Georgia: Regional Power Transmission Enhancement Project

Loan number: 2974-GEO

Initial Environmental Examination (IEE)

April 2013

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This initial environmental examination represents a document of the borrower. The views expressed herein do not necessarily represent those of ADB’s Board of Directors, Management, or staff, and may be preliminary in nature.
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CURRENCY EQUIVALENTS
(As of 1 May 2013)
Currency unit
1 GEL = 0.61 USD $
1 USD $ = 1.65 GEL

ABBREVIATIONS

ADB - Asian Development Bank
APA - Agency of Protected Areas
CEMP - Construction Environmental Management Plan
CSC - Construction Supervision Consultant
EA - Executing agency
EIA - Environmental Impact Assessment
EMP - Environmental Management Plan
ESIA - Environmental and Social Impact Assessment
GoG - Government of Georgia
GRL - Georgia Red List
GSE - Georgia State Electrosystem
IEE - Initial Environmental Examination
IEEE - Institute of Electrical and Electronics Engineers
IMO - Independent Monitoring Organization
KNP - Kolkheti National Park
LARP - Land acquisition and resettlement plan
NEA - National Environmental Agency
NGO - Non-governmental organization
PCB - Polychlorinated biphenyl
PIU - Project Implementation Unit (within GSE)
SCADA - Supervisory Control and Data Acquisition
SPS - Safeguard Policy Statement (of ADB, June 2009)
TL - Transmission line
UNFCCC - United Nations Framework Convention on Climate Change
A. EXECUTIVE SUMMARY

1. The Asian Development Bank (ADB) is providing technical assistance to the Government of Georgia (the Government) to support Georgian State Electrosystem (GSE) in assessing the viability of options to enhance power transmission capacity through various hardware and physical infrastructure improvements to rehabilitate and strengthen power transmission within Georgia, as well as provide the potential to eventually export power within the region.

2. The availability and reliability of GSE’s transmission infrastructure have been vastly improved for recent years as a result of intensive capital investment programs successfully implemented with the support of international financial institutions and donors.

3. The proposed project as described below is among the top investment priorities of GSE’s Strategic Development Plan 2012-2020 and, once implemented, will further enhance the reliability and stability of GSE’s transmission and interconnection infrastructure and remarkably improve the capability of cross-border energy exchange for export, import and transit.

4. The Regional Power Transmission Enhancement Project (the Project) comprises three main components: (i) substation rehabilitation and improvements (ii) construction of a new Khorga 220/110 kV substation and iii) consulting services. Only components i) and ii) involves activities that could have an impact on the environment.

5. At the first phase of the Project Initial Environmental Examination (IEE) has been prepared for new Khorga substation construction subproject. The new substation will be an important addition to the transmission system in western Georgia. It will guarantee stable transmission of energy produced at Enguri hydropower station to the western region of Georgia, especially to the industrial zone of Poti and to Turkey through Batumi Substation. The document was approved in Sep 2012 by ADB.

6. The second phase of the Project comprises three main components: (i) complete rehabilitation of 500kV substation Ksani, (ii) rehabilitation/expansion of existing Marneuli substation, and (iii) supply of 125MVA autotransformer for substation Menji, is to ensure safe and improved power supply to the east part of Georgia, especially Tbilisi metropolitan area and Kvemo Kartli Region, increase the reliability of entire power system of Georgia and facilitate power export/import/transit and regional trade operations with neighboring countries.

7. During the second phase, for the compliance with ADB’s requirements for environmental assessment, an Initial Environmental Examination has been prepared for these three components. The IEE assesses the existing environmental conditions in the project areas; assesses the proposed location, design, construction and operation activities and evaluates their potential impacts; proposes appropriate mitigation and monitoring measures that are incorporated into an Environmental Management Plan that when implemented will ensure that potential adverse impacts are avoided or minimized so that residual impacts are reduced to acceptable levels.
8. The IEE is based on secondary sources of information, field inspection and information gathered during community and stakeholder consultations.

9. The present document is an updated version of approved IEE prepared for the first phase of the Project. Background information of this IEE is based on the approved IEE for new Khorga substation construction project. The present document consists of description of 4 substations: Menji SS, Khorga SS, Marneuli SS and Ksani SS. The proposed substation sites are located at following areas:

1. Menji substation – The project area is located on the territory of Senaki Municipality in Samegrelo-Zemo Svaneti administrative region;
2. Khorga substation - The project area is located on the territory of Zugdidi Municipality in Samegrelo-Zemo Svaneti administrative region;
3. Marneuli substation - The project area is located on the territory of Marneuli Municipality in Kvemo Kartli administrative region;
4. Ksani Substation - The project area is located on the territory of Mtskheta Municipality in Mtskheta-mtianeti administrative region

A.1 POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

10. According to the law of Georgia on Permit on Environmental Impact (2008) the Ksani and Menji substations subprojects do not require preparation of EIA and obtaining of Permit on Environmental Impact. For Khorga and Marneuli substations subprojects according to Georgian legislation, preparation of Environmental Impact Assessment document and obtaining of the respective permits are required.

11. For Khorga SS, EIA has been already prepared and submitted to Ministry of Environment, with public consultations and all requirements under the legislation of Georgia conducted and met. Together with other necessary documents, this EIA for Khorga substation shall be submitted to the Ministry of Economy and Sustainable Development to obtain a Construction Permit for 220/110kV Substation Khorga before the start of construction activities. Ecological expertise and approval of the EIA by the Ministry of Environment is a part of the procedure of, and necessary pre-condition for, the issuance of the Construction Permit. The same procedure shall be applied for Marneuli SS sub-project.

12. Following ‘Environmental Considerations in ADB Operations’ of September 2006, the Project can be considered to be a Category B project requiring an Initial Environmental Assessment (IEE).

ADB Environmental Guidelines

13. 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.
14. 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.

15. ADB’s safeguard policy statement (SPS) sets out the policy objectives, scope and triggers, and principles for three key safeguard areas:
   - The Involuntary Resettlement Policy (1995);
   - The Policy on Indigenous Peoples (1998), and

A.2 Project Description

16. The Project activities include:
   1. Complete rehabilitation of 500kV substation Ksani, including HV primary equipment, relay protection and control;
   2. Rehabilitation and expansion of Marneuli substation with 500/220/10kV bays (six 500kV bays and one 220kV bays), including:
      - 501MVA autotransformer (3x167MVA +1x167MVA);
      - connection to existing 220kV part of Marneuli substation via 220kV line (about 400m);
      - Realignment of existing 500kV lines Vardzia and Mukhrani to ensure looping in and looping out of 500/220/10kV substation.
   3. Supply of 125MVA autotransformer for 220/110kV substation Menji.

A.3 Description of the Environment (Baseline Data)

Physical Resources

17. Georgia is a country in Caucasus, Eurasia, at the Black Sea coast. Georgia is situated at the crossroad of South-East Europe and West Asia and it is a transcontinental country by its location although it is part of Europe by its socio-political situation and culture. Area of the country is 69,700 km². Administratively there are 12 administrative units. Each administrative unit is divided into Municipalities (64 municipalities in total).

Air Quality

18. Air Quality. Ambient air quality monitoring is conducted at only seven locations in Georgia. None of these are located in project areas. The nearest air monitoring substation is located in t. Rustavi in 10 km from the project territory of Marneuli substation. Proceeding from all of the above mentioned, air quality at all of the construction/rehabilitation sections is satisfactory, because these zones are not located in the area of intensive traffic or industrial territories.
Climate

19. The climate of Georgia is extremely diverse which is directly linked to the country’s location: the juncture of subtropical zone, Aral-Caspian arid climate regions and continental plains of Asia. Likhi Range determines the contrast of climate conditions of various parts in Georgia. Climate in the west Georgia is humid subtropical, however in east, it is dry and mild humid-subtropical, but the south part of the country is mainly characterized by the continental climate. The Black Sea and the Greater Caucasus Mountain Range mainly influence the formulation of the countries’ climatic conditions which create so called barrier thus protect the country from cold wind masses from the north.

Radiation Background

20. Radiation screening has been undertaken for the assessment of radiation baseline. Measures were taken on 10-17th April 2013 with the use of standard certified Russian device “Radex”. At all sites area the background radiation was 1014 micro-roentgen/hour.

Noise Background

21. Background noise levels were identified in all project areas. Measures were taken on 10-17th April, 2013 using standard certified device “Digital Millimeter MS6229”. Background noise was 60-65 Db.

Surface water

General Description

22. Georgia is rich in water resources. 26060 rivers flow within Georgia with total length reaching 26 thousand km. The majority of these rivers (99, 4 %) are characterized with short length (less than 25 km).

23. Water resources are unequally distributed and are mainly located in the western part of the country. Georgian rivers belong to two water catchment basins, which are divided by Likhi ridge. About 18109 rivers belong to the Black Sea water catchment basin – it is 70 % of the rivers of Georgia. 7951 rivers are included in the Caspian Sea water catchment basin (30 %). 555 rivers of the Black Sea basin and 528 of the Caspian Sea basin have been studied in hydrological terms.

Underground and Thermal Waters

24. Georgia is one of the richest countries in the world in terms of ground fresh water resources. Georgia exceeds the global characteristics for 2.5 times (in average) per capita. The full ground resources of Georgia have not been identified yet. The ecological condition of the waters has not been determined as well.
25. The construction/rehabilitation sections of the sub-projects discussed in the document are located in the below hydro-geological zones:

- Substation Khorga located on Artesian basin zone of Georgian belt - Porous, fractured and fractured/karstic artesian basin of Kolkheti;
- Menji substation located on Artesian basin zone of Georgian belt - Porous, fractured and fractured/karstic artesian basin of Kolkheti;
- Ksani substation located on Zone of pressured water systems of Adjara-Trialeti fold mountain zone - Fractured and fractured/karstic pressured water system of Tbilisi;
- Marneuli substation located on Artesian basin zone of Georgian belt - Porous and fractured water artesian basin of Marneuli-Gardabani.

**Geology/Seismology**

26. Despite its small area, Georgia presents one of the most varied topographies within its geographical boundaries. Georgia lies mostly in the Caucasus Mountains, and its northern boundary is partly defined by the Greater Caucasus range. The Lesser Caucasus range runs parallel to the Turkish and Armenian borders and the Surami and Imereti ranges connect the Greater Caucasus and the Lesser Caucasus, create natural barriers in the region.

27. According to the construction norms and rules of “Seismologically Prooved Construction” (Cl. 01. 01-09), rehabilitation/construction sections are located within 8 score seismic zone.

**Ecological Resources**

28. All rehabilitation/construction sections are located in areas under significant anthropogenic press. Due to expansion of economic activities and long anthropogenic impact fauna and flora of the project territory has significantly decreased both in terms of species and quantities.

29. According to the project, only rehabilitation of the existing infrastructure within the current substation areas will be undertaken for two sub-projects (Ksani and Menji).

30. The expansion of Marneuli substation is planned. 87 000 m² of new land will be added to the area. The land is used as pasture now. The mentioned area is under severe impact of permanent grazing and the biodiversity is almost entirely modified.

31. Construction of new substation of Khorgi will be undertaken on agricultural land, which is also entirely modified section in terms of biodiversity as a result of long economic activities.

32. No tree cutting is planned within the project zone within the mentioned project. The adjacent areas are very poor in terms of flora and fauna. Hence, rehabilitation/construction and exploitation period should not involve any significant impact on wildlife.
Protected areas

33. As the map of the protected areas of Georgia shows (Map 16), none of the rehabilitation/construction sections of the project are located near the protected areas. The closest zones are in the below distances from the protected areas:

1. The nearest protected area - Kolkheti National Park – is located at 5-6 km distance from Khorgi substation;
2. The nearest protected area - Kolkheti National Park – is located at 8-10 km distance from Menji substation;
3. The nearest protected area - Tbilisi National Park – is located at 15-17 km distance from Ksani substation;
4. The nearest protected area - Gardabani Managed Reserve - is located at 10-12 km distance from Marneuli substation.

A.4 Anticipated Environmental Impacts and Mitigation Measures

Construction Phase

34. When construction will start all project activities will be restricted to the property of GSE. In Menji and Ksani all of the rehabilitation/construction measures will take place within buildings and caverns of the substations.

35. In Marneuli the new area for extension would cause a blockage to the existing local road. Construction of a by-pass is required (See “Resettlement Action Plan for Marneuli Subproject”). Some side effects can impact areas far away from the Substation sites:

- Collection, transportation and treatment the used oil in Ksani and Menji substations;
- Disposal of scrap metals, porcelain and oil impregnated paper in Ksani and Menji substations;
- In Marneuli access road to the object and sheep driving route coincide and about 200 000 sheep will pass in the vicinity of Marneuli substation project area twice a year;
- Disposal of construction and municipal wastes;
- Increased truck movements during construction period also through inhabited areas in Marneuli;
- Increased quarrying activities for Marneuli and Khorga substations;
- Wastewater will arise from domestic sewage from site workers.

36. The following impacts are also typical from rehabilitation/construction activities:

- Noise and emissions of harmful substances;
- Soil pollution;
- Water pollution
37. These impacts can be reduced by a variety of measures and good international practices, many of which are common in most urban construction. These include:

- Construction and municipal wastes have to be treated or disposed of in an environmental sound manner;
- Use of defined, well planned routes and reductions in vehicle speed where required;
- Fuel, oil and hazardous materials will be stored in designated areas with temporary impermeable bunds at distance of at least 100 m from any water course;
- The representative of the infectious disease service of the disease control center should be present during the land work, the process of substation extension (widening) and installation of new poles;
- The exploration of the borrow pits should be conducted by the licensed companies;
- The collection, transportation and treatment of used oil should be conducted by the licensed companies (see “Used Oil Management Plan”).

**Operational Phase**

38. There are some potential environmental impacts during operation period:

- Oily waste water of the substation from overhauling transformers or accidental leakage and blows off;
- There is public and scientific concern over the potential health effects associated with exposure to electric and magnetic fields (EMF);
- Typical impacts for rehabilitation and repairing activities;
- Impacts from uncontrolled Disposal of municipal wastes;
- Main positive impacts during operation of the Project will be a more reliable power supply within the Georgia, including export to Turkey.

39. These impacts can be reduced by a variety of measures:

- The mitigation measure to address EMF exposure is to follow international good practice by adhering to the principle of “prudent avoidance”;
- Professional trained technicians will conduct routine operation during operation period of the Project. Similar to the construction phase, the operating personnel would not generate inflict with locals in employment and culture.

**A.5 Analyses of Alternatives**

40. Only Khorga subproject comprises the construction of a new substation from the four
substations included in the project. Other three subprojects deal with rehabilitation and extension of the existing substations. Hence, only no-project alternative was discussed.

41. The proposed projects as described below is among the top investment priorities of GSE’s Strategic Development Plan 2012-2020 and, once implemented, will further enhance the reliability and stability of GSE’s transmission and interconnection infrastructure and remarkably improve the capability of cross-border energy exchange for export, import and transit.

42. It should be noted that the level of negative impact on the environment as a result of the project is not high. All project territories are located in urban areas with significant anthropogenic impact.

43. Proceeding from all of the above mentioned, the economic effect from the project significantly exceeds the negative impact on the environment as a result of the project.

**A.6 Information Disclosure, Consultation, and Participation**

44. The following public consultations were conducted under the Khorga subproject:

- On 8th April 2011 a meeting was held by social safeguards specialist from GSE, the Project’s resettlement and environmental specialists, and representatives of various offices/departments of the Khobi Municipality and also Gamgeoba/village Rtsmunebuli (authority);
- The village Rtsmunebuli was requested to organize a meeting with the land users. This consultation was undertaken on 13th of April 2011.

45. For the subprojects – Ksani, Marneuli and Menji substations, most of the main stakeholders have already been identified and consulted during preparation of this IEE (see annex III).

**A.7 Grievance Redress Mechanism**

46. As the work is being done in inhabited areas, most of the impacts are construction related, and therefore it is anticipated that improper or inadequate implementation of EMP may lead to disturbance and inconvenience to local people during construction. In order to provide a direct channel to the affected persons for approaching project authorities and have their grievance recorded and redressed in an appropriate time frame, GSE will establish a Grievance Redress Mechanism. A Complaint Cell and a Grievance Redress Committee will be established in local municipality levels to function throughout the construction period.

