and hydraulic fluids, antifreeze, etc. from construction vehicles and machinery
(ii) Miscellaneous pollutants (e.g. asphalt, cement and concrete)

(iii) Construction wastes (packaging, stones and gravel, cement and concrete residue, wood, etc.)
(iv) Small amount of hazardous wastes (e.g. waste oils, oily rags, spent filters, contaminated soil, etc) constituting about 0.1% of total amount of the wastes.

G. Mitigation Measures

68. Contractors should ensure the proper handling of lubricants, fuel and solvents. Storage tanks should not be located within 50m of any watercourse, well or dry gorges. All tanks should be placed in a bund of at least 110% of the tank's maximum capacity. If more than one tank is stored within the bund, the system must be capable of storing 110% of the biggest container's capacity or 25% of their total capacity, whichever is greater. The bund should be impermeable (e.g. concrete-lined), without drainage points or other breaches. Accumulated rainwater in bunds should be pumped out of the bund to either drains or the ground if uncontaminated. In case of fuel spillage the spilled fuel should be recollected and contaminated bund treated by the absorbents: sawdust, sand or straw.

69. Ground water and surface water pollution risk should be reduced or eliminated in case of immediate removal of polluted ground. Where any area of the spread is at risk from silt pollution washing off into a watercourse of water body, effective measures should be put in place to ensure that such pollution does not occur. Such measures may include:

(i) Use of silt fences
(ii) Use of straw bales to deflect and filter water
(iii) Use of a system of bunds and grips to prevent water from entering watercourses, etc.
(iv) Use of holding/settling lagoons to store water running off the spread. It is intended to use natural settling rather than flocculants to facilitate sedimentation following which clean water can be disposed.

H. Plora

70. It will be necessary to cut and uproot 31 trees planted in the traffic separation line as well as 53 trees planted along the River bank (they are mostly 50-60 years old Oriental planes). As for 39 trees planted on the sidewalk on the opposite side of the River bank, they may be saved.

I. Mitigation Measures

71. The construction site will not be restored on its original place. The vegetation will be restored on the top of the tunnel within the project envisaged recreation zone. According to the project the area of vegetation will be increased.

72. For each tree cut 2 trees should be planted with the species and volume of the tree cut. On this section other species besides the pure Oriental planes may be also planted. It is desirable that the mixed species of Oriental planes be planted. For instance, along with the Oriental planes Fraxinus italics excelsior, Acer campestre, Tyilia Caucasica may be included, and from bushes: Continus, S. Hypemrifolia, arrowwood.
It is recommended that the depth of the soil (top and lower layer) be no less than 1.5 meter in the areas where the trees and bushes will be planted.

J. Landscape

73. Construction site is located closely at the historical part of the city. To keep the general architectural view of the district it's desirable to consider recommendations of historical-architectural researches and to construct buildings that would not represent a dissonance and would naturally match to the landscape of the district. Attention should be given to protection of the values characteristic to that districts:

(i) Artistic side of new spatial facades, rhythmic separation and colors should not be far away from architectural nature and artistic characteristics of old Tbilisi;

(ii) During construction attention should be paid also to design-architectural structure and construction materials, which should be in line with the environment;

(iii) Spatial-compositional and architectural dominants' visual-spatial relationship should be clear. Right scale in regard to the natural environment of the residential district and of the city as a whole should be identified.

VI. ANALYSIS OF OPTIONS

74. Tree alternative options were considered:

(i) Option 1 No project;

(ii) Option 2 Set up new traffic lights control mode and widen the motor road at the expense of sidewalks;

(iii) Option 3 The option envisages construction of three tunnels. The traffic on the right bank of river Mtkvari is to be channeled underground making it possible to give a multifunctional role to the area. This option envisages partial closure of the right bank for traffic during construction of one lane tunnel, then channeling the traffic to the constructed tunnel and starting construction of the second tunnel on the other side of road.

Table 1 Social and Environmental Aspects of the Alternatives

Potential Impact	Comparison of Options			
	1	2	3	Preferred Option
Air Quality	According techno-economic substantiation (annex B) after 3-4 years the traffic volume will increase. Congestion idle running vehicles an additional source of air emissions.	According techno-economic substantiation (annex B) after 9-10 years traffic congestion and emissions from idling vehicles will increase.	Traffic will flow Directly through the tunnel so there will be fewer emissions to the atmosphere.	3
Water Quality	An increased risk of water pollution from runoff of various	An increased risk of water pollution from runoff of various	The level of the contamination will be less as vehicles will pass more quickly through the tunnel.	3

Potential Impact	Comparison of Options			
	1	2	3	Preferred Option
	chemicals from idling vehicles.	chemicals from idling vehicles		
Soil Contamination	An increased risk of soil (In the wide median reset lane between the current traffic lanes) pollution from runoff of various chemicals from idling vehicles.	An increased risk of soil (In the wide median reset lane between the current traffic lanes) pollution from runoff of various chemicals from idling vehicles.	The level of the contamination will be less (in the recreation zone) as vehicles will pass more quickly through the tunnel	3
Solid Waste Management	This option involves no construction so no solid waste will be produced.	The option involves minor construction and only small volume of solid waste will be produced.	The option involves significant excavation, producing significant volumes of cut materials (soil and stones or rocks) approximately 80 000 -85 000 m^3.	1
Noise	After 3-4 years traffic congestion will increase. Idle vehicles are an additional source of noise.	After 9-10 years traffic congestion will increase. Idle vehicles are an additional source of noise.	Noise will decrease as a result of continuous flow of traffic which will mostly be located below ground of the vehicles.	3
Vibration	After 3-4 years the traffic congestions will increase. Idle vehicles are an additional source of vibration.	After 9-10 years road congestions will be increased. Idle vehicles are an additional source of vibration	Vibration will decrease as a result of continuous traffic of the vehicles.	3
Flora	No change.	Around 40 mature trees on the existing roadside and central reservation would be removed because of widening the motor road at the expense of sidewalks.	Maximum 120 mature trees on the existing roadside and central reservation will be removed because the new tunnel will be built by open trenching. however twice this number of new trees will be planted in the landscaped area above the tunnel.	3
Fauna	No change	During	During construction phase	1

Potential Impact	Comparison of Options			
	1	2	3	Preferred Option
		construction phase Potential impacts are temporary, short-term, reversible and manageable.	Potential impacts are temporary, short-term, reversible and manageable.	
Historical Resources	The protected area in the old part of Tbilisi is outside the project boundary but the increase in traffic congestion will deteriorate the view of the historical protected area.	The protected area is outside the project boundary but the increase of traffic congestions rise will deteriorate view of the historical protected area.	Artistic side of new spatial facades of the recreation zone should not be far away from the architectural nature and artistic characteristics of old Tbilisi. The protected area will be more acceptable for tourism development, because of the availability of improved local road connections and parking.	3
Social issues	After 3-4 years the increased traffic congestion will increase in rush-hours and social and environmental issues make worse.	After 9-10 years the traffic congestions will rise in rush-hours and social and environmental issues make worse.	After construction the social and environmental conditions will significantly improve.	3

VII. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

A. Legislation and regulations of Georgia

75. There is no category of EEI in Georgian environmental assessment legislation and public consultation is required only for 21 types of project for which only Environmental Impact Assessment, these requirements are set forth in the law on Environmental Impact Permit (2008). The 6th clause of in mandatory law provides detailed requirements and procedures for conducting public consultations and established timeframes for information disclosure and discussion, namely:

(i) The developer is obliged to carry out public discussion of the EIA before its submission to the administrative body responsible for issuing a permit (normally MoE);

(ii) The 5 days after conducting the public disclosure meeting, the minutes of the meeting should be prepared to reflect all the questions and comments raised and explanations, provided by the project proponents in response;

(iii) Appropriate corrections should be incorporated into the main text of the EIA;

(iv) If required. If the comments and proposals of stakeholders are not accepted the letter of explanation should be sent to the authors.

B. ADB Requirements

76. The borrower/client will carry out meaningful consultation with affected people and other concerned stakeholders, including civil society, and facilitate their informed participation. Meaningful consultation is a process that (i) begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle;1 (ii) provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people; (iii) is undertaken in an atmosphere free of intimidation or coercion; (iv) is gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups; and (v) enables the incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues.

VIII. GRIEVANCE REDRESS MECHANISM

77. The Project Implementation Unit (PIU) (MDFG in this particular case) has overall responsibility for project implementation and environmental compliance. The administrative bodies responsible for environmental protection are the Ministry of Environmental Protection and Natural Resources (MoE) and the City Hall. The affected population and stakeholders may send their grievances, related to the project induced environmental impacts and nuisance to PIU or directly to the administrative bodies responsible for the environmental protection. The MoE and city hall are obliged to respond on the grievances, which have been received from the population or other interested parties in accordance with the requirements of the Administrative Code of Georgia. The PIU will facilitate the response through implementing a project specific grievance redress mechanism. During the public consultation process, the PIU will inform the stakeholders and public that the PIU is responsible for environmental compliance and grievance redress. PIU will provide at the public consultation meetings and on the MDF web-site the contact details of the persons responsible for grievance collection and response. Upon the receiving the grievance (in written or oral communication) the PIU will execute following actions:

(i) Send its representatives to check the claims and monitor the situation;
(ii) Involve MoE and City Hall when and where appropriate;
(iii) Receive expert's conclusion (from MDF personnel, independent experts or MoE/City Hall experts);
(iv) Submit to the constructing company and operator in writing request on corrective measures;
(v) During 10 days after receiving the grievance, inform the affected person or persons in writing about the expert's decision and applied corrective measures.
(vi) If the affected person is not satisfied by the decision, they may present further information in support of new case. The subsequent decision of the PIU/MOE and Municipality is considered finally.

78. If the affected stakeholder or person is not satisfied by the response of PIU or administrative bodies, the grievance may be directed to the court.

IX. ENVIRONMENTAL MANAGEMENT PLAN

A. Institutional Framework for EMP Implementation

79. The construction contractor is obligated to follow EMP and good construction practice via clauses to this affect in the construction contract. In order to meet this obligation, a contractor shall be required to have at least one environmental specialist on the team, who is able to fully understand the recommendations of the EMP and professionally apply prescribed mitigation measures to the contractor's daily operations.
During operation phase to follow EMP and good practices is obligated Administration of Old Tbilisi district.

B. Reporting on EMP Implementation

80. The contractor, through the environmental specialist on the team, shall prepare monthly status reports on the EMP implementation throughout the construction period.

81. The technical supervisor consultant or engineer prepares monthly reports on the status of EMP implementation and environmental performance of the contractor. These reports shall be based on the contractor's reports and carry analysis of their content.

82. MDF will ensure that monthly reports from the contractor and from the technical supervisor are made available for the environmental specialists of ADB promptly upon their arrival in MDF administration.

83. The EMP generally specifies monitoring reports every 6 months during construction of the project road. The EMP monitoring report can be a single document including all items listed in chapter 10.1. For each item the report should include a summary of the pertinent government regulations and permits, specifying progress made during the reporting period with numerical data, identifying items not complied with, and providing reasons of noncompliance. The EMP monitoring report must be prepared by the local environmental control organization with the assistance provided by an independent monitoring agency.

C. Remedies for EMP Violation

84. Old Tbilisi district administration (OTA), as the client of construction works, will be responsible for enforcing compliance of contractor with the terms of the contract, including adherence to the EMP. For minor infringements, an incident which causes temporary but reversible damage, the contractor will be given 48 hours to remedy the problem and to restore the environment.

D. Environmental Management Plan

85. The environmental management plan (EMP) should be constantly updated in compliance with the laws of Goergia, as new requirements are raised concerning environmental protection and restoration. The EMP identifies actions for environmentally sound implementation of the Project through avoidance and/or mitigation of adverse effects..

86. The EMP has the following objectives:

(i) To meet the requirements of Georgian legislation and ADB Safeguard Policies requirements for environmental restoration and mitigation of adverse effects;
(ii) To identify adverse impacts on the environment due to operation of project areas;
(iii) To give instructions concerned for environmental protection, restoration, and mitigation of negative environmental effects;
(iv) To serve as a reference document for the environmentally sound implementation of the Project.

87. The constructor will monitor and measure the progress of implementation of the EMP. The extent of monitoring activities will be commensurate with the project's risks and impacts. In addition to recording information to track performance, the constructor will undertake inspections to verify compliance with the EMP and progress toward the expected outcomes.

X. CONCLUSION AND RECOMMENDATION

88. The presented IEE document clearly shows that there would be positive as well as negative impacts on environment during construction and regular operation phases. The document describes mitigation measures for all negative impacts on environment together with related expenses that includes implementation of the mitigation measures as well as monitoring costs; The most significant positive impact of the completed project would be ensuring continuous traffic flow on the right bank of the river and hence, major reduction of emissions into air. Also, there will be reduction of noise, dust and vibration level, some of which presently exceed established norms, in the area surrounding the balnealogical resort.

(i) Recreation zone would be established above the tunnel where it would be possible to create facilities for rest-entertainment of population, which would be a factor in attracting tourists: In the future there would be set up playgrounds, children's squares, action theater, exhibition halls, service facilities and etc. along river bank at lower level of the recreation zone. Besides, entrance to the river Mtkvari at this place will make it possible to arrange sport-entertainment activities on river Mtkvari,And to establish a marine for river boats.
(ii) There will be some Negative impact during the construction phase due to noise, dust and vibration level created by construction machinery. There are multitude common impacts of urban construction so there are well developed methods for that are mitigation.
(iii) Negative impact would be caused also by lowering the motor road by 6 meters, which would create threat of flooding during long rainy periods.
(iv) Although about 100-150 trees of 50-60 years of age would be cut during the construction phase and about 1,200 m2 green area would be destroyed, it is planned to create 10,700 m2 green area and to plant two times more trees and to ensure that 80% of the trees survive.
(v) According to preliminary data there will be significant volumes of cut material (soil and stones or rocks) approximately 80 000 -85 000 m3. Part of them will be reused and recycled and the other part will be disposed on the Iagluja landfill as inert waste
(vi) Financial condition of a few trade facilities would be deteriorated during the construction period, however their financial conditions would drastically improve compared to the without project situation after the construction is completed. In addition, the project implementing company would be given recommendation to hire local population (at least 50% of the employees) in case of willingness and required qualification. The project envisages also construction of parking lot for

200 cars and construction of 631 m2 commercial area as well as various types of entertainment and resting centers, which would be positively reflected on social and economic condition of the population.

(vii) In spite of some negative impacts, which would be regularly monitored along with strict implementation of the mitigation measures, the project benefits significantly outweigh the negative impact.

I. INTRODUCTION

A. Aim of the Project

1. Upgrading and improvement of local transport and transport-related infrastructure plays a significant role in the development of Tbilisi city infrastructure. To this effect a number of important activities have been implemented and financed from the Tbilisi City budget and other sources, including grants and loans in the past two decades. In spite of these efforts, numerous transport related problems facing Tbilisi residents remain to be adequately addressed.

2. To address a key area of traffic congestion Tbilisi City Administration (The proponent of the project) proposes to construct a tunnel over a 400m length of Gorgasali street and reconstruct access roads. Extensive investments are proposed for the connecting road system and intersections/interchanges with this road system under future projects Beyond addressing traffic congestion, the proposed tunnel will improve the traffic flow on the right bank of the Mtkvari River. Creating uninterrupted traffic flow and a new recreational zone should result in attraction of tourists in the city.

3. The goal of the present environment assessment report, conducted as a part of the feasibility study of the project, is to assess whether the project will be environmentally sustainable at the project design, implementation and operation stages. The possible negative impact on the environment will be identified, prevented, mitigated or managed.

4. The Municipal Services Development Project funded by the Asian Development Bank (ADB). Presented project is one of various projects backed by international donor organizations to be implemented by the Municipal Development fund (MDF).
MDF aims at strengthening institutional and financial capacity of municipalities through investing financial resources in local infrastructure and services, and on improving on sustainable basis the primary economic and social services

B. Current Situation and Project Importance

5. Gorgasali street and the right bank of the Mtkvari River are a very important transport artery of Tbilisi. Currently the most narrow traffic area is adjacent to Bath houses under Metekhi Bridge. The width of this section does not exceed 12 m and is limited, on one side, by low-level reference wall and on the other side by the lawn separating the road from the embankment.

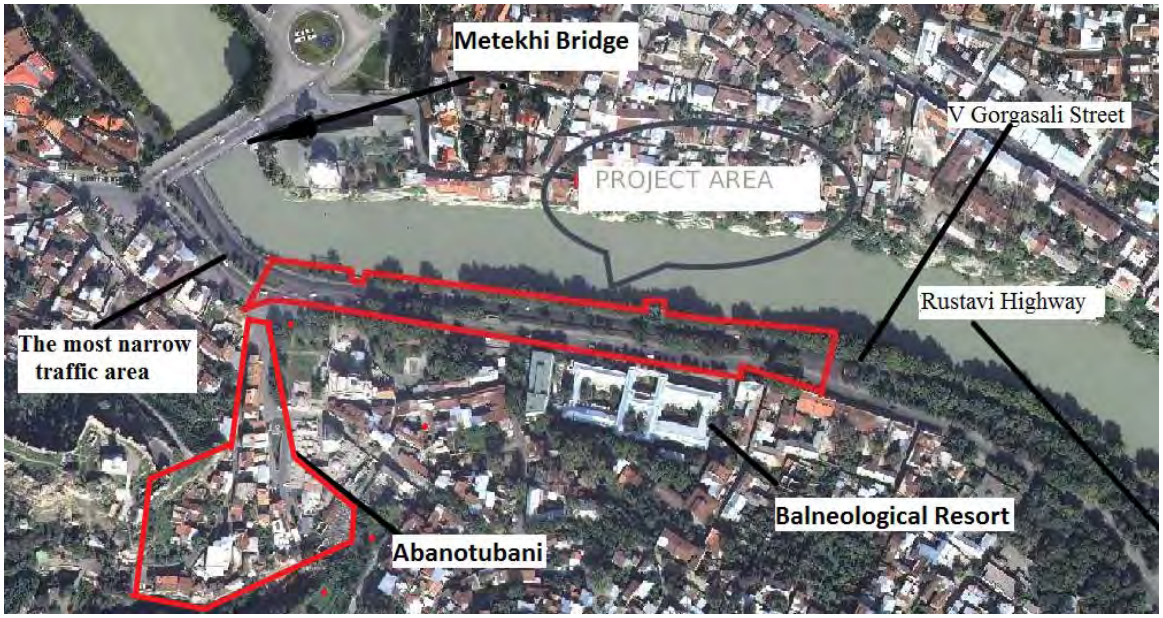


Figure 4: Project area

6. Geometrical parameters of this road junction have been elaborated in the beginning of 50th years of the last century, when car park of Tbilisi didn't exceed 20000 units. 80% lorries and by buses driven by disciplined, professional drivers. At present total traffic density of vehicle passing this road junction in the rush hours is more than 5500 veh/hour and this quantity increases by 7% yearly.

7. Study of transport flows at Abanotubani, adjacent to Gorgasali street and the Balneotherapic health resort have been carried out during the project. Date collected by the Traffic Safety Research Center in 2005 and 2007 were also collected. This showed that, if this light of road was not improved there will be such a traffic jam created during the rush hours in 3-4 years that it will be impossible to alleviate the situation by employing traffic management.
As a result of the project implementation it is expected that:

(i) From Metechi Bridge towards Ortachala and from Ortachala towards Metechi Bridge the traffic flow will be unobstructed which will improve the environmental condition of the area (by preventing atmosphere pollutant ion from idling vehicle engines);
(ii) Transferring the traffic from the surface road adjacent to the balneology health resort in to the tunnel will significantly decrease the level of noise;
(iii) Though vegetation will be removed on the project site (around 115-120 Oriental planes (Platanus italies orientalis) of 50-60 years old will be cut), the project plant twice as many trees in a recreation zone to be created on the top of the tunnel;
(iv) The project implementation will improve the social condition of the local community members. In the recreation zone the car parking lot for 200 cars and a commercial space of 683m^2 are planned to be arranged.

C. Brief Outline of the Contents of the Report

89. The IEE was prepared in accordance with Georgia's environmental legislation, ADB's relevant policy and MDF's procedures and environmental guidelines. The objectives of the IEE are the following:

(i) Define potential positive and negative environment impact for various scheme alternatives;
(ii) Provide technical information and recommendations to facilitate selection of the best alternative;
(iii) Preparation of Environmental Management Plan (EMP) including action plan for mitigation of likely damage, monitoring planned description of institutional measures;
(iv) Ensure mechanisms for public participation and information dissemination on the basis of relevant legislation and existing procedures.

8. The expected outcome of the IEE is a complete analysis of the selected improvements in compliance with international practice and reliable from environmental and social point of view.

9. The main environmental and social-economic information (baseline data) was obtained from specific documents through study of materials submitted by members of the Georgian Academy of Science and study of information available on the internet and through discussions with the national and international NGOs. In addition, official data was obtained from central and local government bodies. It should be noted that the Ministry of Environment Protection and Natural Resources of Georgia (MoE) helped in identification of relevant agreements and information sources. Many site visits were conducted during the study and information was collected directly from local residents, in order to identify those issues that might not have been detected through review of information obtained from other sources.

10. Apart from this, targeted assessments were carried out in the field and as a result certain specific issues, which required additional study, were identified in the course of data collection and consultations. The following additional studies have been carried out:

(i) 4 units of ten meter deep wells were drilled in order to study geology and hydrology of the area;
(ii) Chemical analysis of ground water was conducted to define its aggressiveness towards cement;
(iii) Measurements were taken in order to define existing radiation;
(iv) Measurements were taken to define existing noise level;
(v) Intensity of traffic flow was defined on the project section; and
(vi) Time and economic losses were assessed on the project section.

II. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

A. Introduction

11. This chapter presents a review and analysis of the environmental and resettlement legislation of Georgia and the procedures for ensuring full compliance with ADB safeguard policy and the ADB environmental assessment and participatory resettlement process guidelines in the implementation of the project which will be financed under on ADB loan. It describes existing Georgian environmental regulations relevant to the project, provides guidance on the measures required for ensuring consistency with environmental assessment and makes reference to institutions at the local and national levels responsible for issuing permits, licenses, and enforcing compliance of environmental standards.

B. Environmental Regulations

1. Legislation and Administrative Structure in Georgia

a. Administrative Structure

12. Ministry of Environment Protection and Natural Resources (MoE). MoE has the overall responsibility for protection of environment in Georgia. The Service of Licenses and Permits of MoE is responsible for reviewing EIAs and for issuance of the Environmental Permits. The MoE Inspectorate is responsible for compliance monitoring, including monitoring of construction activities and auditing of all kind of entities. Regional services of MoE are involved during agreement on Terms of Reference on architectural design of a project and in commissioning of completed facilities. The Ministry of Environmental Protection and Natural Resources of Georgia (MoE) is the main state body pursuing state policy in the sphere of environment. Their functions for regulating economic or development activities with regard to environmental protection include:

(i) Issuing permits for project development (Environmental Impact Permit);
(ii) Setting emission limits and issuing surface water intake and discharge consents;
(iii) Inspection of operating plants;
(iv) Responding to incidents and complaints;
(v) monitoring air pollution and noise levels (especially near residential areas);
(vi) Regional services of MoE will agree upon sites for disposal of spoil and construction wastes.

13. The Ministry defines and evaluates real and possible risks of impact on the natural environment during implementation of different types of activities. Accordingly the Ministry has been assigned as the responsible body for making decision on granting permission to the proponent on implementation of projects that require on Environmental Impact Assessment (EIA). Granting procedures differ slightly for different types of projects.
For projects, that do not require a Construction Permit, the Environmental permit is issued by the MoE on the ground of State Ecological Expertise. State Ecological Expertise is carried out by MoE upon official submission of Environmental Impact Assessment (EIA) prepared by project developers.

14. For projects requiring a Construction Permit, no special permit is issued by MoE (according to “One window principle”, only one permit shall be issued for each activity). The Construction Permit is issued by the Ministry of Economic Development of Georgia, but is subject to the consent of the MoE in the form of Conclusion of Ecological Expertise, as well as the Ministry of Culture (Center of Archaeological Studies, Department of Monuments protection). Consent of the MoE in such cases should be issued according to the same procedures (EIA, public consultations; SEE etc.) as for issuing an Environmental Permit. The Ministry of Economic Development as an administrative body issuing a permit ensures the involvement of the MoE as a different administrative body in the proceedings initiated for the purpose of permit issuance, in accordance with Georgia’s Law on Licenses and Permits (2008).
Project screening (definition of the project category and necessity for preparation of EIA) and scoping (definition of set of environmental issues and Terms of Reference for the EIA study) is carried out by the project implementing agency and its consultants (in this case Municipal Development Fund (MDF) and its consultants). Scoping and screening do not represent mandatory procedures according to Georgian legislature although review of scoping/screening outcomes and agreement is considered a desired practice.

15. As a rule, EIA permitting conditions contain requirement for informing MEPNR regarding fulfillment of the EIA permit conditions. This basically means giving information regarding implementation of Environmental Management and Monitoring Plans.

16. The Ministry of Economic Development (MoED). MoED is responsible for carrying out the review of technical documentation (including conclusion of state independent experts) and issuing Permits on Construction for projects classified as the projects of State Importance, as well as for supervision over constructing activities. State supervision of construction and compliance monitoring is provided by the Main Architecture and Construction Inspection (MACI), which is operating under the Ministry of Economic Development of Georgia.

17. The Municipal Development Fund of Georgia (MDF).MDFis a Legal entity under public law with the aim to promote the institutional and financial strengthening of the local self-governing bodies, investments in local infrastructure and services and sustainable progress of the principal economic and social services for the local population (communities).

18. The Fund is responsible for managing the finances received from central and local budgets, international financial institutions and other donors, and proceeds gained through the Fund loans as principal and interest amounts used to finance local and regional infrastructure and investment projects and appropriate technical assistance in the field of service.

19. MDF, within the limits of the programs accomplished by it, is responsible for purchasing the projects/plans and EIA research, as well as building and rehabilitation works of the municipal infrastructure. During the deals of purchase, the Fund is obliged to follow the legislation of Georgia under the established rule and by observing the environmental and social requirements of donor organizations. MDF is responsible for proper consideration of the environmental problems within the limits of the accomplished projects.

20. In particular, the functions of MDF include considering the EIA and environmental management plans of the accomplished projects. In addition, the Fund evaluates the degree of consistency of the contractor's activity with the environmental management plans, EIAs, environmental standards and other obligations.

21. The domestic resources of MDF are sufficient for the administration and general environmental control of projects. In case of necessity, aiming at performing the environmental monitoring of specific projects, MDF will purchase proper services within the limits of a single project for technical-economic and environmental supervision.

b. Constructing Contractor

22. After appointment all Constructing Contractors should provide Constructing Contractor's Environmental Management Plan (EMP) developed on the basis of the EEI for the project. The necessity to develop Contractor/s management plan is normally fixed in the Construction Contract. The Constructing Contractor has the following obligations:

(i) to employ Environmental consultants (persons or company) responsible for developing and implementing the construction phase EMP and for provision of corresponding information to MDF;
(ii) to develop, if required, a Spoil and Rock Disposal Plan and Construction Waste Disposal Plan agreed with the MoE and its regional services;

(iii) to develop, if required, Reforestation and/or Biorestoration Plan or Compensation Plan agreed with the MoE (Forestry department; Biodiversity department);
(iv) Constriction Schedule;
(v) The EMP implementation costs should be included into the construction budget.

23. The Contract should also indicate that the Spoil and Rock Disposal Plan, as well as the Reforestation Plan, should be agreed with the Regional Services of the MoE, while the other chapters of the Constructing Contractor's Environmental Management Plan should be reviewed and accepted by MDF.

c. Other Responsible Governmental Institutions

24. **The Ministry of Culture and Sports.** The ministry is responsible for supervision of the construction activities in order to protect archaeological heritage. If construction is to be carried out in a historic site or zones of cultural heritage, consent of the Ministry of Culture, Monument Protection and Sport is also required for issuing a construction permit.

25. **Management Unit for Food Safety and Risk Analysis of the Ministry of the Agriculture (MUFSRA). MUFSRA** is responsible for implementation of complex sanitary protection measures in the case of identification of burial sites during earthworks. Information about suspicious burial sites should be delivered to the "MUFSRA" by the Constructing Contactor (field environmental officer).

2. Framework Legislation

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

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

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

29. Legislative execution of constitutional requirements in the sphere of environmental protection is implemented through the framework "Law on Environmental Protection" (1996, as amended) and the set of specific laws developed on its basis. The framework law regulates environmental protection and in the use of nature on all Georgia's territory including its territorial waters, airspace, continental shelf and special economic zone. The law deals with education and scientific research in the scope of environment, environmental management aspects, economic levers, licensing, standards, EIA and related issues. It considers different aspects on protection of ecosystems, protected areas, issues of global and regional management, protection of ozone layer, biodiversity, protection of Black Sea and international cooperation aspects. In particular, the law addresses a broad spectrum of issues, like environmental management, environmental education and awareness building, licenses and permits, fines and

enforcement, environmental impact assessment, which should be further regulated by specific laws. Below the environmental regulations most relevant to the project are summarized.

a. Legislation Related to Environmental Assessment and Environmental Permitting

30. At present, the environmental permitting procedure in Georgia is set out in three laws: The project proponent, in implementing projects, will comply with (i) The Law on Licenses and Permits (2005); (ii) The Law on Environmental Impact Permits (EIP 2008), and (iii) The Law on Ecological Examination (EE) 2008.

31. The Law on Licenses and Permits regulates legally organized activities posing certain threats to human life and health, and addresses specific state or public interests, including usage of state resources. It also regulates activities requiring licenses or permits, determines types of licenses and permits, and defines the procedures for issuing, revising and canceling of licenses and permits (Article 1, Paragraph 1).

32. The Laws on Environmental Impact Permit and on State Ecological Expertise integrate all the amendments introduced in legislation of Georgia during recent years.

33. The Law of Georgia on Environmental Impact Permit determines the complete list of the activities and projects subject to ecological expertise (clause 4 p.1) and the legal basis for public participation in the process of environmental assessment, ecological examination and decision making on issuance of an environmental impact permit.

34. Under the “activities” subject to the ecological expertise the law includes construction of new or upgrading of existing facilities imposing change of technology and operational conditions for the projects and activities included into the list. The routine maintenance works in relation with the same facilities do not require ecological expertise and permit.

35. If the activity included in the list in clause 4 p.1 also requires a Construction Permit, the administrative body responsible for issuance of the Construction Permit ensures involvement of MoE, in the administrative procedures. In such cases the MoE issue as the conclusion on the Ecological Expertise of the project based on the documentation provided to MoE by the administrative body issuing the Permit. Compliance with the conditions of the Conclusion is obligatory for the project proponent. The conditions of the Conclusion on Ecological Expertise is a part of conditions of the Construction Permit.

36. The aforementioned laws do not provide details of screening procedure and do not define responsibilities of parties. According to the practice, the screening of project proposals and the preliminary assessment of their environmental impact, mitigation measures and the approach to the environmental study (scoping) are being carried out by the project proponent in consultation with MoE.

b. Public Consultation Procedures

37. The 6th clause of the law of Georgia on the Environmental Impact Permit provides detailed requirements and procedures for conducting public consultations and established timeframes for information disclosure and discussion, namely:
According to article 6, a developer is obliged to carry out public discussion of the EIA before its submission to an administrative body responsible for issuing a permit (in case of activity

requiring construction permit before initiating stage 2 procedure for construction permit issuance).

38. The project executor will publish the information on the planned activity before the conducting of public review. The information will be published in central mass media, as well as in the newspapers in administrative territorial office (if any) of the region, where the activity is planned.

39. The announcement must contain the following information:
(i) Goal, title and place of the planned activity;
(ii) Location of the agency where the interested subjects will be able to familiarize
(iii) themselves with the documents associated with the activity (including reports on
(iv) environmental impact);
(v) The deadline for submittal of considerations;
(vi) Place and time for public review.

40. The executor will:
(i) Provide EIA hard copy and electronic version to the administrative agency, that issues permission in a week after publication;
(ii) Accept and consider written notes and considerations provided by citizens in 45 days after the date of evaluation publication;
(iii) Conduct public review of the planned activity no later than in 60 days after the publication of the announcement;
(iv) Invite corresponding local self – administration and governmental agencies representatives; the Ministry of the Environmental Protection and the Ministry of Economical Development and other involved administrative agencies to the public review;
(v) Reviews will be conducted in a public way and any citizen will be able to attend it.
(vi) Public review will be conducted at the region administrative center, where the activity is planned.

c. Official Submission of EIA to MoE

41. Article 8 of the Law specifies the documents to submit to receive a permit:

(i) An operator, in order to receive a permit, shall submit a written statement to the Ministry. A statement to receive a permit is submitted, considered and processed under the rule established by the 'Law of Georgia on Licenses and Permits'.
(ii) An operator is obliged, in addition to the information specified by the 'Law of Georgia on Licenses and Permits', to submit the following documents:

- An EIA report drawn up under the standards specified by the legislation of Georgia (in 5 hard copies and 1 soft copy);
- A location plan of the planned activity (with the indication of distances);
- Volume and types of the expected emissions (a technical report of inventory of the stationery sources of pollution and emitted/discharged harmful substances and projections of maximum permissible concentrations of emitted/discharged harmful substances (in 4 copies);
- A brief description of the activity (as a non-technical summary);
- A statement about any confidential part of the submitted statement.

- An operator is obliged to submit a full diagram of the technological cycle to the permit issuing body even if the given activity contains a commercial and/or state secret. This part of the statement, according to sub-clause 'e' of clause 2 of the given Article should be submitted separately by the operator.

d. Issuance of the Permit on Environmental Impact

42. The article 9 of the law describes the procedures of issuing the Environmental Impact Permit. The same issue is addressed in the laws of Georgia on "Licenses and Permits" (2005) and "on Ecological Examination' (2008).

(i) According to the law on "Licenses and Permits," the MoE takes decision on issuing Permit within the 20 days after submission of request on permit by the project proponent.
(ii) MoE , in accordance with the law on Ecological Examination, ensures expertise of the submitted documentation and issuance of Conclusion on Ecological Examination. The Permit (Environmental Permit, or Construction Permit when the latest is required) is issued only in case of the positive conclusion of the Ecological Examination.

3. Other Environmental Laws

43. The Law on the Environmental Protection Service (Agency). In accordance with the '**Law on the Environmental Protection Service** of 2008, an environmental protection control system has been established to ensure the following: (a) state control in the field of environmental protection and ecological systems safety, (2) observance of the proper laws by the subjects of regulation, (3) population's trust in the mentioned system and in state organs, generally in respect of performance of state obligations and transparency in the field of environmental protection. Under the same Law, there has been an environmental protection agency established (on the base of a former environmental protection inspection) and the functions of its employees specified. In particular, they are authorized to accomplish an environmental inspection of the objects of regulation (physical and legal entities, state authority and local self-governing bodies) and monitoring of their activities. Besides, the prerogative of the environmental protection agency is to calculate the damage to the environment to compensate it to the state, put forward the requirement to the objects of regulation to compensate the damage, and in case of non-meeting such a requirement, file a proper appeal before the court.

44. For the road project, a subject of inspection and monitoring may be the process of building (legal use of resources; environmental pollution, noise and vibration, etc.) and exploitation-related activity (waste management, emissions; safety etc.).