**A.8 Environmental Management Plan**

47. Within the IEE an Environmental Management Plan (EMP) has been developed. It contains mitigation and monitoring measures mainly for the construction phase. Main focus was given to the generated big amount of used oil. It is recommended to monitor regularly the
implementation of the proposed mitigation measures during the whole construction period with special focus to proper management of the oil (removal, transport, treatment).

48. GSE, as responsible PIU for the project, will recruit a Construction Supervision Consultant. The national and international team of consultants will assist GSE as project supervision consultant on the rehabilitation/construction of the substations. The Consultant will also provide capacity building training to construction contractor staff for project management and operation and maintenance. The Consultant will assist GSE in assuring that the project is implemented according to the specified standards.

49. The Construction Supervision Consultant (the Consultant) being also responsible for supervision of all environmental issues shall prepare quarterly reports including the progress of the implementation of the EMP. These reports shall be submitted to GSE and distributed to all involved departments. The report shall contain all discrepancies from the EMP and list all HSE relevant incidents and accidents that occur during the implementation of the refurbishment measures. Based on these reports and on own regular construction site audits the Consultant together with GSE/PIU will prepare semi-annual performance and monitoring reports and submit them to ADB.

50. The EMP identifies actions for environmentally sound implementation of the Project through avoidance and/or mitigation of adverse effects.

51. 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 a reference document for the environmentally sound implementation of the Project.

A.9 Conclusion and Recommendation

1. The Regional Power Transmission Enhancement Project will generate only minor environmental impacts that can be reduced to acceptable levels through implementation of practical mitigation measures normally associated with internationally recognized good engineering practice. Key findings of the IEE are summarized below.

2. No significant natural habitats will be affected by the Khorga, Ksani, Marneuli and Menji substations development due to its location within an area where the natural habitat has been highly modified by recent agricultural activities and human settlement.

3. The Khorga substation site has been selected to avoid environmentally sensitive areas, villages, settlements and religious and cultural/heritage sites and to avoid significant social impacts and costs associated with land acquisition and resettlement.
4. The impact of the substation site on agricultural land is limited and comprises the loss of 13.5 ha of low lying state-owned land that has hitherto been leased informally to local farmers. Compensation for the loss of agricultural production by informal lessees will be paid to project affected people according to the Land Acquisition and Resettlement Plan.

5. The design of Marneuli substation area will cover 3 land plots, with two of them owned privately (one of them is owned by a private person and another one is owned by LTD “Firm Lomtagora”) and the last one owned by the state. The total area of the land area to be purchased to build the substation is 48,373m² with 23,861 m² to be purchased from private owners and 24,514 m² to be purchased from Company Ltd. LOMTAGORA.

6. For Marneuli substation, full EIA shall be prepared, with public consultations and all requirements under the legislation of Georgia conducted and complied with. Together with other necessary documents, the EIA shall be submitted to the Ministry of Economy and Sustainable Development to obtain a Construction Permit before the start of construction activities.

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

8. It is considered that the project will contribute positively to the economic development of the Country through:
   - Improved functionality of the national grid
   - Improved reliability and security of power supply to the region
   - Meet the increased power demand of the regions
   - Guarantee transmission of energy to Turkey

9. Based on the analysis conducted in this assessment it is concluded that overall the Project will result in significant positive socioeconomic benefits, and those potential negative environmental impacts that have been identified are small-scale and localized, and can be minimized adequately through good design and the appropriate application of mitigation measures. It is therefore recommended that the Project be supported by ADB.
B. POLICY LEGAL AND ADMINISTRATIVE FRAMEWORK

ADB Policies

52. The IEE has been carried out to ensure that potential adverse environmental impacts are addressed according to the Asian Development Bank Safeguard Policy Statement, June 2009.

53. The ADB’s Safeguard Policy Statement, June 2009 has been used to classify the sub-project as a Category “B” project which requires an IEE.

B.1. Administrative Structure in Georgia

54. Ministry of Environment Protection (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 kinds 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. 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:

- Issuing permits for project development (Environmental Impact Permit)
- Setting emission limits and issuing surface water intake and discharge consents
- Inspection of operating plants
- Responding to incidents and complaint
- MoE is responsible for monitoring air pollution and noise levels (especially near residential areas)

55. The Ministry defines and evaluates real and possible risk of impact on natural environment during implementation of different types of activities. Accordingly the Ministry has been assigned as responsible body for making decision on granting permission to the proponent on implementation of projects, which require Environmental Impact Assessment (EIA). Granting procedures slightly differ for different type of projects.

56. For the projects, which do not require Construction Permit, the Environmental permit is being issued by the MoE on the ground of State Ecological Examination. State Ecological Examination is carried out by MoE upon official submission of Environmental Impact Assessment (EIA) prepared by project developers.
57. For projects requiring 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 the issuance of the Permit is subject to the consent of the MoE in a 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 Environmental Permit.

58. 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 administrative proceedings initiated for the purpose of permit issuance, in accordance with Georgia’s Law on Licenses and Permits.

59. 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) 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 of the Ministry of Environment Protection and Natural Resources is considered a desired practice.

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

61. The Ministry of Economic Development (MoED). MoED is responsible for carrying out the review of technical documentation (including conclusion of an independent experts) and issuing Permits on Construction for projects classified as the projects of Special Importance, as well as for supervision over constructing activities and for arranging Acceptance Commission after completion of construction.

62. 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.

63. JSC Georgian State Electrosystem (GSE). GSE is responsible for elaboration of policy and strategic plans related to developing energy infrastructure facilities, management construction, rehabilitation, reconstruction and maintenance of the infrastructure of public use of international and national significance, utilizing funds from the state budget, lawns, grants and other financial sources.

**Constructing Contractor**

64. After appointment all Constructing Contractors should provide Constructing Contractor’s Environmental Management Plan (EMP) developed on the basis of the IEE and EIA 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:

- To employ Environmental consultants (persons or company) responsible for developing and implementing the construction phase EMP and for provision of corresponding information to MDF;
- To develop, if required, a Spoil Disposal Plan and Construction Waste Disposal Plan agreed with the MoE and Local government;
- Construction Schedule;
- The EMP implementation costs should be included into the construction budget.

Other Responsible Governmental Institutions:

65. **The Ministry of Culture.** The ministry is responsible on supervision of the construction activities in order to protect archaeological heritage. In case if construction is to be carried out in a historic sites or zones of cultural heritage, consent of the Ministry of Culture is also required for issuing construction permit (If such is necessary).

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

[Note: Governmental institutions responsible for technical supervision and compliance with the design documentation and construction standards are described in Design Documentation and are not subject for EIA or EMPs].

**B.2 Legislation**

**B.2.1 Framework Legislation**

67. 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.

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

69. 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.

70. Legislative execution of constitutional requirements in the sphere of environmental protection is implemented through framework Georgian "Law on Environmental Protection" (1996, as amended) and the set of specific laws developed on its basis. The framework law regulates the legal relationship between the bodies of the state authority and the physical persons or legal entities (without distinction-legal form) in the scope of 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 and standards. EIA and related issues considers different aspects: protection of ecosystems, protected areas, global and regional management, protection of ozone layer, biodiversity, protection of Black Sea and international cooperation aspects. In particular, the law addresses 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. According to the requirements set forth in the framework law, numerous laws and normative–legal documents were adopted to regulate specific environmental issues in Georgia. Further below the environmental regulations most relevant to the project – and first of all, to the permitting process – are described.

B.2.2 Other Environmental Laws

71. 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.

72. 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.).
73. **Waste Management.** The following acts of the Ministry of Labor, Health and Social Protection of Georgia define the waste management rules to be met during the project:

74. 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);

75. 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);

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

76. 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 workplaces. 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.

77. Types of harmful human impact include:

- Introduction of pollutants into the ambient air;
- Radioactive impact on ambient air;
- Ambient air pollution with micro-organisms and microbial toxins;
- Physical impact of noise, vibration, electromagnetic field, etc on ambient air.

78. Types of ambient air pollution are specified:

- Emission of pollutants into the ambient air from stationary pollution source;
- Emission of pollutants into the ambient air from mobile sources of pollution;
- Emission of pollutants into the ambient air from non-point sources of pollution;
- Emission of pollutants into the ambient air from small-scale sources of pollution.

79. According to the Article 29¹, 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.

80. 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.

81. Registration of emissions from stationary pollution sources comprises:

- Self-monitoring of emissions;
- State emission registration system.

82. 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:

- emission measurements (assessment)
- registration of emissions
- reporting of emissions

83. 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.

84. 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.

85. 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.

84. According to Article 10 of the Law,

86. 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.
87. 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.

88. The Red List of Georgia was approved by the Presidential Decree No. 303 ‘On approving the Red List of Georgia’ (May 2, 2006)

89. 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.

90. 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.

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

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

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

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

**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

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

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

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

**Article 10.** The rule to estimate the environmental damage caused from the pollution of water resources.

91. The ‘Law of Georgia on Cultural Heritage’ was approved in May of 2007. Article 14 of the Law specifies the requirements for ‘large-scale’ construction works. According to this Article, a decision on career treatment and ore extraction on the whole territory of Georgia, as well as on construction of an object of a special importance as it may be defined under the legislation of Georgia, is made by a body designated by the legislation of Georgia based on the positive
decision of the Ministry of Culture, Monument Protection and Sport of Georgia. The basis for the conclusion is the archeological research of the proper territory to be carried out by the entity wishing to accomplish the ground works. The entity wishing to do the ground works is obliged to submit the Ministry the documentation about the archeological research of the territory in question. The preliminary research should include field-research and laboratory works. In case of identifying an archeological object on the territory to study, the conclusion of the archeological 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, on the basis of the archeological research.


92. Article 9. Rules regulating the economic activity within the coast protection zone:

(1) The body issuing a building permit within the zone of coast engineering protection is obliged to engage the Ministry in the permit issuing process as a concerned administrative body and send it proper documentation for the obligatory conclusion.

(2) The construction project of buildings and premises within the zone of coast engineering protection should envisage the compensation amounts for the expected coastal damage.

(3) Extraction of inert material within the zones of strict supervision of sea, water reservoir or river is prohibited, unless this is done for the purposes of coast-formation or control of streams.

**B.3 International Conventions and Agreements**

93. Georgia is a party to the following environmental protection conventions and agreements:

- UN Framework Convention on Climate Change;
- UN Framework Convention on Climate Change Kyoto Protocol;
- Montreal Protocol on Substances That Deplete the Ozone Layer (also London, Copenhagen and Montreal revisions);
- Vienna Convention for the Protection of the Ozone Layer;
- Geneva Convention on Long-range Trans-boundary Air Pollution;
- Ramsar Convention on Wetlands of International Importance, especially as Waterfowl Habitat;
- UN Rio de Janeiro Convention on Biological Diversity;
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES);
- Convention on Migratory Species;
- Paris Convention on the Protection of World Culture and Natural Heritage;
- European Archaeological Heritage Convention; and

B.4 Environmental and Social Requirements of the ADB

B.4.1 The Asian Development Bank’s (ADB) Safeguard Policy

ADB Environmental Guidelines

94. 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.

95. 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.

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

- The Involuntary Resettlement Policy (1995);
- The Policy on Indigenous Peoples (1998), and

97. 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.

98. 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.

99. 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.
EIA and Environmental Screening under ADB Guidelines

100. 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.

101. 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).

102. **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.

103. **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.

104. **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) 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.

**Environmental Impact Assessment**

105. 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

**Public consultation**

106. 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.

107. For policy application, 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; (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.

108. According the ADB policy public consultation process should:

(i) Describes the process undertaken during project design and preparation for engaging stakeholders, including information disclosure and consultation with affected people and other stakeholders;
(ii) Summarizes comments and concerns received from affected people and other stakeholders and how these comments have been addressed in project design and mitigation measures, with special attention paid to the needs and concerns of vulnerable groups, including women, the poor, and Indigenous Peoples; and
(iii) Describes the planned information disclosure measures (including the type of information to be disseminated and the method of dissemination) and the process for carrying out consultation with affected people and facilitating their participation during project implementation.

B.5 Comparison of the National legislation and ADB Requirements

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

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

111. Considering ecological risk, cultural heritage, resettlement and other factors, the Bank classifies projects supported by them under categories A, B, C and FI. However in the Georgian legislation, EIA is carried out only if a developer seeks to implement projects listed in the Law on Environmental Impact Permit. This list is compatible with the category A projects of the Bank classification. According to the Georgian legislation EIA is not required in other instances, while Asian Development Bank guidelines requires limited EIA or IEE for the B category projects, and an environmental review of projects that are not expected to produce environmental impacts (category C).

112. Georgian legislation does not specify the format of environmental management plans (EMPs) and the stage of their provision for projects requiring EIA and does not require EMPs for projects not requiring EIAs. The Asian Development Banks guidelines require EMPs for all categories of projects and provides detailed instructions on the content.
113. According to Georgian legislation MoE is responsible for monitoring of project implementation and compliance with the standards and commitments provided in the EIA, and the role of the EMP is less clearly defined. The PIU or “Project Proponent” is responsible for implementing “self-monitoring” programs for projects requiring EIA. In contrast ADB guidelines stress the role of EMPs, which are important for all categories of projects, and the Project Proponent (in our case – GSE) is required to ensure inclusion of a monitoring scheme and plans into EMPs. Monitoring of performance compliance against EMPs is important element of ADB requirements.

114. The national legislation also does not take into account the issue of involuntary resettlement at any stage of environmental permit issuance. The Georgian legislation considers social factors only in regard to life and health safety (e.g. if a project contains a risk of triggering landslide, or emission/discharge of harmful substances or any other anthropogenic impact). While the Bank’s document establishes the responsibility of a Borrower for conducting an environmental assessment, the national legislation provides for the responsibility of a project implementing unit to prepare EIA and ensure public consultation.

115. The role of the Ministry is restricted to participation in EIA consultation and carrying out state ecological examination required for the adoption of a decision on issuing an EIA permit as established under the legislation of Georgia. Under ADB regulations ADB carry out project screening and categorization at the earliest stage of project preparation when sufficient information is available for this purpose, also according ADB’s Public Communications Policy, ADB is committed to working with the borrower/client to ensure that relevant information (whether positive or negative) about social and environmental safeguard issues is made available in a timely manner.

116. 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>
<thead>
<tr>
<th>#</th>
<th>Action</th>
<th>Georgian Legislation</th>
<th>ADB Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Screening</td>
<td>Project Proponent in consultation with MoE</td>
<td>Bank and Consultant hired by Project Proponent</td>
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<tr>
<td></td>
<td>Scoping</td>
<td>Draft EIA</td>
<td>Public Consultations</td>
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<td>2</td>
<td>Not required. Could be conducted voluntarily by Project Proponent.</td>
<td>To be prepared by Environmental Consultant.</td>
<td>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.</td>
</tr>
<tr>
<td>3</td>
<td>Obligatory. Bank and Consultant hired by Project Proponent</td>
<td>To be prepared by Environmental Consultant.</td>
<td>At least two consultations for Category A projects – one at the scoping stage and one for the draft EIA.</td>
</tr>
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**B.6 Harmonization of the ADB and Georgian Legislation Requirements**

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

Introduction

118. The Asian Development Bank (ADB) is providing technical assistance to the Government of Georgia (the Government) to support Georgian State Electrosystem (GSE) in assessing the viability of options to enhance power transmission capacity through various hardware and physical infrastructure improvements to rehabilitate and strengthen power transmission within Georgia, as well as provide the potential to eventually export power within the region.

119. The proposed project as described below is among the top investment priorities of GSE’s Strategic Development Plan 2012-2020 and, once implemented, will further enhance the reliability and stability of GSE’s transmission and interconnection infrastructure and remarkably improve the capability of cross-border energy exchange for export, import and transit.

120. The Regional Power Transmission Enhancement Project (the Project) comprises three main components: (i) substation rehabilitation and improvements (ii) construction of a new Khorga 220/110 kV substation and iii) consulting services. Only components i) and ii) involves activities that could have an impact on the environment.

121. At the first phase of the Project Initial Environmental Examination (IEE) has been prepared for new Khorga substation construction subproject. The new substation will be an important addition to the transmission system in western Georgia. It will guarantee stable transmission of energy produced at Enguri hydropower station to the western region of Georgia, especially to the industrial zone of Poti and to Turkey through Batumi Substation. The document was approved in Sep 2012 by ADB.

122. The second phase of the Project comprises three main components: (i) complete rehabilitation of 500kV substation Ksani, (ii) rehabilitation/expansion of existing Marneuli substation, and (iii) supply of 125MVA autotransformer for substation Menji, is to ensure safe and improved power supply to the east part of Georgia, especially Tbilisi metropolitan area and Kvemo Kartli Region, increase the reliability of entire power system of Georgia and facilitate power export/import/transit and regional trade operations with neighboring countries.

123. The present document is an updated version of approved IEE prepared for the first phase of the Project. Background information of this IEE is based on the approved IEE for new Khorga substation construction project.

124. The IEE is intended to meet the requirements of Georgian Law as described in Section B and meet the requirements of the Asian Development Bank for Category B projects as described in the Asian Development Bank Safeguard Policy Statement, June 2009.

125. The objectives of the IEE are to:
i. Assess the existing environmental conditions in the project area including the identification of environmentally sensitive areas;

ii. Assess the proposed location, design, construction and operation activities to identify and evaluate their potential impacts, and determine their significance; and

iii. Propose appropriate mitigation and monitoring measures that can be incorporated into an Environmental Management Plan that will avoid or minimize adverse impacts so that residual impacts are reduced to acceptable levels.

126. The IEE is based on secondary sources of information, field inspection and information gathered during community and stakeholder consultations. Design details have been provided by the international transmission line consultant.

**Report Structure**


**C.1 Category of the Project**

128. According to the law of Georgia on Permit on Environmental Impact (2011) the Ksani and Menji subprojects do not require EIA and obtaining of Permit on Environmental Impact. For Khorga and Marneuli substations subprojects, according to Georgian legislation, preparation of Environmental Impact Assessment document and obtaining of the respective permit is required.

129. Following ‘Environmental Considerations in ADB Operations’ of September 2006, the Project can be considered to be a Category B project requiring an Initial Environmental Assessment (IEE). The acquisition of agricultural (pasture) land plots will occur within Marneuli subproject (see document “Marneuli Subproject Resettlement Plan”). 87 000 m² of land will be allocated for the new construction as implied by Khorga subproject. At present the land is state owned. An agricultural product is cultivated on the land plot by local population. 1 year of yield will be compensated to the population within the project. As for land acquisition, no land will be acquired within Khorga subproject. Other subprojects will not require any acquisition of land and resettlement activities will not become necessary at all. There is no protected area located closely and ecologically sensitive habitats will not be affected.
C.2 Need for the Project

130. The availability and reliability of GSE’s transmission infrastructure have been vastly improved for recent years as a result of intensive capital investment programs successfully implemented with the support of international financial institutions and donors. Besides, the improved financial position of GSE for the last few years enabled GSE to implement a number of rehabilitation and construction activities with its own resources and funds. As a result of these joint efforts, about 80% of primary equipment and 30% of secondary equipment at GSE substations, as well as a significant part of transmission lines, have already been replaced or rehabilitated. These projects significantly improved the situation in GSE substations and lines, shortened the outages and maintenance, reduced transmission losses and improved the power transmission quality criteria.

131. However, GSE is still investing in the remaining portions of the assets to achieve further improvement of the transmission grid. GSE is committed to have all the GSE substations fully rehabilitated/upgraded by 2015-2016, with all remaining primary and secondary equipment replaced and/or refurbished and effectively controlled from the National Control Center (NCC).

132. The proposed project as described below is among the top investment priorities of GSE’s Strategic Development Plan 2012-2020 and, once implemented, will further enhance the reliability and stability of GSE’s transmission and interconnection infrastructure and remarkably improve the capability of cross-border energy exchange for export, import and transit.

C.3 Project Location

133. The project areas are located in different territorial units (see map 1):
134. The proposed substation site is located near Khorga village in Khobi District of Samegrelo Region in West Georgia. The site comprises 13.5 hectares of flat, low lying agricultural land (Figure 1). The site is bounded to the south by the Tbilisi to Poti railway line and embankment. Drainage channels run parallel to the railway embankment on both sides. The Senaki to Poti road runs parallel to the railway line and drainage channel on its southern side.

**Figure 1. Khorga substation area**

135. Menji Substation – the substation is located within Samegrelo-Zemo (Upper) Svaneti administrative unite, in t. Senaki, namely, its western part (Figure 2). The mentioned territory belongs to urban development type, where anthropogenic impact is very high.
136. Ksani substation – the existing substation, the rehabilitation of which is planned by the project, is located in Eastern Georgia, within Mtskheta municipality of Mtskheta-Mtianeti province. The territory is characterized by lowland terrain and represented by steppe and semi-desert landscape. The project will be implemented within the territory of the existing substation. (Figure 3).

Figure 3. Ksani substation area

137. Marneuli substation – the project area is located within Marneuli municipality – the eastern part of Kvemo (Lower) Kartli province. Acquisition of additional territory of 87 500 sq. m. is required for the extension (widening) of the existing substation (Figure 4), which is planned within the project. The land to be acquired is agricultural (pasture), which has been used for sheep grazing for the recent decade. The project area also crosses road sections of local
significance. The mentioned section is a very low quality short road, which connect t. Marneuli with t. Rustavi. The use of the road is possible only seasonally. The mentioned road is also used by shepherds for livestock movement to the winter pastures.

Figure 4. Marneuli substation area

**C.4 Technical Components**

138. The Project activities include:

- Complete rehabilitation of 500kV substation Ksani, including HV primary equipment, relay protection and control;
- Rehabilitation and expansion of Marneuli substation with 500/220/10kV bays (six 500kV bays and one 220kV bays), including:
  - 501MVA autotransformer (3x167 MVA +1x167MVA);
  - Connection to existing 220kV part of Marneuli substation via 220kV line (about 400m);
  - Realignment of existing 500kV lines Vardzia and Mukhrani to ensure looping in and looping out of 500/220/10kV substation.
- Supply of 125MVA autotransformer for 220/110kV substation Menji.
- Construction of new substation in Khorga.

139. The list of equipment required for complete rehabilitation of 500kV Ksani substation is as follows:
Table 2. The list of equipment required for complete rehabilitation of 500kV Ksani substation

<table>
<thead>
<tr>
<th>Equipment for Ksani Substation</th>
<th>500kV</th>
<th>220kV</th>
<th>110kV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Circuit breaker</td>
<td>-</td>
<td>-</td>
<td>8 pcs</td>
</tr>
<tr>
<td>2. Voltage transformer</td>
<td>3 pcs</td>
<td>-</td>
<td>12 pcs</td>
</tr>
<tr>
<td>3. Current transformer</td>
<td>3 pcs</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4. Surge arrester</td>
<td>3 pcs</td>
<td>-</td>
<td>12 pcs</td>
</tr>
<tr>
<td>5. Disconnector</td>
<td>10 pcs</td>
<td>30 pcs</td>
<td>35 pcs</td>
</tr>
<tr>
<td>6. Post insulator</td>
<td>46 pcs</td>
<td>38 pcs</td>
<td>33 pcs</td>
</tr>
<tr>
<td>7. Bay protection and control system</td>
<td>5 sets</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>8. OHL protection and control system</td>
<td>-</td>
<td>10 pcs</td>
<td>9 sets</td>
</tr>
</tbody>
</table>

Other necessary arrangements:
Foundations for all power equipment, cable trenches (ducts) and secondary switching cables. Protection and control systems shall be installed in containers near the power equipment.

140. The list of equipment required for expansion/rehabilitation of 220kV Marneuli substation is as follows:

Table 3. Equipment for Marneuli Substation

<table>
<thead>
<tr>
<th>Equipment for Marneuli Substation</th>
<th>500kV</th>
<th>220kV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Circuit breaker</td>
<td>9 pcs</td>
<td>1 pc</td>
</tr>
<tr>
<td>2. Voltage transformer</td>
<td>12 pcs</td>
<td>-</td>
</tr>
<tr>
<td>3. Current transformer</td>
<td>9 pcs</td>
<td>3 pcs</td>
</tr>
<tr>
<td>4. Surge arrester</td>
<td>15 pcs</td>
<td>-</td>
</tr>
<tr>
<td>5. Disconnector</td>
<td>22 pcs</td>
<td>4 pcs</td>
</tr>
<tr>
<td>6. Protection and control system for 500kV connections</td>
<td>7 sets</td>
<td>-</td>
</tr>
<tr>
<td>7. Reactor</td>
<td>1 set</td>
<td></td>
</tr>
<tr>
<td>8. 500/220kV autotransformer 501MVA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Autotransformer protection and control system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. 10kV bays</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

Other necessary arrangements:
Foundations for all power equipment, cable trenches etc.
Protection and control systems shall be installed in containers near the power equipment.

141. The technical components of the Khorga substation will include:

   i. 1 x 220 kV bay from Menji 220 kV SS (old Poti feed)
   ii. 1 x 220 kV bay for Kolkhida 2 line to Vektori SS
   iii. 1 x 220 kV bays for Kolkhida 2 line to Menji SST
   iv. 1 x 220 kV bay for Anaklia line (former Paliastomi 2 line) to Vardnili hydropower station.
   v. 1 x 220kV bay for Paliastomi 2 line out to Batumi SS
vi. 2 x 220kV bays for double circuit lines from Jvari 220kV SS
vii. 1 x 220 kV bus coupler bay
viii. 2 x 220/110 kV transformer feed bays
ix. 220 kV spare Bays and metering bays
x. 2 x 110 kV bays for double circuit line Poti ½
xi. 1 x 110 kV bus coupler bay
xii. 110 kV spare bays and metering bays.

142. The detailed design and layout of the substations have yet to be prepared.

C.5 Project Implementation Schedule

143. The project implementation period will be 4 years (for Ksani SS, Menji SS and Marneuli SS) and is scheduled to be completed by no later than the end of 2016. For the Khorga subproject - implementation period will be 3 years and is scheduled to be completed by no later than the end of 2015 (see Table 4).
## Indicative Activities

### A. Loan Approval Milestone
- **Loan Negotiation**: September 2012
- **ADB Board Approval**: November 2012
- **Loan Signing**: March 2013
- **Loan Effectiveness**: April 2013

### B. Project Outputs Milestone

#### Physical
1. **220/110 kV Khorga Substation**
   - **1.1 Bidding Documents and Specification Preparation**: March 2013
   - **1.2 Bidding Period**:
   - **1.3 Bid Evaluation**:
   - **1.4 Contract Negotiation and Award**: Sept to Oct 2013
   - **1.5 Detailed Design**:
   - **1.6 Site Preparation and Civil Works**:
   - **1.7 Manufacturing Materials and Equipment**:
   - **1.8 Factory Test**:
   - **1.9 Delivery to Site**:
   - **1.10 Construction and Installation**:
   - **1.11 Commissioning and Final Test**:
   - **1.12 Completion of Contract**: March 2015

2. **Substations Rehabilitation and Improvement**
   - **2.1 Bidding Documents and Specification Preparation**: March 2013
   - **2.2 Bidding Period**:
   - **2.3 Bid Evaluation**:
   - **2.4 Contract Negotiation and Award**: September 2013
   - **2.5 Site Survey**:
   - **2.6 Detailed Design**:
   - **2.7 Equipment Procurement and Manufacturing**:
   - **2.8 Installation and Pre-parameterization**:
   - **2.9 Factory Test**:
   - **2.10 Delivery to Site**:
   - **2.11 Installation and Commissioning**:
   - **2.12 Completion of Contract**: December 2016

#### Non-physical
1. **Project Supervision and Management Consultants**
   - **3.1 RFP issued by GSE**: June 2013
   - **3.2 Proposal evaluation**:
   - **3.3 Contract negotiation and award by GSE**: November 2013
   - **3.4 Consulting team mobilization**: January 2014
   - **3.5 Project supervision and management**:
   - **3.6 Final report submission by consulting team**: November 2016

2. **Study on Potential Hydropower Investment Projects**
   - **4.1 Feasibility Study**: December 2015

### Table 4. Project Implementation Schedule

<table>
<thead>
<tr>
<th>Month</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
</tr>
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<tbody>
<tr>
<td>Jan</td>
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<tr>
<td>Dec</td>
<td></td>
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</tr>
</tbody>
</table>

**Legend:**
- **= OLD SCHEDULE**
- **= NEW SCHEDULE**
- **= OLD SCHEDULE HAS BEEN ADJUSTED**
- **= BLACK AS NEW START OF SCHEDULE**
- **= YELLOW AS EXTENDED PERIOD.**
C.6 Associated Facilities

144. Associated facilities are defined here as those facilities (in this case transmission lines) associated with the project that depend on the project's existence.

145. In case of Marneuli substation within the limits of the present project in addition to building the substation, the following works will be accomplished:

- Connecting up the design substation to the existing Marneuli 220 KW substation.
- Connecting up the existing 500 KW transmission line “Vardzia” to the design substation.

146. The above-mentioned connections will need the installation of additional eight power transmission towers under the project.

147. In the case of Khorga substation there will be no associated facilities since Khorga substation would be built (and is entirely justified) based on its connection to the Vadrnili/Paliastomi 2 line only. The Anaklia/Paliastomi 2 line directly crosses the substation site such that connection with it will not entail construction of any new transmission line section. None of the other proposed transmission line connections to Khorga substation described above are classified as associated facilities of this project.

148. Only rehabilitation works are planned within the remaining two subprojects (Menji and Ksani substations). Hence, construction of additional infrastructure is not required for project implementation.
D. Description of the Environment

D.1 Physical Resources

149. **Georgia** – a country in Caucasus, Eurasia, at the Black Sea coast. Russia borders Georgia from the North, Turkey and Armenia from the South and Azerbaijan from the South-East. Georgia is situated at the crossroad of South-East Europe and West Asia and it is a transcontinental country by its location although it is part of Europe by its socio-political situation and culture (Figure 5).

**Figure 5. Location of Georgia on the crossroad of South-East Europe and West Asia**

- **Territory** – total area of the country is 69,700 km², total length of its borders is 1,771 km including 1,461 km land border (164 km with Armenia, 322 km with Azerbaijan, 723 km with Russia and 252 km with Turkey) and 310 km coastal border (Black Sea);

- **Nature** – Georgia territory is largely mountainous, nature is diverse – from subtropics to Caucasus glaciers; the highest elevation is at Mt. Shkhara – 5,068 m and the lowest is black sea. Agricultural land is 16% of total territory of the country, pastures – 25%, forests – 34%. Main rivers are Mtkvari and Rioni.

- **Natural Resources:** timber, hydropower, manganese deposits, iron ore, copper, minor coal and oil deposits; coastal and mountainous resorts.
Religious structure (according to the 2002 census): Orthodox Christian 84.0%, Muslim 9.9%, Armenian-Gregorian 3.9%, Catholic 0.8%, Jesuits 0.4%, Judaists 0.1% and etc.

150. Administratively there are 11 administrative units (Figure 6). Each administrative unit is divided into Municipalities (64 municipalities in total). According to the constitution territorial arrangement of the country should be defined after restoration of central authority on whole territory of Georgia.

151. Each municipality represents self-governing unit with homogenous physical-geographic conditions and defined natural boundaries as well as ethnic-cultural characteristics of population and historically established territorial-administrative function.

Figure 6. Administrative Units of Georgia and projects location areas

152. The project areas are located in different territorial units:

- Menji substation – The project area is located on the territory of Senaki Municipality in Samegrelo-Zemo Svaneti administrative region;
- Khorga substation - The project area is located on the territory of Zugdidi Municipality in Samegrelo-Zemo Svaneti administrative region;
- Marneuli substation - The project area is located on the territory of Marneuli Municipality in Kvemo Kartli administrative region;
- Ksani Substation - The project area is located on the territory of Mtskheta Municipality in Mtskhetamtianeti administrative region.
D.1.2 Air Quality and Climate

D.1.2.1 Air Quality

153. Air Quality. Ambient air quality monitoring is conducted at only seven locations in Georgia. None of these are located in project areas. The nearest air monitoring substation is located in T. Rustavi in 10 km from the project territory of Marneuli substation.

154. Ambient air in Georgia is polluted from emissions of vehicles, energetic sector, agriculture and industrial objects. Motor transport and energetic sector are the main pollutants in urban areas from the above listed factors. It is noteworthy that the amount of fuel consumed by motor transport and energetic sector has increased in the recent period, which in its turn results in increased emissions of harmful substances in the air.