45. Waste Management. The following acts of the Ministry of Labour, Health and Social Protection of Georgia define the waste management rules to be met during the road rehabilitation projects:
The act on "Approval of the rules of collection, storage and neutralization of the wastes of preventive treatment establishments" 16 August of 2001, 300 ("Georgian Legislative Messenger" N90 24/08/2001);

46. The act on “Approval of arrangement of polygon/grounds for disposal of solid household wastes and adoption of sanitary rules and norms” 24 February, #36 (Georgian Legislative Messenger #17, 07.03.03);

47. The “Georgian Law on Ambient Air Protection” was put into effect from 1 January 2000.

The scope of the “Georgian law on Ambient Air Protection” is to protect ambient air on the whole territory of Georgia from harmful human impact. This law does not govern the field of air protection in work places. Main competences of governmental authorities in the field of ambient air protection (a) Development of environmental monitoring (observation) system; (b) Development and implementation of common policies and strategies; and (c) Development of integrated ambient air pollution control.

48. Types of harmful human impact include:
- (i) introduction of pollutants into the ambient air;
- (ii) radioactive impact on ambient air;
- (iii) ambient air pollution with micro-organisms and microbial toxins;
- (iv) physical impact of noise, vibration, electromagnetic field etc on ambient air.

49. Types of ambient air pollution are specified:
- (i) emission of pollutants into the ambient air from stationary pollution source;
- (ii) emission of pollutants into the ambient air from mobile sources of pollution;
- (iii) emission of pollutants into the ambient air from non-point sources of pollution;
- (iv) emission of pollutants into the ambient air from small-scale sources of pollution.

50. According to the Article 29[1], the inventory on emissions of air pollutants from stationary pollution sources is obligatory for physical and legal entities. The special inventory report is to be prepared for 5 years for each source of the atmospheric air pollution and each type of a harmful substance.

51. At preparing the EIA project, a full inventory on emissions (in case of existence) is to be carried out and maximum permissible concentrations or temporarily agreed permissible concentrations of the emitted harmful substances for stationary pollution sites are to be set. Maximum permissible concentration is an amount of permitted emissions of air pollutants from stationary pollution sources. Temporarily agreed permission concentrations can be approved for five years (maximum) without prolongation. The Maximum permissible concentration of the emitted harmful substances for stationary pollution sites is approved for 5 years for each source of the atmospheric air pollution and each type of a harmful substance.

52. Registration of emissions from stationary pollution sources comprises:
- (i) Self-monitoring of emissions;
- (ii) State emission registration system.

90. Self-monitoring of emission of pollutants from stationary pollution sources means that economical actor (operator) shall conduct adequate self-monitoring of pollutant emissions from stationary pollution sources. It includes:
- (i) Emission measurements (assessment);
- (ii) Registration of emissions;
- (iii) Reporting of emissions.

91. State emission registration system is a system of compilation, processing and analysis of emission reporting documentation. The Ministry of Environment Protection and Natural Resources of Georgia conducts state registration of emissions.

92. The Law of Minerals of 1996 provides provisions for the mineral resource exploration and management and establishes the requirement to obtain a license according to the procedures established under this law. The Law on Licensing and Permits (June 25, 2005) establishes the most recent regulations for licensing. According to the current legislation all quarries and borrow pits require to obtain a license.

93. The Wildlife Law of 1996 mandates the MoE to regulate wildlife use and protection on the whole territory of the country. The law empowers the MoE to issue hunting permits and licenses, declare hunting areas, control poaching, etc. Potential poaching by the workers should be controlled also during construction works, especially in sensitive ecological areas.

94. Forestry Code of Georgia (1999, including effective amendments). The Forestry Code of Georgia regulates the legal relations connected to looking after, protection, restoration and application of the forest fund and its resources. The aims of the Forestry Code of Georgia are as follows.

53. Looking after protection and rehabilitation of forests aiming at conserving and improving their climatic, water-regulating, protective, cultural, health, medicinal and other mineral wealth, conservation and protection of original natural and cultural environment and its individual components, including the vegetation cover and fauna, bio-diversity, landscape, cultural and natural monuments in the forests, rare and endangered plant species and others and regulation of their interaction in the benefit of the future generation.

54. Article 38 of the Forestry Code establishes the modes of protection of the state forest fund:

(i) Aiming at protecting the present state of the state economic forest fund and its biodiversity, originality of intact forests and relict, endemic and other valuable plant species, the general or special mode of protection of the state economic forest fund has been introduced by considering the priority functionality, historical, cultural and other values of the forest

(ii) The mode of protection of the protected territories of Georgia is defined under the Georgian Law ‘On the system of protected territories’.

95. Article 41 defines the modes of protection to be used for different categories of the state economic forest funds:

(i) The mode of special protection applies to the resort and green zones of the state economic forest fund, as well as flood-plain forests and forest sub-alpine zone.

(ii) The mode of general protection applies to the soil conservation and water-regulation forests under the rule provided by Article 42 of the present Code.

96. Article 39 specifies the special limitations to certain types of activity defined by the special mode of protection:

(i) The following activities are prohibited in the state economic forests and lands where a special mode of protection is applied:

- Cutting of a principal use;

(ii) Activities of the first and second categories as defined by the Law of Georgia 'On environmental permits', except the programs for rehabilitation of the protected areas and founding the hunting firms (02.03.2001 749).

55. Law of Georgia 'On the system of the protected areas' (1996). The Law defines the categories of 'protected areas' and specifies the frames of activities admissible in the given areas. The permitted actions are defined by considering the designation of the areas and in accordance with the management plans and provisions of the international conventions and agreements to which Georgia is a party. As a general requirement, the following activities are prohibited in the protected areas:

(i) Disturbance or any other changes of the natural ecosystems
(ii) Demolition (destroy), arrest, disturbance, damage (invalidation) of any natural resource with the purpose of its exploitation or any other purpose
(iii) Damage of the natural ecosystems or species by reason of the environmental pollution
(iv) Bringing and breeding foreign or exotic species of living organisms
(v) Bringing explosives or toxic materials to the area.

56. According to the above-mentioned Management Plan, all kinds of economic and entrepreneurship activities are admissible in the support zone provided they do not hamper the functioning of the protected areas.

57. Law of Georgia 'On the Red List and Red Book' (2003). The Law regulates the legal relations in the field of developing the Red List and Red Book, protecting and using the endangered species, except the legal issues of the international trade with endangered wild animals and wild plants, which within the limits of the jurisdiction of Georgia are regulated by virtue of the Convention 'On the international trade with the endangered species of wild fauna and flora' concluded on March 3 of 1973 in the city of Washington.

58. According to Article 10 of the Law, any activity, including hunting, fishing, extraction, cutting down and hay-mowing, except particular cases envisaged by the present Law, Law of Georgia 'On animal life' and legislation of Georgia, which may result in the reduction in number of the endangered species, deterioration of the breeding area or living conditions, is prohibited.

59. Possible harmful effect of anthropogenization on the endangered species should be taken into account when issuing the permit on environmental impact during the ecological expertise.

60. The Red List of Georgia was approved by the **Presidential Decree No. 303 'On approving the Red List of Georgia' (May 2, 2006).**

61. In case when the road rehabilitation project is to be accomplished within the resort zone accordingly, the Law of Georgia 'On Tourism and resort' and Law of Georgia 'On the zones of sanitary protection of resorts and resort areas' should be considered.

62. Decree No. 538; There is a chance that the project activity may cause harm to the environment, which will be impossible to mitigate even through planning and realizing the preventive measures. The rules to estimate and compensate for the environmental damage have been developed for such cases under the Decree No. 538 'On approving the methods to estimate the environmental damage' of the Minister of Environmental Protection and Natural

Resources of Georgia adopted on July 5, 2006. Below we site the clauses, which may be useful to estimate the damage within the limits of the project.

63. Article 2. The rule to estimate the damage caused by the harmful anthropogenic action on the atmospheric air

64. Article 3. The rule to estimate the environmental damage caused by the soil pollution

65. Article 4. The rule to estimate the environmental damage caused by the soil degradation

66. Article 5. The rule to estimate the environmental damage caused by illegal action with forest resources

67. Article 6. The rule to estimate the environmental damage caused by damaging the green plantations in the capital of Georgia, other cities and towns, regional centers and settlements

68. Article 7. The rule to estimate the damage caused by damaging the fish reserve and other biological forms

69. Article 8. The rule to estimate the damage caused by illegal acquisition of the animal life objects

70. Article 9. The rule to estimate the environmental damage during the fossil exploitation

71. Article 10. The rule to estimate the environmental damage caused by the pollution of water resources.

4. Environmental Standards and Norms

a. Environmental Quality Regulations and Standards

72. Within the context of a road project, environmental quality standards and norms are of primary importance. They define the quality of ambient air, admissible levels of surface water pollution and measures for their protection including zones of sanitary protection. The maximum admissible levels of air and noise pollution are also a certain importance to the stage of building. In accordance with the “Law on public health”, the environmental qualitative norms are approved by Decrees of the Minister of Labor, Health and Social Security of Georgia (Decrees Nos. 297/N of 16.08.2001, including the changes made to it by further decrees of the Ministry Nos. 38/N of 02.24.2003, 251/N of 09.15.1006, 351/N of 12.17.2007).

73. Ambient Air Quality Norms. The provisions for the protection of ambient air against contamination and the values of Maximum Admissible Concentrations of the harmful substances in the ambient air in the vicinity of the settlements is provided in the Environmental Quality Norms approved by the Order #297N (16.08.2001) of the Ministry of Labour, Health and Social Protection (as amended by the Order No 38/n of the same Ministry of 24.02.2003). The quality of atmospheric air (pollution with hazardous matter) is also defined by the order of the Minister of Environment Protection and Natural Resources (#89, 23 October 2001) on approval of the rule for calculation of index of pollution of atmospheric air with hazardous pollution.

Table 2: Maximum Admissible Concentration of Pollutants (MAC) in Ambient Air mg/m^3

N	Substance	N according to CAS	Formula	MAC (mg/m^3)		Class of harmfulness
				Maximum fugitive	Average Daily	
1	2	3	4	5	6	8
6	Nitrogen (IV) Dioxide	10102-44-0	NO_2	0.085	0.04	2
111	Sulfur Dioxide	9/5/7446	SO_2	0.5	0.05	3
359	Carbone Oxide	630-08-0	CO	5	3	4
360	Soot (Carbone black)	1333-86-4	C	0.15	0.05	3

74. Noise Standards. The Georgian standards for noise control are approved by the Decree of the Minister for Health, Labor and Social Affairs (297n of August 16, 2001) on the 'Approval of Environmental Quality Standards', which specify the tolerable and maximum admissible levels of noise for different zones.

Table 3 Georgian Noise Quality Standards in Residential Areas

Time	Indicative Level La dBA	Maximum Admissible Level La max dBA
7am – 11 pm	55	70
11pm – 7am	45	60

b. Construction Permits

75. Terms and procedures for obtaining Construction Permit, as well as issues related to the State supervision are mostly covered by the following legal acts:

(i) The Law of Georgia on Construction Permit (2004);

(ii) Government Decree No 140 on the Rules and Conditions for Issuing Construction Permit (2005) with amendments The Law on State Supervision over the Architecture and Construction Related Activities (1997) with amendments.

76. According low small scale auxiliary buildings, also rehabilitation and restoration activities do not required a construction permits.

77. If the construction is carried out by a Ministry of the Government or its structural unit, the preparation and agreement with the authorities of the project documentation should comply with the requirements stipulated in Decree No 101 of 2007. In particular, the project documentation and its review procedures should comply with the requirements set forth for phase I, II and III of the permitting cycle which are as follows:

(i) Phase I. Pre-Design Stage

- Confirmation of the land plot ownership and preparation of related documents;

- Agreement on SoW and ToR for the Architectural Design with the Architectural Department of local administration;
- Preparation of the Design in accordance with the aforementioned SoW and ToR.
-

(ii) Phase II. Consent of the Architectural Department of local administration
(iii) Phase III. Application for acquiring Construction Permit and permitting procedures

i. Pre-Design Phase

78. To obtain a Construction Permit the project proponent should provide to Ministry of Economic Development (MoED) documents confirming land plot ownership or right for land use, comprising extracts from the State Register or agreement with the land owner. This is relevant also for the construction activities to be carried out by central or local governmental bodies.

79. Terms of Reference for Architectural Design is a complex set of requirements determined by normative acts, which defines:

(i) Destination (residential building; industrial etc.);
(ii) Parameters (number of floors, dimensions etc.);
(iii) Layout;

80. List of Technical Requirements - environmental, technical and organizational conditions for design and construction. Each of these conditions should be agreed with the appropriate service agencies and should be supplemented the technical documentation.

81. Terms of Reference for Architectural Design should comprise requirements related to urban development planning; environmental protection and hygiene and sanitary safe conditions; protection of cultural heritage and historical sites etc. ToR for the architectural design should be issued by the Architectural Department of the local administration and Project Design documentation should be prepared by the project proponent in accordance with this ToR.

ii. Design Phase

82. Designs should be prepared in accordance with all requirements set forth within the Terms of Reference for Architectural Design and in compliance with the relevant design and construction standards. Design should be cleared by the Architectural Department of the local administration. If construction is to be carried out in a zone of cultural heritage protection, consent of the Ministry of Culture, Monument Protection and Sport is also required.

iii. Phase III. Construction Permit

83. If the project is to be implemented in area with special regime, appropriate consent of the relevant governmental body is required. This requirement is relevant for:

(i) Protected areas;
(ii) State border zone;
(iii) Sanitary protection zones of resorts;
(iv) Coastal zone;
(v) Right of Ways of highways, railways, pipelines and electro-transmission lines;

(vi) Sanitation-protection zones of water supply headwork's, water reservoirs, hazardous waste disposal facilities etc;
(vii) Zone of historical or cultural heritage protected in accordance with the law of Georgia on Cultural Heritage Protection.

97. The 'Law of Georgia on Cultural Heritage' was approved in 2007. Article 14 of the Law specifies the requirements for 'large-scale' construction works. A decision on career treatment and ore extraction in Georgia, as well as on construction of an object of a special importance based on the positive decision of the Ministry of Culture, Monument Protection and Sport of Georgia. The conclusion is basis on archeological research carried out by the entity wishing to conduct the ground works. That entity is obliged submit to the Ministry documentation about the archeological research of the area in question. This should include field-research and laboratory works. If an archeological object identified in the area, the conclusion of the archeological research should contain the following information: (a) a thorough field study of the archeological layers and objects identified in the area by using modern methodologies, (b) recommendations about conservation of the identified objects and planning of the building activity, on the basis of the archeological research.

C. Environmental and Social Requirements of the ADB

1. The Asian Development Bank's (ADB) Safeguard Policy

a. ADB Environmental Guidelines

84. All projects funded by ADB must comply with ADB Safeguard Policy Statement (2009). The purpose of the Policy is to ensure that the projects undertaken as part of programs funded under ADB loans are environmentally sound, are designed to operate in compliance with applicable regulatory requirements, and are not likely to cause significant environmental, health, or safety hazards.

85. Safeguard policies are generally understood to be operational policies that seek to avoid, minimize, or mitigate adverse environmental and social impacts, including protecting the rights of those likely to be affected or marginalized by the development process.

86. ADB's safeguard policy statement (SPS) sets out the policy objectives, scope and triggers, and principles for three key safeguard areas:
(i) The Involuntary Resettlement Policy (1995);
(ii) The Policy on Indigenous Peoples (1998), and
(iii) The Environment Policy (2002).

87. All three safeguard policies involve a structured process of impact assessment, planning, and mitigation to address adverse effects of projects throughout the project cycle. The safeguard policies require that (i) impacts are identified and assessed early in the project cycle; (ii) plans to avoid, minimize, mitigate, or compensate for the potential adverse impacts are developed and implemented; and (iii) affected people are informed and consulted during project preparation and implementation. The policies apply to all ADB-financed projects, including private sector operations, and to all project components.

88. Affected people are consulted during project preparation and implementation and information is disclosed in a form, manner, and language accessible to them. Safeguard plans

are disclosed to the general public and the information is updated at various stages in the project cycle.

89. ADB is committed to the principles of host-country responsibility for measures to mitigate adverse environmental and social impacts. ADB in funded projects shall therefore comply with host-country laws, regulations and standards, as well as requirements by which the host country is bound under international agreements.

b. EIA and Environmental Screening under ADB Guidelines

90. ADB carries out project screening and categorization at the earliest stage of project preparation when sufficient information is available for this purpose. Screening and categorization is undertaken to (i) reflect the significance of potential resources required for the safeguard measures; and (iii) determine disclosure requirements.

91. ADB uses a classification system to reflect the significance of a project's potential environmental impacts. A project's category is determined by the category of its most environmentally sensitive component, including direct, indirect, cumulative, and induced impacts in the project's area of influence. Each proposed project is scrutinized as to its type, location, scale, and sensitivity and the magnitude of its potential environmental impacts. Projects are assigned to one of the following four categories:

(i) **Category A.** A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment is required.

(ii) **Category B.** A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination is required.

(iii) **Category C.** A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications need to be reviewed.

(iv) **Category FI.** A proposed project is classified as category FI if it involves investment of ADB funds to or through a FI (financial intermediary).

92. Involuntary Resettlement. ADB will screen all projects to determine whether or not they involve involuntary resettlement. For a project involving involuntary resettlement, a resettlement plan will be prepared that is commensurate with the extent and degree of the impacts.

93. Indigenous Peoples. ADB will screen all projects to determine whether or not they have potential impacts on Indigenous Peoples. For projects with impacts on Indigenous Peoples, an Indigenous Peoples plan will be prepared.

94. Information Disclosure. In line with ADB's Public Communications Policy, ADB is committed to working with the borrower/client to ensure that relevant information (whether positive or negative) about social and environmental safeguard issues is made available in a timely manner, in an accessible place, and in a form and language(s) understandable to affected people and to other stakeholders, including the general public, so they can provide

meaningful inputs into project design and implementation. ADB will post the following safeguard documents on its website:

(i) For environment category A projects, draft environmental impact assessment reports at least 120 days before Board consideration;
(ii) Draft environmental assessment and review framework, draft resettlement frameworks and/or plans, and draft Indigenous Peoples planning frameworks and/or plans before project appraisal;
(iii) (iii)Final or updated environmental impact assessments and/or initial environmental examinations, resettlement plans, and Indigenous Peoples plans upon receipt;
(iv) Environmental, involuntary resettlement, and Indigenous Peoples monitoring reports submitted by borrowers/clients during project implementation upon receipt.

c. Environmental Impact Assessment

95. EIA evaluates the potential environmental risks and impacts of a specific project in its area of influence, examines alternatives to the project, identifies ways of improving project selection, sitting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts. EIA includes the process of mitigating and managing adverse environmental impacts during the implementation of a project.

96. According the ADB policy EIA should:

(i) Be initiated as early as possible in project development and be integrated closely with the economic, financial, institutional, social, and technical analyses of a proposed project;
(ii) Resettlement, indigenous peoples and cultural Property, and trans-boundary global environmental aspects;
(iii) Also take into account specific host- country conditions – the findings of environmental studies, National Environmental Action Plans, national legislation, the capabilities of the entity implementing the project, as they relate to managing environmental and social impacts, and obligations of the country under relevant international environmental treaties and agreements.

97. EIA report should include:

A. Executive Summary
B. Policy, Legal, and Administrative Framework
C. Description of the Project
D. Description of the Environment (Baseline Data)
E. Anticipated Environmental Impacts and Mitigation Measures
F. Analysis of Alternatives
G. Information Disclosure, Consultation, and Participation
H. Grievance Redress Mechanism
I. Environmental Management Plan
J. Conclusion and Recommendation

d. Public consultation

98. Involve the public in project design and recommended measures for continuing public participation; (ii) summarize major comments received from beneficiaries, local officials, community leaders, NGOs, and others, and describe how these comments were addressed; (iii) list milestones in public involvement (e.g., dates, attendance, topics of public meetings), and recipients of the report and other project-related documents; (iv) describe compliance with relevant regulatory requirements for public participation; (v) if possible summarize public acceptance or opinion on the proposed project; and (vi) describe other related materials or activities (e.g., press releases, notifications) as part of the effort to gain public participation. This section will provide of summary of information disclosed to date and procedures for future disclosure.

99. ADB adopted a two-step process to solicit feedback and gather information from its stakeholders.

100. Step 1: Overview Document. With the help of resident missions or local consultants, ADB identified in each targeted country key stakeholders to be invited to provide feedback. ADB then disseminated an overview document entitled "A Note on the Draft Environment Policy Working Paper" to generate ownership and partnership in the development of an environment policy. This five-page document provided background into the need for an ADB environment policy, and an overview of ADB's philosophy and proposed policy reforms. Accompanying the overview was a short questionnaire for soliciting feedback on the proposed direction. The local consultants followed up with each stakeholder, answered questions, and encouraged participation. After receipt of comments, ADB synthesized the comments and uploaded the synthesis to the Internet. The comments were considered in formulating the revised draft.
Step 2: Environment Policy Working Paper and Country Consultations.

101. After receiving initial comments and completing the environment policy draft, ADB disseminated the draft and held at least one consultation meeting in each of the 15 countries identified earlier with participants from step 1. Environment specialists from ADB participated in the meetings. Trained consultants facilitated the sessions.

D. Comparison of the National legislation and ADB requirements

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

103. Considering an ecological risk, cultural heritage, resettlement and other factors, the Bank classifies projects supported by them under categories A, B, C and FI. As mentioned in the Georgian national legislation review section, EIA is carried out only if a developer seeks to implement projects listed in the Law on Environmental Impact Permit. This list is compatible with the category A projects of the Bank classification. According to the Georgian legislation EIA is not required in other instances, while Asian Development Bank guidelines may require limited EIA or IEE for the B category projects, as well.

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

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

106. The above considerations reveal major differences between the Bank guidelines and the national legislation.

107. Some of the specific issues are considered below:

108. The most significant difference between the Bank's approaches on one hand and the national legislation on the other is that the latter does not take into account the issue of involuntary resettlement at any stage of environmental permit issuance. The Georgian legislation considers social factor only in regard with life and health safety (e.g. if a project contains a risk of triggering landslide, or emission/discharge of harmful substances or any other anthropogenic impact). Thus, the national legislation does not consider resettlement as an issue in the process of issuing environmental permits, unlike the Bank which takes a comprehensive approach to this issue.

109. While the Bank's document establishes the responsibility of a Borrower for conducting an environmental assessment, the national legislation provides for the responsibility of a project implementing unit to prepare EIA and ensure its consultation.

110. The role of the Ministry is restricted to the participation in EIA consultation and carrying out state ecological examination required for the adoption of a decision on issuing an EIA permit as established under the legislation of Georgia. Under the ADB regulations the ADB resident mission is responsible for coordination of the whole EIA process from initial screening/scoping till the review of drafts and approval and public disclosure of the final EIA.

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

Table 4: Table of Activities

#	Action	Georgian Legislation	ADB Requirements
1	Screening	Project Proponent in consultation with MoE	Bank and Consultant hired by Project Proponent
2	Scoping	Not required. Could be conducted voluntarily by Project Proponent.	Obligatory. Bank and Consultant hired by Project Proponent

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

E. Harmonization of the ADB and Georgian Legislation Requirements

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

F. International Conventions

113. This chapter briefly introduces the main features of key multilateral environmental agreements to which Georgia is a part:

1. The Rio Declaration and Agenda 21

114. Rio Declaration on Environment and Development often shortened to Rio Declaration, was a short document produced at the 1992 United Nations Conference on Environment and Development (UNCED), informally known as the Earth Summit. The Rio Declaration consisted 27 principles intended to guide future sustainable development around the world.

115. Agenda 21 is a programme run by the United Nations (UN) related to sustainable development. It is a comprehensive blueprint of action to be taken globally, nationally and

locally by organizations of the UN, governments, and major groups in every area in which humans directly affect the environment.

2. United Nations Framework Convention on Climate Change Convention (UNFCCC) 1992, and the Kyoto Protocol (1997)

116. The United Nations Framework Convention on Climate Change (UNFCCC or FCCC) is an international environmental treaty produced at the United Nations Conference on Environment and Development (UNCED), informally known as the Earth Summit, held in Rio de Janeiro from 3 to 14 June 1992. The objective of the treaty is to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

117. The treaty itself sets no mandatory limits on greenhouse gas emissions for individual countries and contains no enforcement mechanisms. In that sense, the treaty is considered legally non-binding. Instead, the treaty provides for updates (called "protocols") that would set mandatory emission limits. The principal update is the Kyoto Protocol, which has become much better known than the UNFCCC itself.

3. Convention on Biological Diversity (CBD), 1992

118. The **Convention on Biological Diversity** (CBD), known informally as the **Biodiversity Convention**, is an international legally binding treaty that was adopted in Rio de Janeiro in June 1992. The Convention has three main goals:

(i) conservation of biological diversity (or biodiversity);
(ii) sustainable use of its components; and
(iii) fair and equitable sharing of benefits arising from genetic resources

119. In other words, its objective is to develop national strategies for the conservation and sustainable use of biological diversity. It is often seen as the key document regarding sustainable development.

120. The Convention was opened for signature at the Earth Summit in Rio de Janeiro on 5 June 1992 and entered into force on 29 December 1993.

121. 2010 is the International Year of Biodiversity. The Secretariat of the Convention on Biological Diversity is the focal point for the International Year of Biodiversity.

4. The Ramsar Convention on Wetlands (Ramsar, 1971)

122. The Ramsar Convention (The Convention on Wetlands of International Importance, especially as **Waterfowl** Habitat) is an international treaty for the conservation and sustainable utilization of wetlands,[1] i.e., to stem the progressive encroachment on and loss of wetlands now and in the future, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value. It is named after the town of Ramsar in Iran.

123. The convention was developed and adopted by participating nations at a meeting in Ramsar on February 2, 1971, and came into force on December 21, 1975.

124. The Ramsar List of Wetlands of International Importance now includes 1,869 sites (known as *Ramsar Sites*) covering around 1,836,000 km²,[1] up from 1,021 sites in 2000. The nation with the highest number of sites is the United Kingdom at 168; the nation with the greatest area of listed wetlands is Canada, with over 130,000 km², including the Queen Maud Gulf Migratory Bird Sanctuary at 62,800 km².

125. Presently, there are 159 contracting parties, up from 119 in 2000 and from 18 initial signatory nations in 1971. Signatories meet every three years as the Conference of the Contracting Parties (COP), the first held in Cagliari, Italy in 1980. Amendments to the original convention have been agreed to in Paris (in 1982) and Regina (in 1987).
There is a standing committee, a scientific review panel, and a secretariat. The headquarters is located in Gland, Switzerland, shared with the IUCN.

5. The Convention to Combat Desertification

126. The United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa is a Convention to combat desertification and mitigate the effects of drought through national action programs that incorporate long-term strategies supported by international cooperation and partnership arrangements.

127. The Convention, the only convention stemming from a direct recommendation of the Conference's Agenda 21, was adopted in Paris on 17 June 1994 and entered into force in December 1996. It is the first and only internationally legally binding framework set up to address the problem of desertification. The Convention is based on the principles of participation, partnership and decentralization - the backbone of Good Governance and Sustainable Development. It now has 193 country Parties to the Convention, making it truly global in reach.

6. The Basel Convention

128. The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, usually known simply as the Basel Convention, is an international treaty that was designed to reduce the movements of hazardous waste between nations, and specifically to prevent transfer of hazardous waste from developed to less developed countries (LDCs). It does not, however, address the movement of radioactive waste. The Convention is also intended to minimize the amount and toxicity of wastes generated, to ensure their environmentally sound management as closely as possible to the source of generation, and to assist LDCs in environmentally sound management of the hazardous and other wastes they generate.

129. The Convention was opened for signature on 22 March 1989, and entered into force on 5 May 1992. A list of parties to the Convention, and their ratification status, can be found on the Basel Secretariat's web page. Of the 172 parties to the Convention, Afghanistan, Haiti, and the United States have signed the Convention but have not yet ratified it.

7. Stockholm Convention

130. Stockholm Convention on Persistent Organic Pollutants is an international environmental treaty that aims to eliminate or restrict the production and use of persistent organic pollutants (POPs).

131. In 1995, the Governing Council of the United Nations Environment Programme (UNEP) called for global action to be taken on POPs, which it defined as "chemical substances that persist in the environment, bio-accumulate through the food web, and pose a risk of causing adverse effects to human health and the environment".

132. Following this, the Intergovernmental Forum on Chemical Safety (IFCS) and the International Programme on Chemical Safety (IPCS) prepared an assessment of the 12 worst offenders, known as the *dirty dozen*.

133. The negotiations for the Convention were completed on 23 May 2001 in Stockholm. The convention entered into force on 17 May 2004 with ratification by an initial 128 parties and 151 signatories. Co-signatories agree to outlaw nine of the dirty dozen chemicals, limit the use of DDT to malaria control, and curtail inadvertent production of dioxins and furans.

III. DESCRIPTION OF THE PROJECT

A. The Project Location and Structural Map

134. Vakhtang Gorgasali Street starts at V. Gorgasali Square going towards Abanotubani, the oldest part of the city and joins the Rustaveli highway, which is a significant main transportation route presentThe project area is characterized by quite level topography. To the south of it is a complex and dissected hilly relief, where residential houses of different sizes and shapes are located. The buildings mainly belong to the first half of 20th century though there are some buildings built in the 80s of the XIX century, specifically the kindergarten and several new residential houses.

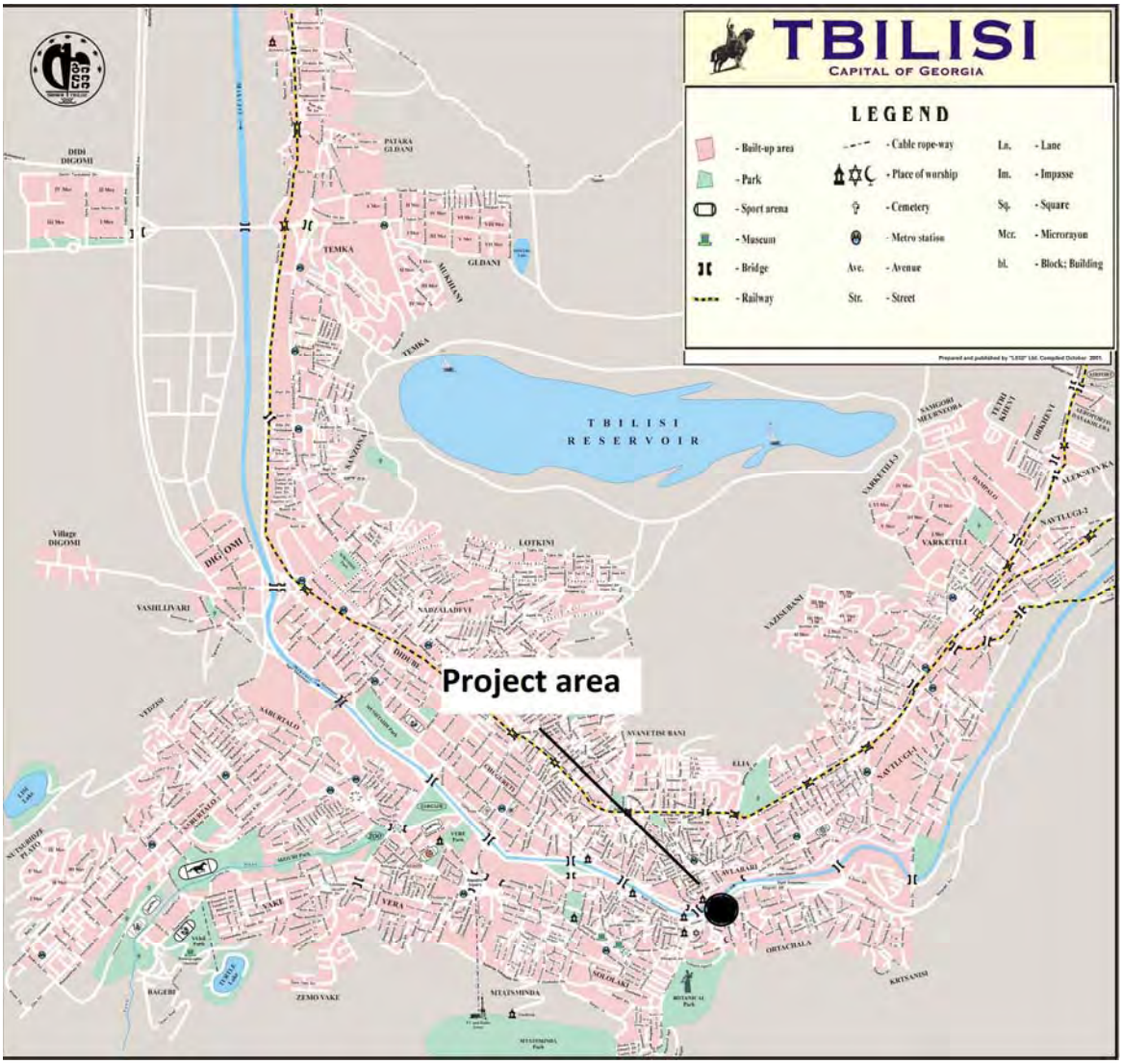


Figure 5 Map of Tbilisi. Location of the Project

135. The Gorgasali Square at the Metechi Bridge connects to Abanotubani via the oldest Samgebro Street which is adjacent to the project area.

136. In 1840 a narrow street was built on side of River Mtkvari which developed into the current Gorgasali Street during the Soviet period.

Pigure 6 Gorgasali Street. Project imPlementation area

137. At present the Gorgasali Square is open onto the Riv. Mtkvari and onto the new Metechi Bridge. It lost the function of market place and became a transport section.

138. The highway along the riverbank on the Gorgasali Street segment is represented currently by two wide traffic lanes and a wide median (with vegetation) between them. There is no other highway with such complex transport parameters on the other section of the River bank. At the same time the highway has a number of the flaws:

139. The highway with its current cross section parameters does not have any opportunity to develop towards the center of the city. This restriction especially applies to the area where the Metechi Bridge is located, in the narrow area of the Riv. Mtkvari where it is not feasible to extent the highway with the same parameters without demolishing the historical buildings and facilities and which is practically excluded. Because of the same reasons the highway cannot be developed towards the Leselidze Street.

140. The analysis showed that the highway creates a great discomfort for the community in their daily lives, specifically:

(i) The left side is not accessible to the pedestrians. It is located by 0,6 to several meters lower compared to the right side of the highway. It warrants arrangement of underground cascade type passages at different elevations [heights] which would not be convenient for the pedestrians to cross. At the same time the underground passage of the left side will be in the flooding zone because of being located below the river surface level. Consequently, the citizens use the public transport which travels in both directions on the right side of the highway and which has an underground passage. The left side of the highway is not accessible for the pedestrians due to the vehicles moving at a high speed;

(ii) The width of the road on the riverbank is artificially increased and its utilization is not appropriate because of the narrowness of the tunnel under the Metechi Bridge.

141. The analysis of the above mentioned data clearly suggest an idea of creating the recreation zone and addressing the asymmetrically developed highway: abolishing the traffic movement in the beginning of the Gorgasali Street and in the parallel area to the right riverbank. One can enter the mentioned transport tunnel from the ramps on the right riverbank and the Gorgasali and Abano Streets and one can take the opposite direction from the Gorgasali Street and the right river bank. The transport tunnel will accommodate all the vehicles in the city allowing for all the traffic to be shifted underground. This will allow for arranging a recreation zone on the upper level of the tunnel with the car parking lots. This will reduce the traffic in this part of the city which is a problem in the streets adjacent to the project area.