155. According to the information of the ministry of environmental protection of Georgia, the total amount of harmful substances from active industries in Georgia into ambient air was 30,134 thousand t. annually (in 2010). In the same 201 the harmful substances emitted by motor transport is 342,701 thousand t., which is about 92 % of the total harmful substances emitted from motor transport and stationary industries creating pollution¹.

156. Proceeding from all of the above mentioned, air quality at all of the construction/rehabilitation sections is satisfactory, because these zones are not located in the area of intensive traffic or industrial territories.

157. For the assessment of the baseline pollution of the ambient air with harmful substances reference values for the baseline concentration given in the “Method of Calculation of Maximum Permissible or/and Temporarily Agreed Emission Norms in Ambient Air” could be used. These values depend on the population numbers of the settlement.

<table>
<thead>
<tr>
<th>Population Thousand men</th>
<th>Baseline concentration value, mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nitrogen dioxide</td>
</tr>
<tr>
<td>250-125</td>
<td>0,03</td>
</tr>
<tr>
<td>125-50</td>
<td>0,015</td>
</tr>
</tbody>
</table>

¹ Quantitative characteristics of harmful substances emitted in ambient air have been calculated on the basis of quantitative characteristics of fuel provided by the department of statistics of the ministry of economic development of Georgia
As the object allocation territory lies within Mtskheta municipality and Ksani community self-governance, the population of which is far less than 10,000 men (see Table 1), according to Table 5, the baseline concentration of nitrogen and sulphur dioxides, carbon monoxide and dust in ambient air is deemed zero. As the substances present in the emissions (methane and odorant) are not included in the table they are also deemed zero.

D.1.2.2 Climate

The climate of Georgia is extremely diverse which is directly linked to the country’s location: the juncture of subtropical zone, Aral-Caspian arid climate regions and continental plains of Asia. Likhi Range determines the contrast of climate conditions of various parts in Georgia. Climate in the west Georgia is humid subtropical, however in east, it is dry and mild humid-subtropical, but the south part of the country is mainly characterized by the continental climate. The Black Sea and the Greater Caucasus Mountain Range mainly influence the formulation of the countries’ climatic conditions which create so called barrier thus protect the country from cold wind masses from the north.

Menji

Menji is located in the central part of Kolkheti lowland with climate conditions typical for Kolkheti lowland. Insignificant elevation of the territory, proximity to the warm Black Sea, frequency of warm air masses throughout all seasons determines the formation of humid subtropical climate in the area.

The hottest months are July and August - 20.8-22.8°C, the coldest – January and December (5.4-7.6°C). Frosts, i.e. falling of air temperature below 0°C with the background of average positive daily temperature, approximately starts in December and stops by the end of March. The number of days without frost exceeds 280 annually.

Precipitations, being one of the main elements forming the climate and hydrological regime of the district, are abundant in the research area. The annual precipitations for the research area fluctuate within 1831 mm and 2305 mm. In addition, there is only one minimum in fall of precipitations in April-May. Precipitations are almost equally distributed throughout the remaining months.

Khorga

Khorga District is warm and humid. Total annual precipitation mainly in the form of rain, amounts to 1500-1600mm and is roughly equally distributed throughout the four seasons. The average monthly temperature in January, the coldest month, is about 4.5 - 4.7°C, while that of August, the warmest month is 22.4 - 22.6°C. However the maximum temperature in August has been known to reach 34°C. The region is characterized by relatively high humidity and strong winds.

The climate of Khobi District is warm and humid. Total annual precipitation mainly in the form of rain, amounts to 1500-1600mm and is roughly equally distributed throughout the four seasons.
seasons. The average monthly temperature in January, the coldest month, is about 4.5-4.7°C, while that of August, the warmest month is 22.4-22.6°C. However the maximum temperature in August has been known to reach 34 °C. The region is characterized by relatively high humidity and strong winds.

Marneuli
165. Humid subtropical climate prevails in Marneuli. The wet periods generally occur during spring and autumn while winter and the summer months tend to be dry. Marneuli experiences hot summers and relatively cold winters. The average annual temperature is 12° C; January is the coldest month (monthly average 0-0.3° C) and July is the hottest (monthly average 23.9° C). Absolute minimal and maximum temperatures recorded are -25° C and 40° C respectively. Marneuli area receives low rainfall compared to rest of the country; annual rainfall ranges between 490-550 mm. May is the wettest month while December in driest. Maximum number of snowy days is 70. Snow occurs normally in December and January; average thickness is less than 10 cm. Wind predominantly blows from north and east. In summer, predominant wind direction is south-east. Average annual wind speed is 2.4 m/sec. Maximum average monthly wind speed is reported in February-March, minimum in December. Based on the data from Marneuli observation station, following figures show monthly average minimum and maximum temperature, precipitation and wind direction and frequency.

Ksani
166. Based upon the data of regular observation stations of the hydro-meteorological network of Georgia located in the area, the climate of the project territory is moderately humid, winter is moderately cold and summer – hot. The average temperature of the coldest month – January is 2-0° C and the temperature of the hottest month – July is 22-24° C. The perennial average of absolute minimums of temperature is (-16) ° C, while perennial average of absolute maximums – (+34)° C.

167. The average annual precipitations are 517 mm. The maximum falls in May-June (within 95-70 mm). The driest months are January and December, when the precipitations are within 23 mm. As regards seasonal distribution of precipitations, relative abundance is typical for spring-summer and lack of precipitations – in autumn-winter.

D.1.3 Radiation Background

1689. Radiation screening has been undertaken for the assessment of radiation baseline. Measures were taken on 10-17th April 2013 with the use of standard certified Russian device “Radex”. The results of the conducted measurements are given in Table 6.

<table>
<thead>
<tr>
<th>Table 6. Background Radiation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level radiation</strong></td>
</tr>
<tr>
<td>(micro-roentgen/hour)</td>
</tr>
</tbody>
</table>
D.1.4 Noise Background

169. Background noise levels were identified in all project areas. Measures were taken on 10-17th April, 2013 using standard certified device “Digital Multimeter MS6229”. The results of the conducted measurements are given in Table 7.

Table 7. Background noise

<table>
<thead>
<tr>
<th></th>
<th>Marneuli Substation</th>
<th>Khorga Substation</th>
<th>Ksani Substation</th>
<th>Menji Substation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise Level</td>
<td>60-65</td>
<td>60-70</td>
<td>60-65</td>
<td>60-65</td>
</tr>
</tbody>
</table>

Figure 9. Noise measurement at Khorga Substation
D.1.5 Water Resources

D.1.5.1 Surface water

General Description
170. Georgia is rich in water resources. 26060 rivers flow within Georgia with total length reaching 26 thousand km. The majority of these rivers (99.4 %) are characterized with short length (less than 25 km).

171. Water resources are unequally distributed and are mainly located in the western part of the country. Georgian rivers belong to two water catchment basins, which are divided by Likhi ridge. About 18109 rivers belong to the Black Sea water catchment basin – it is 70 % of the rivers of Georgia. 7951 rivers are included in the Caspian Sea water catchment basin (30 %). 555 rivers of the Black Sea basin and 528 of the Caspian Sea basin have been studied in hydrological terms.

Marneuli
172. There are four rivers on the territory of Marneuli Municipality: Mtkvari, Khrami, Algeti and Debeda. The rivers provide water for drinking and irrigational purposes. Marneuli has sufficient water resources to fully meet the demand for irrigation of agricultural lands on the municipality territory.

173. Rivers Algeti (in the western direction, distance – 2 km) and Mtkvari (Kura) (in the eastern direction, distance 10 km) are located the closest to the project area.

174. River Algeti – a river in Eastern Georgia within the municipalities of Tetritskharo and Marneuli. Its length is 108 km, basin area 763 km². It starts from the southern slope of Trialeti ridge in the vicinity of Kidekari rocks (at the altitude of 1900 m above the sea level). In the upper reaches it flows to the south-east in a deep forest-covered ravine, from village Tbisi – in narrow rocky ravine and at Marneuli continues at lowland flowing into r. Kura from the right in the vicinity of village Kesalo. The river feeds on rain, snow and ground waters. About 45 % of the annual discharge is rain, 25 % - snow and 30 % - ground waters. It is characterized with floods in spring and beginning of summer. It is shallow in other seasons. The minimum discharge occurs in October. About 48.1 % of the annual discharge occurs in springs, 32.4 % - in summer, 11.6 % - in winter and 7.9 % - in autumn.
175. River Kura – it is the largest river of Trans-Caucasus starting from Turkey at 2742 m above the sea level on the eastern slope of m. Kizil-Giaduk. It flows into the Caspian Sea in Azerbaijan. Its length is 1515 km \[1\], catchment area – 188 thousand km\(^2\). Section of about 400 km of the middle reaches of r. Kura is located within Georgia. Kura is the longest in Azerbaijan – its length equals to 906 km in the country.

176. The average annual discharge of Kura is 32,6 m\(^3\)/sec at Khertvisi, 84,1 m\(^3\)/sec – at Likani, 143 m\(^3\)/sec – at Zegvi, 205 m\(^3\)/sec – at Tbilisi, 402 m\(^3\)/sec – at Mingecauri, 580 m\(^3\)/sec – at the estuary. Kura feeds the Caspian Sea with 18.1 km\(^3\) of water annually.

177. Kura discharge by seasons is as follows: 48,5 % of discharge occurs in springs, 26,9 % - in summer, 13,7 % - in autumn and 10,9 % - in winter. The discharge is distributed according to feeding components: ground waters – 38,6 %, snow – 36,6 % and rain – 24,8 %.

**Ksani**

178. Ksani substation is located in the vicinity of r. Kura and Ksani.

179. River Ksani – it is a river on the southern slope of Maghran-Dvaleti Caucasus, left tributary of r. Kura with length of 84 km, catchment area of 885 km\(^2\). It starts from Keli volcano upland, namely, Keli lake at the altitude of 2914 m above the sea level. It has narrow ravine in the upper and middle reaches and wide at Mukhrani lowland. It crosses Skhaltba ridge at estuary forming a narrow ravine again.
Figure 11. Surface water sources at Ksani substation

180. Main tributaries are: Tskhradzmula, Tchurta, and Aleura. It feeds on snow, rain and ground water. Floods occur in spring, shallow waters – in winter. Rain caused flash floods are typical for summer and autumn.

181. 54 % of annual discharge falls in spring, 20 % - in summer, 14 % - in autumn, 12 % - in winter. Frozen banks, minor freezing and icing occur from the middle of November till the end of March.

182. Average annual discharge at the estuary is 15 m$^3$/sec, average annual discharge of solid sediments – 6.6 kg/sec. It is used for irrigation.

Khorga
183. The main water resources within the vicinity of Khobi District are the rivers: Khobi, Rioni, Munchia, Tsivi and Lake Paliastomi.

184. The Rioni River is the largest with a length of 327 km, 27 km of which passes through Khobi district. The average height of the Rioni River basin is 1084 m and has an average gradient of 7.2%. In total it has 383 tributaries.
185. The Khobi River has a total length of 150 km, of which about 50km flows through Khobi District. The average height of the Khobi River basin is 560 m, and has an average gradient of 15.4%. In total it has 1418 tributaries, among them on the territory of Khobi are the rivers Tsivi – length 33 km, Zana – 42 km and Chanistskali – 63 km.

186. Lake Paliastomi has a surface area of 547 km², with average water depth of 2.1 m. The Paliastomi lake basin includes the Lesser Paliastomi, Imnati, and Lesser Okvati.

Menji

187. River Tsivi starts from the foothills of Samegrelo ridge at the altitude of 363 m above the sea level and flows into r. Rioni from the right side at 46th km from the estuary in 1 km to the south-east of village Mukhuri. The length of the river is 60 km, total flow – 357 m³, average inclination – 5.9, area of the underground basin – 199 km², average altitude – 140 m. 138 tributaries of various types flow into the river with total length of 256 km. The main tributaries are Otskarie (length – 12 km) and Shebe (16 km).
188. Riverbed meanders without branches. The width of the flow is within 2-12 m, depths – 0,5-2 m, speed – 0.2-1 m/sec. Riverbed is sandy and silty within Kolkheti lowland.

189. The river feeds on snow, rain and ground waters. It is characterized with flash floods throughout the entire year. The river is stacked from Senaki-Poti automobile road till the estuary. The river is used for village mill.

D.1.5.2 Underground and Thermal Waters

190. Georgia is one of the richest countries in the world in terms of ground fresh water resources. Georgia exceeds the global characteristics for 2.5 times (in average) per capita. The full ground resources of Georgia have not been identified yet. The ecological conditions of the waters have not been determined as well.

191. The construction/rehabilitation sections of the sub-projects discussed in the document are located in the below hydro-geological zones:

- Substation Khorga located on Artesian basin zone of Georgian belt - Porous, fractured and fractured/karstic artesian basin of Kolkheti;
- Menji substation located on Artesian basin zone of Georgian belt - Porous, fractured and fractured/karstic artesian basin of Kolkheti;
- Ksani substation located on Zone of pressured water systems of Adjara-Trialeti fold mountain zone - Fractured and fractured/karstic pressured water system of Tbilisi;
- Marneuli substation located on Artesian basin zone of Georgian belt - Porous and fractured water artesian basin of Marneuli-Gardabani.
Springs of thermal waters of temperatures ranging within 40-108 °C are recorded in Georgia, of which 8 springs are natural and 198 – artificial bore holes.

3 artificial bore holes are located in village Menji in the vicinity of only Menji substation from the reviewed sub-projects. 5750 m³ of thermal waters with temperature of 57-65 °C are extracted daily from these bore holes. The mentioned thermal waters have natural medicinal factors: mineral waters with methane, sulphides, flint, chloride-sodium with total mineralization of 6,0-14,0 gr/dm³ and mineral waters with nitrogen, sulphides, chloride-sodium with total mineralization of 5,2-7,4 gr/dm³. The method of medicinal application is mineral water baths. Several medicinal institutions functioned in village Menji in 1970-1999. After disintegration of the Soviet Union these institutions had gradually lost their function and the infrastructure is totally destroyed today. Thermal waters are used by private entrepreneurs based on respective licenses. The mentioned entrepreneurs use the thermal waters for regulating temperature in green houses.

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3 “Thermal waters, resources, Georgia” - Proceedings World Geothermal Congress 2005. Georgia Academy of Sciences, Institute of Hydrogeology
D.1.6 Geology/Seismology

D.1.6.1 Geology

**Khorga substation**

194. Khobi district is underlain by Tertiary (mainly Neogene) and Quaternary marine, alluvial and lake deposits. Neogene deposits are developed in the northern part of the district, while Quaternary marine deposits on the terraces of the Black Sea, and on the Kolkheti plane, underlie recent alluvium and swamp deposits.

195. Neogene deposits (Miocene - Pliocene) are represented by lower to upper Miocene clays, sandstones, conglomerates and limestone of varying thickness. Alluvial deposits are also widespread in the region.

**Menji substation**

196. Geologically upper hundreds of meters within the central zone of Kolkheti depression (P. Gamkrelidze) are covered with Quaternary sediments.

197. The youngest main strata of the basis are Upper Chaudi layers of Pliocene age. They are mainly represented by clays, small conglomerates and sandstones with total depth up to 1100 m.

198. Quaternary system is dominant in Kolkheti lowland and comprises ancient and modern continental sediments of various depths.

199. Ancient alluvium occurs in the eastern part, it forms large accumulative plain on the banks of r. Rioni, which joins the lowland. It is represented by dense stones filled with sandstones. Modern alluvium forms the valley of r. Rioni along with lower terraces with width reaching 2-5 km. It is represented by sands and sandy formations in the lower reaches of the river.

200. Hydro-geological significance of these sediments is fairly high. They have loose structure and high water permeability. Proceeding from the above, they form the movement pass for ground waters to the lowland.

201. Alluvial-lake sediments occur in the major part of the lowland comprising central and western parts of r. Rioni gorge. River alluvium is the initial material forming these sediments. During the process of shifting rivers lakes, former riverbeds and various plains of the terrain have been filled and alluvium has been enriched with organic substances.

**Ksani substation**

202. In geological terms the territory of the district to be assessed lies within the intermountainous depression zone of Georgia included in the lowland zone of Shida (Inner) Kartli and mainly comprises r. Kura gorge. It has been formed by the northern slopes of Trialeti ridge, remnants of highland and erosive terraces. Accumulative and accumulative-denudational terrain forms are distinguished within the district.
203. Accumulative forms of the terrain are spread on both sides of r. Kura. As regards accumulative-denudational forms, they mainly occur on the left slopes of r. Kura in the section between t. Kaspi and t. Mtskheta.

204. The territory of the district is formed by Upper Sarmatian, Middle Miocene and Paleocene-Lower Eocene sediments in geological terms.

205. Sarmatian sediments are mainly distributed on the left slope of r. Kura, while sediments of Middle Miocene and Paleocene-Lower Eocene – on the right bank of r. Kura.

206. Upper Sarmatian sediments are lithologically represented by marine and continental molasses-sands, clays, conglomerates and marls.

207. Conglomerates are mainly composed of carbonate and volcanic-terrigenic sediment stones. They are cemented with carbonate cement and characterized by high level of solidity.

**Marneuli Substation**

208. Iaghluja upland is located within Marneuli municipality. The project area lies here as well. The entire Iaghluja upland with approximate length of 17 km and width of 10-11 km is composed of Neogene conglomerates, clays and sandstones. The absolute height of Iaghluja upland is 784 m while relative height in proportion to Marneuli plain exceeds 400 m. Iaghluja upland could be divided in three parts in morphological terms. The northern part of the upland is more elevated and is represented by typical erosive hill in terrain. Iaghluja hill is steeply inclined to the north, while it is gradually inclined to the south (towards Marneuli plain) and continues into flatted surface of the upland. The northern slope of the latter gradually inclines towards Marneuli plain. Both Iaghluja upland and its peripheral hills are severely dissected with dense network of dry gorges and gullies, which are filled with water during torrential rain.

**D.1.6.2 Seismology**

209. According to the construction norms and rules of “Seismologically Proved Construction” (Cl. 01. 01-09), rehabilitation/construction sections are located within 8 score seismic zone.
D.1.7 Topography and Soils

210. Despite its small area, Georgia presents one of the most varied topographies within its geographical boundaries. Georgia lies mostly in the Caucasus Mountains, and its northern boundary is partly defined by the Greater Caucasus range. The Lesser Caucasus range runs parallel to the Turkish and Armenian borders and the Surami and Imereti ranges connect the Greater Caucasus and the Lesser Caucasus, create natural barriers in the region.

Khorga substation

211. Khorga district is located on the Kolkheti plane which is crossed by a dense network of rivers that discharge into the Black Sea. The west part of the district is mainly covered by swamps and swamp forests.

212. In Samegrelo region there are a variety of soil types which reflects the diverse climatic-relief conditions of the region.

213. The low lying Kolkheti plane is characterized by swampy podzol soils. Various sections of the Kolkheti lowland differ by hypsometric location which influences the development of their podzol and turf-swampy soil forming processes. Plain turf soils are developed along a 2-8km belt adjacent to the coastline Along the beds of swamp rivers swampy silt soils are developed.

214. On the slightly elevated area the Kolkheti plain at a height of 100-200 above sea level various types of alluvial soils have developed on the alluvial deposits of the Enguri, Chalis Tskali, Khobi, Rioni, Tskenistskali, Jumi, Tsivi and Abasha Rivers. These soils comprise clay, loam and silt sands and are used for cultivating annual crops (maize, vegetables) as well as various fruits (kiwi, feijoa, pineapple guava), tea, bay, tung tree.
215. In the foothill zone of Samegrelo on low hills yellow soils predominate, being the product of chemical weathering of the underlying rocks.

216. In the hilly zones at the height of 170-200 above sea level relatively small areas are occupied by red soils and podzolized red soils. Such iron rich soils are used for cultivating tea, tung tree and citruses as well as pastures.

217. In the higher part of the Samegrelo foothill zone at 200-500 meters above sea level humus - carbonated soils are developed. These soils are used for ploughing and particularly for bay tree growing.

218. In hilly areas and slopes at the height of 400-700 m above sea level which are covered by broad leaved and mixed forests, dark grey forest soils predominate. These soils are used both for annual and multi-year crops.


**Menji substation**

220. According to the soil-geographic zoning scheme of Georgia (M. Sabashvili), the soils of the project route are mainly within the district and sub-district of the western lower part of Kolkheti lowland.

221. The soil forming strata of Kolkheti lowland and project area soils are Quaternary sediments, namely, Middle and Upper Quaternary sediments. The upper part of the loose strata is alluvium brought by Caucasus rivers, the Black Sea sediments are located underneath, of which ancient Black Sea, New Euxinic, Karangath, Ancient Euxinic and Chaudi layers are distinguished by faunistic signs.

222. Senaki area is divided into the northern and southern parts according to terrain peculiarities. The northern part consists of uplands and hills. The average height of m. Eki is up to 270 m above the sea level. M. Eki is dissected into hills to the north and west by r. Tsivi and its tributaries.

223. Mountains of Shkhepi, Kikachona, Khabazeti, Ziskhirishi, Sakharbedio and Sakiri, Shushania hill, etc. are located near the town.

224. Along with the above listed terrain forms, rivers and flows have formed deep gorges and ravines in areas composed of limestone and chalk. The southern part of the municipality is a significant section of Kolkheti lowland, which is dissected by r. Tsivi and r. Tekhura tributaries. The maximal height of the lowland exceeds 30 m. It is elevated to the north and ends at the southern end of Eki, Shkhepi and Nokalakevi hills.

**Ksani substation**

225. The below landscape types are present within Mtskheta municipality:

1. Shrub steppe with forest elements on alluvial-carbonate meadow soils;
2. Oriental hornbeam shrubbery on forest Cinnamonic and brown soils;
3. Shrub steppe with oak-hornbeam formations on forest natric and alkalized brown soils;
4. Oak and oak-hornbeam formations on forest Cinnamonic soils;
5. Grasses with shrubbery on forest Cinnamonic soils;
6. Floodplain forest landscape.

226. Meadow alluvial (ancient alluvial) carbonate and meadow Cinnmonic soils occur on Mukhrani-Saguramo plain. Meadow Cinnmonic soils are also present at plains near r. Kura and foothills of the northern slope of Trialeti ridge. Forest Cinnmonic soils are fairly widespread as well.

227. Cinnamonic soils are mainly carbonate. New carbonate formations of mycelium and congregations are established and visually distinguishable in the deep layers of the profile. Reaction is neutral or slightly alkaline. It has good agronomic features and represents the main soil of the agricultural zone of Eastern Georgia.

**Marneuli Substation**

228. The major part of the municipality comprises the accumulative plain of the same name, which unites the territories of the lower reaches of r. Algeti, Khrami, Mashavera and Debeda at the altitude of 270-400 m above the sea level. Horizons of slightly dislocated clays and sandstones of Neogene period are located at the basis of Marneuli plain. These horizons are covered with Quaternary continental sediments (pebbles, conglomerates, sands and clays), the total width of which exceeds 100 m in some areas (according to the boring material). Marneuli plain is slightly inclined from the west to the east. The surface has been formed as a result of gradual joining of the flattened areas of floodplains, floodplain first and second terraces of r. Algeti, Khrami, Debeda and Kura. The first terrace above the floodplain, the relative height of which fluctuates within 6-10 m is well developed between r. Debeda and Khrami, while the surface of the second terrace above the floodplain (25-30 m) is the widest between r. Khrami and Algeti as well as r. Algeti gorge and between the former river gorge of Kovutapa to the north of Algeti gorge.

229. The project area is located on the so called Solonchaks. The soils of this type are represented by alkalized and Solonetz soils. Alkalized soil profiles contain soluble salt, while consumed sodium is accumulated in the complex of Solonetz soils. These two soil categories are closely connected in terms of genesis. The majority of Solonchaks both easily soluble salts and sodium cation accumulated in the consuming complex. The process of natric soil formation is linked with delluvial-proluvial activities which occurred in the past. Weathering products brought by temporary water flows from the saline containing strata of Iaghluji ridge on the inclined surface results in natric nature of the soils of the area. As a result, alkalized soil is formed. As regards Solonetz, the process is connected with desulphadizing of the sulphates accumulated in the soil. The below soils occur in Marneuli municipality: slightly natric, moderately natric and very natric soils. Salinizing of soils is mainly sulphate and chloride-sulphate. Distinguishable gleying signs along with salinizing occur in the soils, which is caused by many irrigation channels and uncontrolled irrigation.
D.2 Ecological Resources

230. All rehabilitation/construction sections are located in areas under significant anthropogenic press. Due to expansion of economic activities and long anthropogenic impact fauna and flora of the project territory has significantly decreased both in terms of species and quantities.

231. According to the project, only rehabilitation of the existing infrastructure within the current substation areas will be undertaken for two sub-projects (Ksani and Menji).

232. The expansion of Marmeuli substation is planned. 87 000 m² of new land will be added to the area. At present the land is used as pasture. The mentioned area is under severe impact of permanent grazing and the biodiversity is almost entirely modified.

233. Construction of new substation of Khorga will be undertaken on agricultural land, which is also entirely modified section in terms of biodiversity as a result of long economic activities.

234. No tree cutting is planned within the project zone within the mentioned project. The adjacent areas are very poor in terms of flora and fauna. Hence, rehabilitation/construction and exploitation period should not involve any significant impact on wildlife.

D.2.1 Flora and Fauna
D.2.1.1 Flora

Samegrelo Region

235. The flora in Samegrelo Region is rich and diverse and reflects its geographic heterogeneity and the influence of human activities. There are up to 1200 higher plant species in Samegrelo region, 175 species of which are endemic species. Especially unique is the flora of peat bogs, as well as the flora of Kolkhic forests with evergreen boscage; oak, beech, and coniferous forests; sub-alpine bushy forests, sub-alpine and alpine tall grasses and alpine meadows.

236. Over the centuries the natural plant cover has suffered significant degradation due to anthropogenic pressure. Plant cover of the lowland plane and hilly zone has been especially modified. Alder groves and Kolkhic mixed deciduous forests are the remains of those primeval forests, which covered wide territory of Kolkheti lowland. The previous floristic composition is almost totally lost due to the pressure of human activities. Because of favorable natural conditions the territory is now largely covered by agricultural crops. Natural flora remains only in remote places or as isolated remnants. These are mostly oak, hornbeam, and chestnut groves.
Figure 16. Khorga substation

Khorga Substation

237. Soil cover between littoral and wetland zones is well developed. Bushy plant cover here comprises mainly blackberry, hawthorn, and other bush plant species. In spite of the human influences the wetlands of Kolkheti lowland (Khobi District) are characterized by rich and original biodiversity with water and wetland species creating a rich floristic complex including:

i. Flora of rivers, lakes, and water reservoirs.
ii. Flora of wetlands fed by ground waters.
iii. Peat bog groves fed by atmospheric water.

238. Among the plants growing on the water surface are water ivy (*Hycharis morsus ranae* L.) and various water ferns. Sea grasses and many other plants adapted to brackish water conditions are also found there. Plants growing in the fresh water reservoirs include yellow lily, water walnut, several species of water grapevine, and many others.

239. Peat bog vegetation comprises deer grass, reeds, and rushes. The peat bogs occupy large areas, providing shelter to a range of plants including water iris, summer snowflake and Cannabis species, etc. One of the most beautiful plants of this region, the Kolkhic white lily, is found in the wetland areas near Poti, in Rioni delta and Paliastomi Lake. Another notable plant of this area is the rare Royal Fern.

240. Alder forests, are typical of the Kolkheti lowland, and form impenetrable wetland forests. These forests are well preserved due to their impenetrability. Bast trees are the most common species and are typically used for protection of river banks due to their strong root system. Bast trees are also a fast growing species and can be found up to 900 m above the sea level.

241. There are many relict species in Kolkheti forests. Dominant species include the Grey alder, Bast-tree, Ash-tree, Imeretian oak, Chestnut and Linden. The most widespread species in the
forest undergrowth along the river banks are: *Rhododendrum ponticum*, *Lauricerasus officinalis* and *Buxus colkhica*, distinguished by their height.

242. The sub-alpine zone (1800-2000 m) is characterized by sparse forests comprising mostly birch, tall mountain maple (*Acer pseudoplatanus*), and *Sorbus aucuparia*. This zone is grades upwards into a dwarf forest zone. Juniper bushes are common in the subalpine zone.

**Marneuli Municipality**

243. Beardgrass steppe and semi-desert vegetation occurs on the lowland and laghuji upland of the district. Only beardgrass as well as beardgrass-needle grass, wormwood-beardgrass and beardgrass-thorny shrub formations are present. The following are mainly represented from grass vegetation: beardgrass, needle grass, fescue, felty germander, false flax, yellow bedstraw, alfalfa, creeping thyme, esparcet, etc. Semi-desert is characterized with wormwood, saltwort, petrosimonia. Thorn shrubbery is mainly represented with Christ’s thorn. Iberian spirea, blackthorn, buckthorn, etc. also occur. Oriental hornbeam, Georgian oak, maple, blackthorn grow on Babakari hill and the foothills of Loki ridge. Hackberry and pistachio occur on laghuji upland and foothills, in mountain forests on Loki ridge and partially over Babakari hill oak-hornbeam formations are spread, in the highest areas – beech formations. Fragments of tugay forests have been preserved at river banks: silver poplar, black poplar, white willow, floodplain oak, elm, mulberry. Crawling plants are abundant: clematis, silk vine, smilax, etc. Sea buckthorn, hawthorn, tamarix, etc. form the understory. Total forests of the municipality are 14583 ha and they are mainly used for firewood production.
Mtskheta Municipality

244. Village Ksani and adjacent area, proceeding from the peculiarities of their natural-climate conditions of their location, are characterized with elements of thorny shrub lowland. This thorny shrub lowland is developed from open woodland, the minor remnants of which have been preserved at the estuary of r. Ksani, station Ksani and other areas. The remnants of the forests are thorny shrubbery with dominant Christ’s thorn. Various species of willow leaved pear, Iberian spirea, buckthorn, Georgian almond, etc. are also present. Beardgrass, fescue, cocksfoot, needle grass, nettle, licorice, esparcet, yarrow, immortelle, various species of blue cirsium, goat’s beard, meadowort, wall germander, garden asparagus, asparagus occur from grasses. It could be summarized that vegetation of Ksani area and adjacent territories does not have great value and thus does not require special protection measures.

D.2.1.2 Fauna

Samegrelo Zomo svaneti

245. Samegrelo fauna comprises almost all systematic categories from the simplest to mammals.

246. Wolf, jackal, fox occur in many areas of the region. Roe deer is frequently observed in Kolkheti foodplain forests, namely, Tchaladidi forests. Boars were abundant in the past, but it has been preserved in some areas only.

247. Avifauna of Kolkheti reserve is rich in nesting and migratory species. Kolkheti is a migratory route and shelter form birds migrating from Europe and Russia.

248. Paliastomi lake and its marshes, especially in spring, are abundant with birds typical for the polar north (ruffs, Eurasian oystercatcher, whooper swan). They occur in Georgia only during flyover. According to ornithologists R. Zhordania and S. Beladze, about 10 thousand various ducks and gese swim in the coastal line and river estuaries of Kolkheti lowland during February.

249. Herons are represented with various species (grey heron, lesser white heron), which have been frequently observed during the expedition in Grigoleti and Maltakva boggy areas and vicinities of lowland adjacent to Rioni.

250. The most diverse class in the substation section is sparrows, of which the following should be mentioned: white wagtail, blackbird, tit, starling, raven, hooded crow, swallow, etc. Kolkheti lowland, namely, r. Rioni floodplains are the place of origin for common pheasant (Phasianus colchicus). The Latin name was given with regard to the place of origin.

251. Predator birds are also abundant: black kite, falcon, marsh harrier, imperial eagle. Otter (valuable fur species) has been preserved in insignificant numbers on the banks of Paliastomi Lake, r. Tschenistskali and Enguri. Economic animal species – nutria should be mentioned as one of the best fur species. It was introduced in Kolkheti in 20th century.
251. Sub-endemic species of Western Georgia – banded newt occurs in Kolkheti reserve and pools or puddles in the adjacent area. Toads, tree frogs, marsh frogs are abundant. Archaic fish – Atlantic sturgeon – is noteworthy. It has been preserved in the Black Sea and r. Rioni is one of the areas, where it naturally spawns.