B. Project Description

142. Construction of three tunnels is considered into the version elaborated by the Design team. Main flows of traffic are passed through the tunnels. On the top over the tunnel is possible to create recreational area (7000 m^2) and to establish Auto-Park.

143. Traffic each of the tunnel is one-way. The carriageways of tunnels 1 and 2 consist of two-lane, and of tunnel 3 - one-lane. According the maximal speed of traffic 60 km/h, width of carriage way of tunnels 1 and 2 is accepted 8 meter, width of carriage way of tunnel 3 is accepted 7.5 meter (Fig 7),

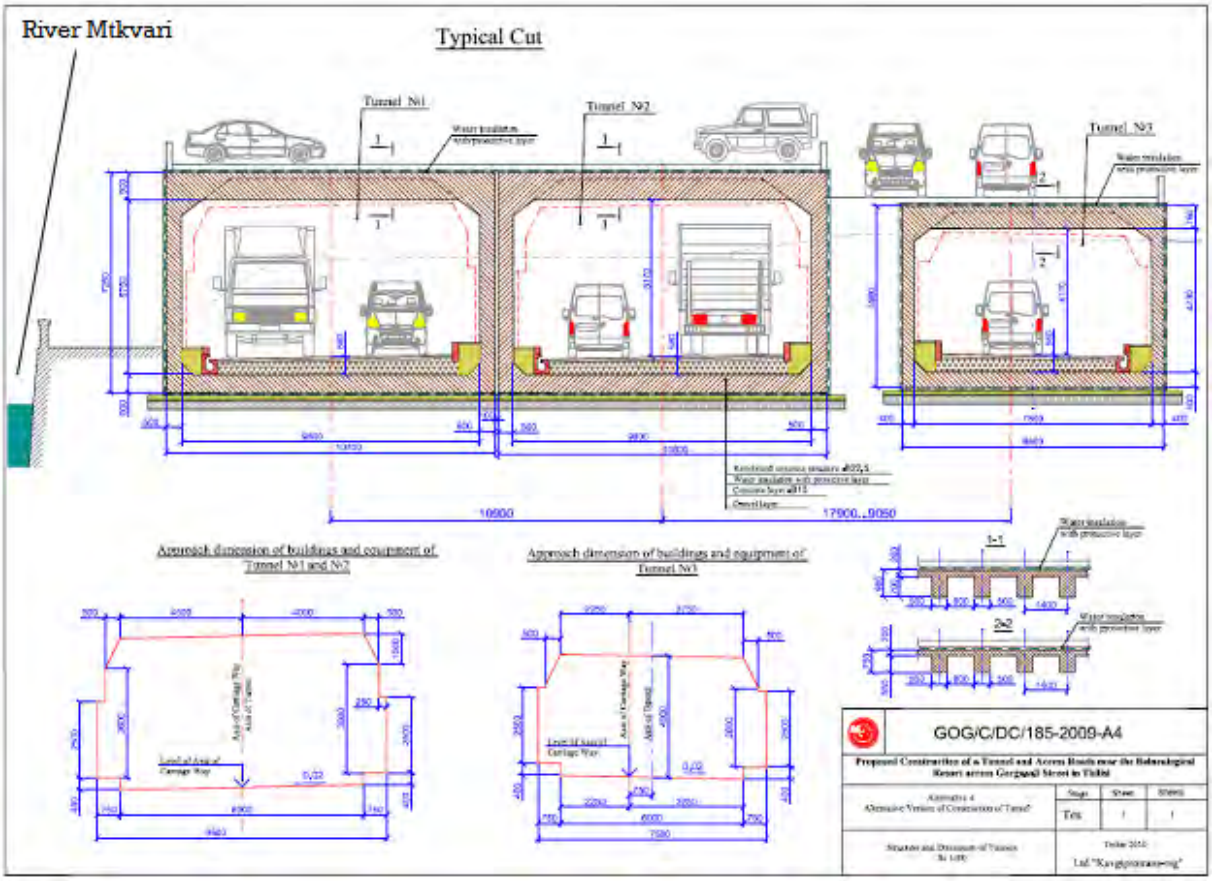


Figure 7: Typical cros-section of the designed tunnels

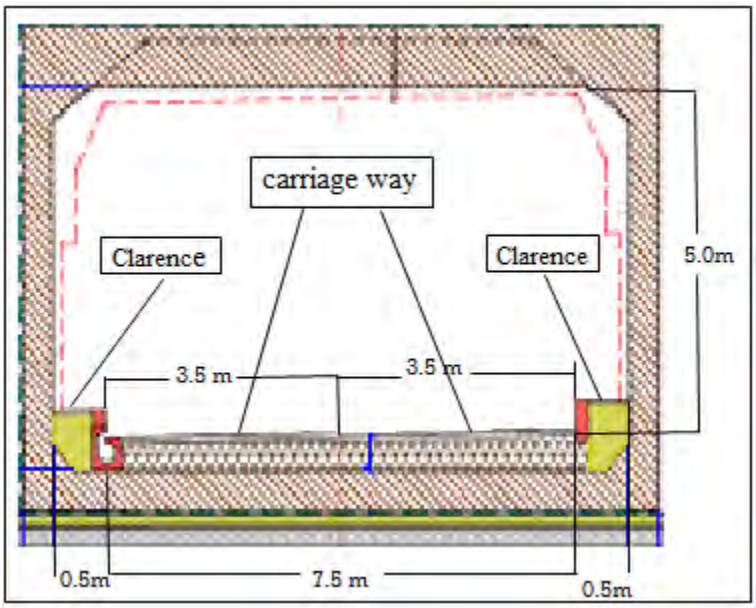


Figure 8: Typical cross-sections of the #1 and #2 tunnels

144. All types of vehicles are allowed through the tunnels #1 and #2 and the accepted height is 5 meter. Width of carriage way of tunnels #1 and #2 is accepted as of 8 meter. Each of the tunnels consists with two Clarences 0.5 m and two carriage way 3.5m (Fig 7);

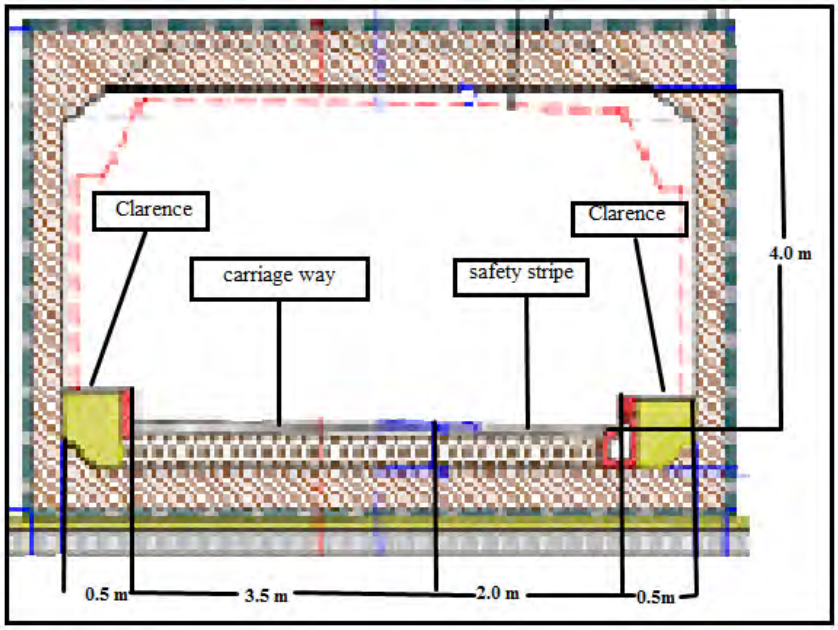


Figura 9 Typical cross-section of the #3 tunnel

145. Through the tunnel 3 is allowed only public transport of city and Passenger cars and accepted height is 4 meter. Width of carriage way of tunnel #3 is accepted as 6.5 meter. The tunnel consists with two Clarence 0.5 m, carriage way 3.5m and safety stripe (Figure 9).

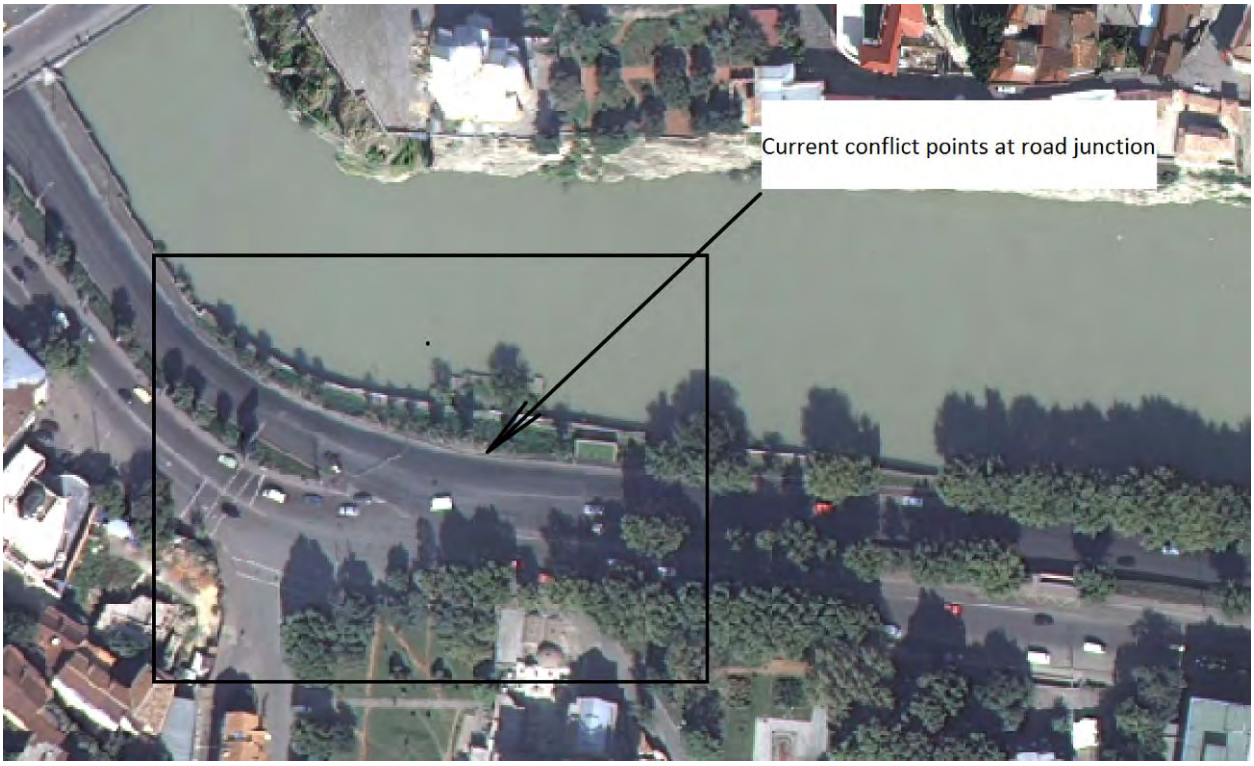


Figure 10. Current conflict point of the road junction

146. Reconstruction of Main Highway section is implemented from Metekhi Bridge up to the entrance of tunnels.

(i) Widening of carriage way on left side (on the side of the River Mtkvari) as well as on
(ii) right side;
(iii) Widening of Left side by the arrangement of reinforced concrete plates;
(iv) Widening of Right side by the arrangement of concrete walls;
(v) Arrangement of ascent staircase from riverside up to the Abano district, as a result of
(vi) partly cancelation of pedestrian crossing.
(vii) The following reconstruction works are considered from the side of Ortachala:
(viii) Arrangement of ascent Pandas with one-lane unilateral traffic on the side of the
(ix) Mtkvari on the upper level of the tunnels;
(x) Arrangement of descent road with one-lane unilateral traffic from the Settlement side.

147. On the area at the top over the tunnel 3, along the tunnel, is considered to arrange 6.5 meter-wide carriage way for bilateral traffic.

148. Upper level of the tunnel 3 is 1.17 meter lower than the levels of tunnels 1 and 2 that will simplify arrangement of junction from the side of the building area.

C. Main Directions of Traffic Flows

149. According the design decisions the traffic flow is implemented at two levels: at the levels of the tunnels and at the upper level of the tunnels.

150. At the levels of the tunnels (Figere 9):

(i) Two lanes from the Ortachala goes towards the Metekhi Bridge passing
(ii) through the tunnel 1;
(iii) Two lanes coming from the Metekhi Bridge goes towards Ortachala passing through the tunnel 2;
(iv) From the Metekhi Bridge additional third lane turns towards the Leselidze Street;
(v) lane coming from Leselidze Street and Abano Street goes towards Ortachala passing the tunnel 3.

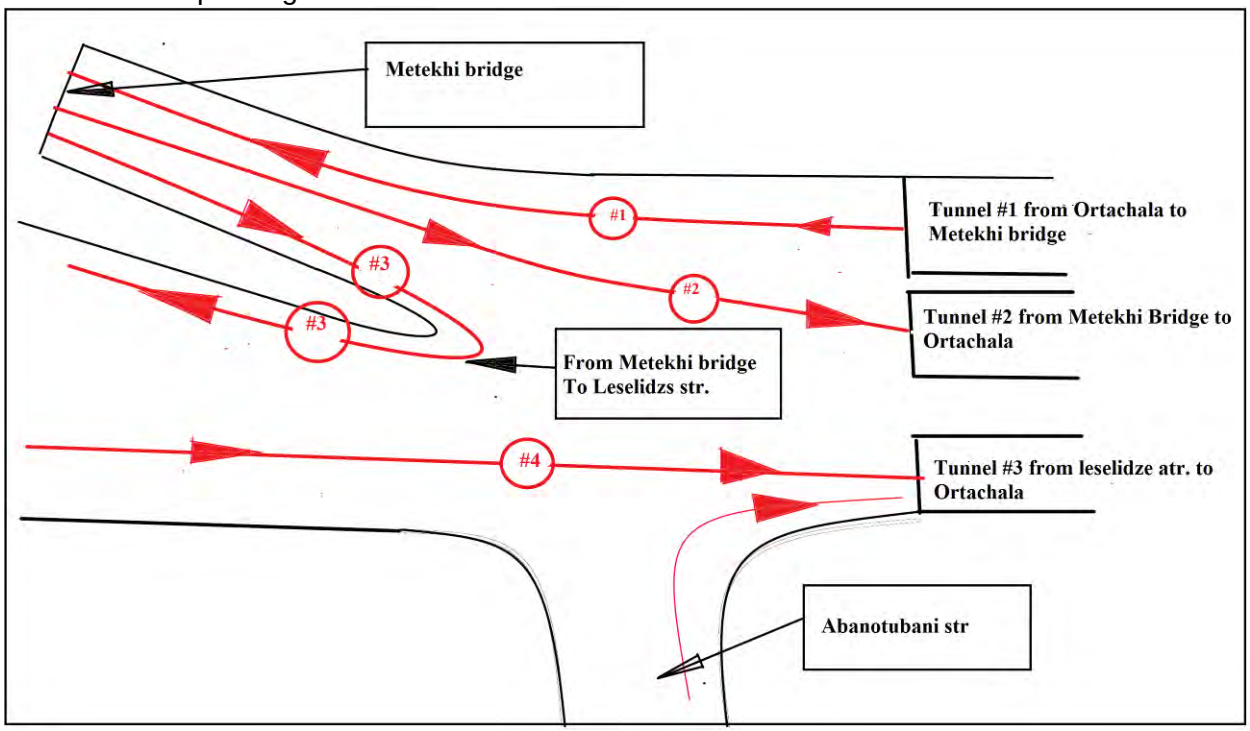


Figure 11. The traffic flow at the levels of the tunnels

151. At the level on the top over the tunnels:

(i) One lane coming from the Leselidze Streets goes up at the upper level and goes down
(ii) toward Ortachala with descent stripe;
(iii) Right stripe coming from Ortachala with the Pandas goes up at the upper level and to go towards Leselidze Street ;
(iv) Right lane coming from Ortachala with the Pandus goes up at the upper level and to turn or reverse (Figere 10)

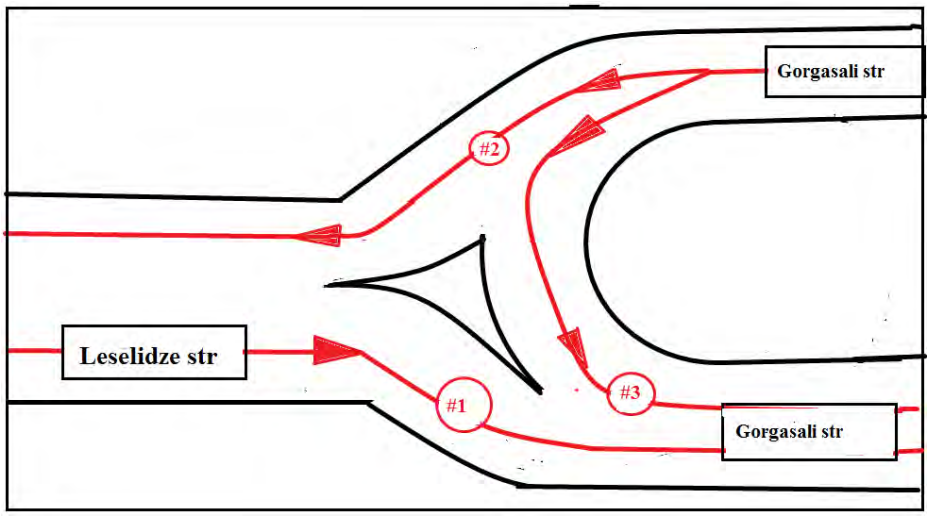


Figure 12 The traffic flow at the level on the top over the tunnels

D. Main Technical and Constructional Decisions

152. Design of Tunnels, Longitudinal profiles and Cuts are given in the drawings.
Constant brace structure of tunnels is presented by the monolithic reinforced concrete tightened frame with plane bottom and walls, and cover is ribbed.

153. Structures of tunnel 1 and 2 are identical. Accepted cross-section of openings is : width - 9.8 m; height - 5.75 m. Thickness of wall is 0.5 m, of bottom - 0.6 m. Pace of cover beams are 1.4 m,. Thickness of cover plate is accepted - 20 cm.

154. Accepted cross-section of openings for tunnel #3 in light is: width - 7.8 m, height - 4.73 m Thickness of wall - 0.4 m and bottom - 0.5 m. Covering beam 0.5 mX0.75 m (h) is arranged with pace of 1.4m. Thickness of cover plate between the beams is 20 cm.

155. Concrete of tunnel structure is accepted as of - **B25,F200,W6;** Accepted structural decisions will provide stability and resistance of building, during the main load pressures as well as during the 8 point seismological event, within its whole period of exploitation.

156. Separation of tunnels 1 and 2 as independent structures gives opportunities to carry out construction works without complete closing of traffic. During the construction period in case of complete closing of traffic and after verification of engineering-geological conditions it is possible to unite structures of both tunnels with one common wall.

157. Length of ascent Pandus is 140 m. From the starting point along the 50 m structure of Pandus is arranged with monolithic concrete support walls and with sand-gravel mix poured between them. Remained section is to be constructed by the monolithic reinforced concrete framed structure. At the upper section of the structure 5.5 m width carriage way and 0.8 m width sidewalk will be arranged. Inter space of reinforced concrete frame partly is used for technological containers of tunnel exploitation, and remained part can be used for commercial purposes.

At the entrances of the tunnels it is considered to arrange upport walls and Pandus. Structure of support walls is accepted of massive-concrete as well as thin-limed reinforced concrete. Structure of Pandus is reinforced concrete.

158. For the concrete walls is used - concrete **B15,F150,W6**
159. For the reinforced concrete walls is used - concrete **B25,F200,W6**
160. As a purpose of widening carriage way, from Metekhi Bridge is arranging reinforced concrete plate - thickness 0.5 m, which is moving towards the side of Mtkvari up to 2.5 meter.

161. Water-proof insulation of tunnels is installed along the whole parameters by the arrangement of stick water insulation. Barring of water-proof insulation will provide safety protection of tunnels from the possible percolation of soil waters from underneath. Stick water insulation on the reinforced concrete structure of pandus is arranged only deep part and covering of structure.

162. Water-proof insulation of support walls is considered on the back surface of walls with the stick of hot bitumen twice and with arrangement of back drainage of wall.

E. Water-draining structures

163. Along the whole length of tunnel on one side of carriage way it is considered arrangement of water-draining channel. Structure of channel is precast reinforced concrete (Figure #10).

164. At the entrance of tunnels along the whole width of carriage way arrangement of water-receiver trays is planned. The trays will be covered with cast iron lattices. Water will be drained down from the trays flown into the River Mtkvari by the d-400 mm pipes.

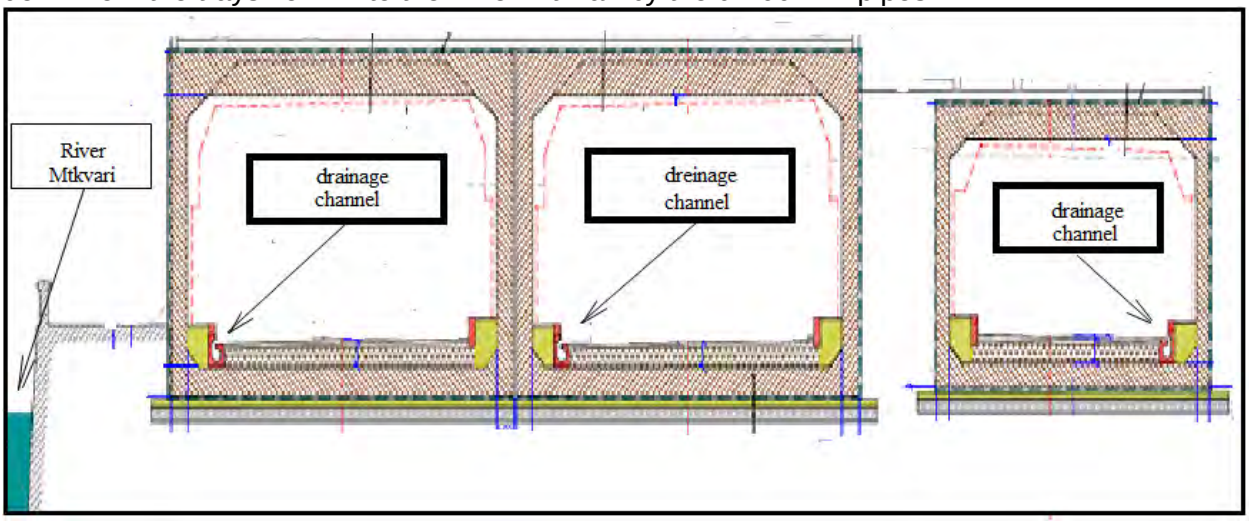


Figure 13. Water-draining structures

165. In case of mentioned scheme will not provide sufficient water drainage from the tunnel, because of level variability. To cope with this problem arrangement of pump-station is considered under the Pandus from the Ortachala side, which will drain down water from the tunnels.

166. According to the point of view of specialists, for the purpose to come over that problem globally is necessary to construct new drainage collector, which will be set more deeply and will connect to the river-bed of Mtkvari after Ortachalahesi.

F. Ventilation

167. Length of tunnels #1, #2 and #3 is correspondingly 332,320 and 290 meter> According to the construction standards (snips) ventilation of vehicle tunnels of the mentioned length is not obligatory. In case of necessity it is possible: to arrange two ventilators of small diameter in every 100 meter at upper corner of the tunnel; to arrange passing openings (ducts or pipes) into the cover of tunnels and through the walls.

G. Lighting

168. In the Detailed Design artificial lighting system of the tunnels should be provided in compliance with the relevant standards.

H. Fire protection

169. According the norms, special fire-protective equipment for the tunnels with given length is not necessary.

170. During the detailed design, requirements of state fire-brigade Service are to be considered.

I. Relocation of existing communications

171. The following are considered by the infrastructure design
- (i) Arrangement of water drainage channel along the 411 m, d-200 mm;
- (ii) Arrangement of water drainage channel along the 461 m, d-500 mm;
- (iii) Arrangement of water drainage channel along the 405 m, d-700 mm;
- (iv) Arrangement of sewerage along the whole width of the construction sight, in four places,
- (v) d-300mm;
- (vi) Arrangement of Drainage to the right side of the tunnel #3 d-400 mm;
- (vii) Replacement of existing gas-pipelines from the construction area and arrangement
- (viii) of the new pipeline sections
- (ix) trench - d-80 mm; along the 47 m wall - d- 50 mm into the trench of 49 m.

172. Arrangement of water drainage channel d-200 mm is foreseen on the right side of the tunnel #3, and d-500 mm and d-700 mm - correspondingly under the tunnels #1 and #2 into the covering of reinforced concrete.

J. Organization of Construction

173. Construction of tunnels is considered with open trench method. At I stage - tunnel #1 is constructed, at II stage - tunnel #2, and at the last stage -tunnel #3. In case of mentioned scheme it is possible to carry out construction works on the Gorgasali Street without complete closing of traffic.

174. Consequence of construction activities with due consideration of traffic safety must be developed within the Detailed Design. Orientate duration of construction is 2 year.

1. I stage

175. The first stage of construction organization envisages mobilizing the vehicles and equipment, placing the traffic signs on the current road sections (at the beginning and end of the transport tunnel), switching the traffic to the left (lower) traffic lanes and fencing a section of the construction site.

2. II stage

176. The second stage envisages carrying out demolishing works on the left (lower) traffic lane of the current road and on the median (separation line). The demolishing works include stripping the current cover with milling bits and its removal to the embankment; demolishing the electricity lighting and other steel structures and storing them; demolishing the sidewalks and storing the basalt dashers; cutting down the trees in the median, removing them and uprooting the remaining stumps; as well as demolishing the lower bearing wall of the median, sectioning the concrete-reinforcement. At this stage the top soil is stripped up to the design elevation and is removed to the embankment.

3. III stage

177. The third stage envisages carrying out the demolishing works of first priority which consists of: arranging the bearing wall adjacent to the left traffic lane and the surface water diversion c/r channel adjacent to the mid support located on the median, and the c/r support cover slabs and arranging the traffic lane.

178. The c/r support cover slabs shall be installed with the motorized crane of 25 tons capacity equipped with the traverse. Besides, it needs to be taken into consideration that the rocky ground at the bottom of the tunnel is to be demolished by the drop hammer.
At the end Stage III when the first priority construction works reaches PK 0+72 it is planned to stop the traffic had been switched to the left traffic lane for 25-35 days. In order to timely complete the construction works on this section the third stage works will be concluded with backfilling the soil behind the walls and compacting it.

4. IV stage

179. At Stage 4 the traffic will be fully switched to the newly arranged left traffic lanes and the demolishing and installation works will start on the upper part of the traffic lane. The demolishing works consist of all the above referred demolishing works plus demolishing the underground passage for pedestrians and storing the c/r sections and disposing the metal as a scrap. The installation works consists of arranging the surface water diversion c/r channel adjacent to the wall, the c/r support cover slabs and arranging the traffic lane. At this stage all the vehicles and equipment that were used at Stage III will be used.

5. V stage

180. At this stage of construction the leveling slab of δ=3cm thick will be arranged on the tunnel cover slabs, as well as the hydro insulation and the protection layer of average height of

δ=6 cm will be arranged. At the same stage the deformation joints will be covered and the concrete construction parapets will be set up.

6. VI stage

181. At the sixth stage the traffic in both directions will be restored and the similar works will be carried out while constructing the tunnel 3.

182. At the sixth stage the liquidation works will be completed. These works consists of removing the remaining vehicles and equipment from the site and disposal of the construction waste.

183. After the completion of Stage VI the car parking lot and surfacing works will be left to be carried out.

K. Construction Wastes

184. The following types of inert waste are anticipated to be produced from these activities (calculated by the FS):

(i) Natural materials (soil and rock); According to preliminary data there will be produced significant volumes of cut material (soil and stones or rocks) approximately 80, 000 -85, 000 m^3. Part of them will be reused and recycled the other part will disposed of on the Iagluja landfill as inert waste;
(ii) Metal constructions (most part of metal pillars of the power line and reconstruction of pedestrian subway). Negligible amount of other metal waste (including scrap metal and wire) is expected.

Table 5: Construction Inert Waste

Type of the waste	Measure	Quantity
Cut Asphalt	m^2/m^3	18234.0/5363
Basalt borders	m^2/m^3	418.6/62.2
Metal pillars of the power line	Tonné	6.72
Cut trees	m^3	300.0
Concrete waste	m^3	2406.0
Demounting granite plates	m^3	138.6
demounting well facing granite plates	m^3	85.5
refuse soil waste	m^3	61717.0
Rocky inert waste	m^3	9783.0
Total of the inert waste	m^3	79554.0

L. Camp Site

185. A Small construction camp will be located on the construction site. Arrangement of the construction camps will not additionally affect the landscape. The potential impacts related to the construction and operation of the camp could be summarized as follows:

(i) Contamination related to fuel storage and fuelling operations
(ii) Sewerage related contamination
(iii) Waste management

IV. DESCRIPTION OF THE ENVIRONMENTAL (BASELINE DATA)

A. Physical Resources

1. Geology

186. Tbilisi is located in the South Caucasus at 41° 43' North Latitude and 44° 47' East Longitude. The city is situated in East Georgia on both banks of the Mt'k'vari River. The elevation of the city ranges from 380-770 m above sea level (1246–1968 ft) and possesses the shape of an amphitheatre surrounded by mountains on three sides. To the north, Tbilisi is bounded by the Saguramo Range, to the east and south-east by the Iori Plain, to the south and west by various endings (sub-ranges) of the Trialeti Range.

Figure 12: Map of the Caucasus Region

187. City of Tbilisi and its surrounding territories are situated at the Eastern end of Ajara-Trialeti fold system, which geologically consists of Paleocene age rocky layers. Mostly they are covered by modern- quaternary age various genesis originated layers but due to strong partitioning (dissection) of the relief, especially on the territory at the right bank of the river, these rocky layers are quite denuded at mountain slopes and bases of ravines.

188. Geologically the research territory is situated in middle eocenial age's main rocky areas. Lithologically they are represented by medium and thick layers of medium and thick-layer sandstones – so called "mixed layer set".

189. The first engineering-geological layer (I) is represented by so called "cultural layer" (IF), which consists of modern technogenic genesis refuse soil. The composition of this layer lithollogically is characterized by great variations – it mainly consists of gravel, small stones and brick pieces and clay filling. The described refuse soil is spread all over the project area; however its thickness varies (see annex A). Maximum thickness, 6 m, was identified at borehole #1 and minimal thickness of 4.8 m was identified at borehole #4. As the wells are located along the axis of the project area (galleria type juncture) at around the same altitude, the diversity of

the thickness of the layer was not reflected, although the diversity of the thickness of the layer is clearly shown on diametrical geological profile.

190. The second engineering-geological layer at the project area is represented by set of rocky layers, which lithollogically consists of medium and thick-layer grey sandstones. This layer is spread over the whole area under the first layer, at various depths. However, absolute altitude of its surface at different points is not distinguished by diversity. According to the baseline geological data the thickness of this layer exceeds several hundred meters. The maximum depth of this layer that we studied using our boreholes is 4.50meters (see annex A).

191. The project area is stable and does not contain geo-hazards, although there is a possibility of provocation of geo-hazardous processes during construction due to using improper design

2. Topography[1]

192. Tbilisi Gorge geographic province occupies valley of the Mtkvari river from Zemo Avchala to the eastern edge of the Teletri Range. The area is bordered on the east by the left side of the Kakheti Highland, on the west by the eastern edge of Trtialeti Range foothills (850-900 m above sea level), on the south, by the very sloppy Teleti Range and on the north by the southern slope of Saguramo Range (see orographical scheme of Tbilisi).

[1] Javakhishvili, Sh. (1988). Monthly Characteristic of Climate Types of Georgia. Tbilisi.; Kordzakhia, M. (1961). Climate of Georgia. Tbilisi; Maruashvili, L. (1964). Physical Geography of Georgia. Tbilisi; Ukleba, D. (1968). Physical Geographical Division of Eastern Georgia. Metsniereba. Tbilisi

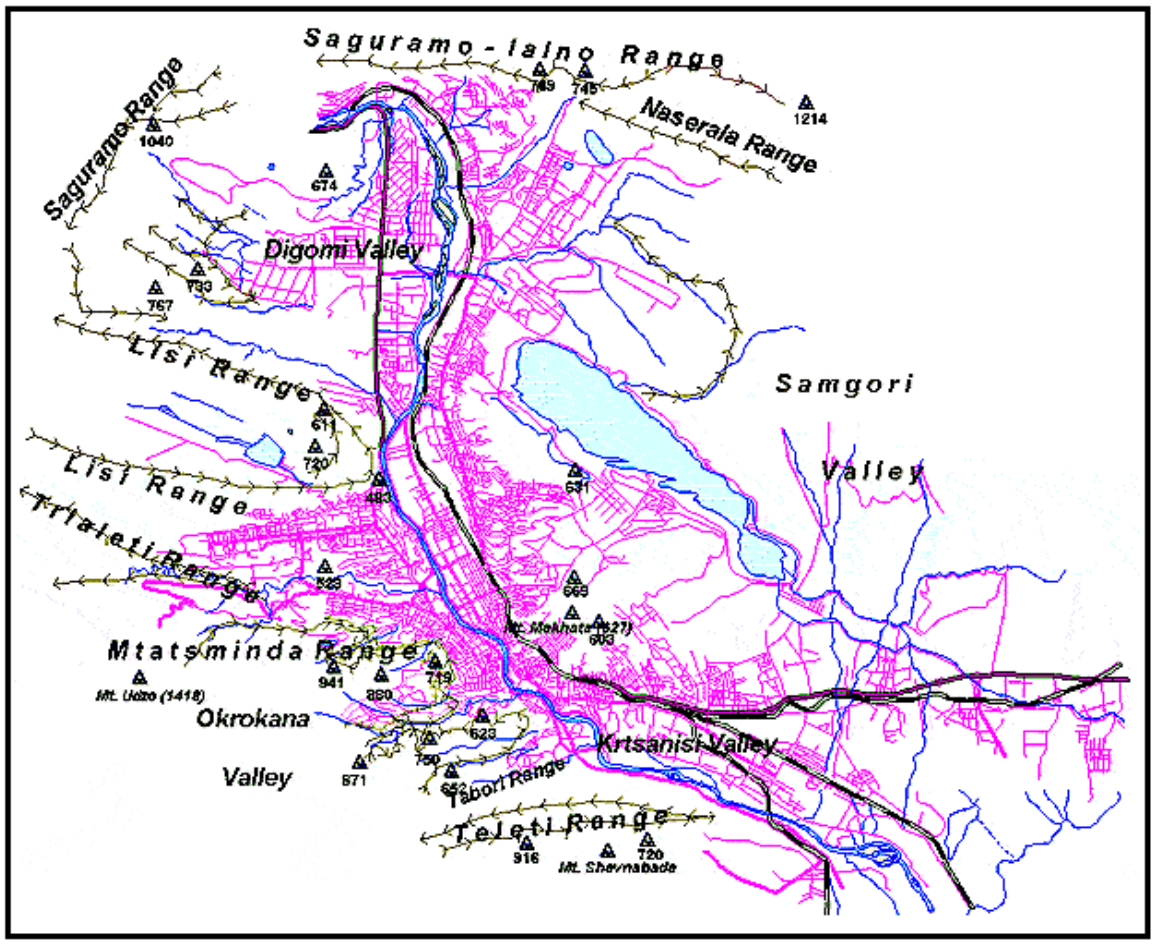


Figure 13 Orographic scheme of Tbilisi gorge (*Compiled by UNEP/GRID-Tbilisi, 1999*)

193. Topography of the Tbilisi Gorge is very diverse. The reason for that are very complex geological structure, as well as erosion-denudation and accumulation processes. The morphological diversity of the Tbilisi Gorge is a result of the asymmetrical positions of the left and right banks of the gorge (Maruashvili, 1964). The left bank is hypsometrically higher and has steeper slopes. Surface there is characterized by numerous small rivers and ravines. At the right side of the gorge, alluvial sediments cover tectonic structure and, therefore, surface is softer. It is slightly disturbed by dry ravines. In this part of Tbilisi the major features of relief are river terraces. Between these two morphologically completely different parts of the gorge, in the lowest part of the city, the Mtkvari river flows.