253. The territory is not rich in reptiles due to the wetland nature of the area. The proof of the above mentioned is the fact that only 9 species out of 53 reptiles occurring in Georgia are represented in Samegrelo (European marsh turtle, slow worm, sand lizard, Deriugin’s lizard, ring snake, dice snake, Caucasian viper (endemic), smooth snake, Aesculapian snake).

254. Wetlands are habitats for mollusks. There is an opinion that Kolkheti is the center of origin for endemic species of mollusks. Species distribution in the neighboring region starts from here (B. Kurashvili, 1974, Zoology of Invertebrates).

255. Anthropoids are the most abundant animal type in the region – including water crustaceous, spiders and especially insects.

256. *Euscapius mingrelius* should be noted from endemic forms of anthropoids.

257. The below invertebrate communities are widespread in the above described bionts: nematodes, lesser bristle worms, leeches, crustaceous, insects, butterflies, flies, etc. Total of 19 invertebrates have been recorded in the region, the majority of which are Georgian and Caucasian endemic species and large number is included in the species under international conventions.

Marneuli Municipality

258. Fauna typical for both mountain forests and steppe occurs in Marneuli district. Wolf, beech marten, weasel, boar, badger; fox, jackal, hare, jungle cat is observed everywhere. The most noteworthy birds are: pheasant, quail, partride, etc. Rivers are rich in European chub, Kura nase, Trans-Caucasian barb, Kura barbell, barbell (*Barbus mursa*), sprilin, Kura bleak, spiny loach, Caspian lamprey, Bulatmai barbell, Caspial shemaya (Danube bleak), sheetfish, etc. Reptiles are abundant as well.

Mtskheta Municipality

259. According to literature sources, Mtskheta municipality was very rich in fauna. Roe deer, boar, Caucasian brown bear, wolf, fox, jackal, lynx, hare, badger, beech marten, weasel, otter, forest dormouse, hamster occurred in the area; birds: partridge, quail, blackbird, magpie, raven, sparrow, etc. The following fishes are present in the municipality rivers: herring, Kura nase, Trans-Caucasian barb, Kura barbell, barbell (*Barbus mursa*), sprilin, Kura bleak, Bulatmai barbell, common carp, etc. Due to expansion of economic activities and long anthropogenic impact the fauna of the municipality has significantly decreased both in species and quantities.

260. The research area is located in the territory of significant anthropogenic pressure. Hence, only synotropic animal species are present.
D.2.3 Protected Areas

261. As the map of the protected areas of Georgia shows (figure 17), none of the rehabilitation/construction sections of the project are located near the protected areas. The closest zones are in the below distances from the protected areas:

- The nearest protected area - Kolkheti National Park – is located at 5-6 km distance from Khorga substation;
- The nearest protected area - Kolkheti National Park – is located at 8-10 km distance from Menji substation;
- The nearest protected area - Tbilisi National Park – is located at 15-17 km distance from Ksani substation;
- The nearest protected area - Gardabani Managed Reserve - is located at 10-12 km distance from Marneuli substation.

![Figure 18. Protected areas of Georgia](image)

262. Kolkheti National Park – The Kolkheti lowland became the subject of international interest firstly in 1996, when Georgia joined the Ramsar Convention on “Wetlands of International Importance Especially as Waterfowl Habitat”. Since 2000 the Kolkheti national park began full-scale functioning. The park is not a monolith formation and it is consisted of separate territories – the districts. The Park is divided into the following natural geographical districts: Anaklia-Churia (between the coastline sections of ravines of the Churia River and the Khobistskali...
River), Nabada (between the western sections of the ravines of the Khobistskali River and the Rioni River) and Imnati (between the western sections of the ravines of the Rioni River and the Supsa River). These are the places where the ecosystems of wetlands are best preserved. Besides, the national park includes the sea water area located between the estuaries of the rivers of Rioni and Churia. The area of Anaklia-Churia is 13713 hectares; Nabada district covers a 10697 hectare area, and the Imnati district area is 19903 hectares. In total, the land area of the National Park is 28571 hectares, and the sea water area – 15 742 hectares. The districts of the National Park are located in the territories of five administration districts - Zugdidi, Khobi, Senaki, Abasha and Lanchkhuti and are a part of two historical regions of Georgia – Samegrelo and Guria.

263. The real beauty of the Kolkheti national park is the Paliastomi Lake that was the gulf of the Black Sea several thousand years ago. The sand dunes displaced along the coast by the sea waves over the centuries isolated the lagoon from the saline water of the sea, and the pure water flowing into the lake from the Pichora River made the water fresh and created the ideal vital environment for many species of fish in the 3 m deep natural reservoir abundant in water invertebrates and plankton.

264. Kolkheti mires, first of all, are important for their relict origin. This lowland is a remainder of the tropical and subtropical landscapes preserved till today, which were stretched along entire Eurasian continent as continuous belt in Cenozoic age about 10 million years ago. In Kolkheti the plants have been preserved that are nowadays characteristic only for swampy ecosystems of tundra and taiga of the far North. The Kolkheti lowland is of other international significance as well.

265. Boreal species alien for Kolkheti grow in the marsh – Sphagnum mosses (Spagnum imbricatum, Sp. palustre, Sp. acutiflium), round-leaved sundew (Drosera rotundiflora), woollyfruit sedge (Carex lasiocarpa) and other plants of alpine zone, such as sedge and Pontic rhododendron (Rhododendron ponticum). Swampy and humid forests include: alder trees, Caucasian wing nut, Imeretian oak and Colchis oak with well-developed evergreen underbrush, Colchis ivy, et al. In the sandy zone of dunes grow Sea-buckthorn and Jerusalem thorn. Composition of species of algae is diverse.

266. The territories of Kolkheti national park are interesting, first of all, by botanic point of view. The complexes of phytocenosis rich in quite diverse, relict and endemic species, and various compositions have remained there till present – they are the different plant communities of the mires, swampy forests and sand dunes located along the coastline, such as: spurge (Euphorbia), eringo (Eringium coeruleum), Colchis sedge (Carex colchica), Imeretian cogongrass (Imperatacyllndrica), astragalus (Astragaluscaucasicus), Marsh woundwort (Stachys palustris), catchfly (Silene), Jerusalem Thorn (Paliurus spinachristi), hawthorn (Crataegus), Sea-buckthorn (Hippophae rhamnoides), et al.

267. Here are spread two species included in the Red Data Book of Georgia with the status of threaten species _ Yellow poppy and Water lily. Along the lakes and marsh rivers in the
wetlands can be found the following plants: Colchis water-lily (*Nymphaea colchica*) and Yellow water-lily (*Nuphar lutea*), Colchis water chestnut (*Trapa colchica*) and Lesser duckweed (*Lemna minor*), and in the peaty mires together with the north tundra species you can find Royal fern (*Osmunda regalis*) and Imeretian sedge (*Molionia litoralis*).

268. Some of them are included in the Red List of Georgia as rare and threatened species: Colchis oak (*Quercus hartwissiana*), Caucasian wing nut (*Pterocarya pterocarpa*), Colchis box-tree (*Buxus colchica*), and among other species the following are injured: maple (*Fraxinus excelsior*), Georgian oak (*Quercus iberica*) and Alder (*Alnus barbata*).

269. In the marsh forests along the peripheral belt of peaty mires and ravines of the marsh rivers dominate about 9-10 m tall Colchis-Hyrcanic alder groves, and rarely it is mixed with wing nut, Imeretian oak or maple, beech, ash-trees and hornbeam. Till present the following species have been preserved: Box tree, Yellow azalea, Pontic rhododendron, Butcher's broom, ilex, *et al*.

270. In total 194 species of birds inhabit the Kolkheti National Park. The route of the annual migration of the birds crosses this territory. For millions of birds that migrate in autumn from the north to the south and in spring from warm countries to their nesting places, the uninhabited mires are ideal places for having a rest during a long distance migration, and for birds of different species Kolkheti is the place where they spend winter. They do not need to go further to the south. In local mires are all the conditions necessary for them to spend winter.

271. Among birds in the territory of Kolkheti National Park the following species can be found: Small water cocks, herons and bright blue kingfisher. Bird watching is possible in October, when the birds of prey fly along the Black Sea coast migrating to the south.

272. Common Buzzards, Black Kites, Common and Lesser Kestrels, Eurasian Hobbies, other falcons, European Honey-Buzzards, White-tailed Eagles, Steppe Eagles and Imperial Eagles soaring in the air at different heights are flying to the south along the coastline. In winter, the groups of ducks, geese, and swans fly in from the north. Besides, here can be found the following species: Woodcock, Eurasian curlews with long and hooked beaks, common coots, grebes, White-fronted geese, Mute and Whooper swans, Dalmatian Pelican, Greater Spotted Eagle, *et al*. One can rarely find the pride and beauty of the fauna of Georgia, the beautiful bird – pheasant, about existence of which the world learned from the Greek seamen visiting Colchis long ago.

273. Among large mammals in the swampy floodplains, forests and shrubs of Kolkheti there can be found: jackal (*Canis aureus*) and Wild boar (*Sus scrofa*), Roe deer (*Capreolus capreolus*) and otter (*Lutra lutra*). It is remarkable, that 6 species of the Red List of Georgia can be found here.

274. The marine mammals are presented by 3 species of dolphins, such as: Aphabet – the Bottle-nose Dolphin (*Tursiops truncatus*), White-sided Dolphin (*Lagenorhynchus*
acutus) and Herring hog (*Phocoena phocoena*). Among amphibians inhabit the Kolkheti the Common Tree frog and Marsh frog are interesting. Among reptiles the following species are found here: Common Newt (*Triturus vulgaris*) and Banded Newt (*Triturus vittatus*), Dice Snake (*Natrix tessellata*), Aesculapian Snake (*Elaphe longissima*) and pond turtle (*Emys orbicularis*).

275. Ichtyofauna of the National Park is presented by 88 species, out of which 23 species are transiting, 21 species live in fresh water and 44 species live in the Black Sea. Among the cartilaginous fish the Atlantic sturgeon and beluga can be distinguished, and among the bony fish – the Black Sea salmon, herring, striped mullet, pike, bonito, *et al.* 6 species of fish of the Red List of Georgia is widespread in the water ecosystems of the Kolkheti National Park, such as: beluga (*Huso huso*), sea sturgeon (*Acipenser sturio*), Sevruga sturgeon (*Acipenser stelatus*), sea trout (*Salmo fario (truta) morpha*), Sand goby (*Gobius (Neogobius) fluviatilis*), roach (*Rutilus frisii*).

276. Going to sightseeing the archeological and cultural monuments in the Kolkheti National Park and its adjacent territories makes the visit much more interesting. The ancient capital of Lazika Archeopolis and the Christian monuments of Kolkheti – Martvili Monastery complex with the scripts and wall paintings of mid centuries, Khobi Monastery, Tsaishi, Kortsxheli and Gulevli churches are all located near the National Park. In Zugdidi, it is also interesting to see the European house-museum of the Dadianis and unique exhibits preserved there.

277. Kolkheti National Park has quite good perspectives for ecotourism. In the period of high level migration it is possible to observe a great number of rare birds. This form of tourism known as a “Bird watching) has become increasingly popular in western countries. Georgia, and especially ornithologically rich Kolkheti, may of fer many interesting meetings to those who is fond of bird watching. In the territory of the Park the bird watching towers are arranged. And the tourists’ accommodation is available in the visitors’ house located in National Park as well as in the hotels of Poti, Grigoleti and Zugdidi.

278. The administration of the national park offers several unforgettable boating routes to the visitors. Along the coastal dunes and Imnati peat there are elaborated walking routes too, but the motor-boats still remain the best means for sightseeing of the wetlands. If you take your place in the boat near Anaklia, in the Churia estuary at the Black Sea and go up the river, or going through Imnati-Paliastomi you enter the Pichora riverbed, you will get many impressions - every turn of the river, going through the local, relict forests, is connected to new surprises and allows one to see rare species of birds.

279. **Tbilisi National Park** – Tbilisi National 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.
280. Area of Tbilisi National Park is 24328 ha. It is situated near the two important cities of Georgia – Mtskheta and Tbilisi.

281. Tbilisi National Park is belonged to the moderate humid climate zone. The winter is moderate cold and summer is long here. The amount of annual atmospheric precipitation is 523-720 mm. The annual air temperature in January is -0.5 °C and in August +24.1°C. Geomorphologically the territory is a rugged region with numerous mountains, slopes and gorges. The highest point is located at 1385 m above sea level. In the territories of Tbilisi National Park the plants are rather diverse. 675 species of grass and wood plants can be found here, among them 104 species are of trees and shrubs. The dendroflora of the Park is interesting due to widespread representatives of Colchis flora of Tertiary period, such as: Black Sea holly (Ilex colchica), Persian ivy (Hedera colchica) and Pastuchov’s ivy (Hedera pastuchowii), European cranberry bush (Viburnum opulus), Butcher’s Broom (Ruscus ponticus), yew (Taxus baccata), Caucasian rhododendron (Rhododendron caucasicus), et al. The territory of Tbilisi National Park is represented by the forest ecosystems of Georgian oak, Oriental beech, Caucasian hornbeam, ordinary ash-trees, Oriental hornbeam and crabapple trees.

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

283. 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.

284. There are numerous Roe deer among ungulate animals. Early the Saguramo Strict Nature Reserve was famous with Caucasian Red deer (Cervus elaphus). Ornithofauna of this place is diverse. Eurasian jay, Blackbird and several species of woodpeckers can be often found there. Among the birds of prey the most numerous is Sparrow hawk and among the Georgia’s Red List species the following can be found there: Imperial eagle (Aquila heliaca), Greater spotted eagle (Aquila clanga) and Levant sparrow hawk (Accipiter brevipes).

285. 12 species of reptiles inhabit the Tbilisi National Park; the most widespread is European Legless Lizard. Grass snakes are also numerous. Yellow-bellied racer and Smooth snake are common to be seen in the Park.

286. 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.

287. There are numerous monuments of exceptionally importance in Mtskheta and its surroundings, which are under the protection of United Nations Educational, Scientific and Cultural Organization (UNESCO); these are the Svetitskhoveli cathedral temple of 11th century, Samtavro church of the same period, monastery complex of Shio Mghvime of 6th century and Jvari monastery. All of Mtskheta is a small city-museum and it hosts to numerous Georgian and foreign guests every day.

288. The territory of Tbilisi National Park is very interesting by viewpoint of tourism. Cultural tourism is well-developed both in Tbilisi and Mtskheta – the cities rich in multiethnic and historical monuments. Saguramo, as a part of the Tbilisi National Park, has great potential for development of ecological, botanical and bird-watching tourism.

289. **Gardabani Managed Reserve** - The area of Gardabani Managed Nature Reserve, established in 1996, is 3484 hectares. The Managed Nature Reserve is located near the Azerbaijan border, in the territories of Gardabani and Mameuli Districts and is at a distance of 39 km from Tbilisi. The Gardabani Managed Nature Reserve was created with the aim of maintenance of the forest groves in this area and improvement of their conditions as well as for protection of the representatives of fauna which inhabit there. Main treasure of flora of the Gardabani Managed Nature Reserve is the floodplain forests, the main trees of which are the Gray poplar (*Populus hybrida*), Black poplar (*Populus nigra*), White willow (*Salix alba*), Aspen (*Populus tremula*), floodplain long-stalk oak (*Quercus longipes*), Wych Elm (*Ulmus glabra*) and Field elm (*Ulmus minor*). In the sub-forest there grow the hawthorn, tamarisk, cornel-elder and Butcher's broom; from the lianas one can find Clematis, Silk Vine and Common hop. The adjacent territories of the floodplain forest are covered with steppe plants, mainly fragments of nipplewort, which are characteristic to this area.

290. Many species of vertebrates inhabit the Gardabani Managed Nature Reserve, namely, 21 species of fishes, 4 species of amphibians, 4 species of reptiles, 135 species of birds and 26 species of mammals, which indicates to high level of biodiversity.

291. A Red deer (*Cervus elaphus*), which is included in the Red List of Georgia, still can be found in the territory of Gardabani Managed Nature reserve.
Among other animals here inhabit Wild boar, hare, jackal, Red fox, Jungle cat, badger, and marten.