194. The Mtatsminda Range, geologically an anticline, dominates the city from the south. To the west it is connected with the Trialeti Range. Top of the range, where city's Central Park Mtatsminda is located, is flat. The largest point here is Mt. Udzo (1418 m).

195. Between the Mtatsminda and Lisi ranges on Saburtalo syncline is situated one of the largest residential districts of the city. On the right side of the Mtkvari river, in the western part of Tbilisi, is located another large residential district, Didi Digomi, which was built on the Digomi valley . It is a completely flat valley with an altitude of 440 m above sea level. In the west it rises slightly (550 m) and gradually transfers to the southern foothills of Saguramo Range (Ukleba, 1968).

196. The last anticline of the right side of river Mtkvari towards the north is the Mtskheta anticline, which continues to the left side of the river and then goes Northeast towards the Gldani district and Mamkoda and Norio villages. On a right side of Mtkvari it embodies by southern slope of Armazi range and bordered on the left side by the bottom of Saguramo-Ialno Range.

197. The research territory is situated an altitude of 390-394 m above sea level (see annex A). It is located at the right terrace of the r. Mtkvari bank between the river and the slopes following the right bank, The area is flat, with slight inclination from Balneological hospital (Esast) and from the bridge (West) towards the lowest point, which is the area near the Turkish bath, between the bridge and Balneological hospital.. Two existing carriageways at some sections are rolling at different level – the riverside carriageway about 0,60m lower than the hillside carriageway.

3. Seismology

198. Special attention is drawn to construction of Tbilisi local network. The recent earthquake of 2002 has highlighted the poor seismic resistance of buildings in Tbilisi. Detailed seismic risk assessment must now be done taking into account present conditions of buildings. Unfortunately we should state that after this earthquake Tbilisi has become much more vulnerable. The moderate earthquake located in Tbilisi requires detailed geophysical studies of adjacent area and continuous observations of local seismicity. At the moment two digital stations are operating in Tbilisi and in nearest future it is planned to increase the number up to five.

199. Modern software systems installed for data acquisition, interactive seismogram analysis and continuous data archiving. Catalogue of events recorded is started, already including up to 600 events for past two years and associated up to 2000 waveforms.

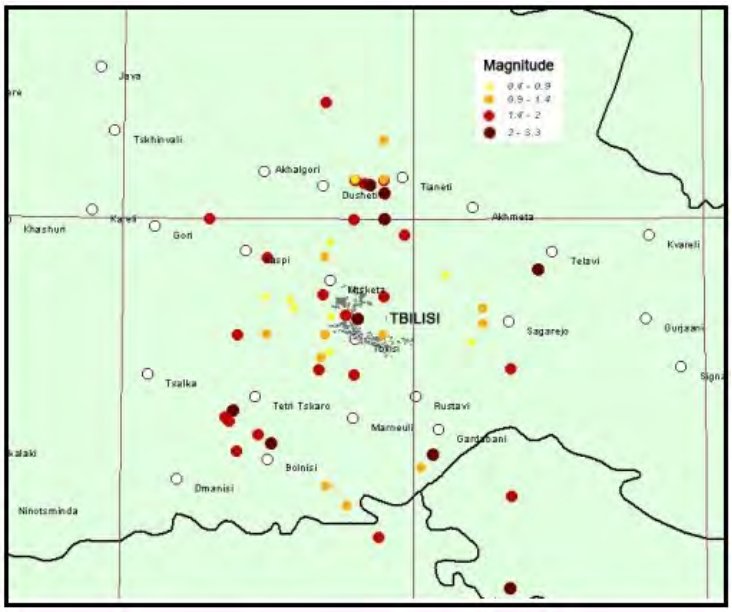


Figure 14 Epicenters of earthquakes in and near Tbilisi in 2004-2005 years (http://seismo.ge/)

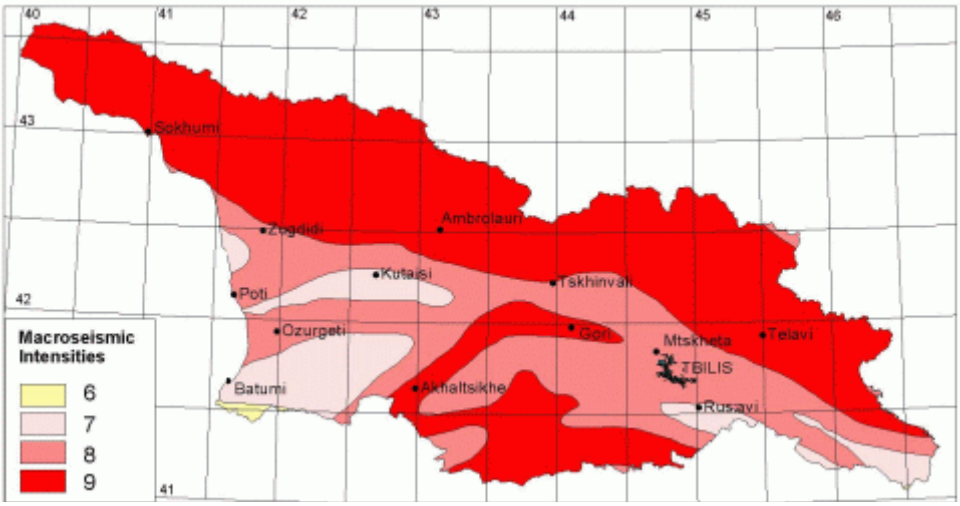


Fig 15: Source: Georgian Geophysical Society, 2002

200. According to the corrected scheme of zoning of the territory of Georgia, the project territory is included in the point 8 earthquake zone (Decree No. 1-1/2284 of October 7, 2009 (Tbilisi) of the Minister of Economic Development of Georgia about standards "Seismically stable construction (PN 01.01-09)). The intensity of tectonic zones are calculated for 2% probability (expectation time 50 years) according to the Richter Scale. The risk of activation of exogenous processes on the territory of Tbilisi has significantly increased after the earthquakes of April 25, 2002 weakening the stability of the landslide-gravitational slopes to the critical tension and areas structured with weak erosive-settling grounds.

4. Climate

201. The climate of Tbilisi can be classified as humid subtropical. The city's climate is influenced both by dry (Central Asian/Siberian) air masses from the east and humid subtropical (Atlantic/Black Sea) air masses from the west. Tbilisi experiences relatively cold winters and hot summers. Because the city is bounded on most sides by mountain ranges, the close proximity to large bodies of water (Black and Caspian Seas) and the fact that the Greater Caucasus Mountain Range (further to the north) blocks the intrusion of cold air masses from Russia, Tbilisi has a relatively mild micro-climate compared to other cities that possess a similar continental climate along the same latitudes.

202. The average annual temperature in Tbilisi is 12.7 °C (54.9 °F). January is the coldest month with an average temperature of 0.9 °C (33.6 °F). July is the hottest month with an average temperature of 24.4 °C (75.9 °F). The absolute minimum recorded temperature is −23 °C (−9.4 °F) and the absolute maximum is 40 °C (104 °F). Average annual precipitation is 568 mm (22.4 inches). May is the wettest month (90 mm) while January is the driest (20 mm). Snow may fall on average for 15–25 days per year. The surrounding mountains often trap the clouds within and around the city mainly during the Spring and Autumn months, resulting in prolonged rainy and/or cloudy weather. Northwesterly winds dominate in most parts of Tbilisi throughout the year. Southeasterly winds are common as well.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °C (°F)	19.5 (67)	22.4 (72)	28.7 (84)	34.3 (94)	34.9 (95)	38.7 (102)			37.9 (100)	33.3 (92)	27.2 (81)	24.0 (75)	
Average high °C (°F)	6.3 (43)	7.1 (45)	12.4 (54)	19.0 (66)	23.0 (73)	27.3 (81)	30.8 (87)	30.4 (87)	26.3 (79)	19.7 (67)	12.9 (55)	7.7 (46)	18.6 (65)
Average low °C (°F)	-1.9 (29)	-1.1 (30)	2.6 (37)	8.2 (47)	11.8 (53)	15.5 (60)	19.0 (66)	18.2 (65)	14.9 (59)	9.1 (48)	4.1 (39)	0.0 (32)	8.4 (47)
Record low °C (°F)	-24.4 (-12)	-14.8 (5)	-12.8 (9)	-4.8 (23)	1.0 (34)	6.3 (43)	9.3 (49)	8.9 (48)	0.8 (33)	-6.4 (20)	-7.1 (19)	-20.5 (-5)	-24.4 (-12)
Precipitation mm (inches)	20 (0.79)	29 (1.14)	31 (1.22)	51 (2.01)	84 (3.31)	84 (3.31)	41 (1.61)	43 (1.69)	35 (1.38)	41 (1.61)	35 (1.38)	23 (0.91)	517 (20.35)

Figure 16 Climate data of Tbilisi

203. Winds: average annual speed 2.4 m/sec; maximum speed – 22 m/ sec with annual repetition. Strong winds (>15m/ sec) occur in March and April; November and December are the most peaceful months. Directions of the winds during a year are as follows: North -26%, North-East-3%, East-4%, South-East-25%, South-8%, South-West-2%, West-4%da North-West-28%. The diagram of the directions of the winds looks as follows:

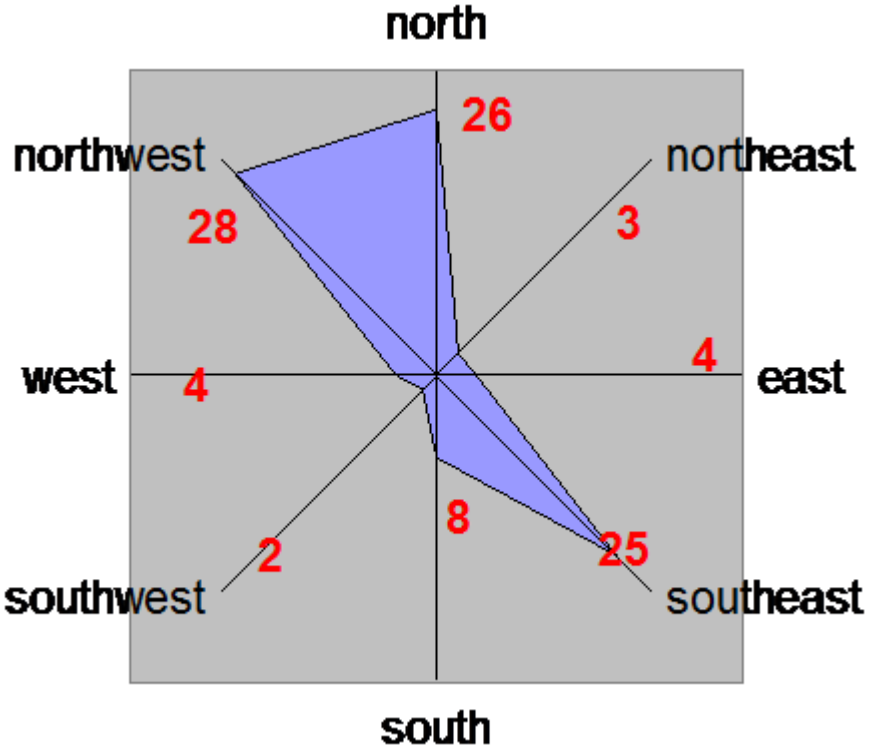


Figure 17: Annual dominate directions of the winds in Tbilisi (%)

5. Air quality

204. Low quality of air in urban areas is one of the main concerns of environmentalists throughout the world. Georgia is not an exception. In the 1980s Georgian Capital Tbilisi was among the most polluted cities of the Soviet Union. Over the 1990-1992 period, due to the industrial breakdown and the sharp decline in transport activity, the quality of air temporarily improved

205. Starting from1993, however, the recovery of the transport sector meant that the quality of air in big cities started to deteriorate again. Today, transport and industry are again the main economic activities that damage Georgia's environment. Transport sector being accountable for most of the urban air pollution. Four-fifths of the Tbilisi air pollution result from road transport.

206. Before the breakdown of the Soviet Union, the State Hydro meteorological Services were responsible for regularly measuring the concentrations (3 times daily) of the basic air pollutants: particulate matter, SO2, NO2 and CO, as well as some specific pollutants from local stationary sources. These measurements were carried out in Georgia until 1991 in 11 large cities at 33 (7 in Tbilisi) measuring sites. There are no regularly available data on other important transport sector emissions, such as ozone (O3), noise or persistent organic compounds and heavy metals, such as lead (Pb) and polycyclic aromatic hydrocarbons (PAHs). For a number of reasons (e.g. the age and origin of vehicles, deficient fuel-control and vehicle - control systems, inefficient management of road traffic and public transport), the motor vehicles operating in Tbilis generate very dirty emissions.

Table 4 Emissions generated from motor vehicles operating in Tbilisi 2003-2005 y.

YEARS	THOUSAND TONNES						
	TOTAL	NO_X	VOC's	CO	SO_2	SOOT	CO_2
2005	246.035	17.179	40.602	178.561	5.710	3.983	-
2004	199.058	12.849	32.028	147.842	3.771	2.568	1444.2
2003	170.096	10.226	26.777	128.758	2.612	1.723	1178.3

Source : Division of Air Protection. Ministry of Environment Protection and Natural Resources of Georgia. Tbilisi. 2006

207. Aside from the growth of freight and passenger transport, the inefficient traffic management, bad driving habits and the poor technical condition of most vehicles contribute to the problem. The capital has become saturated by road transport. Most of the vehicles are 10-15 years old. The number of Soviet-made models has decreased, being mainly replaced by second-hand European cars. There are no restrictions on the age of vehicles on the road, even in the case of public transport.

208. Available data indicate that mobile sources are responsible for an increasing share of total air emissions, their contribution rising from some 70% in 1991 to about 91% in 2005. Mobile sources contributed 38% of dust, 82% of SO_2, 89% of NOx, 90% of the volatile organic compounds (VOC), and 95% of CO emissions in 2005 (see table 1). Transport is also contributing an increasing share of CO_2 emissions.

Table 5. Air Quality in Tbilisi

Pollutant	WHO air quality guidelines	EC limit value	Georgian MAC	Averages measured over five-year periods		
				1984-1988	1989-1993	1994-1998
Particulate matter, µg/m^3	50.0	150.0	150.0	400.0	350.0	300.0
SO_2, µg/m^3	60.0	50.0	50.0	120.0	90.0	140.0
NO_x, µg/m^3	40.0	..	40.0	45.0	50.0	40.0
CO, mg/m^3	1.0	..	3.0	4.2	4.0	3.2
Phenol, µg/m^3	..	..	3.0	4.4	7.0	4.4
Formaldehyde, µg/m^3	..	..	3.0	12.0	12.5	12.0

Source: UNEP-GRID. Tbilisi Environmental Atlas. Tbilisi, 1999.

209. Tbilisi, with its one and a half million inhabitants, is home to more than 30 per cent of the population of Georgia. The city, especially the city centre, was not designed to accommodate the current number of motor vehicles (in 2004: 128 988 registered units of vehicles). The river valley, which determines the city's elongated shape, prevents a smooth operation of a large number of vehicles as well as a dispersion of air pollutants. Four-fifths of the Tbilisi air pollution result from road transport. Despite the recently improved road conditions, renovated traffic-light system and some restrictions on vehicle movements in the city centre, traffic jams occur frequently on Tbilisi's streets and avenues.

210. From the results of the city-wide one-month diffusion tube study of Tbilisi in 2002 carried out by the experts from the Ministry of Environment of Georgia and AEA Technology, an interpolated contour plot on NO2 concentrations was produced using the Surfer contouring software and interpolation by the method of "krigging". In order to estimate the number of people exposed to concentrations above the EU limit value of 40µgm-3, the areas enclosed within the 40µgm-3 interpolated contours were highlighted- see Figure 17.

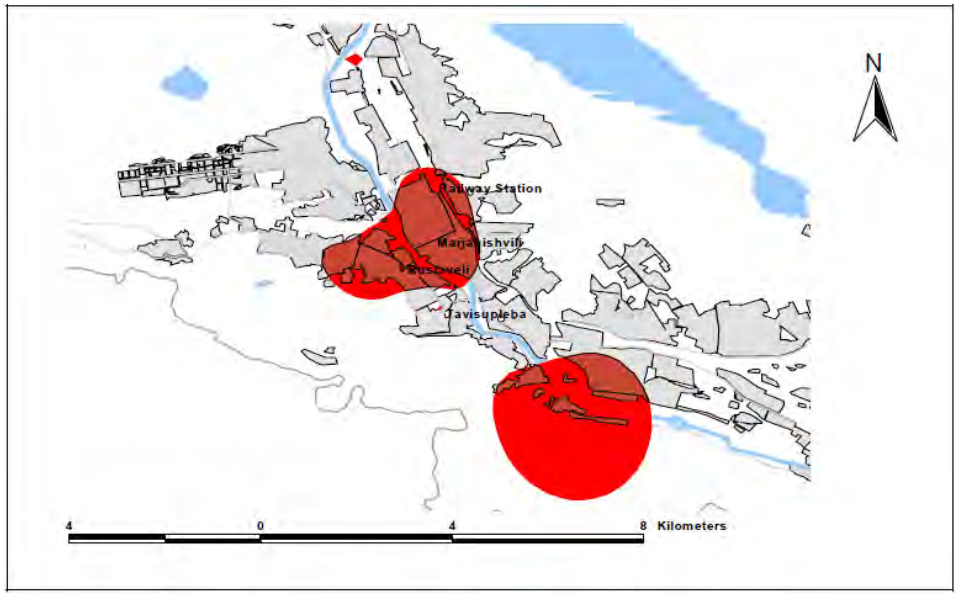


Figure 18. Map highlighting areas with NO_2 concentration greater than 40µgm^{-3}

211. From these data, an estimate of the population that might be exposed to excessive concentrations (above the EU annual average NO2 limit of 40 µgm-3) has been derived. The

underlying assumptions are that the population in the 10 districts is evenly distributed across the residential areas (i.e. only where the main areas of buildings are situated) and that the one-month annual average concentrations of NO2 are typical of those expected over a calendar year.

212. In October 2005 surveys were conducted at selected sites in Tbilisi on the concentration of dust, sulphate, anhydrate, nitrogen dioxide, carbohydrate and soot in the air. The results are as follows: At the intersection of A. Kazbegi and Tamarashvili streets the concentration of dust and nitrogen dioxide twice exceeds the marginally permitted concentration (MPC), sulphate dioxide and soot are within the norms of the MPC, while carbon monoxide is 20% over the MPC; At Marjanishvili Square the concentration of dust is 1.2 times higher than the MPC, sulphate dioxide and soot is within the MPC, nitrogen dioxide and carbon monoxide are 1.5 and 1.15 times higher than MPC, respectively;

213. At the intersection of Chavchavadze Avenue and Kekelidze street dust is 1.8 times higher than MPC, sulphate dioxide is within the MPC, nitrogen dioxide, carbon monoxide and soot are respectively 1.6, 1.5 and 2.8 times higher than the MPC; On Tsereteli Avenue, near the Mining Chemistry building, dust is 1.2 times higher than the MPC, sulphate dioxide is within the MPC, nitrogen dioxide, soot and carbon monoxide are respectively 2.2, 1.6 and 1.4 times higher than the MPC. The above once again confirms that air pollution is caused primarily by motor-transport emissions because there are no industrial enterprises in these areas (with the exception of the area around the Mining Chemistry building, where four petrol stations are located).

Table 6 Pollutants from Mobile Sources

1000 tons

Pollutants	1999	2000	2001	Share of mobile source emissions (average of 1999-2001)
Particulate matter				
Total	**4.96**	**4.58**	**4.72**	
Stationary sources	3.47	3.11	3.24	
Mobile sources	1.49	1.47	1.48	31%
SO_2				
Total	**6.52**	**6.14**	**6.35**	
Stationary sources	4.16	3.81	4.01	
Mobile sources	2.36	2.33	2.34	37%
NO_x				
Total	**26.79**	**26.04**	**27.7**	
Stationary sources	4.74	4.24	5.03	
Mobile sources	22.05	21.8	22.67	83%
NMVOC				
Total	**28.74**	**27.74**	**28.85**	
Stationary sources	3.26	2.93	3.05	
Mobile sources	25.48	24.81	25.8	89%
NH_3				
Total	**0.04**	**0.03**	*	
Stationary sources	0.04	0.03	*	
Mobile sources	*	*	*	*
CO				
Total	**163.84**	**162.26**	**163.22**	
Stationary sources	4.06	3.76	3.91	
Mobile sources	159.78	158.5	159.31	98%
N_2O				
Total	**0.96**	**0.84**	**0.86**	
Stationary sources	0.93	0.81	0.83	
Mobile sources	0.03	0.03	0.03	3%
CH_4				
Total	**0.73**	**0.62**	**0.64**	
Stationary sources	0.42	0.31	0.32	
Mobile sources	0.31	0.31	0.32	47%
CO_2				
Total	**3235**	**3127**	**3253**	
Stationary sources	1472.0	1371.0	1427.0	
Mobile sources	1763.0	1756.0	1826.0	56%

Source: Ministry of Environment and Natural Resources Protection and State Statistical Department, 2002.
Note: * no data available.

Noise

214. Unfortunately, noise in Tbilisi is not monitored and the given assessment is based only on the outward appearance. Tbilisi is a rather noisy city, particularly the central part of it which is mainly caused by the transport: the city main roads are narrow and the traffic is heavy there. In spite of the fact that most of the establishments are concentrated in the centre of the city, the "rush hours" are not distinctly visible at definite time. There is only one, very long in time, "rush hour" which lasts approximately from 12 o'clock a.m. until 9 p.m. Besides, the centre is the most densely settled area (average 25.5 thousand inhabitants per sq.km; for this reason the traffic in the centre is heavy even during the night hours (for example, "non-ceasing lines" of mini-bus taxis or "marshroutkas" work until 11-12 p.m.) The intensity of traffic is relatively lower in summer - from the middle of July until September. The city orography contributes to the spread of the noise: from the centre noise spreads to the city hill-sides.

215. Most automobiles in Tbilisi are out of order which, along with the air pollution, contributes to the increase of the noise. Passenger cars are mainly of the old Soviet model, or individually imported obsolete cars from Europe which need considerable repairs. During the last three

years a new problem emerged - so called "marshroutkas", mini-bus taxis, the influx of these, majority of them being out of order, cause serious problems of pollution and noise.

216. The noise arising from air transport is local and spreads only in the territory adjoining the airport. Less intensive is the noise of railroad since the major section of the railroad in the city is rather far away from the settled areas, at the same time the railroad movement is not very intensive. Neither is very significant the noise arising from plants and factories which are located rather far away from the settled areas.

6. Most noisy streets in Tbilisi

217. In spring 1999 by GRID-Tbilisi were identified the most noisy streets in the city (16 spots) which are in the immediate proximity to the building. The survey of the traffic load was carried out (car/hour) according to the type of transport (see the table below).

Table 6 Most noisy streets in Tbilisi *SourceUNEP/GRID-Tbilisi, 1999*

#	Name of the street	Passenger cars	%	Mini-buses	%	Other %
1	Kostava St. (near the Georgian TV)	5106	82.2	1068	17.2	0.6
2	Kostava St. (near the Publishing House)	3198	71.6	1164	26	2.4
3	Gamsakhurdia Ave.	3210	82.8	594	15.3	1.9
4	Chavchavadze Ave.	3174	83	582	15.2	1.8
5	Rustaveli Ave.	2658	75.7	780	22	2.3
6	Kostava St. (near the Vere Park)	2028	69.3	828	28.3	2.4
7	Pushkin St.	1896	72.8	648	24.9	2.3
8	Varaziskhevi-cobble-stone	2346	90.5	198	7.6	1.9
9	Queen Tamara Ave.	1824	77.2	456	19.3	3.5
10	Vajha-Pshavela Ave.	1866	79.3	432	18.4	2.3
11	Kazbegi Ave.	1812	83.4	324	15	1.6
12	Leselidze St. -cobble-stone	1482	78.9	378	20.1	1
13	Tsereteli Ave.	1086	62.6	528	30.5	6.9
14	David Agmashenebeli Ave.	1170	79.6	264	18	2.4
15	Vere Slope -cobble-stone	1140	79.2	288	20	0.8
16	Mardjanishvili St.	1074	81.5	306	22	3.5

218. In the central streets an average loading is 2780 cars/hour. 78% of the transport are passenger cars, 20% - mini-bus taxis and 2% others (buses, trolley-buses, lorries, etc.) Observations revealed the most overloaded streets: Kostava Ave., Gamsakhurdia, Chavchavadze and Rustaveli Avenues.

219. Below we provide results of measurement of the background noise at the proposed Construction site. The measurements have been carried out on February 10 of 2010 at 10.00AM, 14.00PM and 18.00PM using the standard certified Russian device - “Шум 1М30”

Figure 19 certified Russian device - “Шум 1М30”

Table 7: Average Noise Level at the Project Site

No	Hours	10:00	14:00	18:00
1	Noise, Dba	78	81	88
2		75	84	87
3		75	82	88

220. Comparison of the measurement data with the values determined under the statutory act (sanitary norms and rules – noise at workplaces, residential and public places (#90, 24.08.2001, m.647)) shows that the noise on the site is exceeding the maximum permissible level

7. Background Radiation

221. Assessment of the background radiation at the proposed site is of interest as baseline for further monitoring.

222. Preliminary studies of the background radiation have been carried out at the project site. The measurements have been carried out on September 10 using the standard certified Russian device – “СРП 6801”. The sampling sites are demonstrated on the map. The data of analysis is provided in the table below:

Table 6 Average radiation Level at the Project Site

Sampling point No	Radiation, mr/h	Maximum permissible level mr/h
1	8	12
2	10	
3	8	

Pic 4 standard certified Russian device – "СРП 6801

223. The background radiation at the construction site is within the range of 8-10 microrentgen per hour.

224. The level of the background radiation, which has been measured during these preliminary studies, is acceptable .

8. Surface water

225. The territory of Tbilisi and its surrounding area represent a zone with mountainous, strongly partitioned relief in the river Mtkvari ravine. Its main orthographic appearance is connected to the North-East end of Trialeti ridge. The city of Tbilisi is situated in this mountainous zone at deep gorge type ravine's base and the slopes. The width of the ravine reaches 3-4 km, however, at the Metekhi gate, where the research district is located, the width of the ravine is narrowed to 30-40 m.

226. River Mtkvari, which flows from the West Georgia towards the East Georgia changes direction at Avchala and flows from the North to the South almost till Ortachala and it turns towards South-East at the research district.

227. River Mtkvari represents main hydrographic element for the city of Tbilisi as well as for its surrounding area. Several tributaries connect river Mtkvari on the City's territory. Its right tributaries are: Rivers Digmistskali, Vere, Dabakhana and Tabakhmela. Its left tributaries are: Rivers Gldanula, Khevdzmara and Satskhenistskali. Our research district is located below Dabakhana tributary towards Mtkvari flow, on the right bank of Mtkvari.

228. Generally the right bank of river Mtkvari within the territory of the city is characterized by ridges and depressions, which appear in turn and which are mainly characterized by running from the West towards the East. Telleti ridge, Seidabad elevation, Sollolaki ridge, David's Mountain, Tskneti Elevation and Digomi Elevation are the most important among them. Krtsanisi depression divides Telleti ridge and Seidabad elevation. River Tabakhmelistskali goes through Krtsanisi depression and river Dabakhana, which (as it was mentioned earlier) connects in the West part of the research territory, flows through the deep ravine between Seidabad elevation and Sollolaki ridge. River Dabakhana flows through a collector on the territory of the settled part of the city and it flows into river Mtkvari in the West part of the research territory through the collector.

229. River Mtkvari, as it was mentioned above, turns at the research territory and flows towards South-West direction. In case of natural slope it flows with 2.7 m/sec speed but after construction of Ortachala Hydro Power Station the level of the river as well as its speed was regulated and at present speed of the river flow depends on operation of the hydro power station. With regard to the feeding regime river Mtkvari has mixed nature and it depends on snow melting and rains. The level of the river fluctuates – its level is lower during winter and it is abounding in water in spring and beginning of summer. It is shallow at the end of summer and autumn, as well as in winter. Sudden floods are frequent during the shallow periods though their duration is less than that of inundations during spring, however they might exceed the spring inundations with regard to abundance in water.

230. Fluctuation of water level and water discharge reach maximum during spring time (up to 212 m^3/second) and minimum - 79.6m^3/second.

231. Chemical composition of water of River Mtkvari is characterized by hydrocarbon and sulphate salts. The rigidity in the city is around 26.02 mg. equivalent. All right tributaries of river Mtkvari, including river Dabakhana, are shallow during drought periods, although they might become powerful devastating water flows during rainy periods.

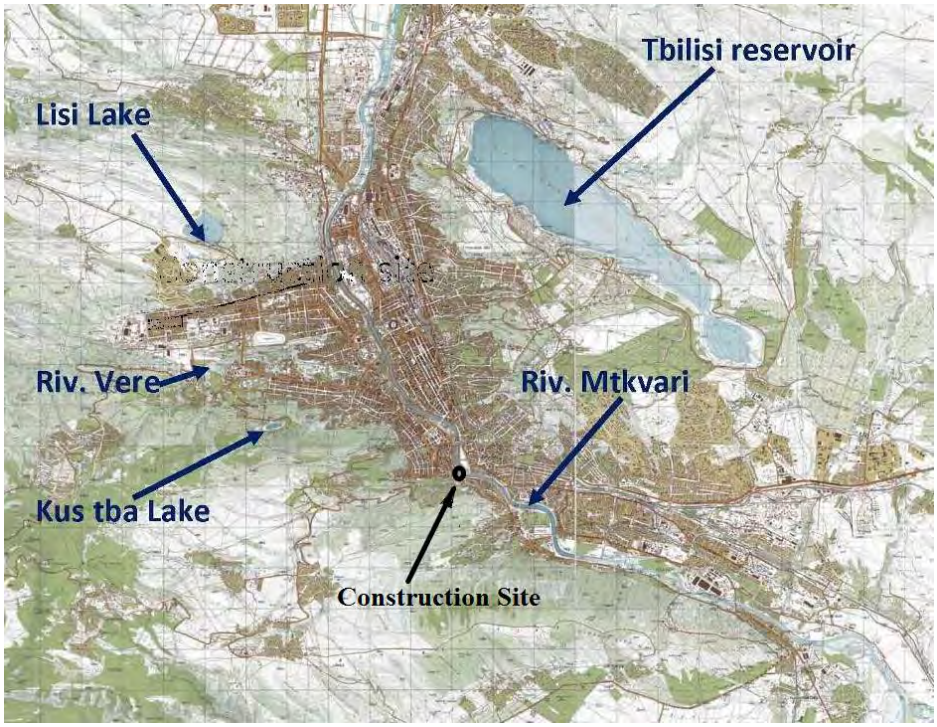


Figure 19. Tbilisi surface water resources

232. There is also number of small lakes around the city (pic #):

233. The **Tbilisi sea** or **Tbilisi reservoir** is an artificial lake in the vicinity of Tbilisi that serves as a reservoir. The lake has a length of 8.75 km and a width of 2.85 km. It was opened in 1953 and has become a popular recreation spot

Figure 20 6 The Tbilisi sea or Tbilisi reservoir

234. Turtle Lake is a direct English translation of **Kus Tba**, a small lake at the outskirts of Tbilisi, the capital of Georgia, so named due to the perceived abundance of turtles living in these places. The other, less frequently used name of this lake is K'ork'i.

235. Turtle Lake is located on the wooded northern slope of Mtatsminda Mount at elevation of 686.7 m above sea level and fed by a small river Varazis-Khevi, a tributary to the Mtkvari (Kura). The area of surface is 0.034 km², while the catchment area is 0.4 km². Maximal depth is 2.6 m.

236. **Lisi** is a small lake in the vicinity of Tbilisi, Georgia; belongs to the Kura valley. The landscape is rocky and arid with shrub vegetation and plots of steppe. The lake itself provides a shelter to various waterbirds. In landscapes near the lake, one can watch small reptiles, birds, fox and hare, Mediterranean plant associations.

Figure 20 Turtle Lake or Kus Tba

Figure 21 Lisi lake

9. Groundwater

237. The relief of the territory of the city, in particular, the lithological content of the constituent rocks and their bedding elements, negative humidity balance and other conditions do not support the feeding of the underground waters. On the right bank of the river Mtkvari, which is characterized by strongly inclined slopes and little vegetation cover, during the abundant atmospheric precipitations, the water infiltration into the grounds is complicated and therefore, the constituent rocks of the Project area are less water-infused than other areas of the city. Precipitate water is drained down mainly as surface water.

238. Thermal waters of a deep circulation spread in the rocks of the same age are an exception. According to their chemical content, the underground waters associated with the Middle Eocene rocks, are mainly of two types:

(i) Thermal curative waters, with their outcrops associated with a tufogenic stratum. According to their chemical composition, these waters are chloride-hydrocarbonate-sodium with the mineralization of 0.25-0.34 mg/l and sulfate-chloride-sodium-calcium with the mineralization of 0.68-0.87 mg/l. Their temperature varies between 26° and 50°.

(ii) The outcrops of the cold waters are associated with the volcanogenic stratum, and they are hydrocarbonate-calcium-magnesium with the mineralization of 1.4-2.6 mg/l and sulfate-hydrocarbonate-calcium-calcium-sodium with the mineralization of 0.6 mg/l. Their temperature varies between 6° and 18°.

239. The underground waters of a deep circulation of the Middle Eocene are characterized by a high content of hydrocarbon of up to 12 gr/l. These waters also contain up to 19.28-22% of methane and nitrogen. The underground waters are characterized by high flow rate. Their circulation is associated with the fissures of the constituent rocks (sandstones). As for the mudstones, they are presented by an almost water-proof stratum.

240. At the project area groundwater was observed in the refuse soil only at one, #4 borehole at 4.3 meter depth (see annex A). Water level is at the same depth as well. Ground

water was not identified at the rest of the boreholes. However, the research area is located below the densely populated part of the city and current water level of river Mtkvari is not at its maximum level. There is a possibility that in absence of proper drainage system water would reach the tunnel from the upper part due to emergency on water supply pipeline or from the lower part due to increase of water level at river Mtkvari.

B. Ecological Resources

241. Flora and fauna of Tbilisi surroundings has always been featured by special diversity. However, in recent years, as a result of the economic crisis, the anthropogenic factor has influenced greatly the biodiversity of Tbilisi environs and has caused the negative changes. Since in current years there is no city biodiversity monitoring system formed, the assessment of the current situation with flora and fauna would not be carried out. The information presented as a result of this is of general nature and the dynamic of the numbering of the species has not been graphically shown.

a. Flora

242. The woods surrounding Tbilisi were cut down long time ago and there are mostly trees and plants (inc. the coniferous trees) artificially planted are growing at the moment both in the settlement areas of the city and its adjacent slopes, hills and mountain slopes. Around the settlement areas there are steppe grass vegetation and thorny shrubs, and in the remote areas, on the slopes of the mountain ridge there are secondary broad-leaved deciduous woods.
From various plant species found in Tbilisi environs there are notable:

(i) Plants entered into the Red Book of Georgia: Acer iberikum, Iris iberika, Tulipa biebersteiniana, Hedera Pastuchovi, Astragalus caucasicus, Campanula armazica, Celtis caukazika, and Punika granatum.
(ii) Endemic species of Tbilisi environs: Thelycrania armazica and Evonymus armazica, Rubus ibericus.

243. As it was mentioned as of XI Century there has been a village type of settlement on the project site which has been changed many times before acquiring the current profile. Thus, there is a high anthropogenic influence on the site. The site does not have significance in terms of flora and fauna.

244. The reconstruction carried out in 1950 years of the XX century completely destroyed the unique settlement of middle age located on the territory adjacent to the balneology health resort on the right side of the Riv. Mtkvari and it was replaced with the city main road.

Figure 22. Oriental planes represented on the project site

245. There are 150 Oriental planes represented on the project site whose age is 50-60 years. This is the maximum age for the species.

246. Thus, the project implementation will have a minimum impact on the flora. At the same time the project envisages the compensation plating in the recreation zone.

b. Fauna

247. The fauna of Tbilisi environs is featured by significant peculiarity. From mammals there should be noted: *Meles meles,* Central Asian Stone Marten *(Martes foina), Mustela nivalis,* Golden Jackal *(Canis aureus),* fox *(Vulpes vulpes),* Wild Cat *(Velis silvestris)*, Rabbit *(Lepus europeus)*, Squirrel *(Sciurus vulgaris)*, Transcaucasian Squirrel *(Sciurus anomalus)*. From rodents widely spread in Tbilisi and its environs there should be noted: Wood Mouse (*Sylvimus silvatcus),* Black Rat *(Rattus rattus),* and Domestic Mouse *(Mus musculus).*

248. From 10 general of three families of cheiroptera, in Tbilisi and its environs 13 species of seven genera should be found, from which the two species are included into the Red Book of Georgia. These are *Barbastella barbastellus* and *Miniopterus schreibersii*.

249. Reptiles are increasing in number these days. The most significant are: *Lacerta strigla, Lacerta sacsicolor, Ophisaurus apodus, Natrix tescelata, Vipera lebetina, Emys orbicularis* and *Testudo graeca* are noted. As for amphibians, in Tbilisi environs there could be found *Bufo bufo* and *Rana ridibunda.*

250. In the Mtkvari River and its tributaries, as well as in the number of reservoirs of Tbilisi environs the various kinds of **fish** are to be found: *Leuciscus cephalus fauriscus, Varicorhynus capoeta, Barbus cyri, Nemachilus brundti, Silurus glanis, Cobius platirostris cyricus.*

251. The water from Riv. Mtkvari is mainly used for the industry, agriculture, thermal power and hydropower purposes. The River is considered to be Fishery Water Facility of 2nd Category.

252. Not a single species represented in the project territory is protected by either the national legislation of Georgia or any other international agreements and treaties (Bonn Convention, CMS, AEWA, EUROBATS, etc). Besides, the project site is not a wintering, feeding or migrating place for the mentioned species.

253. The birds (mainly seagulls and cormorant) which flock on this site in the winter time (November-March) can move upstream or downstream of the Riv. Mtkvari without any problem.

Figure 23 seagulls at the project site

254. The only receptor may be bats whose colonies may dwell in the functioning or abandoned underground communications (sewage collectors, abandoned basements, drainage canals, etc).

c. Protected areas

255. In Georgia the history of Protected Areas dates back many centuries. The first Protected Area – Lagodekhi Strict Nature Reserve was established as early as 1912.

256. At present the total area of Protected Areas is 495 892 hectares, which is about 7 % of the country's territory. About 75 % of Protected Areas are covered by forests.

257. There are 14 Strict Nature Reserves, 8 National Parks, 12 Managed Nature Reserves, 14 Natural Monuments and 2 Protected Landscapes in Georgia.

258. Primary function of the Protected Areas is protection of natural heritage of the country.

259. The nearest protected area from project area is Tbilisi National Park. Park was established on the basis of Saguramo Strict Nature Reserve, which was created in 1957. The Park is located at a distance of 25 km from Tbilisi and is included in the Green Zone of the city. The Saguramo Strict Nature Reserve was established with the purpose of maintenance of the forest characteristic for Georgia and protection of the forest habitants, among them the rare species such as Caucasian Red deer and lynx.
Area of Tbilisi National Park is 24328 ha. It is situated near the two important cities of Georgia – Mtskheta and Tbilisi.

260. The fauna of Tbilisi National Park is quite rich. Among mammals the most widespread speciesare Red fox *(Vulpes vulpes)* and Gray wolf *(Canis lupus)*. Beech marten *(Martes foina)* and weasel *(Mustela nivalis)* can be found nearly every where. Among the large beasts of prey lynx *(Lynx lynx)* and Brown bear *(Ursus arctos)* are rare.

261. The territory of Tbilisi National Park is distinguished with considerable diversity of representatives of fauna. Here can be found the animals such as:Roe deer *(Capreolus capreolus)*, hare *(Lepus europaeus)*, Beech marten *(Martes foina), et al.*Gray wolf *(Canis lupus)*, Brown bear *(Ursus arctos)*, Red fox *(Vulpes vulpes)* and lynx *(Lynx lynx)* can be also found there.

262. Tbilisi National Park directly borders with the masterpiece of Georgian architecture of the 6th century – the Jvari monastery of Mtskheta, from where the breathtaking view of Mtskheta and entire environment is opened. From Jvari the archeological excavations carried out in Bagineti range could be seen on the other side of the Mtkvari River. These are the remains of palace of Pitiakhshis (supervisors of Mtskheta) of Armazi, antique baths and Pagan idols, the idols, which were demolished by St. Nino, who brought Christianity to Georgia; and after several centuries the domed temple of Jvari was built in high mountain on the opposite side of the place as a sign of victory of Christianity over the Paganism. Mtskheta is very rich in archeological and cultural monuments.

d. Historical protected areas

263. Old Tbilisi is an administrative district in Tbilisi, capital of Georgia. Although the term "Old Tbilisi" has long been used to denote a historical part of the city, it was only in 2007 that it became a distinct administrative entity to incorporate several historical neighborhoods formerly included in the districts of Mtatsminda-Krtsanisi, Isani-Samgori, and Didube-Chughureti.

264. Old Tbilisi is principally centered on what is commonly referred to as the Tbilisi Historic District, which, due to its significant architectural and urban value, as well as the threat to its survival, was previously listed on the World Monuments Watch (1998, 2000, 2002)

Figure 24 Public baths in Abanotubani district (historical protected area)

265. Near the project area there are locations of historical importance nearby, including Abanotubani sulphur baths and other spa baths dating from the 17th century. However these and the protected area are outside the project boundary, which lies entirely within the footprint of the existing road.

266. Abanotubani is an important historic part of the city — the place, where according to a legend the King of Iberia, Vakhtang Gorgasali's falcon fell, leading to a discovery of the hot springs and, subsequentely, to founding of a new capital.

e. Green areas

267. The majority of Tbilisi parks are created in last century by individuals and mainly used to be in their ownership. From 1921 the parks moved to state property. Parks are distributed unevenly on city's territory. On the right bank of Kura the area of green zone is much larger that on the left one.

268. In Soviet times the significant part of the area of historical parks was sacrificed to construction (for example, Mushtaid, the Park of Pioneers and Pupils and many others). there are examples of the construction of new parks on free territories, for example, old cemetery (Vera garden). Because of special limitations the historical parks are overloaded and only partially satisfy the demands of urban population on green areas. Especially in hot summer days parks receive more visitors than they can afford (for good holidays and the conditions of protection of vegetation it is desirable the area per person to be not less than 60 m2).

269. Operations have been conducted for the purpose of greening of Tbilisi suburbs. Artificial pine crops have been planted. Last year and at present in Tbilisi and its suburbs the total drying of the pine have been taking place at these areas. Maybe, the main reason of this event is the drought of 1998 summer, autumn and that of this year, because of which the introduced pine species (*Pinus nigra*) cannot endure real changes of Tbilisi climate. Considerable losses are expected (including financial, by loss of constructed areas and as a result of the termination operations for the purpose of saving/protection, reduction of fire hazard risk and others).

270. By Soviet norms (which are considered to be operative today) for the cities of southern zone 11.6 m2 park area per capita, while there is less than 5 m2 per capita. From 1990 by *Tbilgamtsvaneba* the construction of new parks with total area of 500 ha was planned. Project documentation envisages the parks adjacent to Sairme street, those of Gldani, "Tbilisi Sea", Vazisubani and Varketili. These plans remain on the paper.
The **Botanical Garden** (near the project area) is distinctive amongst Tbilisi parks. Here the city's old historical traditions of garden and park art are reflected. The history of the garden begins in VIII century; it is featured by unique microclimate, attractive landscapes and is an integral part of the old city's planning structure. Its area is of 275 hectares: green crops constitute 190 hectares. East Asian flora collection is represented over there

271. In 1994-95 on account of energy crisis, according to information from "*Tbilgamtsvaneba*" about 30 000 trees have been annihilated. This process is going on quite intensively, information on which is not available. Different construction processes are going on "designed" territories and parks available.

272. Earlier, the greening of the city was the responsibility of Tbilgamtsvaneba and Municipal Department of Culture, which used to carry out management and economic activities supported by state. Large parks of the city (so-called "parks of culture and recreation") were under the supervision of Tbilisi Department of Culture. In1994 by the resolution of the Municipality Cabinet Tbilgamtsvaneba was given 5 parks:

1. Kustba, Keeni hill and Makhati hill forest parks
2. Central Culture and Recreation Park
3. Forest-park Shavnabada
4. Nadzaladevi Culture and Recreation Park
5. "Megobroba" park of Isani

273. By the decree of the Municipality Cabinet (12.01.95; No. 01/64/66) the Municipal Department of Culture has been given the Mtatsminda, Vake and Mushtaidi parks announced as art monuments.

C. Economic Development

274. Tbilisi is a significant industrial, social and cultural center in the Caucasus Region and has become one of the important transport routes for the global energy and trade projects (Baku-Tbilisi-Ceyhan Oil Pipeline and Baku-Tbilisi-Erzurum Gas Pipeline). The city is located on one of the historical Great Silk Road and has the position of trade/transit center at the crossroad of the North Caucasus, Turkey, Armenia and Azerbaijan.

275. The city stretches 33 km along the Riv. Mtkvari. The total area of the city is of 372 sq.m. The River divides the capital into two parts. The left side exceeds the right side districts by the territory and the population. The South-East part of the city is located at the 370 meters from the sea level and the settled areas on the Mtatsinda Slope are located at 550-600 meters.

276. Tbilisi is divided into eight administrative districts which have their representatives in the Sakrebulo (Tbilisi Assembly) and have the local self-government bodies with the limited jurisdiction. This kind of arrangement was created in 1930s during the Soviet ruling. After Georgia declared its independence the District system was slightly changed and after the most recent changes the Districts of Tbilisi are as follows: Old (Dzveri) Tbilisi, Vake-Saburtalo, Gldani-Nadzaladevi, Isani-Samgori, and Didube-Chugureti.

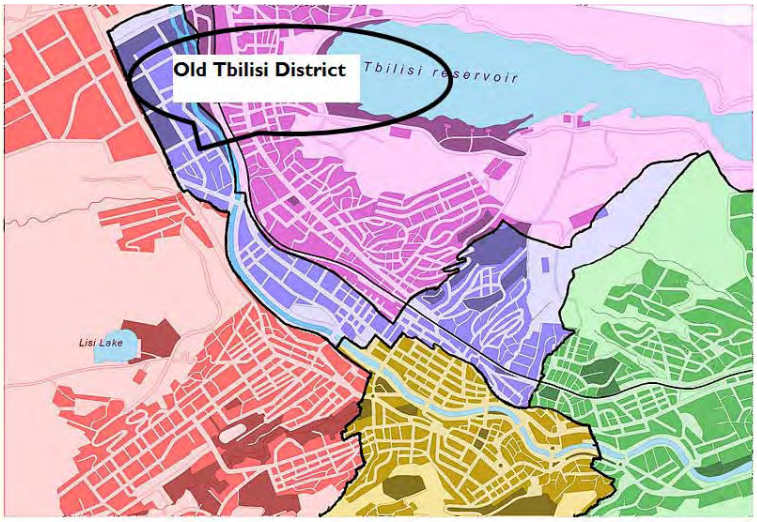


Figure 25 Tbilisi districts Borders

277. The Old Tbilisi District became an administrative district as of 2007. Old Tbilisi District covers Mtatsminda-Krtasinisi and Isani-Samgori Districts. It denotes the old part of the city.

278. The District is located on both banks of the Riv. Mtkvari (Photo #20) and mainly consists of XIX Century urban settlements, mostly consisting of eclectic architecture and several buildings date back to V Century. The city as it existed before XIX Century did not survive due to the invasion of Persia in 1795. Among the highlights of Old Tbilisi are churches, museums, sulfur baths and narrow streets with carved balconies.

1. Industries

279. The renowned events taking place in 1990s in Georgia and its capital as well as the economic developments brought Tbilisi infrastructure and social-economic system to the brink of collapse. Main economic parameters started to improve as of 2001. As a result of comprehensive social and economic reforms of the new Government of the country the Gross Domestic Product (GDP) started to increase at a high rate as of 2003. A significant share of the economic growth comes on economic activities in Tbilisi.

Table 7 Value added costs produced in Tbilisi 1998-2005 years

Value added costs produced in Tbilisi in 1998-2005
(Current prices, mln. GEL)

	1998	1999	2000	2001	2002	2003	2004	2005
AGRICULTURE, FORESTRY, FISHING	15,4	8,1	9,1	6,8	2,6	4,8	27,7	8,2
PROCESSING HOME-MADE PRODUCTS	33,2	33,9	28,5	36,8	42,8	45,9	51,3	19,7
INDUSTRY	173,3	219,0	262,5	273,1	313,1	363,2	373,3	535,3
CONSTRUCTION	108,9	79,5	120,0	108,0	150,6	202,0	247,7	276,7
TRADE AND TECHNICAL SERVICE	166,4	201,8	275,2	291,7	351,2	380,5	401,1	422,1
TRANSPORT, STORAGE COMMUNICATION	211,7	258,7	226,9	248,5	266,5	326,6	350,4	417,4
STATE MANAGEMENT, DEFENSE, LAW ENFORCEMENT	82,9	77,3	84,9	96,8	117,2	126,3	196,3	263,3
EDUCATION	41,6	54,8	65,8	75,0	81,2	92,9	121,3	127,6
PUBLIC HEALTH	88,8	94,4	123,6	121,9	142,3	115,9	104,4	157,5
OTHER SERVICES	398,4	451,2	419,7	426,9	613,4	612,0	532,6	772,4
TOTAL VALUE ADDED COSTS	1320,5	1478,8	1616,2	1685,5	2080,9	2270,2	2406,1	3000,2

280. The industry, construction, transport and telecommunications compose the economic foundation of Tbilisi (Tables #,,8,9,10,11). Much more than half of the products produced in Tbilisi come on these fields.

281. A clearer picture of Tbilisi economic development is shown by a per-capita calculation of the products and services produced in the city. In 2005 the GDP per capita amounted to 2732 GEL which is more by 170 GEL, or by 6.5%- compared to the same indicator for the whole country. It needs to be mentioned that before 2003 the average GDP indicator in the country exceeded the same indicator for Tbilisi

Table 8 Industry output in 1999-2008 and number of employed. Sourse: www.statistics.ge

year	working capital (Million Lari)	Explodes quantity	Products quantity (Million Lari)
1999	318.8	37801	342.1
2000	491.2	33898	436.5
2001	495.0	29995	416.1
2002	653.6	28342	509.2
2003	802.3	26354	608.1
2004	860.5	29260	655.8
2005	1004.6	32161	803.5
2006	1431.4	36366	1063.4
2007	2100.6	37036	1542.6
2008	2315.2	36454	1604.5

Table 9 Construction Industry output in 1999-2008 and number of employed. Sourse: www.statistics.ge

year	working capital (Million Lari)	Explodes quantity	Products quantity (Million Lari)
1999	107.3	12582	108.7
2000	122.1	10437	120.8
2001	154.4	10503	154.2
2002	180.7	9887	190.7
2003	180.3	9684	174.8
2004	243.7	11802	237.9
2005	434.1	21454	467.9
2006	776.3	23754	756.5
2007	1122.1	28916	1105.3
2008	891.0	20056	887.2

Table 10 Trade output in 1999-2008 and number of employed. Sourse: www.statistics.ge

year	working capital (Million Lari)	Explodes quantity	Products quantity (Million Lari)
1999	680.2	13647	98.2
2000	855.0	44456	113.5
2001	784.4	16429	99.1
2002	1090.0	17654	115.8
2003	1349.1	24918	144.9
2004	1944.5	28204	234.0
2005	2938.0	34436	279.8
2006	4061.7	27186	596.8
2007	6181.0	29573	1003.3
2008	7764.1	36167	1296.8

Table 11 transport and telecommunications output in 1999-2008 and number of employed (www.statistics.ge)

year	**working capital (Million Lari)**	**Explodes quantity**	**Products quantity (Million Lari)**
1999	281.5	19646	290.4
2000	366.9	19461	361.6
2001	477.8	22517	445.7
2002	577.6	24618	534.8
2003	734.4	23448	629.0
2004	1051.2	18716	736.1
2005	1379.3	19542	893.7
2006	2057.3	39239	1479.6
2007	2335.4	36584	1600.1
2008	2585.9	37669	1742

282. There is only one important industrial plant near project area:

283. Ortachala HPP (Hydro Power Plant) - Ortachala HPP is a seasonally regulated hydro power plant located, on the river Mtkvari. Its installed capacity is 18 MW. Average annual capacity of the power plant is 80 million kW/h.

284. Ortachala HPP was put into operation in 1954. The plant is in a state possession.

2. Infrastructure

285. Sewage and drainage systems are covered 100% of the city. At the same time current infrastructure is very old and unsure.

286. The construction of the drainage system of Tbilisi started in 1835. Generally they used brick sewers in which utility and sanitary waters as well as rainfalls flowed and empted in the river Mtkvari.

287. At present Tbilisi drainage systems with the diameter of 150- 1200 mm are built with brick, arch, concrete, reinforced concrete, ceramic, cast iron, asbestos cement and polyethylene pipes. The drainage system is self-flowing.

288. The total length of the system is 1600 km:
(i) 1000 km - street network
(ii) 600 km – interquartile and yard network

289. The length of the main trunk sewer is 72 km. The waste waters run through the sewer to Gardabani Treatment Plant. There are 42 separating chambers on the main sewer.

290. There are 5 aqueducts on the River Mtkvari – Avchala, Didube, Metekhi, River Gldanula and River Digmuli.

291. The capacity of Gardabani Treatment Plant is 1, 0 million cubic meters/day.
The water-drainage system is amortized, but is in the working condition, mainly consisting of 800-mm-diameter cast iron pipes.

292. Should be noted that the sewage facilities of enterprises such as storage facilities for oil-products, carwashes, petrol stations must be properly treated before they can be connected to the central sewer network. An additional problem faced by the city is the unavailability of a specially equipped sediment treatment facility that would make it possible to systematically remove the sediments that accumulate in the sewage treatment system.

293. As for the existing situation in the water supply of Tbilisi, 70% of the city is supplied with no interruption, while 30% is supplied with water according to a set schedule. The city's water supply meets the national standards laid out in the law of Georgia “on potable water”. In terms of ensuring the quality of the water supply, it should be noted that in the city's water supply company, Tbiltsqalkanali Ltd, which has a monopoly in the sector, 3 chemical-bacteriological laboratories and 1 chemical laboratory are in operation. These labs are 100% responsible for the quality of the city's water supply.

294. Throughout 2005- 2006 extremely important reconstruction and rehabilitation works have been carried out on the Tbilisi water supply network. The majority of central water pipelines have been replaced, which has significantly decreased the number of emergency shut-downs of the system and, accordingly, losses of water. A total of 59 km of the network in various districts of Tbilisi was replaced. It should be pointed out that such works had not been carried out for the past 15 years.

295. Water supply and sewerage pipelines were completely changed in Kalaubani (project area) as well as storm water network; new street light pillars were set up.
It is important that Kalaubani maintained its old appearance. The communications were completely changed at each yard. The Kalaubani Rehabilitation Project was wholly financed by the government of the capital.
Gas and Electric supply systems are covered 100% of the city
Tthe existing transmission lines, water supply pipelines and drainage channel s presented at the project area are planned at the mobilization and preconstruction stage in order to remove to the safe sites. All of these infrastructural systems should be uninterruptedly functional during and after completion of construction activities.

3. Waste management

296. Local government representatives, called Gamgeoba (there are 5 Gamgeoba in Tbilisi), and Cleaning Municipal Service (Sesvise) is a structural unit of Tbilisi City Hall Office share the management and control of the efficiency and quality of work done by private transport companies. The Gamgeoba is responsible for looking after waste collection and transportation, whereas, Tbilisi’s Improvements Service looks after landfills and landfill management.

297. Poor conditions at waste treatment facilities jeopardize the environment and the health of the population. In this respect it should be mentioned that the system of solid waste management in Tbilisi is wholly inefficient and does not meet any contemporary requirements or standards. There is no experience of waste separation, recycling or secondary treatment; the surrounding environment is polluted; the population's knowledge about sanitation is very low and areas of unsanitary conditions are common. Two open legal waste-treatment areas service the capital: a) the Gldani waste-treatment area, which was established in 1972, receives some 1,700 cubic metres of waste daily; b) the Lilo waste-treatment area, which was established in 1989, occupies a territory of 5 hectares and receives some 1,800 cubic metres per day. Neither of the above waste-treatment areas meets contemporary requirements. In particular, they are not surrounded by fences and layers of waste are not covered with soil, which pollutes the

atmosphere. Also, channels are not set up to collect atmospheric precipitation and leqchate drained through garbage, which contributes to the pollution of the soil and ground waters. No gas collection systems are installed.

298. With the goals to improve the situation, during last years has added 52 items of machinery; 40 of them are waste carriers, and 12 items are machinery for cleaning streets. There are also 30 special moto-rollers, which have the same function as street cleaners, that empty official bins and clean green areas; 6300 containers of various sizes; 3300 street litter bins, 2500 litter receptacles. Also, there are plans to purchase 8 additional machines for cleaning.

299. Up to 2500 street workers are cleaning the capital city. There are official bins and streets with special aromatizes with various fruity aromas, in order to exterminate the unpleasant scent that bothered the residents of Tbilisi in streets or buildings. There is now a fee of 1 lari and 20 tetri (GEL) per person for this.

300. The inert waste which will be produced after project implementation can be disposed on Iagluja Landfill which is located at 22 km away from the project site. Out of 22 km to be travelled to transport the waste only for 2-3 km goes through Tbilisi. It is not appropriate to use the Gldani Landfill because it is located at the opposite end of the city and is far from the project site

4. Transportation

a. Subway

301. Presently the system consists of 2 lines, 22 stations on 26.4 kilometers of track. 20 stations are below ground and two are surface level. 16 Stations are deep level and 4 shallow level. Due to Tbilisi's uneven landscape, the metro, particularly the Gldani-Varketili line, in two cases goes above ground.

302. In 2005 it was estimated that a total of 105.6 million people used the Metro. Although the platforms are accommodated for five-carriage train currently 4 and 3 carriage trains are used on lines 1 and 2 respectfully. The car models are identical to those of other ex-Soviet Metros. The cost per token is 20 tetri and remains valid for the whole duration. Trains run from 6:00 am till 1:00 am with intervals ranging between 4 minutes and 2.5 during peak times.

303. The nearest subway station from project area is approximately in 1 km distance.

b. Railway

304. The first train arrived in Poti from Tbilisi in 1872, October 10 At present there are four railway stations in Tbilisi : Avchala, Didube, Navtlughi and Tbilisi central station. The capital is linked as with different parts of Georgia , so with Armenia , Azerbaijan and Russia by means of railway main line. In the nearest future railway main line will enable Georgia to be connected with Turkey.

c. Taxi

305. In Tbilisi the quick ground transport is a taxi. Taxi is the only means of public transport which can be used for 24 hours. You can see a considerable number of taxes in the streets of Tbilisi . Notwithstanding the fact that you can catch and use a taxi in any part of the city, it is far

more effective to get in touch with the operator and to call a taxi by phone. There are several companies as such in Tbilisi.

d. Bus

306. As a result of the work of Tbilisi City Hall, the transport network of the city has already been re-arranged. Citizens no longer have problems to reach their destinations by the city transport. The place of minibuses, which used to hinder traffic, now has been occupied by the new buses in the streets of the city.

307. In the first half of 2006 in Tbilisi, there were 265 mobile bus crews in operation, which is 72 percent (100 units) more in comparison with the same period in the last year.

308. During the first 6 months of the 2006 year, municipal buses have transported 19.0 million passengers, which amounts to 117 percent in comparison with the same period in the last year.

309. The regulation regarding city transport has been expanded; an itinerary map and timetable was developed for the buses. The service time has been lengthened by several hours.

310. In 2008 the route scheme of the buses will have been so much modernized that only in case of the city growth it will became necessary to take changes into it. To support the disabled people in their travelling, Tbilisi City Hall obtained 40 adapted buses for such kind of people

5. Land Use

311. There are no private or/and state commersial facilities at the construction area. Only few medium size commercial facilities are located at the nearby territory of the construction site at Gorgasali Avenue, opposite side of the rivr bank. It is not neccssary to close or temporary quit activities of the mentioned commercial facilities.

312. Based on the official documnt issued by the City Hall of Tbilisi and visual observation it is obvous that there are no legal or illegal buildings located at the mentioned territory as well as at the auxiliary territory used during the construction period.

313. In more details the landuse and resettlement issues are discussed in 6.1

a. Power sources and transmission

314. After Georgia became independent, the process of energy sector rehabilitation was started, and this brought together the formation of electric power system as a separate independent structure. In particular, the generation plants were formed as independent electric power stations.

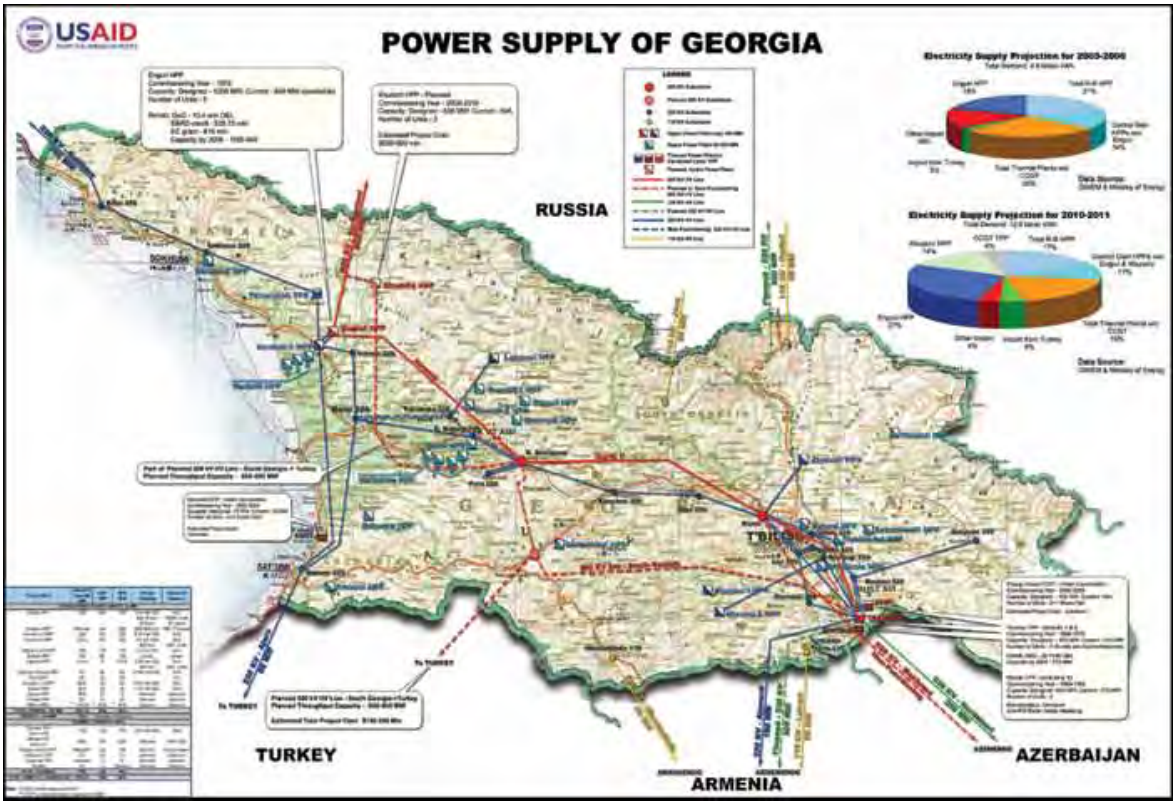
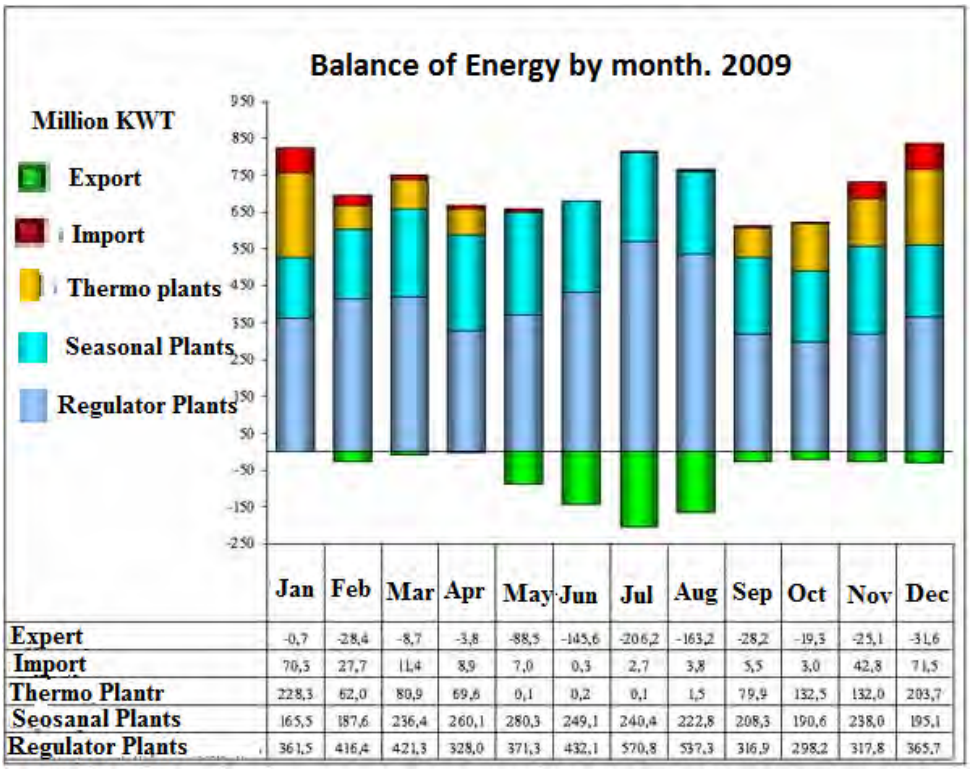


Figure 24 Power supply of Georgia

315. Since 2000, a new phase of the energy sector rehabilitation started, this time with the participation of a foreign company. In 2002, before the entrance of the foreign company, "Electrodispecherizacia2000" and "Elektrogadatsema" merged, which resulted in the formation of the "Georgian State Electric System" LLC. In 2001, the management of Wholesale Power Market was transfered to the Spanish company, "Iber Drola" for a period of 5 years. Since 2003, the Irish Company ESB International has been executing the management of the GSE LLC.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Expert	-0,7	-28,4	-8,7	-3,8	-88,5	-145,6	-206,2	-163,2	-28,2	-19,3	-25,1	-31,6
Import	70,3	27,7	11,4	8,9	7,0	0,3	2,7	3,8	5,5	3,0	42,8	71,5
Thermo Plantr	228,3	62,0	80,9	69,6	0,1	0,2	0,1	1,5	79,9	132,5	132,0	203,7
Seosanal Plants	165,5	187,6	236,4	260,1	280,3	249,1	240,4	222,8	208,3	190,6	238,0	195,1
Regulator Plants	361,5	416,4	421,3	328,0	371,3	432,1	570,8	537,3	316,9	298,2	317,8	365,7

Fig 25 Balance of Energy in Georgia.

316. Joint-Stock Company Telasi is one of the largest distribution companies on Georgia energy market which owns high (110kw) tension the middle (35-10kw) tension and the short (6-0,4kw) tension current networks in Tbilisi and its near areas.

317. The main features of company activity:
- (i) Realization of electric energy (sell or buy the electric power);
- (ii) Technical and manufacture activities (exploitation and service of electric network).

318. At the same time company provides the following services:
- (i) Transit service of electric energy;
- (ii) Technical service of subscribers;
- (iii) Billing and payment collection service for outside organizations;

319. Customer service and exploitation of electric network is carried in 17 centers of subscriber's services, in 4 additional points of bill collection and in14 areas of exploitation, which are located in all administrative regions.

320. Joint-Stock Company Telasi with 2 billion kilowatt-hour energy distributes to 416 500 subscribers in a year.

321. In difference with the last year's energy crisis, now the limit on electric energy and accidents in capital city per day decreased. The quality of reliable energy supply, also price rate indicator of electric energy use increased. During two years, company paid more than 2 million GEL to state budget.

b. Distributing Network Structure

322. Joint-Stock Company Telasi distribution network includes:
- (i) 110 kw under stations - 23 under stations, 45 transformers;
- (ii) 35 kw under stations - 12 under stations, 23 transformers;
- (iii) 6-10/0,4 under stations - 1570 under stations, 2032 transformers;
- (iv) 110 kw air - electro transfer lines - 33 lines, lengths 284 km;
- (v) 35 kw air - electro transfer lines - 14 lines, lengths 85 km;
- (vi) 35 kw cable lines - 10 lines, lengths 17 km'
- (vii) 6/10 kw air - transfer lines - 37 lines, lengths 36 km;
- (viii) 6/10 cable lines - 2098 lines, lengths 1587 km;
- (ix) 0,4 kw air - transfer lines - 1206 lines, lengths 502 km;
- (x) 0,4 kw cable lines - 6569 lines, lengths 739 km.

323. The main courses of company are: reliable electro energy supply, make better customer service, improve new technology and modernization of whole network.

324. During the last 6 years the electic power supply has been significantly improved and 24 hoir supply is available for residential houses, public buildings and industrial plants or commercial facilities.

325. The existing transmission lines at the project area are planned at the mobilization and preconstruction stage in order to remove to the safe sites. Transmission infrastructural systems should be uninterruptedly functional during and after completion of construction activities.

D. Social and Cultural Resources

1. Population and demographics

326. Tbilisi is a multicultural city. The city is home to more than 100 different ethnic groups. Around 80% of the population is ethnically Georgian, with significant populations of other ethnic groups which include Armenians, and Azeris. Along with the above mentioned groups, Tbilisi is also home to various other tiny ethnic groups including Ossetians, Abkhazians, Ukrainians, Greeks, Jews, Russians, Estonians, Germans, Kurds, Assyrians, and others.