292. Silver bream (*Blicca bjoerkna transcaucasica Berg*) and many other small fishes in the Mtkvari River. Among them the following species of the Red List of Georgia can be
distinguished: Wels catfishes *Silurus glanis*), Black Sea Roach (*Rutilus frisii*) and Aral Spined loach (*Cobitis aurata*). There are many carps (*Cyprinus carpio*), breams (*Abramis brama*), Wels catfishes (*Silurus glanis*), Caucasian goby (*Gobius cephalarges constructo Nordmann*), barbell (*Barbus barbus*).

293. From the birds you can see Hoopoe, Magpie, Blackbird, Chaffinch, Goldfinch and Nightingale, and among the Georgia's Red List species the following are distinguished: White-tailed eagle (*Haliaeetus albicilla*), Imperial eagle (*Aquila heliaca*), Egyptian vulture (*Neophron percnopterus*), Greater spotted eagle (*Aquila clanga*), Levant sparrow hawk (*Accipiter brevipes*) and Saker falcon (*Falco cherrug*).


295. The Gardabani Managed Nature Reserve is located in Kartli, a region with a rich historical past. Near the Managed Nature Reserve there have been discovered the former settlements of the Eneolyth - the Early Bronze age, and the crypts of the Middle Bronze era. The monuments of late Bronze age and Early Iron era have also been found. Among the historical monuments near the Gardabani Managed Nature Reserve, surely the David-Gareji monastery complex is distinguished.

296. During the centuries many small and big monasteries appeared on the waterless and lifeless Iori plateau and these places became the hotbed of Georgian spirituality, literacy and wall painting. Bertubani – one of the most important monasteries of the David Gareji complex is situated in the territory of Azerbaijan. Lavra, Udabno, Natlismtsemeli, Verangareja, Chichkhituri, Dodos Rka, and Tetri Senakebi are the monuments included in monastery complex and are harmoniously set in the beautiful landscape, which attract many visitors and religious people.

297. The tourist potential for of this region is not realized yet and is mainly expressed in cultural, walking and driving-adventure tours toward the David Gareji Monastery complex. In the Managed Nature Reserve it is possible to organize bird watching and animal watching tours as well as botanical and ecological tours.

D.3 Economic Development

D.3.1 Industries

Senaki Municipality

298. The main resource of the municipality is land. Senaki municipality is an agricultural region by its development. 42,7 % of the municipality is agricultural land. Other fields of economics,
which are represented within the municipality, are closely intertwined with agriculture. The following industries function in the municipality:

- Expodan LLC – wheat grinding, flour and bran production;
- Gergezi LLC – tea processing plant;
- Xylotrans LLC – wood processing;
- Verdzi LLC – hazel nut and meat processing;
- Nikoru LLC – milk processing plant;
- Kargi Veli LLC – wheat, bran and flour realization.

299. The main directions of development for the population of the municipality are plant growing and livestock breeding.

300. Grain maize and soy production are significant in plant breeding. Vegetable and perennial crop growing is also more or less developed. The following are cultivated: citrus, fruit, tea, vineyard, laurel, orchards, subtropical persimmon, kiwi, etc.

301. There is comprehensive resource for the development of agriculture in the municipality. The municipality has good tradition and experience in production of soy of elite varieties. If irrigation-drainage networks are rehabilitated, agricultural land could be maximally utilized. After completion of respective measures in plantations covered with shrubbery, unused or amortized land plots which are unused could be included in the turnover.

Khobi Municipality

302. The economy of Khobi municipality relies heavily on the oil industry through the storage and trans-shipment facility of the Black Sea Terminal at Poti. The Terminal receives raw oil and diesel delivered by rail and facilitates long-term storage and loading onto ships. The Terminal employs 580 people and its revenues form 65-70 % of the budget of Khobi municipality (6,139,000 GEL).

303. Other key economic activities in the municipality include: agriculture, extraction of construction materials such as sand, aggregate and general fill material and turf supplies;

Mtskheta Municipality

304. The main fields of agriculture in Mtskheta municipality are: vegetable growing and horticulture, vineyards, fruit growing, livestock breeding, wheat is also produced.

305. T. Mtskheta is a town-museum with many historical monuments and places attractive to both local and international tourists. Proximity to the capital is a favorable factor as well.

306. Several large industries operate in Mtskheta municipality:

- Kampa LLC – juice production;
- JSC Mina – glass production;
- Barambo LLC – chocolate and sweet production;
- Agro-consortium Tserovani – milk and soy processing plant, produces various food;
- Neoprint LLC – produces paper for export;
- Several poultry plants successively function within the municipality;
- Slaughter house equipped with modern technologies has recently started functioning in village Natakhtari;
- Brewery Natakhtari functions in village Natakhtari;
- A plant has started functioning in Akhal (New) Tserovani (refugee settlement). It produces various perfumeries.

**Marneuli Municipality**

307. The main fields of economy in Marneuli municipality are: flour and bakery goods, milk processing and cheese production, production of canned fruit and vegetables even with meat ingredients, decorative stone carving and processing, furniture production, exploitation of gravel and sand quarries, etc.

308. Approximately 2100 industrial objects are registered in Marneuli municipality. 100 are industrial. The industries of the district should be mainly included in small and medium categories. The region is not different from other parts of Georgia in these terms.

309. Trade sector is well developed in the municipality. Various retail and wholesale and service objects are located in the area. We consider functioning of small cement plants as perspective if necessary investment is found, because components required for the productions are extracted within the municipality.

**D.3.2 Infrastructure facilities (e.g. water supply, sewerage, flood control)**

*Water supply and sewerage*

**Senaki**

310. After the recent rehabilitation 85 % of Senaki population is supplied with water 24 hours a day, 15 % - according to schedule for 4 hours a day. At present a project funded by the European Union is being implemented in t. Senaki. The project implies arrangement of a new 8470 m long water pipe, installation of 303 water meters and arrangement of an information kiosk.

311. Only several streets are supplied with gas in Senaki. Pipes are being installed at present and according to the plan, major part of the town will be included in the system by the end of 2013. The project of the urban development of the town implies full facilitation of the town population with gas in the nearest two years. T. Senaki population uses firewood for heating apartments now.

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4United water supply company of Georgia (date for January 2013)
Khobi

312. Khobi town has reticulated water supply for all residents whereas Khorga village has reticulated water supply for 80% of its residents with the remaining 20% relying on wells. Only Khobi town is served by a sewerage system. All other district villages have no sewerage system.

Marneuli

313. Marneuli municipality is fully facilitated with potable water: t. Marneuli and all the villages except for the following: Khutor Lezhbadini, Khikhani, Takalo, Khanchigazalo, Kirachmughanlo, where the population extracts the required potable water from springs and wells in the villages. Families who are facilitated with water are supplied through central pipeline from the catchment reservoirs of the natural springs.

314. 40 % of t. Marneuli and 30 % of village Tsopi population are facilitated with sewerage.

315. Gas is supplied by Socar Georgia Marneulgas. 97 % of t. Marneuli is facilitated with gas.

Mtkskhet

316. At present t. Mtkskhet is facilitated with water through Tbilisi water pipeline from the main building of Aragvi gorge, namely, Natakhtari pump station. T. Mtkskhet is fully supplied with potable water, while only 60 % of the villages of the municipality are facilitated with potable water. According to the information of Mtkskhet municipality, 60 % of the 49 main water buildings within the municipality need repair.

317. The town is partially facilitated with sewerage system. Part of the industrial-fecal waste waters go through collectors and flow into rivers: Kura and Aragvi. At present the project of rehabilitation of waste water treatment building is being implemented in Mtkskhet (World Bank funded project).

318. Gas is supplied by two companies in the municipality: Kartli Gas and Socar. 69 % of the population is gasified. Works on gasification of the remaining population are underway.

D.3.3. Transportation (roads, harbors, airports, and navigation)

Senaki Municipality

319. The area of Senaki municipality is 520.7 km$^2$. A town and 14 villages are included within the municipality. Distance from Senaki to Tbilisi by automobile road is 317 km, to the province center – Zugdidi 44 km. The nearest harbor is in t. Poti with distance of 38 km, the nearest airport – in Kopitnari (42 km). Senaki has a railway station.

320. The total length of the roads of state significance within the municipality is 75.2 km, the roads of local significance – 273 km.

321. Suburban and inter-city traffic is distributed between rail and road transport. 4 private transport companies service the town.
Khobi Municipality

322. The area of municipality is 676 km$^2$. Khobi is located in Kolkheti lowland, on the right bank of r. Khobi at the altitude of 25 m above the sea level. Khobi gained the municipality status in 1981 and comprises a town (t. Khobi), 20 administrative units and 56 villages.

323. The municipality is located in 285 from the capital (by railway), military airport of Senaki is at 15 km distance, Poti marine harbor – in 35 km. Eurasian railway crosses the municipality along with a road of international significance. The total length of the automobile roads within the municipality is 310 km, of which: 15.4 km are of international significance, 112 km – of state significance and 182.6 km – of local significance.

Marneuli Municipality

324. The area of the municipality is 935.2 km$^2$. It is located about 420 m above the sea level. The municipality comprises a town and 17 administrative-territorial units, which, in its turn, consist of 83 villages. The center of the municipality is t. Marneuli located in 29 km from Tbilisi, 48 km – from the center of the region t. Rustavi, 30-30 km from the borders of Azerbaijan and Armenia. The nearest airport is located in Tbilisi. Vaziani military airport is located in 30 km from Marneuli.

325. The administrative center of the municipality is crossed by a railway of international significance connecting Georgia with Armenia.

326. Baku-Tbilisi-Ceyhan oil and gas pipelines are located within the municipality.

327. The total length of central and intra-district roads of Marneuli municipality is 540 km, of which 220 km is central and 320 km – intra-district roads. 230 km is asphalted and 310 – unsurfaced.

Mtskheta Municipality

328. Mtskheta municipality is located in the eastern part of Georgia and lies within Mtskheta-Mtianeti according to historical-geographical zoning. It is situated at the altitude of 480 m above the sea level. Its area is 63652 ha. The municipality comprises a town and 63 villages, which are united in 25 territorial units of local self-governance. T. Mtskheta lies in 8 km from Tbilisi.

329. The nearest civil airport is in Tbilisi.

330. Trans-Caucasian railway crosses Mtskheta municipality along with Georgian military road (Tbilisi-Senaki-Leselidze and Tbilisi-Stepantsminda-Larsi section of the highway) and roads of local significance. The total length of roads of local significance is 260 km, the length of roads of state significance -1.9 km and of international significance – 83.9 km.
D.3.4 Power Sources and Transmission

331. Hydro-energetic potential of Georgia (rivers, lakes, water reservoirs, ices, underground waters, bogs) is on one of the first places in the world.

Transmission

332. Two power transmission companies are operating within the Georgian territory - Georgian State Electrosystem” JSC (GSE) and “Sakrusenergy” JSC.

333. Sakrusenergo” JSC-united energy system was established” on 27 May, 1996 by the Georgian Government in cooperation with “Russian United Energy System”. Company’s start-up capital is distributed between the founders on a 50-50 % basis.

334. The basic function of the joint stock company is to work in parallel regime with all neighbor country’s energy systems.

335. GSE assets include the major part of transmission facilities. The company was set up in November of 2002 on the base of “Electrodip AO 2000” LLC and “Electrogadacema” JSC. Under the GNERC issued license, the dispatcher insures the technical management of the system with a view to securing the stable regime for electric energy supply and consumption.

Distribution

336. Three companies are carrying out the distribution of electric energy in Georgia: "Energo-Pro Georgia", "Telasi" and "Kakheti Energy Distribution".

337. Joint-Stock Company “Energo-Pro Georgia” is one of the largest transmission companies in Georgian energy market that, except Tbilisi and Kakheti regions, owns high (110kv) voltage, the medium (35-10kv) voltage and the low (6-0,4kv) voltage networks on the whole territory of Georgia.

338. The main features of company activities:

- Distribution of electric energy;
- Production of electric energy;
- Electric energy transit;
- Technical service of its subscribers.

339. “Energo-Pro Georgia” provides 2,150 billion electric energy in a year and distributes to 850 000 subscribers. Thus, companies' sales amount of electric energy is equal to 40 percent of electric energy use in Georgia.
340. All municipalities, where rehabilitation/construction objects are located, are supplied with electricity throughout 24 hours a day.

D.3.5. Agricultural development, mineral development, and tourism facilities

D.3.5.1. Agriculture

Senaki Municipality

341. In terms of development Senaki municipality is an agrarian district. 22260 ha are agricultural land from 520.7 sq. km territory of the municipality. It is 42.7 % of the total area, of which arable land is 10953 ha (49 %), pastures – 7025 ha (32 %), hay meadows – 20 ha (0.1 %), perennial crops – 3907 ha (17 %), unused (due to land plot turnover) – 349 ha (1.5 %). The municipality is located in Kolkheti lowland, the characteristic of which is inclination of the territory from hilly area to the lowland. The main sectors of agriculture are plant growing and livestock breeding. Maize and soy production play significant role in plant growing. Vegetable growing is more or less developed. The following are important from perennial crops: citruses, fruits, tea, vineyard, laurel, subtropical persimmon, kiwi, etc.

342. There is comprehensive resource for the development of agriculture in the municipality. The municipality has good tradition and experience in production of soy of elite varieties. If irrigation-drainage networks are rehabilitated, agricultural land could be maximally utilized. After completion of respective measures in plantations covered with shrubbery, unused or amortized land plots which are unused could be included in the turnover.

Khobi Municipality

343. In terms of development Khobi municipality is an agrarian district. 44 % of the area, i.e. 29942 ha, are agricultural land. 45 % of the agricultural land, i.e. 13515 ha, are arable land, 12588 ha – pastures, 11 ha – hay meadows, 3828 ha – perennial crops.

344. The main resource of the municipality is land. Subtropical crops are significant – tea, citruses and ether bearing plants. The major sector for municipality population is plant growing and development of livestock breeding, which is achieved through maximal utilization of arable land and pastures. Cereals (mainly maize) play significant role in greens growing; citruses, hazel nut, laurel and tea – in perennial crops.

Marneuli Municipality

345. According to the information of December 1, 2011 provided by the service of the agriculture development of Marneuli municipality, agricultural land fund of the municipality is 57,052,59 ha. Agricultural land comprises the following: arable land – 22,271.29 ha; hay meadows – 1,724.98 ha; pastures – 30,945.8 ha; perennial crops – 2,110.52 ha (Table 3). 6512 ha of land of Iaghluji and Babakari pastures of the municipality are used by: t. Marneuli, communities of Kapanakhchi, Algeti, Kachaghani and Kasumlo. 33,230 ha of agricultural land are privatized.

346. The following landraces are cultivated in the municipality – wheat, barley, maize, rye, sunflowers; from vegetables: potato, cabbage, carrot, onion, garlic, haricot, cucumber, tomato, etc.
347. Marneuli municipality has excellent conditions for the development of agriculture. The main competitive advantage is favorable climate, which enables to have yield 2-3 times a year. Cattle breeding is well developed along with sheep and poultry breeding.

Mtskheta Municipality

348. The main fields of agriculture of Mtskheta municipality are: vegetable growing and horticulture, viticulture, fruit growing, livestock breeding, wheat growing.

349. The main instrument for the development of food processing industry in the municipality is the production of respective agricultural produce in the agrarian sector and possible volumes of the industrial processing of this produce, which could create additional perspectives for municipal budget if sound planning is undertaken. Mtskheta municipality has the potential to produce ecologically clean, export and intra-country consumption food products, various tins, tomato-pastas, natural juices, preserves, stewed fruit, etc. Objects of can production of the municipality have the experience in production of the mentioned goods, but unfortunately they stopped functioning due to financial problems. If they start functioning again, the total produce of food and processing industries should be tens of millions of GEL. However, financial investments are needed.

D.3.5.2. Mineral Development

Senaki Municipality

350. The main natural resources of Senaki municipality are:
   - Fresh water bore holes in the communities of Nosiri, Akhalsopeli, Menji and Ledzadzame;
   - Thermal water bore holes in the communities of Menji and Nokalakevi;
   - Limestone ore at Eki mountain;
   - Sand quarry at r. Rioni;
   - Gravel quarry at r. Tekhuri.