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
1097.5	1088.5	1081.7	1079.1	1078.2	1079.7	1103.3	1101.1	1106.7	1106.7

Table 12 Official data on regular inhabitants of Tbilisi 2000-2009 y.

327. Official data on regular inhabitants of Tbilisi exist, however in fact there are 300 thousand more people living in the city. Mainly they are students, workers and peasants from regions who temporarily reside in Tbilisi.

328. Data on the number of persons born and died in 2000-2008 is given in Table 12. As it can be seen from the table the number of newborns slightly, but exceeds the number of persons who died.

Table 13 Number of persons born and died in 2000-2008

	2000		2001		2002		2003		2004		2005		2006		2007		2008	
	Nomb of ofBorn	Number of Died	Nomb of ofBorn	Number of Died	Nomb of ofBorn	Number of Died	Nomb of ofBorn	Number of Died	Nomb of ofBorn	Number of Died	Nomb of ofBorn	Number of Died	Nomb of ofBorn	Number of Died	Nomb of ofBorn	Number of Died	Nomb of ofBorn	Number of Died
Georgia	48,800	47,410	47,589	46,218	46,605	46,446	46,194	46,055	49,572	48,793	46,512	40,721	47,795	42,255	49,287	41,178	56,565	43,011
Tbilisi	15,380	11,690	15,648	11,408	16,057	11,465	16,808	12,597	12,317	12,424	12,794	11,164	13,773	12,454	14,210	12,040	15,136	12,123

329. More than 85% of the residents of Tbilisi practice various forms of Christianity (the most predominant of which is the Georgian Orthodox Church). The Russian Orthodox Church as well as the Armenian Apostolic Church have significant following within the city as well. Catholics, Lutherans, Baptists, and other Christian denominations also make up the city's Christian minority. A large minority of the population (around 8%) practices Islam (mainly Sunni Islam). Judaism is also common, but to a lesser extent (about 2% of Tbilisi's population practices Judaism). Tbilisi has been historically known for religious tolerance. This is especially evident in the city's Old Town, where a Mosque, Synagogue, and Eastern and Oriental Orthodox Churches can all be found within less than 500 meters (1,600 ft) from each other.

2. Socio-economic Situation

330. Unemployment level in Tbilisi is very high. During nearest last year's it's had achieved 29-30%.

	2005 y.	2006 y.	2007 y.	2008 y.
Active Population (labors)	429.8	434.7	480.7	430.1
Employed	305.0	303.6	346.1	302.1
Haired	248.9	248.8	291.0	240.6
Self employed	55.6	53.8	55.2	61.4
vague	0.5	1.0	0.0	0.1
Unemployed	124.8	131.1	134.6	128.0
Unemployment level (%)	**29.0**	**30.2**	**28.0**	**29.8**
Active level (%)	**54.4**	**52.9**	**55.3**	**52.4**
Employment level (%)	**38.6**	**37.0**	**39.8**	**36.8**

Table 14 Employment date

331. The changes that have taken place in Georgia over the past several years have made it possible to address gender issues at the state level. Specifically, several state institutions

working on issues of gender equality were created, including the Consulting Council on Gender Equality at the Parliament of Georgia and the Governmental Commission on Gender Equality Issues (See table 15).

	2000 y.	2001y.	2002 y.	2003 y.	2004 y.	2005 y	2006 y.	2007 y.	2008 y.
Unemployment level (%)	w.-9.7 m11.0	w.-10.7 m-11.6	w.-11.0 m-14.0	w.-11.5 m-11.5	w.-11.8 m-13.4	w.12.6 m-16.8	w.-11.7 m-15.2	w.-12.6 m-13.9	w.-16.8 m-16.1
Active level (%)	w-57.2 m-75.1	w-58.3 m-75.9	w-56.6 m-75.8	w-57.7 m-76.3	w-56.9 m-74.3	w-55.9 m-73.5	w-53.6 m-72.2	w-55.6 m-73.3	w-53.5 m-73.4
Employment level (%)	w-51.6 m-66.0	w-52.0 m-67.1	w-49.9 m-65.1	w-51.0 m-67.5	w-50.2 m-64.3	w-48.8 m-61.2	w-47.4 m-61.2	w-48.1 m-63.1	w-44.9 m-61.1

Table 15. Enploument and Gender issues (2000-2008 years) m-men; W-women

During nearest last 15 years employed pupil's wages are increased. (Table 27)

1995y	13.5	lari
1996y	29.0	lari
1997y	42.5	lari
1998y	55.4	lari
1999y	67.5	lari
2000y	72.6	lari
2001y	94.6	lari
2002y	113.5	lari
2003y	125.9	lari
2004y	156.6	lari
2005y	204.2	lari
2006y	277.9	lari
2007y	368.1	lari
2008y	534.9	lari

Table 16. Average wages. 1995-2008 year. (between employers)

3. Public health and facilities

332. The following types of facilities make up the core of the primary healthcare in Georgia: Ambulatories: Ambulance stations and rural doctor ambulatories are the frontline of PHC and usually serve a catchment of about 1,000 people. They provide only outpatient care and have been traditionally staffed by around four to five part or full-time medical staff. The staff are usually "generalists", paediatricians, gynaecologists, surgeons and dentists. In 2007, there were 558 such centres in Georgia.

333. Polyclinics: The adult polyclinic provides outpatient care and was originally designed to cover 10,000 adults (defined as those over 15 years old). They are staffed by both generalist physicians and usually at least 10 part-time specialists, typically employing between 30 and 60 staff overall. The clinics thus provide both primary care and specialty care under one roof. The adult polyclinics are generally found in urban areas. Children's polyclinics provide basic and some specialized services to children up to the age of 15 years. They are located in both rural and urban areas and have outpatient facilities. Services include immunization and home visiting of new-born. When the clinics were built, they were intended to cover a catchment of 10,000 children under 15 years of age. The clinics mainly employ paediatricians but, depending on the size of the catchment and funds available, may also have a minimum of nine part- or full-time specialists. In 2007, there were 250 polyclinics in Georgia.

334. Women's consultation clinics: Women's consultation clinics provide antenatal, gynaecological and obstetric care to women on an outpatient basis. Abortions are also undertaken at the clinics. The clinics are usually staffed by at least five staff, including obstetricians, gynecologists and nurses. In 2007, there were 18 such clinics.
Health centers: These canters, based mainly in the urban areas, are staffed by family doctors. Diagnostic and emergency services are provided in some. Several private clinics/companies have been providing pre-paid health plans (similar to staff and/or group model HMOs) combining integrated delivery of medical service and medical insurance since 1992. They pioneered family doctor practices and case management in Georgia.

4. Inpatient healthcare

335. In 2007, there were 265 inpatient healthcare facilities in Georgia. These facilities provided 14,565 hospital beds. This is a substantial decrease in bed provision from 1991 when there were 53,122 beds in 390 hospitals. However, despite these reductions, numbers remain high compared to other countries and, in 2007, there were approximately 331.9 beds per 100,000 population. Occupancy rates dropped from 73% in 1980 to 40 % in 2007. The types of secondary and tertiary facilities found in Georgia can be divided up as follows:

336. Municipal hospitals ("Gamgeoba Hospitals", formerly known as "rayon hospitals"): Each municipality has at least one municipal or gamgeoba hospital. The hospitals provide both inpatient and outpatient services. They generally employ emergency room physicians ("traumatologists"), gynecologists, general surgeons, anesthetists, intensive care specialists and sometimes cardiologists. Some of the larger municipal hospitals, found in the larger urban centers, also offer more specialized services, such as neurology and neurosurgery, oncological services, and some have specialist dispensaries attached.

337. Specialized hospitals and research institutes: Georgia has a large number of specialized hospitals, most of which are in Tbilisi. Attendance at these hospitals previously required a referral or admission through the emergency room, where one existed, but today many patients access the services directly.

338. Dispensaries: Dispensaries are specialized outpatient clinics that provide services for endocrine conditions, tuberculosis, drug addiction ("narcological dispensary"), sexually transmitted diseases and dermatological, neuropsychiatric, rheumatologic and cardiac problems. Some are attached to a hospital and are generally found only in the urban areas. There were 69 dispensaries in Georgia in 2007.

5. Education

339. For the past few years, the legal framework of the educational sphere in Georgia has significantly improved as priorities have been defined and the level of community involvement in the educational process has increased. Nonetheless, certain difficulties still persist.

340. The Tbilisi city government's Municipal Service of Education and Culture closely cooperates with the Ministry of Education and Science of Georgia and non-governmental organizations working in the field of education that seek to improve conditions for the physical and intellectual development of children and adolescents.

341. He changes under way in the spheres of economics, education and employment necessitate the modernization of vocational education through increased interaction with labor market structures and the establishment of a social dialogue and collaborative efforts with employers. For this purpose, the Governmental Commission on Social Partnership in Vocational Education was established in 2005 on the initiative of the Ministry of Education and Science. It reviewed the concept of vocational education and developed an action plan for its implementation.

342. As of today, there are 15 primary vocational educational institutions in Georgia, of which two are financially self-sufficient, and 8 secondary vocational educational institutions that are funded by the government. In order to efficiently utilize the aforementioned potential, it is very important that the local government be involved in the process of increasing the number of workers in the city's labor market who have practically applicable professional skills. Furthermore, this process should be coordinated by the relevant structures of the local government.

Table 17 Tertiary Education Institutions in Tbilisi. Source: Department of Statistics, Ministry of Economic Development of Georgia

	2002/2003	2003/2004	2004/2005	2005/2006
Number of tertiary education institutions	105	102	116	106
Public sector	15	15	15	13
Non-public sector	90	87	101	93

Secondary Schools in Tbilisi

Number of secondary professional schools

unit

	Public				Private			
	2005/2006	2006/2007	2007/2008	2008/2009	2005/2006	2006/2007	2007/2008	2008/2009
GEORGIA – total	86	79	69	30	67	78	71	4
TBILISI	23	19	15	8	21	34	29	3

Number of Secondary School Students

at the beginning of school year, persons

	2005/2006	2006/2007	2007/2008	2008/2009
GEORGIA – total	**634724**	**635988**	**614666**	**643299**
TBILISI	**166651**	**170814**	**167374**	**179460**

6. Physical cultural resources

343. The development of the attitude towards the protection of historical heritage was a long time process, which continues even today.
In feudal times (V - XIX centuries) Tbilisi was developing slowly. Only in the 13th century some suburbs developed around the city wall, until then there were just districts inside the city wall.

344. The concept of historical heritage was not identified in the social life of that time.

345. Capitalist era (XIX - XX centuries are connected with "joining" Russia) gave Tbilisi strong impulse of development. The city occupies the high terrace of the right bank and low-lying area of the left bank of the Mtkvari river. In the old feudal part of the new constructions appear spontaneously, here and there. The concept of monument comes in social life, which, in the first place, is connected with religious worship - churches and monasteries. The feudal part of Tbilisi was saved due to its linear development and today it is very valuable for the city both from the point of view of history and culture.

346. Soviet period transferred the old part of Tbilisi into the "polygon" of "socialistic reconstruction". This made not only separate monuments fall a victim, but also very important elements of the city planning structure.

347. Liberalization of the social life of 60s contributed to the protection of historical sites. In 70s Tbilisi was a distinguished city among other cities of the Soviet Union: a new architectural and restoration school was started. A large scale program of the restoration and regeneration of Tbilisi started stages of which is represented by the yearly celebration of "Tbilisoba".

348. The leading organization in the implementation of these activities is the Main Department of Monumental Protection (since 1978 with management functions), It could organize the stimulation of the direct participation of the population in the restoration activities, e.g. the restoration works of Narikala Castle, etc.

349. In 1975 most part of the old city came under the area of protection where the particular regime of construction was introduced. In 1985 by the initiative of the Main Department of Monumental Protection and Scientific Society the Government issued a Decree on the Measures for Further Improvement of the State Protection of the Historical Part of Tbilisi. This Decree was also consolidated by other normative acts. Three areas of particular fields that were to be observed were:

(i) Protection of the Historical part;
(ii) Regulation of Construction;
(iii) Protection of the landscape.

350. This approach at least partly carried out its purpose - the urban heritage of the city was saved from the attacks of typical soviet type constructions which did not fit into the environment.

351. Today, actually, historical heritage is not protected and regulated (controlled) by the government. Historic zone of Tbilisi is the most catastrophic state at present: buildings in the old districts of the city are undergoing day by day degradation by underground waters, due to obsolete communications and some other processes. This trend is largely "supported" by the construction of private living houses which often by their size and character do not correspond to the historical district of the city.

352. This trend may continue but not for a very long time since the population of the city and particularly its professional part (architects, urbanites, etc.) are very much concerned about the existing situation.

353. Old Tbilisi is an administrative district in Tbilisi, capital of Georgia. Although the term "Old Tbilisi" has long been used to denote a historical part of the city, it was only in 2007 that it became a distinct administrative entity to incorporate several historical neighborhoods formerly included in the districts of Mtatsminda-Krtsanisi, Isani-Samgori, and Didube-Chughureti.

354. The district is located on the both sides of the Mtkvari River and is dominated by Mount Mtatsminda, Narikala fortress and the Kartlis Deda monument. It chiefly represents a 19th-century urban fabric with largely eclectic architecture which includes the buildings and structures from the 5th to the 20th century. However, most of the pre-19th century city did not survive due to the devastating Persian invasion of 1795. The district houses a bulk of the tourist attractions in Tbilisi, including churches, museums, sulphur bathhouses, and peculiar wooden houses with open, carved balconies. In the 19th century, the core territory of the modern-day district of Old Tbilisi was tentatively subdivided into ethnic neighborhoods.

355. There are locations of historical importance nearby, including Abanotubani sulphur baths and other spa baths dating from the 17th century. However these and the protected area are outside the project boundary, which lies entirely within the footprint of the existing road
Old Tbilisi is principally centered on what is commonly referred to as the Tbilisi Historic District, which, due to its significant architectural and urban value, as well as the threat to its survival, was previously listed on the World Monuments Watch (1998, 2000, 2002).

356. The detailed data on historical and cultural resources is provided in the annex D)

7. Minority Communities

357. One of the premiere challenges for Georgia as it continues to solidify its democratic institutions and transition to stable statehood is effectively managing the multiethnic nature of the population. Rich in ethnic diversity, Georgia nevertheless suffers from low levels of internal integration.

358. For a long time this problem did not receive due attention from the state. In general, any measures taken towards integration were sporadic in character. Even now the issue of national minorities is considered to be very delicate and politically risky, and there is a general lack of political will for managing minority issues. There have been numerous delays in the adoption of various laws, which led to heated discussions. The lack of a comprehensive approach makes it difficult to reach a consensus.

359. To some degree, Georgia already recognizes and protects a number of minority rights: minority mass media enjoys certain assistance from the state, there are no obstacles to close

contact with historical motherlands, and minorities have the right to receive educational instruction in non-Georgian languages. These achievements, among others, are recognized internationally.

360. However, these achievements were not balanced with integration processes. It can be said that significant progress was achieved in granting the minorities their rights, but little has been done to provide active participation of minority groups in the broader society. For example, minorities have access to education in their native languages. However, at the same time minority community members exhibit a poor knowledge of the Georgian language.

361. That is why Georgia's minority communities remain largely alienated from the socio-economic and political life of the country. There is insufficient participation by representatives of minority groups in official structures; minority community members exhibit a poor knowledge of the Georgian language; and there are latent or explicit tendencies towards irredentism in regions compactly inhabited by minorities. An extreme consequence of this alienation is the existence of separatist regimes on Georgian territory.

362. Co-operation with international organizations has proven an effective impetus to political and legislative bodies, and has raised awareness of the need for a conceptual vision of the issues related to ethnic minority populations. Standards established in international treaties serve now as the basis for legislative and policy actions in the field of minority rights and integration.

363. However, Georgia has a number of international obligations with regard to minority rights protection that have not been fulfilled yet. The Georgian Parliament after some delays recently ratified the Framework Convention on National Minorities, although the European Charter for Regional and Minority Languages is as yet unsigned.

364. The Parliamentary Committee for Human Rights and Civic Integration has for some time prepared a *Concept on the Policy Regarding the Protection and Integration of the Persons Belonging to National Minorities.* This Paper is an authorized version of the official draft of the mentioned Concept

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES: CONSTRUCTION

A. Summary of Activities and Anticipated Impacts

365. This section provides a brief description of anticipated site-specific impacts related to the construction phase of the project and these are described in more detail in the text below.

Table 18 Summary of activities and anticipated impacts

#	**Construction Phase. Potential Impacts During Rehabilitation Works**	**Yes/No Severity**	**Sites**
1	Groundwater. Water drainage.	Yes Minor	Physical existence of linear installation, like tunnels may affect drainage patterns and change shallow groundwater and surface water circulation. However, the tunnel is quite short so it may cause only local changes of drainage patterns. With proper design of drainage system the impacts will be easily mitigated.
2	Impacts on Archaeological Sites	No	Reconstruction carried out in the 1950s damaged the unique settlement of the Middle Ages, located at the right bank of Riv. Mtkvari, on the territory adjacent to Balneology health resort. They were replaced with main highways of the city. Abanotubani have escaped from a complete demolition. There are locations of historical importance nearby, including Abanotubani sulphur baths and other spa baths dating back to the 17th century. However these and the protected area are outside the project boundary, which lies entirely within the footprint of the existing road.
3	Impact on precious ecology (Flora and Fauna)	Yes Minor	The River Mtkvari is heavily polluted, is of no special interest for ecology or biodiversity and is not protected. However there are 150 Oriental planes on the project site whose age is 50-60 years. From this total around 115-120 mature trees will be removed because the new tunnel will be built by open trenching. Twice this number of new trees will be planted in the landscaped area above the tunnel, but given the ecological value of mature trees the scheme should be reviewed at the detailed design stage and amended to retain some of the existing trees. The birds (mainly seagulls and cormorant) which flock on this site in the winter time (November-March) can move upstream or downstream of the Riv. Mtkvari without any problem. So at the construction phase the potential impacts are temporary, short-term, reversible and manageable.

4	Landslides, slumps, slips and other mass movements in road cuts triggered by the construction activities.	No or minor	Geologically the Project area is situated in middle eocenial age's main rocky areas. The project area is stable and does not contain geo-hazards, although there is a possibility of provocation of geo-hazardous processes during construction if cuts were not properly designed or implemented.
5	Increased local air pollution due to rock crushing, cutting and filling works and chemicals from asphalt processing. Air pollution from vehicle operations during construction activities.	Yes	There are businesses, a hospital and residential areas on the landward side of the development so these will need to be protected from decreases in air quality to the maximum extent possible. Contractors should therefore be required to conduct all rock crushing and asphalt preparation offsite, preferably in an uninhabited area outside the city. Dust reduction measures should also be implemented on and off-site.
6	Impacts on local traffic and traffic safety	Yes. Medium	The construction site impose certain safety risks for the population and, therefore, compliance with safety rules is important. Local traffic can be affected by transport activities related to the project. The mentioned impact is temporary, medium and manageable. Long-term impact on local traffic should be beneficial.
7	Noise pollution from vehicle operation during construction in populated areas. Traversed by the highway, notably metropolitan areas or densely settled rural areas. Local noise.	Yes. Medium	Intensive operations of heavy trucks are required to deliver required amount of inert materials to the site. The construction sites impose certain safety risks for the population and, therefore, compliance with safety rules is important.
8	Poaching by construction workers	Very low probability	The river Mtkvari.
9	Construction wastes. Spoil Demolition of old pavement Concrete and metal constructions	Yes	The main sources of the inert waste are: Natural materials (soil, crushed stone, detrital rocks); according to the estimates quite a large amount of inert waste is expected to be produced: stripped asphalt - 53,00 m^3; residuals of concrete - 2,400 m^3; fill soil - 61,717 m^3; rocky soil - 9783 m^3. *The prior ways to manage inert waste is treatment and reuse. Disposal of the landfill is a final way in the waste management.*
10	Decline of water quality and increased pollution and sedimentation. Increased suspended sediment in river.	Yes	Especially during construction tunnel 1.

11	Declined water quality and increased pollution through concrete emergency discharge incidents	Yes Minor	Especially during construction tunnel 1.
12	Soil and water contamination during construction by oil, grease, fuel and paint	Yes Minor	Construction site.
13	Impact on existing infrastructure	Yes	Electric power transmission systems, water supply and drainage channel systems and channels
14	Poor sanitation and solid waste disposal in construction camps and work sites (sewerage, sanitation, waste management)	Yes Minor	Construction camps would be located at the construction site. The construction camp will not be used as living facilities because it is expected that majority of the employees would be local persons. The construction camp would be equipped with a toilet and other necessary infrastructure.
15	Traffic conditions	Yes Minor	The construction phase does not envisage complete cancellation of traffic flow on the right bank of River Mtkvari.

Table 19 Expectable impacts on the environment

Activity/Factor	Impact	Direct	Indirect	Positive	Negative	Reversible	Irreversible	Temporary	Mitigable	Residu
Physical existence of linear installation	Shallow groundwater and drainage patterns	+			+		+		+	
	Aquatic area									
	Emissions	+			+	+		+	+	
	Noise, vibration	+			+	+		+	+	
	Ground pollution and/or waste generation	+			+	+		+	+	
	Ground and surface water pollution	+			+	+		+	+	
Demolishing the concrete wall Demounting granite plates demounting well facing granite plates	Destruction of natural landscape, habitats, erosion									
	Aquatic area	+			+	+		+	+	
	Emissions	+			+	+		+	+	
	Noise, vibration	+			+	+		+	+	
	Ground pollution and/or waste generation	+			+	+		+	+	
	Ground and surface water pollution	+			+	+		+	+	
demounting pedestrian subway	Destruction of natural landscape, habitats, erosion	+			+	+		+	+	
	Aquatic area	+			+	+		+	+	
	Emissions	+			+	+		+	+	
	Noise, vibration	+			+	+		+	+	
	Ground pollution and/or waste generation	+			+	+		+	+	
	Ground and surface water pollution	+			+	+		+	+	
Cut the soil	Destruction of natural landscape, habitats, erosion								+	
	Aquatic area	+			+	+		+	+	
	Emissions	+			+	+		+	+	
	Noise, vibration	+			+	+		+	+	
	Ground pollution and/or waste generation	+			+	+		+	+	
	Ground and surface water pollution	+			+	+		+	+	
Construction of the wall	Destruction of natural landscape, habitats, erosion								+	
	Aquatic area	+			+	+		+	+	
	Emissions	+			+	+		+	+	
	Noise, vibration	+			+	+		+	+	
	Ground pollution and/or waste generation	+			+	+		+	+	
	Ground and surface water pollution	+			+	+		+	+	
Arrangement of the infrastructure	Destruction of natural landscape, habitats, erosion								+	
	Aquatic area	+			+	+		+	+	
	Emissions	+			+	+		+	+	
	Noise, vibration	+			+	+		+	+	
	Ground pollution and/or waste generation	+			+	+		+	+	
	Ground and surface water pollution	+			+	+		+	+	
Assembly tunnel cover slabs	Destruction of natural landscape, habitats, erosion								+	
	Aquatic area								+	
	Emissions	+			+	+		+	+	
	Noise, vibration	+			+	+		+	+	
	Ground pollution and/or waste generation	+			+	+		+	+	
	Ground and surface water pollution	+			+	+		+	+	

Arrangement of surfacing works	Destruction of natural landscape, habitats, erosion								+	
	Aquatic area								+	
	Emissions	+			+	+		+	+	
	Noise, vibration	+			+	+		+	+	
	Ground pollution and/or waste generation	+			+	+		+	+	
	Ground and surface water pollution		+		+	+		+	+	

B. Resettlement Issues

366. Preliminary asseement of potential resettlement issues was conducted based on the project maps of facility layout, cadastrial maps provided by the City Hall of Tbilisi and comparative analyses of aireal photo images and on site verification of preliminary data.
Figure 26 shows that the area in which the project will be constructed is owned by the state. There are no private or/and state commercial facilities in the construction area. Only a few medium sized commercial facilities are located nearby (Figures 27.28.29.30), at Gorgasali Avenue, opposite side of the river bank. It is not neccssary to close or temporary suspend activities of the commercial facilities (Figure 31 – represents schematic disposition of the medium size facilities).

Figure 26 – Registered land plots according to data of 12 December, 2009 (cadastrial code: 011804001009**)**

Figure 27 Newspaper kiosk

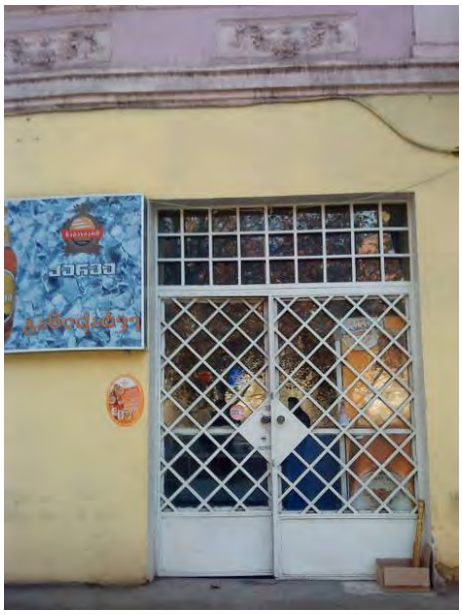


Figure 28 - Medium size commercial premises

Figure 30 – Medium size facility

Figure 29 –Medium size facility (shop)

367. Based on the documnt (cadastrial code**:** 011804001009**)** issued by National Agency of Public Registry (www.reestri.gov.ge) and visual observation it is clear show there satellite map there are no legal or illegal buildings or economic activities located in the project area or in the auxiliary area that will used during the construction period. It is therefore not necessary to prepare a resettlement plan under the project. The small shops and newspaper kiosk adjacent to the site should in fact benefit from the presence of the construction site as well as are very likely to make purchases there.

Figure 31 - Schematic disposition of the medium size facilitis at the nearby territory of the project area

368. Only one small facility is located at V.Gorgasali Avenue inside the construction territory which is a bus stop (photo #15). This will be closed down at the start of the construction period by arrangement with the Tbilisi City Hall and the construction will be required to erect a notice informing people of the nearest alternative bus stop. To ensure public transport remains avalable in this area the designs should be amanded to inlude a bus stop in the recreation/parking area above the new tunels.

C. E.2 Noise and Air Quality

369. Noise and emissions of harmful substances are typical impacts of construction. However, in the case of this project, it is clear that there will not be any significant impact on the environment due to noise or air emissions. Therefore, no special measures are necessary to mitigate any impacts. Rather, the rules required by the building practice and norms should be sufficient to observe and carry out monitoring (Installing the screens around the construction site, check and repair all vehicles).

370. Only one side of the project site, where the construction equipment is expected to work more intensively, borders with the settlement. The measurements in the settlement area showed that the level of noise is quite high at the moment as a result of traffic, and this will be during the construction period. As construction will not involve large numbers of heavy vehicles and machinery and they will not operate continuously it is likely that noise will in fact be reduced during the construction work. The residential buildings borders with the project site only at the beginning of the tunnel from the side of Ortachala (they are located at 10-15 meters away from the project site). The balneology health area is located at 20-30 meters away and Restaurant Nikala is located at 30-40 meters away from the project site. This distances will be increased by

20-15 meters during the construction of the second tunnel (the River bank side), which will further reduce the incidence of noise.
Regarding air qualities during construction of the project, the following types of emissions are expected:

(i) Emissions from motor engines (bulldozers, cranes, excavators, compressors)
(ii) Dust due to earth works and driving of techniques along the ground surface.

371. The emission rate of inorganic dust during the operation of the road building techniques (excavators, bulldozers, mobile cranes, etc.) and the emissions caused by engine operations is estimated (see annex C). Most of them run on diesel. The emissions caused by the building machines are also estimated by effective normative documents and reference literature. By using the tables given in the reference documents the gross annual emissions of the techniques or gross annual emissions during the project and maximum one-time emissions may be calculated.

1. Mitigation Measures

372. The residential and public area is located closely to the construction site. It will not be affected significantly by the construction related emissions. However, emissions of heavy machinery involved in the construction should be managed by a proper engine maintenance practice and use of good quality fuel. The work of engines in an idle mode should be excluded.

373. A relatively high impact is related to the dust emissions, which hardly can be quantified. However, it is obvious that the earth works and transportation of gravel and other inert materials from borrow-pits will impose nuisance related with dust. This is a temporary impact, and should be mitigated by periodical watering of the work sites.

374. The residential and public areas will not be disturbed significantly by the noise nuisance. Mitigation of this impact is possible by employing the engine maintenance practice and avoidance of engine work in an idle mode. The only limitation that could be recommended is to prohibit the night-time (10 pm and 6 am) works to limit the works performed near the residential or public houses to the absolutely necessary site-related works and to carry out all auxiliary noisy works (like crushing conglomerates, milling demolished asphalt etc.) at sufficient distance from residential houses.

375. All vehicles shall be maintained so that their noise and emissions do not cause nuisance to workers or the local people.

376. All vehicles will be checked and repaired in case of need to eliminate increased level of noise due to damaged parts.

377. Regular maintenance of diesel engines will be undertaken to ensure that emissions are minimized, for example by cleaning fuel injectors. Routine maintenance will be carried out to a high standard to ensure that vehicles are safe and that emissions and noise are minimized. All the plants used on site will be regularly maintained so as to be in good working order at all times to minimize potentially polluting exhaust emissions.
Vehicle refueling shall be undertaken so as to avoid fugitive emissions of volatile organic compounds through the use of fuel nozzles and pumps and enclosed tanks (no open containers will be used to store the fuel).
If it is deemed necessary in dry conditions or where significant quantities of dust are being or are likely to be produced, mitigation measures will be arranged with the Construction Manager.

378. Mitigation measures will include:

(i) Damping down using water browsers with spray bars or other technical means; Minimum 1 browsers should be required for that purpose. However, the construction contractor should not be limited by this figure, and if required additional browsers should be engaged.
(ii) Sheeting of construction materials and storage piles; and
(iii) Use of defined haulage routes and reductions in vehicle speed where required. Materials will be transported to the site in off peak hours.
(iv) Materials transported to the site will be covered/ wetted down to reduce dust. The construction site will be watered as appropriate. Personal protective equipment will be provided to workers as necessary. All vehicles will be checked and repaired in case of need to eliminate increased emission due to the damaged parts;
(v) Maximum number of many existing trees on the site should also be retained as long as maximally possible because they will also help to intercept dust;
(vi) Installing the screens around the construction site.

D. Inert Construction Wastes

379. The following types of inert waste are anticipated to be produced as a result of carrying out these activities:

(i) Natural materials (soil and rock); According to preliminary data contained in the Feasibility Study there will be significant volumes of cut material (soil and stones or rocks) approximately 80, 000 -85, 000 m^3. Part of this will be reused and recycled and the other part will be disposed on the Iagluja landfill as inert waste (see below);
(ii) Metal constructions (mostly the metal pillars of the power line and reconstruction of pedestrian subway), Metals (including scrap metal and wire) and an insignificant amount of other metal waste are expected to be produced.

1. Mitigation Measures

380. Several options for managing the inert waste have been considered. These are as follows:

(i) Disposal of all the waste on the Iagluja Landfill (75, 000-85, 000 m^3)

381. The waste can be disposed on Iagluja Landfill which is 22 km from the project site. Of the 22 km to be travelled to transport the waste only for 2-3 km goes through Tbilisi. It is not appropriate to use the Gldani Landfill because it is located at the opposite end of the city and is far from the project site. Besides, the vehicles loaded with the waste will have to cover 30 km in the central parts of Tbilisi (around 7500-8500 trips), so disposal will be more expensive and will cause more disturbance along this route.

On the other hand, there are a number of disadvantages to the disposal of the inert waste produced during the project implementation on Iagluja Landfill:

(i) If the inert material is disposed as waste, the additional payment of service fee of around 750,000-850,000 GELwill be required;

(ii) Iagluja Landfill was opened in 1985 and actually it is already full. Disposal of the waste of such volume and density would aggravate the current situation on the landfill.

382. Some of the waste should be used to cover the waste at the landfill on daily basis.

383. Domestic waste of 400 m^3 is disposed daily on Iagluja Landfill. This volume of waste is daily covered by soil, the volume of which is 10% of the waste disposed. Thus, if inert material from the construction site is used for this purpose the volume required is $40m^3x365d=14600\ m^3$ per year. At present material is stripped off on the territory adjacent to the landfill area which negatively affects the landscape to a certain extent. Phase-out of the landfill is planned in 2 years. Consequently, for the daily coverage of the inert materials of up to 30, 000 m^3 is needed annually.

384. In this case the inert material should be stored temporarily on Iagluja Landfill, in those areas where the soil is being stripped off.

385. Some of the waste should be used to finally close down Iagluja Landfill (30, 000 m^3); Officially, Iagluja Landfill occupies 5 ha, though at the moment the waste is disposed on a larger area. According to Georgian legislation for the final close-down of the landfill the waste should be covered by inert materials of at least 0.6 m thickness. The inert material produced as a result of the project implementation could therefore be used for the final coverage of the Landfill, comprising 50, 000 m^2x 0.6 m = 300,000m^3 . So material from the project could easily fulfill part of this need.

386. Rocky inert waste should be crushed to be used for construction of new roads (10 000 m^3).The structure of the inert material produced from the second geological layer (represented by the rocky material) suggests that it is not suitable for use in covering the domestic waste on the landfill. It is also not appropriate to dispose this type of inert material as waste on the domestic landfill. It is most appropriate to hand over this inert waste as a raw material to companies rehabilitating and constructing the roads in and around Tbilisi. In this case the company implementing the road rehabilitation in Abanotubani will cover only transportation expenses.

E. Non Hazardous Construction Waste

387. The main non-hazardous construction wastes are likely to include the following around 200-300 m^3 of contractors will be prohibited from burning this on site, along with all other nonhazardous waste (garbage, litter etc.) from the construction sites and camps will be disposed on municipal landfills in cooperation with the official municipal waste operators.

388. The contractor will be also required to provide personnel involved in handling of hazardous and non-hazardous waste with training in:

(i) Waste handling
(ii) Waste treatment; and
(iii) Waste storage.

F. Hazardous Construction Wastes

389. Small quantities of hazardous wastes will be generated as a result of vehicle operations and the maintenance activities, including:

(i) bitumen;
(ii) liquid fuels;
(iii) lubricants, hydraulic oils;
(iv) chemicals, such as anti-freeze;
(v) contaminated soil;
(vi) spillage control materials used to absorb oil and chemical spillages;
(vii) machine/engine filter cartridges;
(viii) oily rags, spent filters, contaminated soil, etc)

1. Mitigation Measures

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

391. Contractors will be required to ensure the proper handling of all hazardous materials, including liquid fuels, lubricants, hydraulic oils, chemicals, such as anti-freeze, contaminated soil, materials used to absorb oil and chemical spillages; machine/engine filter cartridges; oily rags, used filters, contaminated soil. Storage containers for these materials should not be located within 50m of any watercourse in this case the River Mtkvari. All containers should be placed in a bund of at least 110% of the tank's maximum capacity. If more than one container is stored within the bund, the system must be capable of storing 110% of the biggest container's capacity or 25% of their total capacity, whichever is greater.

392. The bund should be impermeable (e.g. concrete-lined), without drainage points or other breaches. Accumulated rainwater in bunds should be pumped out of the bund to either drains or onto the ground if uncontaminated. In case of fuel spillage the spilled fuel should be recollected and the contaminated bund shall be treated using the absorbents: sawdust, sand or straw.

G. Soil Pollution

393. There are a number of materials need in a project of this type, which can pollute both soil and water if spilled or improperly disposed of. These include:

(i) Diesel fuel, lubrication oils and hydraulic fluids, antifreeze, etc. from construction vehicles and machinery;
(ii) Miscellaneous pollutants (e.g. asphalt, cement and concrete);
(iii) Construction wastes (packaging, stones and gravel, cement and concrete residue, wood, etc.);
(iv) Extremely small amount of hazardous wastes (e.g. waste oils, oily rags, spent filters, contaminated soil, etc) constituting about 0.1% of total amount of the wastes.

1. Mitigation Measures

394. Specific mitigation measures should be implemented on the construction site to prevent the soil pollution:

395. Contractors should ensure the proper handling of lubricants, fuel and solvents. All tanks should be placed in a bund of at least 110% of the tank's maximum capacity. If more than one tank is stored within the bund, the system must be capable of storing 110% of the biggest container's capacity or 25% of their total capacity, whichever is greater.

396. All fuel / hydrocarbon dispensing nozzles are to be of a drip control design and securely locked when not in use.

397. Vehicles should not be left without the supervision during refueling process. All refueling operations on the working sites should use absorbent pads and/or straw to minimize spills, which shall be put in place prior to the commencement of refueling operations.

398. Waste management will be arranged in accordance with p. 6.4 and 6.5.

H. Water Pollution

399. Water pollution may result from a variety of sources, including the following:
- (i) Spillages of fuel, oil or other hazardous substances, especially during refueling
- (ii) Silt suspended in runoff waters from the construction site
- (iii) Washing of vehicles or equipment or disturbance of watercourse banks and bed when crossing the watercourse by a heavy machinery
- (iv) Exposure of contaminated land and groundwater

400. Spillages, etc may travel quickly downhill to a watercourse or water body which in this case is located immediately alongside the site (River Mtkvari). Once in a watercourse, it can be difficult to contain the pollution which can then impact over a wide area downstream. It is therefore vital that a prompt action is taken in the event of any potential water pollution incident. Once the working width has been stripped of topsoil, the subsoil becomes exposed. When implementing the earthworks in a wet weather this may result in uncontrolled release of suspended solids from the work area.

401. Topsoil stripping on the work sites and trenching may result in increased erosion runoff and contamination of surface water.

1. Mitigation Measures

402. Specific mitigation measures should be implemented on the construction site in order to prevent water pollution:

403. Contractors should ensure the proper storage and handling of lubricants, fuel and solvents by following the storage and pollution prevention measures proposed above (section 6.5 and 6.6).

404. No fuel storage or refueling of vehicles or equipment should be allowed within 50m of river Mtkvari, or near drainage channels. Vehicles should not be left without the supervision during refueling process. All refueling operations on the working sites should use absorbent pads and/or straw to minimize spills, which shall be put in place prior to the commencement of refueling operations.

405. The risk of Ground water and surface water pollution should be reduced or eliminated by the measures outlined above, and by prompt action in the event of a spill, to contain and clean

up the material and remove the polluted ground. Soiled ground and absorbents should be removed, stored and treated as a hazardous waste as described above. In case of a significant spill an authorized and responsible person should be informed, works shall be stopped till the pollution has been removed. Refueling shall always be carried out with the correct equipment (i.e. nozzles of the appropriate size), and only by suitably trained and experienced Refueling Operators. Fuel supply equipment should be regularly checked to prevent leakage due to inappropriate condition of refueling equipment. Equipment and storages should be isolated and guarded to prevent pollution due to cases of stealing or vandalism. All mobile plants, including but not limited to cranes, compressors, generators, bulldozers, excavators etc. and storage tanks should be maintained and operated in such a way that all leaks and spills of materials should be minimized. Daily plant checks (Vehicle Maintenance Procedure) will be undertaken to ensure that there are no leaks or other problems. Vehicle maintenance, cleaning, degreasing etc should be undertaken in designated areas of hard-standing, not over the unstable ground (embankments etc.). Water tanks with sprinklers are envisaged for watering roads and machinery maintenance. Maintenance points will not be located within 50m of river Mtkvari, or near drainage channels. The storage of potentially polluting materials, refueling and maintenance of mobile plant within 50m of all watercourses/water bodies, dry riverbeds should be prohibited.

406. Erosion control measures should be applied during the construction activities to prevent runoff of into the River Mtkvari. The contractor should plan all excavations, topsoil and subsoil storage so as to reduce to a minimum any runoff. Contractors will be required to organize and cover material storage areas and to isolate wash down areas from the river by selecting areas that are not free draining into any watercourse.

407. Where any area of the spread is at risk from silt pollution washing off into a watercourse of water body, effective measures should be put in place to ensure that such pollution does not occur. Contractors should be required to implement such measures as:

(i) Use of silt fences
(ii) Use of straw bales to deflect and filter water
(iii) Use of a system of bunds and grips to prevent water from entering watercourse, etc.
(iv) Use of holding/settling lagoons to store water running off the spread. It is intended to use natural settling rather than flocculants to facilitate sedimentation following which clean water can be disposed.
(v) Asphalt or wet cement and/or concrete will not be allowed to enter any watercourse, pond or ditch.

I. Impacts on Archaeological Sites

408. There are locations of historical importance near the project site, including Abanotubani sulphur baths and other spa baths dating back to the 17th century. However these and the protected area are outside the project boundary, which lies entirely within the footprint of the existing road. There are no above ground monuments or sites of known archeological interest. At the same time the possible discovery of archeological finds during excavation works should be considered in order not to damage them.

409. During construction of the road in Soviet times some archaeological artifacts were destroyed. Therefore, special care should be taken to ensure that any remaining material is properly recognized and recorded. Land clearance works, grading and excavations are associated with the risks of damaging the underground archaeological remnants.

1. Mitigation Measures

410. As the construction sites are located near known areas of an archeological interest, destruction of archeological layers during the construction process is possible. To avoid this risk, preliminary preventive studies and archeological supervision during the earthworks is necessary. These should be agreed with the Ministry of Culture when obtaining the construction permit, in accordance with the rules of the permit issuance by the project proponent (article 14 of the Law on Cultural Heritage). The Permit is only issued following a positive decision of the Ministry of Culture, Monument Protection and Sport of Georgia, following archeological research of the project area carried out by the entity wishing to accomplish the ground works. The entity must provide the Ministry with documentation about the archeological research, including field-research and laboratory works. The conclusion of the research should contain the following information: (a) a thorough field study of the archeological layers and objects identified on the study territory by using modern methodologies, (b) recommendations about the problem of conservation of the identified objects and planning of the building activity on the design territory,. According to the established practice, the archaeological studies are conducted under the detailed design contract at the stage of obtaining the Construction Permit.

411. At the construction stage the archaeological monitoring should be secured by the construction contractor under the supervision of the Ministry of Culture, Monument Protection and Sport of Georgia.

J. Transport related impacts

412. The construction process will produce large number of movement by heavy trucks on the roads served the site, delivery construction materials and excavation waste for use or disposal. This can cause a number of impacts, including:

413. Heavy trucks are required to deliver required amount of inert materials to the needed sites within the construction site. Different types of impacts are anticipated in that regard:

(i) Noise & Vibration;
(ii) Traffic congestion (nuisance);
(iii) Air pollution (dust; emissions);
(iv) Mud on roads;
(v) Refueling, maintenance and vehicle cleaning and related risks of soil and water contamination.

98. The construction sites carry certain safety risks for the population and, therefore, compliance with safety rules is important. Local traffic can be affected by transport activities related to the project. The mentioned impact is temporary, insignificant and manageable. A long-term impact on local traffic should be beneficial.

1. Mitigation Measures

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

(i) Require adherence to engine maintenance schedules and standards to reduce air pollution.
(ii) Use of defined, well planned haulage routes and reductions in vehicle speed where required..

(iii) Periodically water down temporary roads on site.
(iv) Cover trucks carrying cement gravel or other loose materials;
(v) Wet or cover trucks carrying stone/ sand/ gravel;
(vi) Haul materials to and from the site in off peak traffic hours.

415. The construction site should be watered as appropriate ensuring that watering is not enough to produce surface runoff. Personal protective equipment shall be provided to workers as necessary. All vehicles shall be checked and repaired in case of need to eliminate increased emission due to damaged parts.

VI. FLORA

416. During construction it will be necessary to cut and uproot 51 trees planted in the traffic separation line as well as 53 trees planted along the River bank (they are mostly 50-60 years old Oriental planes). As for 39 trees planted on the sidewalk on the opposite side of the River bank, they may be saved.
As for the cut off trees of around 200-300 m^3, they should be sold or handed over to the local community members. Small branches and foliage shall be gathered and disposed on the landfill and the contractor will be prohibited from burning this materials.

A. Mitigation Measures and Compensation Plan

417. Considering the nature of the project the construction site shall not be restored on its original place. The vegetation will be restored on the top of the tunnel within the proposed recreation zone. For each tree cut off, 2 trees/plants shall be planted with the species and the volume of the trees cut off being taken into consideration. Only indigenous trees will be re-planted and local botanists should be consulted in the detailed design stage to advise on appropriate species. Other species besides the pure *Oriental* planes may be also planted. For instance, along with the *Oriental* planes *Fraxinus excelsior*, *Acer campestre, Tyilia Caucasica* may be included, and out of the bushes *Continus, S. Hypemrifolia*, and arrowwood may be used.

418. It is recommended that the depth of the soil (top and lower layer) be no less than 1.5 meter in the areas where the trees and bushes will be planted to allow sufficient root formation for maximal growth.

419. In some areas, in order to control the erosion processes and improve the microclimate, sanitary and hygienic conditions and to organize the resort areas it is allowed to prepare the soil on the rocky slopes The rocky soil is drilled op to the depth 1 meter, and is cleaned the soil is backfilled in it. In order to improve this method it is envisaged to arrange the trenches of 1 m width and 1.3 m depth instead by lasting them. After the trees and bushes are grown in the nursery and planted in the project corridor the target survival rate of the trees and bushes shall not be less than 80%;

420. During the restoration period it will be necessary to replace the withered trees and bushes with the same kind and number of trees and bushes;

421. As a result of the above measures the vegetation will be arranged on the construction site, the extent of erosion will be decreased and its recreation function will be enhanced.

B. Impacts on landscape

422. The project site lays alongside the historical Abanotubani area, which contains some of the oldest and most important areas and buildings in the city. It will be important therefore that the shape of the new tunnel and road structures does not detract from the landscape and character of the historical area, which is very important to local people and tourists. it would be desirable to consider the recommendations of historical-architectural researches and to construct such facilities that would not represent a dissonance and would naturally match to the landscape of the district. Attention should be given to protection of the values characteristic to the districts:

(i) Aesthetic side of the constructions in the upper part of the construction site can be considered at a less extent, however, specific characteristics of the existing streets network and relief, which was well foreseen during the development of the district, must be taken into consideration to the maximum extent possible;

(ii) Designs should also reflect the fact that the area is intend to be functioned, so layout of public services and amenities including of parking space must be well considered and organized;

(iii) Aesthetic side of new spatial facades, rhythmic separation and sloppiness should not be far away from architectural nature and artistic characteristics of Old Tbilisi;

(iv) On the other hand, it is not desirable to mechanically copy the architectural aesthetics of Old Tbilisi, as this might give a certain false flavor to the facades;

(v) The characteristics of the landscape facing the river bank should be considered, and in particular the view towards river basin – one of the most picturesque parts of the city – the Metekhi cliff should be maintained and enhanced;

(vi) The buildings on the Gorgasali Street are assigned classification of monument and represent architectural samples of the end of the 19th century and beginning of the 20th century, although they are quite damaged, which obligates us to restore them; however the back side of the buildings facing Pasrik street, where most of the buildings are completely demolished, make some space for construction;

(vii) During construction attention should be paid also to design-architectural structure and construction materials, which should be in line with the environment;

(viii) Spatial-compositional and architectural dominants' visual-spatial relationship should be clear. Right scale in regard to the natural environment of the residential district and of the city as a whole should be a component of the design.

C. Protection of the Soil and Erosion Prevention

Topsoil Protection

423. There is in fact very little topsoil at the site, which is mainly covered by asphalt and paving. Topsoil remains only at the sites covered by vegetation.

The topsoil shall not be handled by construction contractor when the following conditions are observed:

(i) The topsoil is frozen;

(ii) The site is experiencing persistent rainfall;

(iii) The topsoil is saturated; or

(iv) Handling will damage the structure of the topsoil.

Topsoil Storage

424. Topsoil will be stored in stockpiles, no more than 2m high with side slopes at a maximum angle of 45^0. The following shall also be taken into consideration:

(i) Dedicated storage locations will be used that prevent the stockpiles being compacted by vehicle movements or contaminated by other materials;
(ii) Topsoil will be segregated from subsoil stockpiles;
(iii) No material will be stored where there is a potential for flooding;
(iv) No storage at less than 25m from river/streams, subject to the site specific topography.

425. In the event that the stockpiles experience significant erosion the Contractor will be required to implement corrective action, such as installing erosion matting over the stockpiles if further surface compaction and/or topsoil seeding fails. The Contractor shall protect the stockpiles from flooding and run-off by placing berms or equivalent around the outside where necessary.

426. Topsoil stockpiles shall be monitored and should any adverse conditions are identified corrective actions to be taken shall include:

(i) Anaerobic conditions - turning the stockpile or creating ventilation holes through the stockpile;
(ii) Erosion - temporary protective silt fencing shall be erected

Subsoil Storage

427. For storing the subsoil in stockpiles, no more than 3m high with side slopes at a maximum angle of 600, the following shall be taken into consideration:

(i) Dedicated storage locations where the stockpiles shall not be compacted by vehicle movements
(ii) or contaminated by other materials; and
(iii) Segregation from topsoil stockpiles.

428. In the event that the subsoil stockpiles experience a significant erosion, Contractor shall take a corrective action such as installing erosion matting over the stockpiles.

D. Existing Infrastructure

Relevant activities are planned at the mobilization and preconstruction stage in order to remove the existing infrastructure at the site transmission lines, water supply pipelines and drainage channels to the safe sites. All of these infrastructural systems should be remain functional during and after completion of construction activities. Permanent monitoring is required to avoid damage of the infrastructure systems, which will not be removed. Any damaged systems should be immediately reinstated.

The following is envisaged by the project under project implementation:

(i) Arrangement of water-course along the 411 m, d-200 mm;
(ii) Arrangement of water-course along the 461 m, d-500 mm;
(iii) Arrangement of water-course along the 405 m, d-700 mm;
(iv) Arrangement of sewerage along the whole width of building sight, in four places,
(v) d-300mm;
(vi) Arrangement of Drainage to the right side of the tunnel #3 from the beginning of the Pandus along 120 meter, d-400 mm;
(vii) Cancellation of existing gas-pipelines into the frames of building sight and arrangement
(viii) of the new one: along the 459 m wall - d-300 mm, into the trench of 15 m; into the 94 m

(ix) trench - d-80 mm; along the 47 m wall - d- 50 mm into the trench of 49 m.

429. Arrangement of water-course d-200 mm is foreseen on the right side of the tunnel #3, and d-500 mm and d-700 mm - correspondingly under the tunnels #1 and #2 into the covering of reinforced concrete.

430. In course of elaborating a detailed design, the options must be processed with the location of water-course pipes d-500 mm and d-700 mm into the frames of sidewalks of tunnels taking into consideration relevant requirements envisaged by the safety and exploitation norms.

E. Potential emergencies

431. Emergency situations related to construction activities could include:

(i) oil spills from the storage tanks
(ii) fire in the camp or oil storage facilities

432. The probability of an emergency is low, but appropriate emergency response plans should be in place. Receptors of the emergency related impacts – the personnel, population and infrastructure of nearby residential houses and public buildings, surface- and ground-water and aquatic habitats.

F. Construction Camp

433. A small construction camp will be located at the construction site. The construction camp will not be used as a living facility because it is expected that a majority of the employees would be local persons.
The construction camp shall be equipped with a biotoilet and other necessary infrastructure.

434. The potential impacts related to the construction and operation of the camp could be summarized as follows:

(i) Potential damage of topsoil
(ii) Contamination related to fuel storage and fuelling operations
(iii) Sewerage related contamination
(iv) Waste management

G. Quarrying Sites

435. Currently it is considered that the Constructing Contractor will not operate quarries materials from suppliers. The construction materials should therefore be purchased only from licensed companies. If the Construction Contractor decides to operate a new quarry, the Contractor shall obtain his own license from the appropriate authorities (Ministry of Economic Development)

436. When planning mitigation measures, dust and other emission impacts, as well as potential river contamination due to improper fueling and vehicle operations should be taken into consideration. These additional potential impacts should be included in the Constructing Contractor’s environmental management plan, if contractor takes the decision to operate new quarries.

H. Anticipated Environmental Impacts and Mitigation Measures: Operations

437. The most significant overall impact of the project once the new facility is operating will be improvement of the traffic patterns. As an indirect positive outcome of this direct impact it is anticipated that traffic congestion will be minimized; emission, noise and vibration impacts will be reduced; and traffic safety will be increased.

438. A recreation zone will be established above the river where it will be possible to create various facilities for rest and entertainment of the community members via other projects. This would be a factor in attracting tourists: in the future there may be playgrounds, children's squares, action theater, exhibition halls, service facilities, etc. along river bank at lower level of the recreation zone. Besides, the entrance to the Riv. Mtkvari at this place will make it possible to arrange sports and entertainment activities on the river. Although about 100-150 trees of 50-60 years of age will be cut down during the construction phase and about 1,200 m^2 of green area will be destroyed, it is planned to create 10,700 m^2 green area and to plant two times more trees ensuring that 80% of the trees survive.

Table 18 Environmental Impacts - Operational Phase

#	**Potential Long-term impacts (Impact of Physical Installations, Traffic and Emergencies)**	**Yes/No** **Severity**	**Sites**
1	Probability of the Tunnel Flooding in Case of the Lengthy Rains	Yes Minor	Lowering of the road by 6 meters, as it is envisaged by the project, increases the risk of flooding the traffic lane in the tunnel in case of lengthy rains
2	Air pollution from vehicle operation in the tunnel	Yes Minor	None of the three tunnels is longer than 350 m and therefore this do not require special ventilation measures according to Georgian Law. The risk of accumulation of emissions in the tunnels is therefore quite low. Regardless of this mitigation measures in order to avoid or mitigate the risk are recommended below.
3	Accident risks associated with vehicular traffic and transport, that may result in spills of toxic materials injuries or loss of life.	Yes very minor	After project implementation the incident risk in the area will be strongly reduced.

439. Here we should mention the mitigation measures to be implemented at the operational stage. Most of these measures (predominantly maintenance works) should be implemented by Local government administration utilizing funds from the state budget, loans, grants and other financial sources.

I. Tunnel Flooding

440. Lowering of the road by 6 meters, as envisaged by the project, increases the risk of flooding the traffic lane in the tunnel in case of lengthy rains.

1. Mitigation Measures

441. Along the whole tunnel on one side of carriage way it is envisaged to provide a water-draining channel . The structure of the channel is precast reinforced concrete.

At the entrance of tunnels along the whole width of the carriage way water-receiver trays will be provided, which are covered with cast iron lattices. From the trays by the pipes d-400 mm water will be flown into the River Mtkvari in most circumstances.

In case of swell, this scheme will not remove drainage water from the tunnel, because of the level is higher than the floor of the tunnel. For this reason provision of a pump-station is envisaged under the Pandus from the Ortachala side, which will operate these rare events and will therefore pump water and discharge it into the River in case of the swell.

According to specialists, in order to solve that problem entirely it is necessary to construct a new drainage collector, which will be set more deeply and will connect to the river-bed of Mtkvari after Ortachalahesi.

J. Air pollution in the tunnel

442. Length of tunnels 1, 2 and 3 are 332, 320 and 290 m recpectively. According to Georgian norms the ventilation of vehicle tunnels of this length is not. If necessary, it is possible to: arrange two ventilation columns of small diameter in every 100 meter at upper corner of the tunnel arrange openings into the cover of tunnels and through the walls).

K. Accident risks

443. City Hall of Tbilisi along with the Ministry of Interior (Department for Managing Emergency Situations) should facilitate development of legislation and emergency response plans regulating transportation of hazardous materials. The system of measures may include but not limited to:

(i) Design and implement safety measures and an emergency plan to contain damages from accidental spills.
(ii) Designate special routes for hazardous materials transportation.
(iii) Regulation of transport of toxic materials to minimize danger.
(iv) Prohibition of toxic waste transportation through ecologically sensitive areas.

444. The abovementioned measures and plans should be elaborated in accordance with the Law of Georgia on Hazardous Substances, and the Regulations issued by the MoE on “Norms of Usage of Chemicals in the Environment and Rules of Transportation, Storage and Usage of Chemicals”. Regulations of other countries (e.g. Order of the Minister of Transportation of Russia # 73 issued 08.08.1995 as amended in 1999) could be used as supporting materials.

445. The most significant positive impact would be improvement the traffic patterns and minimizing accident risks.

VII. ANALYSIS OF ALTERNATIVES

446. The implementation of the project will not make any significant or special negative environmental impact. The range of possible negative effects of the project is limited to the impacts typical to the construction activities and operations. Such impacts can be controlled possible by meeting the relevant standards and norms and requirements of the present EIA.

(i) **Option #1** No project**;**
(ii) **Option #2** Set up new regulation mode and widen the motor road at the expense of sidewalks;
(iii) **Option #3** The option envisages construction of three tunnels. The traffic on the right bank of river Mtkvari is to be channeled to underground making it possible

to give a multifunctional role to the area. This option envisages partial closure of the right bank for traffic on the right bank of the river and construction of one lane tunnel, then channeling the traffic to the constructed tunnel and starting construction of the second tunnel on the other side of road.

A. Introduction

447. As it was mentioned above, Gorgasali Street and Riv. Mtkvari's right embankment street adjacent to it are very important transport artery in Tbilisi. The parallel traffic areas of consisting of these two streets from Metekhi Bridge to P. Bagrationi Monument represent a single transport artery and it is necessary to consider and estimate their transport-operational properties as one transport facility (see Fig. №2). At the same time any measure, carried out at the mentioned section, has a significant impact on a certain transport (traffic) space, which consists of the road junction adjacent to the P. Bagrationi Monument, as well as the current road junctions on both sides of Ortachala (Ortachala Power station) Bridge, the current road junctions at the beginning and the end of transport tunnel under Metekhi Bridge, and the current road junction on both sides of Metekhi Bridge and Baratashvili Bridge.

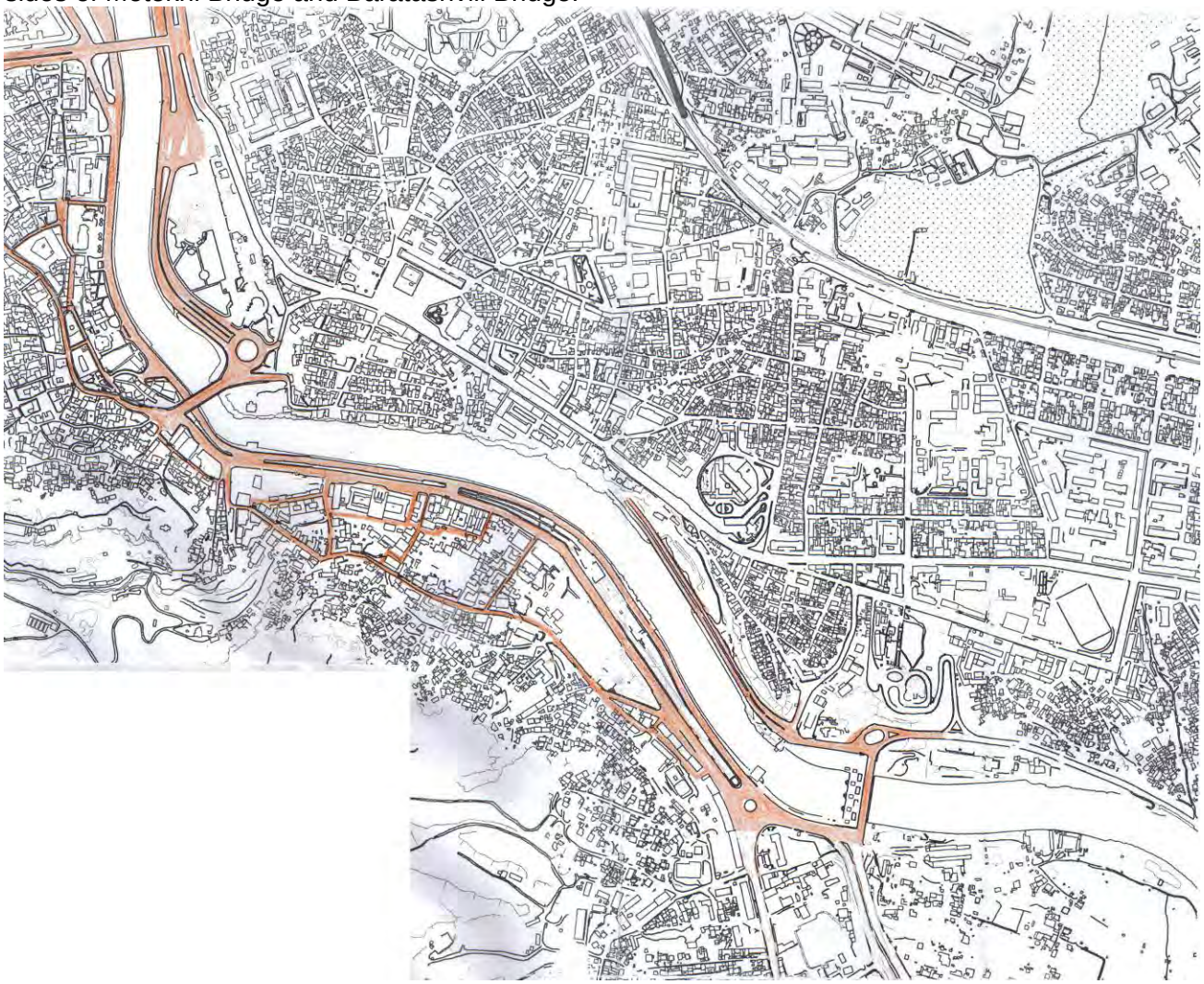


Figure 27 Zone of influence of road junction adjacent to Abanotubani and Balneotherapic health resort.

448. The most narrow and difficult place of mentioned single transport space is the section adjacent to Baths coming from the Gorgasali Square to Ortachala. The width of this section in the narrowest area does ‘not exceed 12 m and is limited on one side by a low-level reference wall, and on the other side by the lawn separating it from the embankment, which has a form of variable-width inclined plane. Besides, the traffic flow is hampered by the embankment section passing under Metekhi Bridge. The traffic area width under the Bridge is equal to 14 becoming even narrower after the Bridge and reaching 10 m, . These narrow road sections join near the turn to Abano Street and form a quadrangular shape square of 34x62 m size. This square is one of the most difficult and heavy congested road junctions in Tbilisi with a great number of conflict points (Fig. 28)

449. Geometrical parameters of this junction have been elaborated in the beginning of 50s of the last century, when the number of vehicles in Tbilisi did not exceed 20000 units. 80% of it was represented by trucks and by buses driven by disciplined, professional drivers. At present the total traffic density of vehicles passing this road junction in the rush hours exceeds 5500 vehicles/per hour and this quantity increases from day to day. 90% of the traffic flow consists of individual cars, most of which are driven by young undisciplined, low skilled drivers.

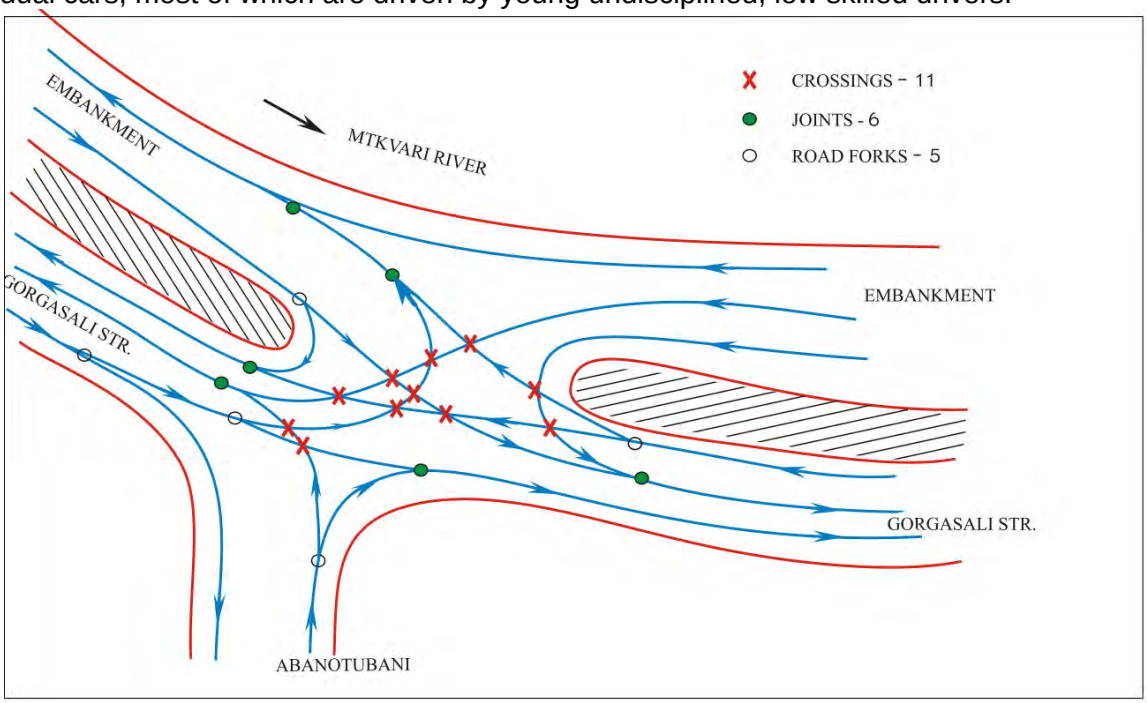


Figure 28 Current conflict points (without traffic control) at road junction of Gorgasali street.

450. Geometrical parameters of road junction were designed more than half a century ago and are characterized by many flaws the correction of which is apparently urgent. Instead of this, multistory structures for commercial purposes are being constructed in the close vicinity to the traffic area, e.g. the reinforced concrete buildings are under construction near the restaurant “Maidani”. Their existence makes it difficult and in some cases even impossible to reconstruct the transport facilities according to the current and prospective (in the nearest 5-10 years) requirements. It is also necessary to plan over a long-term, 20-30 years perspective. A main reason of chaos is an incorrect traffic organization at the road junction. It is arranged an oncoming traffic on both of traffic areas, which are isolated from each other by the separation line. For example the public transport traffic is organized with oncoming direction at the traffic

area adjacent to Balneology Health Resort. In its turn, it is caused by the arrangement of bus stops on both of the traffic areas for the buses coming from Ortachala.

B. Option #1

451. Expected delays were estimated at the first stage. The economic losses for the society due to the inadequate operation of the juncture are defined on the basis of those calculations. Deterioration of ecological indicators due to the significant increase of emission of pollutants from engines during the delays was also taken into consideration.

452. Delays are estimated based on the data on the traffic flow intensity and composition that was obtained through observations conducted in accordance with the standard procedures. From 11.00 am-13 pm and from 16.00-18.00 pm the survey team of 4 persons carried out observation of traffic flows during three mid working days of the first week of November 2009.
The data from the 2009 observations and 2005 and 2007 studies show that intensity of the traffic flow annually increases by 7%. It is expected that this rate would be maintained during the next 10 years.

453. The analysis of the variation of the intensity level shows that the traffic is most congested under Metekhi Bridge and on the sections of the right bank road. In case the existing regulation mode and the same width of motor road is retained, in 3-4 years' time the traffic congestions will rise in the rush-hours and their liquidation by employing the traffic management tools will be impossible.

C. Option #2

454. Setting up a new regulation mode and widen the motor road at the expense of sidewalks (Figure 29). The analysis of traffic load (see annex B) variability shows that the most congested directions of the road sections are those passing under Metekhi Bridge and along the right embankment of Riv. Mtkvari. In this case the risk of traffic congestions occurrences in the rush hours will be postponed for a period of 2-3 years, however similar situation will rise again in the future.

Options #1 and #2 were dropped as the conducted analysis in both cases showed that traffic congestions will occur and it would be impossible to regulate the traffic.

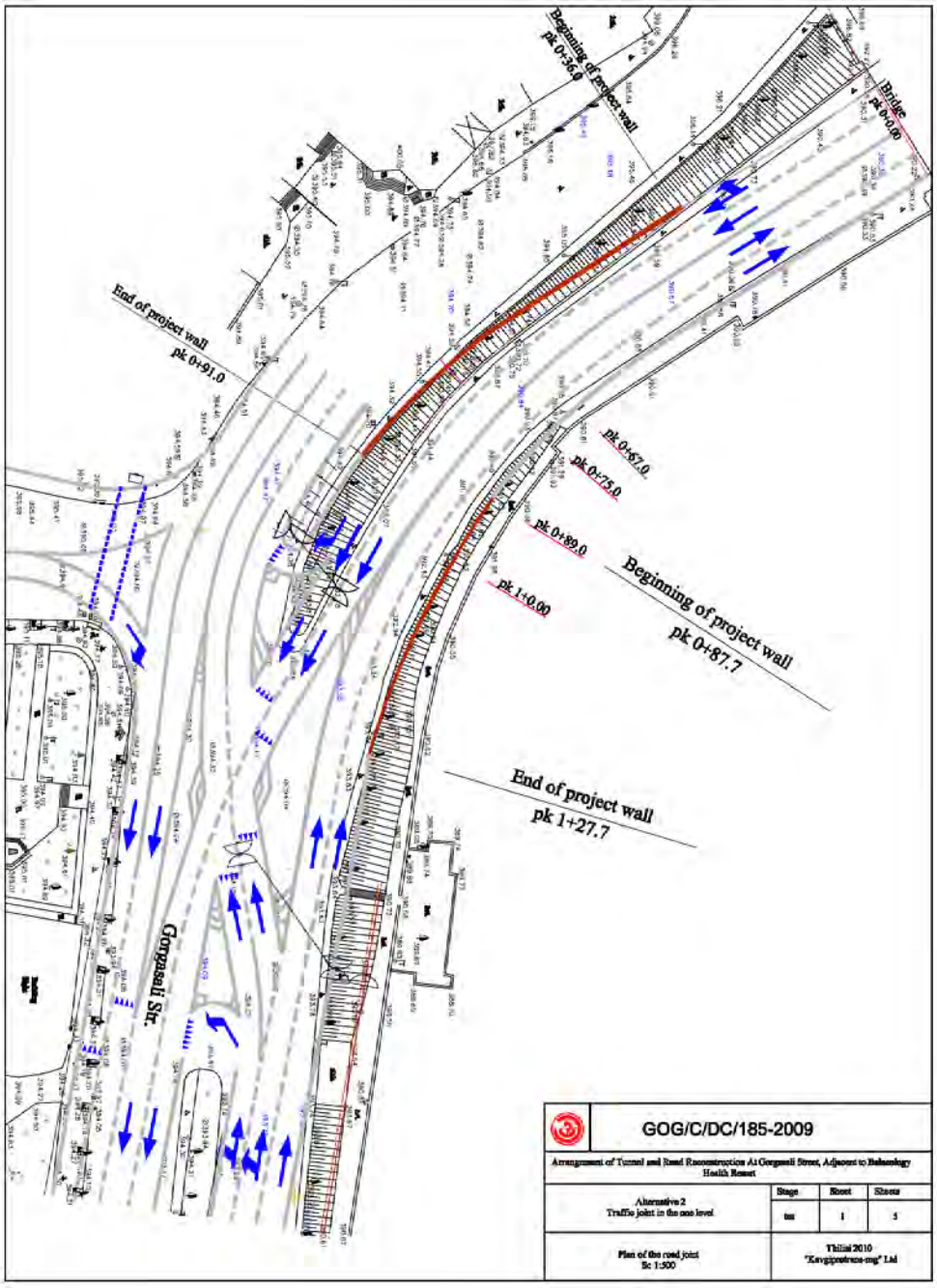


Figure 29. Option #2 Main directions of traffic flow

D. Option #3

455. Construction of three tunnels is considered into the version. Channel traffic on the right bank of river Mtkvari to underground and to give multifunctional role to the area. This option envisages partial closure of the right bank for traffic on the right bank of the river and construction of one lane tunnel then channeling the traffic to the constructed tunnel and construction of the second tunnel on the other side of road

456. It is necessary to drastically increase the road capacity of current road section under Metekhi Bridge. There are several possibilities for to achieve this:

(i) I – arrangement of at least two additional traffic lanes in the tideway of Riv. Mtkvari;

(ii) II – arrangement of additional traffic lanes with the same width under the current traffic area.

457. Technically the first offer is more easily realizable, since it requires console balcony or flyover (console is preferable, because it will not decrease the natural section of Riv. Mtkvari). However the negative side of this option is a poor architectural view, which is unsuitable for this location.

458. The second option is technically more difficult to implement, since it will be necessary to move down a traffic area elevation by 4-5 meters lower than Riv. Mtkvarir's high water level. More over there will be a risk of inundation caused by Riv. Mtkvari water and by surface waters during heavy rains.

459. In our opinion, the third option is the most expedient: construction of arch with the same outline next to the existing arch under Metekhi Bridge, or else demolition of the existing arch and construction of a new arch with parabolic outline and with double road capacity. This measure will drastically improve the traffic conditions at the road junction and at the same time will allow us to shift the current traffic flow of Leselidze Street to the right embankment of Mtkvari River and to direct this flow to the Freedom Square through the road junction adjacent to Baratashvili Bridge. All this will make it possible to completely transform Leselidze Street and the adjacent territory into a pedestrian zone, while along Abanotubani and Balneology Health Resort we will have a high speed highway with the division of oncoming traffic. In this case the local transport needs of the adjacent territory in the direction Ortachala – Center will be possible through Grishashvili Street by arranging one additional cross connection on it. The Gorgasali Square will be accessible from Grishashvili Street by passing Abanos (Bath-house) Street and Samgebro Street. For this purpose an insignificant reconstruction of these streets will be necessary.

460. Disadvantages of this option are the following: necessity employing the mining methods for the construction of a similar second arch, or for the construction of the Metekhi Bridge section at right embankment with a brand new structure, which is appropriate to the architecture of the current bridge. In both cases it will be necessary to move the famous restaurant "Meidani" to the other, suitable building, and to reconstruct Grishashvili and Samgebro Streets.

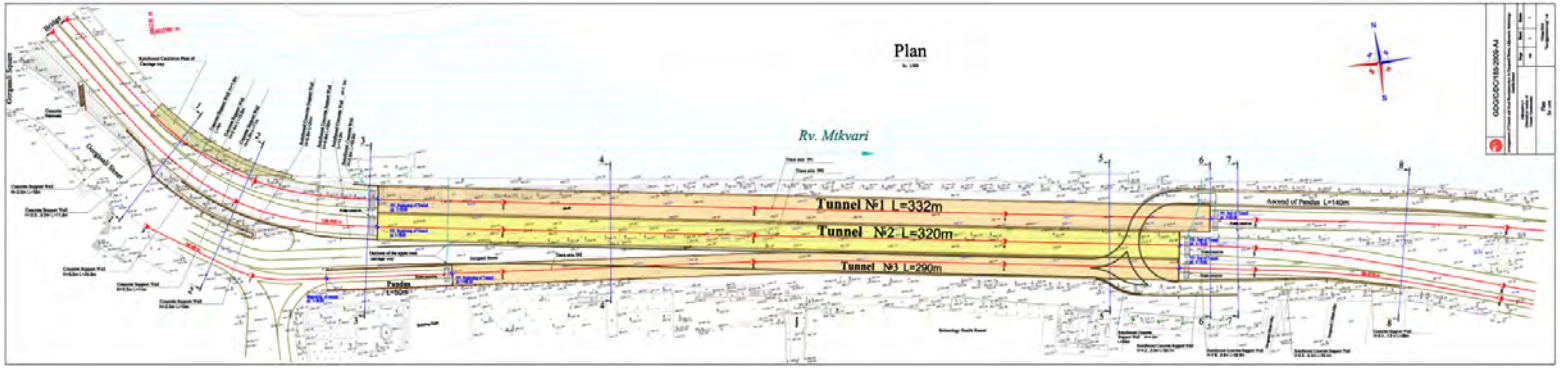


Figure 30 Main directions of traffic flow on the I and II levels

461. In any case a full-scale opening of the road junction and ensuring an appropriate architectural, recreational value is possible only by a full-scale use of the transport capacity of the adjacent streets. These facilities are: Grishashvili Street with creation of additional longitudinal braces from Gorgasali Street's side, with road junctions of Riv. Mtkvari right embankment, Metekhi Bridge and under Baratashvili Bridge; both sides of the road junctions of Ortachala Bridge and the Metekhi tunnel with the adjacent road junction at Rike Square.

E. Social and Environmental Aspects of the Options

Table 18 Social and Environmental Aspects of the Alternatives

Potential Impact	Comparison of Options			
	1	2	3	Preferred Option
Air Quality	According techno-economic substantiation (annex B) after 3-4 years the traffic volume will increase. Congestion idle running vehicles an additional source of air emissions.	According techno-economic substantiation (annex B) after 9-10 years traffic congestion and emissions from idling vehicles will increase.	Traffic will flow Directly through the tunnel so there will be fewer emissions to the atmosphere.	3
Water Quality	An increased risk of water pollution from runoff of various chemicals from idling vehicles.	An increased risk of water pollution from runoff of various chemicals from idling vehicles	The level of the contamination will be less as vehicles will pass more quickly through the tunnel.	3
Soil Contamination	An increased risk of soil (In the wide median reset lane between the current traffic lanes) pollution from runoff of various chemicals from idling vehicles.	An increased risk of soil (In the wide median reset lane between the current traffic lanes) pollution from runoff of various chemicals from idling vehicles.	The level of the contamination will be less (in the recreation zone) as vehicles will pass more quickly through the tunnel	3
Solid Waste Management	This option involves no construction so no solid waste will be produced.	The option involves minor construction and only small volume of solid waste will be produced.	The option involves significant excavation, producing significant volumes of cut materials (soil and stones or rocks) approximately 80 000 -85 000 m^3.	1
Noise	After 3-4 years traffic congestion will increase. Idle vehicles are an additional source of noise.	After 9-10 years traffic congestion will increase. Idle vehicles are an additional source of noise.	Noise will decrease as a result of continuous flow of traffic which will mostly be located below ground of the vehicles.	3
Vibration	After 3-4 years the traffic congestions will	After 9-10 years road congestions will be	Vibration will decrease as a result of continuous traffic of the vehicles.	3

	increase. Idle vehicles are an additional source of vibration.	increased. Idle vehicles are an additional source of vibration		
Flora	No change.	Around 40 mature trees on the existing roadside and central reservation would be removed because of widening the motor road at the expense of sidewalks.	Maximum 120 mature trees on the existing roadside and central reservation will be removed because the new tunnel will be built by open trenching. however twice this number of new trees will be planted in the landscaped area above the tunnel.	3
Fauna	No change	During construction phase Potential impacts are temporary, short-term, reversible and manageable.	During construction phase Potential impacts are temporary, short-term, reversible and manageable.	1
Historical Resources	The protected area in the old part of Tbilisi is outside the project boundary but the increase in traffic congestion will deteriorate the view of the historical protected area.	The protected area is outside the project boundary but the increase of traffic congestions rise will deteriorate view of the historical protected area.	Artistic side of new spatial facades of the recreation zone should not be far away from the architectural nature and artistic characteristics of old Tbilisi. The protected area will be more acceptable for tourism development, because of the availability of improved local road connections and parking.	3
Social issues	After 3-4 years the increased traffic congestion will increase in rush-hours and social and environmental issues make worse.	After 9-10 years the traffic congestions will rise in rush-hours and social and environmental issues make worse.	After construction the social and environmental conditions will significantly improve.	3

VIII. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

A. Legislation and regulations of Georgia

462. In April 2000 Georgia ratified the Aarhus Convention. This UNECE convention facilitates and regulates information availability, involvement of the public in the decision making and law availability issues for the field of environmental protection. It secures implementation of the principle that the involvement of all interested parties is necessary in order to achieve a steady development. The convention provides that the environmental protection shall be within the area of governmental accountability, transparency and responsibility. It is based on the premise

that involvement of the public provides for the better projects creation, better development and governance.

463. The Georgian legislation on EIA and Environmental Permits requires consultations with the public only for those projects for which it is required that the Environmental Impact Assessment be developed**.**

464. Article 6 of the law of Environmental Impact Permit (2008) sets out detailed requirements and procedures for conducting public consultations and the timeframes for information disclosure and discussion, namely:

(i) A developer is obliged to carry out public discussion of the EIA before it is submitted to an administrative body responsible for issuing a permit (in case of activity requiring a construction permit before initiating stage 2 procedure for construction permit issuance).
(ii) The project proponent/developer shall publish information on the planned activity before conducting a public review. The information shall be published in the central mass media, as well as in the newspapers in the administrative territorial office (if any) of the region, where the activity is planned.

465. The announcement shall contain the following information:
(i) the goal, title and place of the planned activity;
(ii) the location of the agency where interested and affected people will be able to familiarize
(iii) themselves with the documents associated with the activity (including reports on
(iv) environmental impact);
(v) the deadline for submittal of suggestions;
(vi) the venue and time of the public review/meeting.

466. The project proponent shall:
(i) provide a hard copy of EIA and its electronic version to the administrative agency that issues permission, in a week after the publication;
(ii) accept and consider written notes and suggestions provided by citizens up to 45 days after the date of publishing the assessment;
(iii) conduct a public review meeting of the planned activity no later than in 60 days after publication of the announcement;
(iv) invite corresponding local self – administration and governmental agency representatives; the Ministry of the Environmental Protection, and the Ministry of Economical Development and other involved administrative agencies to the public review;

467. Reviews shall be open to the public and any citizen will be able to attend it. The public review shall be conducted in the region administrative center, where the activity is planned.

468. According to Article 7 of the law, during 5 days after conducting the public disclosure meeting, the minutes of the meeting should be prepared to reflect all the questions and comments raised and explanations provided by the project proponents in response. Appropriate corrections should be incorporated into the main text of the EIA, if required. If the comments and proposals of stakeholders are not accepted a letter of explanation should be sent to the authors. The minutes of the meeting, as well as response letters, explanations and corrections should be submitted as supplementary materials to the EIA to MoE or the administrative body responsible

for issuing the Permit. The mentioned documents should be considered as an essential part of the EIA.

B. ADB Requirements

1. Public Consultation

469. Public consultation is mandatory as part of the EA process for category A and B projects supported by ADB. The adequacy of the public consultation and information disclosure is one of the criteria used to determine the project's compliance with the safeguard policies.

470. Category B Projects. It is recommended that public consultation be carried out during the early stages of the EA process and throughout the project implementation any environmental issues that affect the local communities, NGOs, governments, and other interested parties be addressed.

471. Environmental assessment reports for ADB projects are intended to be accessible to interested parties and the general public. The *Environment Policy* and *Guidebook for Policy on Confidentiality and Disclosure of Information* outline the requirements on the required types of environmental reports for disclosure.

472. To facilitate the required consultations with affected groups and local NGOs, the information about the project's environmental issues as well as technical data needs to be transferred into a form and language(s) accessible to those being consulted. For the projects deemed environmentally sensitive, SIEEs are made available to the public through the depository library system, and are placed on the ADB website no later than 120 days prior to the Board considerations. For other category B projects, the environmental analysis is posted on the ADB website as part of the RRP. The full IEE reports are also made available to the interested parties upon request.

473. The proposed project and exchange of views with relevant government institutions and other interested parties to facilitate the dialogue. Disclosure of the environmental assessment is not required for the category C projects. However, the public can access to the environmental information described in the RRP that is posted on the ADB website

2. Reporting

474. Reporting the public consultation and information disclosure activities is required as a part of the project review. The information regarding the past and future consultations and disclosure activities is reviewed during the mid-term review and annual review for Category A and B sensitive projects. A summary of the past consultation activities and recommendations and future plan shall be described in the EIA and SEIA for a category A project and IEE and SIEE for a category B project. The key reporting aspects listed below are to be included in both EIA and IEE:

(i) Relevant laws and regulation;
(ii) Methodologies used to inform and involve the public in the EA process;
(iii) Analysis of the data and information gathered;
(iv) Discussion of the strategic issues related to various stakeholders, level of involvement,

(v) Documentation of public meetings and interviews, including dates, names, topics of discussion, and important outcomes;
(vi) Recommendations on how the project might address concerns raised during public consultation; and
(vii) recommended measures for continuous public consultation during the environmental management program.

3. Public Consultation Scheme

475. In order to comply with the Georgian legislation and the ADB requirements and to ensure meaningful consultations, the following actions are planned:

4. Disclosure of documents

The electronic versions of the draft EIA will be placed on the Old Tbilisi district web-site.
Hard copies of Project environmental documentation (draft IEE and Executive Summary) will be placed in:
(i) the Old Tbilisi administration office
(ii) MoE Department of Licenses and Permits

5. Public consultation meetings

476. One public consultation meeting will be conducted following 14 days after the disclosure of EIA documentation in the Old Tbilisi administration office.

477. Information about the planned meetings

6. Public Consultation

478. Public consultation meeting is planned to take place in MDF office on 12.04.2010
Electronic version of the draft IEE will be placed on the MDF web-site – 30.03.2010
Hard copy of the IEE and Executive Summary will be available for review in MDF office.

479. Announcement will be made in central newspapers and CENN mailing network about the planned public consultation meeting. The note will contain information explaining where the disclosed reports could be observed, time and place of the planned consultation meeting, contact persons for submission of comments.

480. Contact person for grievance and comment collection is environmental and social specialist of MDF Medgar Tchelidze
E-mail : mchelidze@mdf.org.ge
Phone: 8.99.162221

IX. GRIEVANCE REDRESS MECHANISM

PIU (MDF in this particular case) has overall responsibility for project implementation and environmental compliance. The administrative bodies responsible for environmental protection are the Ministry of Environmental Protection and Natural Resources and the City Hall. The affected population and stakeholders may send their grievances, related to the project induced environmental impacts and nuisance to PIU or directly to the administrative bodies responsible for the environmental protection.

481. The MoE and city hall are obliged to respond to the grievances, which have been received from the population or other interested parties in accordance with the requirements of the Administrative Code of Georgia

482. However, the PIU will facilitate the response through implementing the following grievance redress mechanism. During the public consultation process, the PIU will inform the stakeholders and the public that PIU is responsible for environmental compliance and grievance redress. PIU will provide information on the public consultation meetings and post on the MDF web-site the contact details of the persons responsible for grievance collection and response. Upon receiving the grievance (in written or oral form) the PIU will carry out the following actions:

(i) send its representatives to check the claims and monitor the situation
(ii) involve MoE and City Hall when and where appropriate
(iii) receive expert's conclusion (from MDF personnel, independent experts or MoE/City Hall experts) submit an instruction on corrective measures to the construction company and the operator during 10 days after receiving the grievance inform the affected person or persons about the experts'
(iv) decision and corrective measures applied;
(v) If the affected person is not satisfied by the decision, they may present further information in support of new case. The subsequent decision of the PIU/MOE and Municipality is considered finally.

483. In case the affected stakeholder or person is not satisfied with the response, the grievance may be the directed to the court.

X. ENVIRONMENTAL MANAGEMENT PLAN

484. Institutional Framework for EMP Implementation

485. Construction Contractor shall be obligated by his contract to follow EMP and good construction practice. In order to meet this obligation, the Contractor shall have at least one environmental specialist in the team, who is able to fully understand the requirements of the EMP and professionally apply the envisaged mitigation measures to the contractor's daily operations. The construction contractor will also be required to prepare and implement his own Construction Phase EMP explaining in detail the action he will take to provide the mitigation set out in this IEE that is his responsibility.

486. The technical supervisor of works commissioned by MDF shall be responsible for establishing a strong field presence in the Project area and keep a close eye on the performance of works. Besides ensuring consistency with the design and ensuring quality of works, the supervisor is required to track implementation of the EMP by the contractor, reveal any deviations from the prescribed actions, as well as identify any unexpected environmental issues should they emerge at any stage of works.

487. MDF provides a general oversight on the environmental compliance of works through ensuring quality performance of the technical supervisor and of the contractor. MDF also liaises with ADB, ensures availability of all environmental information, and facilitates environmental supervision of the Project by ADB.

A. Reporting on EMP Implementation

488. The Contractor, will be required by the construction consultant to prepare monthly progress reports on the EMP implementation. Such reports shall be prepared by the Contractors environmental specialist and will contain information on the main types of activities carried out during the reporting period, status of any clearances/permits/licenses which are required for carrying out such activities, mitigation measures applied, and any environmental issues that have emerged in relations with suppliers, local authorities, affected communities, etc. Contractor's monthly progress reports shall be submitted to the technical supervisor and MDF.

489. The technical supervisor shall prepare monthly reports on the progress of EMP implementation and environmental performance of the contractor. These reports shall be based on the contractor's reports and will carry analysis of their contents. The technical supervisor shall assess how accurate is the factual information provided in the contractor's reports, fill in any gaps identified therein, and evaluate the adequacy of mitigation measures applied by the contractor. The technical supervisor shall highlight any cases of incompliance with EMPs, inform on any acute issues brought up by the contractor or revealed by supervisor himself, and propose corrective actions. Once approved by MDF the Technical Supervisor will instruct the contractor to implement the corrective action.

MDF shall ensure that monthly reports from the contractor and from the technical supervisor are made available for the environmental specialists of the Fund promptly after they are received by the MDF administration. The Fund, through its environmental specialists, shall report to ADB on the status of environmental compliance of construction works each quarter.

490. Such reports shall contain information on all violations identified and the actions taken to correct them. MDF shall inform the ADB on any major environmental issue at any time, independently from the schedule of regular reporting.

B. Monitoring

491. The monitoring plan for the project is summarized **in p.10.1** Monitoring measures include construction site supervision, verification of permits, monitoring of compliance of the contractor performance and specific monitoring of environmental impacts like: noise, dust, soil and water pollution and air emissions etc.

492. The technical supervisor of works commissioned by MDF is responsible to establish strong field presence in the Project area and keep a close eye on the course of works. Along with ensuring consistency with the design and ensuring quality of works, the supervisor is mandated to track implementation of EMP by the contractor, reveal any deviations from the prescribed actions, as well as identify any unexpected environmental issues should they emerge at any stage of works.

C. Budget for implementation of EMP

493. Most of the mitigation requires action by the contractor, which will be taken as part of the normal construction activities, the costs of which are estimated elsewhere. There are in fact very few other mitigation actions that need to be budgeted separately. Those that do require separate budgeting provision are:

494. The costs of environmental activities associated with the construction will be included in the contract for construction.

495. Construction contractor is obligated to follow EMP and good construction practice. In order to meet this obligation, a contractor shall have at least one environmental specialist on the team, who is able to fully understand recommendations of EMP and professionally apply prescribed mitigation measures to the contractor’s daily operations.

496. The total compensation costs (Offset Tree Felling Program) – 3 500 Gel.

497. Supervision over the implementation of the compensatory planting program will cost about 500 Gel. These costs should be incurred by Old Tbilisi District administration.

498. The Archaeological studies should be conducted by contractor via engaging appropriate organization. Estimated costs for these studies equal 2 000 GEL. These expenses should be considered in the Construction contract.

499. Costs of spoil and rock disposal 340 000 GEL.

500. Some not significant expenses are foreseen with respect to the following public consultation on the EIA and EMP and will be borne by the Contractor company.

D. Remedies for EMP Violation

501. MDF as PIU and Old Tbilisi Administration (OTA), as a client of construction works, shall be responsible for enforcing compliance of the contractor with the terms of the contract, including adherence to the EMP. For minor infringements, an incident which causes temporary but reversible damage, the contractor will be given 48 hours to remedy the problem and to restore the environment. If restoration is done satisfactorily during this period, no further actions will be taken. If it is not done during this period, another contractor shall be tasked to do the restoration, and the cost shall be deducted from the failed contractor's next payment

Environmental impact at the Construction Phase					
Impacts	**Sites**	**Mitigation Measures**	**Costs**	**Responsibility for Implementation**	**Responsibility for Monitoring and Enforcement**
Erosion from road cuts and fills and sedimentation of natural drainage ways. **Nature of impact**: long-term. Change of relief, drainage patterns, land clearance, may cause gradual but stabile intensification of erosion	Construction site	Installation of long-term drainage systems and anti-erosion structures. • reinstatement of relief, soil and vegetation cover • Installation of long-term drainage system and permanent monitoring. • Installation of sedimentation basins, seeding or planting of erodible surfaces as soon as possible • Increase the number of drain outlets. • Place drain outlets so as to avoid cascade effect. • Line receiving surface with stones, concrete. • Long-term monitoring and maintenance	Insignificant	Construction Contractor	Construction Contractor MDF.
Erosion stimulated from fresh road cuts and fills and temporary sedimentation of natural drainage ways. **Nature of impact: immediate**; Fresh road cuts may immediately trigger intensive erosion during construction and drastic increase of sedimentation	Construction site	**Mitigation strategy**: prevention through implementing temporary anti-erosion measures – temporary drainage, biomatting or geo-textile cover, berms etc. • Limitation of earth moving to dry periods. • Protection of most susceptible soil surfaces with mulch. • Protection of drainage channels with berms, straw or fabric barriers. • Installation of sedimentation basins	Insignificant	Constructing contractor	Constructing contractor MDF.
Erosion of lands below the road bed receiving concentrated outflow from covered or open drains	Construction site	• Increase the number of drain outlets. • Place drain outlets to avoid cascade effect. • Line receiving surface with	Insignificant	Constructing contractor	Constructing contractor MDF.

		stones, concrete.			
Topsoil losses due to improper storage and handling	Construction site	**Topsoil Protection** The topsoil will not be handled by Contractor when the following conditions are observed: • The topsoil is frozen; • The site is experiencing persistent rainfall; • The topsoil is saturated; or • Handling will damage the structure of the topsoil. • Keep topsoil storage standards	Insignificant	Constructing contractor	Constructing contractor MDF.
Increased suspended sediment in streams affected by erosion at construction sites and fresh road cuts, fills and waste dumps. Declined water quality and increased sedimentation **Character of impact**: immediate; Fresh road cuts may immediately **trigger** intensive erosion during construction and drastic increase of sedimentation	Construction site	**Mitigation strategy**: prevention through implementing temporary anti-erosion measures – temporary drainage, temporary sediment catchments etc. • Protect susceptible surfaces with r fabric, • Establishment of retention ponds to reduce sediment loads before water enters streams	Insignificant	Constructing contractor	Constructing contractor MDF.
Soil and water contamination during construction by oil, grease, fuel and paint	Construction site	• Collect and recycle lubricants. Store the lubricants and fuel residue in special room. Use impermeable tray for placing lubricant containers. • Avoid accidental spills through good practice. • Avoid refueling near watercourses; Ensure proper maintenance of equipment and fueling of the vehicles and	Insignificant	Constructing contractor	Constructing contractor MDF.

		machinery. • Check vehicles (leaking of fuel etc.) • Organize and cover material storage areas; • Isolate concrete, earthwork and other works from water courses by using sealed formwork; • Isolate wash down areas of cement and gravel trucks and other equipment from water courses by selecting areas for washing that are not free draining directly or indirectly into water courses;			
Poor sanitation and solid waste disposal in construction camp and work sites (sewerage, sanitation, waste management) .	Construction site	Provide adequately located and maintained waste disposal facilities (containers). Contract municipal waste operators for disposing the household waste, garbage and small amounts of nonhazardous construction waste etc. .	Insignificant	Constructing contractor	Constructing contractor MDF.
Construction wastes. Disposal of excess soil and rock. Certain part of the cut material (soil and rocks) should be disposed of Spoil Demolition of old pavement Concrete and metal constructions	Construction site Asphalt and rocks demolition area; Landfill	Assess and, if required, develop a spoil and rock disposal plan Provide for disposal facilities agreed with Regional Services of MoE Transport any further material to the nearest spoil disposal sites agreed with the regional services of MoE and/or municipal services. The main purpose is not to damage valuable landscapes or soil deposits and other ecological sensitivities. For the rock disposal licensed landfill can be used. All waste from the construction site will be disposed of in accordance with the local environmental regulations and on the sites approved by the environmental authority. The demolished asphalt and rocks	340 000 Lari	Constructing contractor	Constructing contractor MDF. MoE

		should be reused.			
Noise pollution from vehicle operation during construction in the populated areas traversed by the highway, Local noise.	Construction site	Install and maintain mufflers on equipment. Routine maintenance shall be done to a high standard to ensure that vehicles are safe and that emissions and noise are minimized. All the plants used on site will be regularly maintained so as to be in good working order at all times to minimize noise. Prohibit night works near the settlements	Insignificant	Constructing contractor	Constructing contractor MDF.
Air pollution from vehicle operations during construction in the populated areas traversed by the highway, Local dust	Construction site Access roads	• Require adherence to engine maintenance schedules and standards (or use alternative fuels) to reduce air pollution. • Periodically water down or lightly oil temporary roads. • Enhance public transportation and traffic management capability. Cover trucks carrying cement and/or gravel; Wet or cover trucks carrying stone/ sand/ gravel; Haul materials in off peak traffic hours.	Insignificant	Constructing contractor	Constructing contractor MDF.
Infrastructure. The main infrastructure element that could be affected are the power transmission lines, water supply systems and irrigation pipes and channels..	Construction site	**Protection of infrastructure.** Replace the affected infrastructure elements Permanent monitoring during construction. Full reinstatement in case of damage	Including in project budget	Constructing contractor	Constructing contractor MDF. City Development Department
Construction Camp Site The potential impacts related to the construction and operation of the camp	Construction site	• Proper waste management. • Arrange the sewerage according standards. • Pollution prevention strategies: proper	Insignificant	Constructing contractor	Constructing contractor MDF.

can be summarized as follows: • Clearance of vegetation cover during camp construction • Potential damage of topsoil • Contamination related to fuel storage and fuelling operations • Sewerage related contamination • Waste management		organization of fueling, waste management; • Proper storage of topsoil			
Creation of temporary breeding habitats for mosquito vectors of disease e.g. sunny, stagnant pools of water. Creation of stagnant water bodies in borrow pits, quarries, etc. suited to mosquito breeding and other disease vectors.	Construction site	Remove all created pools till spring-time. Reinstate relief and landscape.	Insignificant	Constructing contractor	Constructing contractor MDF.
Health hazards by noise, air emissions and dust raised and blown by vehicles during construction activities.	Construction site; Access roads	Dust control by application of watering. Use as minimum as 2 browsers; Noise control, installation of mufflers on equipment, daytime works;	Insignificant	Constructing contractor	Constructing contractor MDF.
Impacts on archaeological sites and remnants	Construction site	Permanent monitoring during land clearance and excavation activities. Stoppage and suspension of construction activities in case of archaeological findings. Completion of required archaeological works before restarting construction activities. Conservation of remnants	Insignificant	Constructing contractor	CAS represents Constructing contractor MDF.

biological recontamination during earthworks near pest-holes of soil infections (e.g. anthrax);	Construction site	Permanent monitoring during land clearance and excavation activities. Stoppage and suspension of construction activities in case of burial site findings. Notification to the local division of Veterinary Department. Veterinary clearance before start up.	Insignificant	Constructing contractor	Veterinary Department of the NSFSVPP Constructing contractor MDF.
Hazardous driving conditions where construction interferes with pre-existingroads	Construction site	Include in the design for proper markings and safety signs on roads, including lights. Instruct the drivers	Insignificant	Constructing contractor	Constructing contractor MDF.

Environmental impact during operation Phase					
Impacts	**Sites**	**Mitigation Measures**	**Timeframe**	**Responsibility for Implementation**	**Responsibility for Monitoring and Enforcement**
Flooding. Continuous rains maybe cause tunnel flooding	Tunnel	Permanently cleaning current drainage systems.	Budget of the local administration	Local government	Local government
Air pollution from vehicle operation in the tunnel	Tunnel	Arrange two ventilation columns of small diameter in every 100 meter at upper corner of the tunnel; (The mentioned issues should be decided by taking into consideration the implementation factors	Project Budget	Local government	MoE

		of territory). .			

I.1 Environmental Monitoring Plan (Matrix)

Construction Phase

Phase	**What?** (*parameter is to be monitored)*	**Where?** (is *the parameter to be monitored)*	**How?** (is the parameter to be monitored /type of monitoring equipment/?)	**When?** (*is the parameter to be monitored – frequency of measurement or continuously)*	**Why?** *(is the parameter to be monitored (reply is not obligatory))*	**Cost**	**Responsible Institution**
Whole construction period.	Dust and Air pollution (solid particles, suspended solids, flying heavy metal particles)	Construction site; Access roads; Cut asphalt and rocks crushing area.	Supervision	*Unannounced inspections; following complaints*	*Assure compliance with HSE requirements.*	*Minimal Included in supervision contracts*	Constructing Contractor MDF
Whole construction period.	*Vibration and Noise*	*Construction site;* Access roads Cut asphalt and rocks crushing area.	*Supervision*	*Unannounced inspections; following complaints*	*Assure compliance with HSE requirements.*	*Minimal Included in supervision contracts*	*Constructing Contractor* *MDF*
Whole construction period.	*Topsoil and subsoil management*	*Construction site,*	Observation	Once per week	Assure compliance	Minimal Included in supervision contracts	Constructing Contractor; MDF
Whole construction period.	Traffic safety/ Vehicle/ pedestrian access Visibility/ appropriate signs	Construction site, Access roads	Observation	Once per week	Assure compliance	Minimal Included in supervision contracts	Constructing Contractor; MDF
Whole construction period.	Material and waste storage, handling, use Water and soil quality (suspended solids, oils, etc)	Construction site; Material and waste storage sites;	Observation	During material delivery and periodically during construction (average 1/week), especially during precipitation (rain/ snow/ etc).	Assure pollution abatement; Assure compliance with, construction standards, environmental norms and EMP provisions;	Minimal Included in supervision contracts	Constructing Contractor; MDF;

Whole construction period.	Waste Management (Transportation and disposal)	Construction sites; Access Roads; Waste disposal areas.	Observation	Once per week	Assure pollution abatement; Assure compliance with, construction standards, environmental norms and EMP provisions	Minimal Included in supervision contracts	Constructing Contractor; MDF
Whole construction period.	Equipment maintenance and fuelling	Refueling and equipment maintenance facilities;	Observation	average 1/week,	Assure pollution abatement	Minimal Included in supervision contracts	Constructing Contractor; MDF
Whole construction period.	Impacts on archaeological sites and remnants	Construction site	Observation	Permanent/daily	Assure cultural heritage protection	Minimal	CAS represents. Constructing Contractor; MDF
Whole construction period.	biological recontamination during earthworks near pest-holes of soil infections (e.g. anthrax);	earthwork site	Observation	Permanent/daily	Assure health protection	Minimal Included in supervision contracts	Construction Field officer; Veterinary Department of the NSFSVPP
Whole construction period.	Protection of infrastructure elements	Construction site; Crossings of current infrastructure;	Observation	During construction activities at the site	Assure infrastructure protection and replasement	Minimal Included in supervision contracts	Constructing Contractor MDF
During Construction period	Reforestation. Eco-compensation Program	Recreation site	Observation	During Construction period	Assure offset of cut forests	Minimal Included in supervision contracts	Constructing Contractor; MDF
During Construction period	Disposal of construction wastes (Inert Waste)	work sites, used areas, Landfill	Observation	During Construction period	Ensure pollution prevention and landscape protection;	Minimal Included in supervision contracts	Constructing Contractor; MDF
Whole construction period.	Personal Protective equipment. HSE issues	Construction site Access roads	Inspection	Unannounced inspections during works	Assure compliance with HSE requirements	Minimal Included in supervision contracts	Constructing Contractor; MDF

Operation Phase

Phase	**What?** (*parameter is to be monitored)*	**Where?** (is *the parameter to be monitored)*	**How?** (is the parameter to be monitored /type of monitoring equipment/?)	**When?** (*is the parameter to be monitored – frequency of measurement or continuously)*	**Why?** *(is the parameter to be monitored (reply is not obligatory))*	**Cost**	**Responsible Institution**
Whole operation period	Permanent monitoring of the drainage systems quality	In and around the tunnel.	Observation	Quarterly	Suitability of current derange systems	Minimal	Local Administration
Whole operation period	Emissions control in the tunnel	In the tunnel	Observation; Sampling/analysis	Quarterly	Pollution abatement;	Minimal	MoE
Whole operation period							

XI. CONCLUSION AND RECOMMENDATION

502. The presented IEE document clearly shows that there would be positive as well as negative impacts on environment during construction and regular operation phases. The document describes mitigation measures for all negative impacts on environment together with related expenses that includes implementation of the mitigation measures as well as monitoring costs

503. The most significant positive impact of the completed project would be ensuring continuous traffic flow on the right bank of the river and hence, major reduction of emissions into air. Also, there will be reduction of noise, dust and vibration level, some of which presently exceed established norms, in the area surrounding the balnealogical resort.

504. Recreation zone would be established above the tunnel where it would be possible to create facilities for rest-entertainment of population, which would be a factor in attracting tourists: In the future there would be set up playgrounds, children's squares, action theater, exhibition halls, service facilities and etc. along river bank at lower level of the recreation zone. Besides, entrance to the river Mtkvari at this place will make it possible to arrange sport-entertainment activities on river Mtkvari,And to establish a marine for river boats.

505. There will be some Negative impact during the construction phase due to noise, dust and vibration level created by construction machinery. There are multitude common impacts of urban construction so there are well developed methods for that's mitigation.

506. Negative impact would be caused also by lowering the motor road by 6 meters, which would create threat of flooding during long rainy periods.
4. Although about 100-150 trees of 50-60 years of age would be cut during the construction phase and about 1,200 m^2 green area would be destroyed, it is planned to create 10,700 m^2 green area and to plant two times more trees and to ensure that 80% of the trees survive.

507. According to preliminary data there will be significant volumes of cut material (soil and stones or rocks) approximately 80 000 -85 000 m^3. Part of them will be reused and recycled and the other part will be disposed on the Iagluja landfill as inert waste

508. Financial condition of a few trade facilities would be deteriorated during the construction period, however their financial conditions would drastically improve compared to the without project situation after the construction is completed. In addition, the project implementing company would be given recommendation to hire local population (at least 50% of the employees) in case of willingness and required qualification. The project envisages also construction of parking lot for 200 cars and construction of 631 m^2 commercial area as well as various types of entertainment and resting centers, which would be positively reflected on social and economic condition of the population.

509. In spite of some negative impacts, which would be regularly monitored along with strict implementation of the mitigation measures, the project benefits significantly outweigh the negative impact.