Khobi Municipality

351. The municipality is rich with natural medicinal thermal waters (sulphur containing mineral waters are on the surface in many areas. They are similar to Tsaishi mineral waters in chemical properties), part of which has been studied by the scientists and part requires research. There are unique hyper-thermal waters, which are distinguishable not only in for Georgia, but for the balneological waters of the former Soviet Union. Sulphur water resources are mainly located at the other side of the villages within the territory of Pirveli Khorga, Kvemo Kvaloni and Bia.

352. Construction and inert material are important resources as well: sand-gravel, coarsely broken stone. Proceeding from the specifics of Kolkheti lowland, turf supplies are noteworthy.
Marneuli Municipality

353. The municipality has mineral resources: large supplies of basalt stones, marble ore in Sadakhlo, stone-gravel, lime and white stone supplies. The amount of the resources gives the opportunity of economic use.

Mtskheta Municipality

354. The following are extracted in Mtskheta municipality: limestone, sand-gravel, zeolite, brick clay. The main minerals by their location are:

- Dzegvi zeolite ore – to the west of Mtskheta in 13 km in the vicinities of village Dzegvi;
- Saskhori I limestone ore – to the south-west of Mtskheta in 10 km, in 13 km from Kaspi cement plant;
- Dzegvi sand-gravel ore – to the west of Mtskheta in 15 km, in the vicinities of village Dzegvi;
- Nichbisi sand ore – in 5 km from Mtskheta, in 2-3 km from village Akhali Nichbisi;
- Samadlo (Saskhori) brick clay ore – within village Saskhori, on the right bank of Kura; etc.

D.3.5.3 Tourism development

Senaki Municipality

355. There are no tourist agencies within Senaki municipality. Resort infrastructure and tourism require development. If respective investment is attracted, the region has all the prerequisites for successful development of the sector.

356. Archeological complex Tsikhe-Goji archeopolis (Nokalakevi community), John the Baptist’s monastery complex of village Eki, Shkhepi fortress are located in the area.

357. Favorable conditions for eco-tourism and boating are in Tchaladidi community.

358. Hiking routes could be arranged using abundance of mountain tracks. The following routes could be planned: Menji Archangel’s monastery-Shkhepi fortress; Menji Archangel’s monastery-Shkhepi fortress-Tsikhe Goji archeopolis; John the Baptist’s cathedral monastery-Shkhepi fortress; John the Baptist’s cathedral church-Teklati Virgin Mary Birth monastery; John the Baptist’s cathedral monastery-Shkhepi fortress-Christmas church of old Senaki; John the Baptist’s cathedral monastery-Menji-Eki John the Baptist’s monastery complex.

Khobi Municipality

359. The territory of present-day Khobi was located in the center of Colchic state and it played significant role in Colchic culture and life. Khobi municipality actively participates in the building
occurring in the country. There are no tourist agencies in the municipality. Resort infrastructure and tourism needs development. If respective funds are attracted, all prerequisites for the successful development are present.

**Marneuli Municipality**

360. Certain (although not significant) potential exists for tourism development in the area. Mainly cultural-educational tourism is developed in Marneuli municipality. Agro-tourism is developed within Tamarisi and Kulari communities. Certain resort potential is assigned to Akhkerp. Horseback riding and hunting could be developed. Marneuli could be regarded as transition point at the southern tourist route of Kvemo (Lower) Kartli, which starts in Tbilisi and ends in Bolnisi.

**Mtskheta Municipality**

361. It is noteworthy that t. Mtskheta is a town-museum with many historical monuments and places attracting both local and foreign tourists, which is also favored by proximity to the capital. Tourist flows are chaotic yet. The situation is not regulated and organized in this direction. It should be noted that the development of tourism will be beneficial for both the authorities and the population.

362. Climate resort zones in Mtskheta municipality are the following: Mtskheta, Tsitsamuri, Zedazeni, Saguramo, Tskhvaritchamia and resort area of cardiological profile – village Saguramo, balneological resort – Karsani. Reserve of the first category – Saguramo (5300 ha) functions in the area. It was established for the protection, study and propagation of Colchic plants. Small lakes near Jvari monastery are noteworthy along with artificial reservoirs and mineral waters near village Tsitsamuri.

363. T. Mtskheta is perspective in terms of development of historical-cultural heritage tourism and the main tourist attraction is part of UNESCO world heritage treasury. As it has been mentioned above, the municipality has the greatest potential for tourism development. According to the visitors’ statistics, 2417 foreign visitors were recorded in Mtskheta information center during 9 months of 2010. In 2009 up to 60000 local and foreign visitors came to Mtskheta. 3773 foreign visitors used the service of tourism information center. The number of tourists and visitors significantly increased in 2009 in comparison with 2008.

**D.4 Social and Cultural Resources**

**D.4.1 Population and Communities**

364. Georgia is divided into 9 administrative-territorial units – provinces and 2 autonomous units (figure 3). The four rehabilitation/construction substations of the project are located within 3 administrative-territorial units comprising the below municipalities:

- **Samegrelo-Zemo (Upper) Svaneti:** Khobi substation (Khobi municipality – village Akhalsopeli) and Menji sub-station (Senaki municipality – village Menji);
- **Mtskheta-Mtianeti:** Ksani substation (Mtskheta municipality – village Ksani);
- **Kvemo (Lower) Kartli:** Marneuli substation (Marneuli municipality).
Table 8 shows the data of the national statistics of Georgia regarding the population numbers in 2002-2012:

Table 8. Population Numbers in Project Zone in 2002-2012 (thousand men)

<table>
<thead>
<tr>
<th></th>
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<td>1</td>
<td>Georgia</td>
<td>437.1</td>
<td>434.2</td>
<td>431.5</td>
<td>432.1</td>
<td>440.1</td>
<td>439.4</td>
<td>438.2</td>
<td>438.5</td>
<td>443.6</td>
<td>446.9</td>
</tr>
<tr>
<td>2</td>
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<td>41.2</td>
<td>40.9</td>
<td>40.6</td>
<td>40.6</td>
<td>41.5</td>
<td>41.2</td>
<td>40.8</td>
<td>40.8</td>
<td>41.3</td>
<td>41.6</td>
</tr>
<tr>
<td>3</td>
<td>Senaki municipality</td>
<td>52.1</td>
<td>51.8</td>
<td>51.5</td>
<td>51.4</td>
<td>52.2</td>
<td>52.0</td>
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<td>51.7</td>
<td>52.3</td>
<td>52.5</td>
</tr>
<tr>
<td>4</td>
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<td>64.4</td>
<td>63.9</td>
<td>64.2</td>
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<td>65.0</td>
<td>46.5</td>
<td>46.5</td>
<td>56.9</td>
<td>57.3</td>
</tr>
<tr>
<td>5</td>
<td>Marneuli municipality</td>
<td>118.2</td>
<td>117.1</td>
<td>117.7</td>
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<td>121.8</td>
<td>122.5</td>
<td>123.5</td>
<td>126.3</td>
<td>128.1</td>
</tr>
</tbody>
</table>

Khobi Municipality

365. The population of Khobi can be characterized as stable for decade covering 2002 to 2012, during which time the population increased by approximately 600 and according to current data are 41,800 (of which 21,065 are women and 20,684 are men). 3722 refugees live in Khobi municipality.

366. According to 2010 data, 99.3% of the population is Georgian, 0.5% is Russian and the remaining 0.2% is either displaced Abkhazians or other nationalities. The population is three-quarters rural (village) with 6,100 people living in the town.

367. The project area lies closest to village Akhalsopeli.

368. Akhalsopeli – is a village in Western Georgia, Khobi municipality of Samegrelo-Zemo (Upper) Svaneti province. It is located on Odishi-Guria lowland at Senaki-Poti railway line at the altitude of 35 m above the sea level. According to 2002 census, 759 people live in the village. 377 are men and 382 – women. The majority of population is ethnically Georgian.

Senaki Municipality

369. The population almost has not changed throughout the recent ten years. 98% of the population are ethnical Georgians, 0.6% - ethnical Russians, 0.2% - ethnical Assirians and 0.2% - representatives of other nationalities.

370. According to 2002 census, 1423 people lived in Menji community (Temi) Sakrebulo (local authorities). 675 were men, 748 – women. 99% of the population are ethnical Georgians.
Mtskheta municipality

371. The population has insignificantly decreased (for 0.9 %) during the period of 2002-2009. However, 10400 refugees have resettled to the municipality after 2008. According to the recent information, the total population of Mtskheta municipality is 57 600, of which 46 500 are locals.

372. According to 2002 census, 1658 people lived in Ksani. 986 were men and 672 – women. 81 % of population are ethnical Georgians.

Marneuli municipality

373. According to the data recorded by local authorities, the population of the municipality is 129 600, of which 28 000 reside in towns, 101 600 – in villages; population density is 149.36 men/sq. km. 48.14 % of Marneuli municipality population are men, 51.86 % - women. The majority of the population is ethnical Azeri – 69 %, Georgians – 20 %, Armenians – 5 % and Greek – 3.2 %.

Employment

374. The unemployment rate in the country is 16.9 %. It decreases in towns (15.5 %) and increases for men (18.1 %). 64 % of the employed are self-employed. Average monthly salary for personnel hired in public sector is 512 GEL, in private sector – 608 GEL. The minimum of subsistence for average consumer (by the end of 2012) is 132 GEL, average minimum of subsistence for a family – 250 GEL. Grocery has the major share (42 %) in the average consumer expenses.

Khobi municipality

375. 68 % of the municipality is economically active (27880 persons), of which only 13500 are employed – that is 59 % of the active population. It should be noted that the majority of the employed are self-employed (72 % - 9600 persons), the remaining 28 % of the population are employed mainly in trade, small entrepreneurship, service, healthcare and education.

Senaki municipality

376. The approximate number of economically active population is 31500 persons in Senaki municipality. It is 60 % of the population. 71 % of active population are employed in the region (22300 persons). It should be noted that the majority of the employed population of Senaki are self-employed 0 73 % (16200 persons).

Marneuli municipality

377. 52.2 % of the municipality population are economically active. Only 6 % (3894 persons) are employed in various fields and sectors. The largest share by types of economic activities (not including self-employment) are as follows: 34.4 % - trade; 18.2 % - healthcare; 8.4 % - processing industry and 2-5 % of employed – in other fields and sectors.
Mtskheta municipality

378. The labor resource of the municipality is 30000 persons (of 46500), which is 64.5 % of the population. The number of employed is 9240 persons. 4240 people are self-employed.

379. The main fields of employment are as follows: agriculture, small entrepreneurship (tourism, trade).

D.4.2 Health Facilities

380. There is an extremely high number of doctors per capita in Georgia compared with other European countries, and it had 462 physicians per every 100,000 people in 2008. There were 320 hospital beds per 100,000 people in 2008. There are three times as many physicians in the nation’s capital city, Tbilisi, than in rural areas.

381. There are low utilization rates of both inpatient and outpatient services, as well as pharmaceutical drugs, suggesting that there are barriers, primarily cost-related, to healthcare access. An estimated 30% of the population is deterred from seeking medical services at all due to the high level of out-of-pocket payments charged.

382. The following healthcare objects are located in Khobi municipality:

- Regional polyclinic for displaced persons from Abkhazia;
- Medical ambulatory – “Mkurnali”;
- Central district hospital;
- Medical emergency station;
- Center of safe motherhood and child rescue;
- Khobi ambulatory-polyclinic union;
- Khobi orthopedic-traumatological division.

383. The following healthcare objects are located in Senaki municipality:

- Senaki hospital
- Senaki maternity hospital;
- Senaki child hospital;
- Senaki psycho-neurological dispensary;
- Ambulatory-polyclinic union;
- Medical emergency 03;
- Senaki union of hospitals and polyclinics;
- Public healthcare center;
- Maternity hospital “Senamed”.

384. The healthcare data for Mtskheta municipality is as follows:

- Mtskheta hospital;
- Ambulatory-polyclinic objects;
- Polyclinic, 15 ambulatories;
- “Mtskheta Emergency Service 03” LLC;
- “Akhalgori Polyclinic Division”;
- “Akhalgori 03 Service”.

385. The following healthcare objects are located in Marneuli municipality:

- Marneuli central hospital;
- Marneuli medical emergency center of “Geo Hospital” LLC;
- Marneuli Polyclinic-ambulatory union of LLC;
- Maternity hospital;
- Marneuli anti-tuberculosis dispensary;
- Aversi clinic.

**D.4.3 Education Facilities**

386. Approximately 650,000 thousand pupils study in 2084 public schools of Georgia.

**Khobi municipality**

387. 26 public schools are located in Khobi municipality along with one private school – temporal secondary school “Area” with 20 pedagogues and 157 pupils. 29 pre-school institutions function in the municipality along with studying youth house, musical school, computer school, sports school and boxing school.

388. One state professional education institution functions in Khobi municipality.

389. One public school operates in village Akhalsopeli with 163 pupils and 21 teachers. Pre-school institutions are absent.

**Senaki municipality**

390. 22 public schools and 5590 pupils are in Senaki municipality. 9 private schools function within the municipality (1005 pupils and 181 teachers). 20 kindergartens are located in the municipality with 596 children. 130 people are employed in kindergartens.

391. One state professional education institution functioned in Senaki municipality. It was closed in 2007.
392. One public school is located in village Menji. It serves 142 pupils. 20 pedagogues are employed at school.

Mtskheta municipality

393. 28 public schools function in Mtskheta municipality. 6170 pupils study at these schools with 748 pedagogues. One private secondary school – “Mtskheta Orthodox Secondary School of Twelve Disciples” functions in the municipality. It has 189 pupils and 27 teachers. Union of preschool institutions is present in Mtskheta municipality. 18 kindergartens function in the municipality with total number of children equaling to 1107 and pedagogues – 67.

394. One state professional education institution functioned in Mtskheta municipality. It was closed in 2009.

395. Three musical schools operate in Mtskheta municipality:
   - Mtskheta D. Gamrekeli School of Art – 170 pupils;
   - Saguramo D. Toradze Musical School – 70 pupils;
   - Ksani Musical School – rehabilitation (95 pupils).

396. One sports school, one boxing arena, stadium and mini-stadium, total of 17 objects are located in the municipality.

397. One public school functions in village Ksani (212 pupils and 22 teachers) along with two kindergartens (84 pupils and 5 pedagogues) and, as we have already mentioned, Ksani Musical School.

Marneuli municipality

398. 73 public schools function in Marneuli municipality. 8 of these schools are located in town Marneuli (4577 pupils and 384 teachers). One private school – Marneuli Agmashenebeli (David the Builder) School-Lyceum of Chaghlari Educational Institutions (89 pupils and 24 teachers) also operates in Marneuli. 1 college is present – Marneuli Medical College. Kindergartens function in all communities except for the communities of Kutliari, Damia-Geurarkhi, Khojorna, Kasumlo, Sadakhlo, Tserakvi, Shulaveri, Akhkerpi, Opreti and Kultari.

399. 3 higher educational institutions function in town Marneuli.

400. Private professional educational institution was opened in Marneuli municipality in 2005, but it was closed the same year.

D.4.4 Physical or Cultural Heritage

Khobi municipality

401. Khobi municipality is rich in historical monuments confirming the glory of Kolkheti. There are 20 above surface and up to 300 underground monuments. Tbilisi, Zugdidi, Poti and Kheti museums display abundant material from these monuments.
402. The most significant monuments of the municipality are: Cheokhvame – St. Kvirike church in Sakirio district of Kheti; Kurumelia Jikha fortress; Machkholderi and Jegeta architectural complexes; Misaronperdi in village Khamiskuri and St. Sophia’s church.

Senaki municipality

403. Senaki territory has been populated since ancient period. The region has always been strategically important. Due to the latter the remnants of the town has not lost its significance even after almost 15 centuries.

404. The most significant monuments of the municipality are: archeological complex Tsikhe-Goji (Fortress Goji) – Archeopolis; John the Baptizer’s monastery complex in village Eki; Shkhepi fortress; in terms of religious tourism Virgin Mary’s Birth monastery located in 3.5 km from the district center – on Kutaisi street, in Senaki is noteworthy. The mentioned monastery is especially interesting because one of the most sacred artifacts – John the Baptizer’s finger is stored here. Menji Archangel Cloister should also be noted – St. Monk Alex Shushania is buried here.

Mtskheta municipality

405. Cultural monuments are known from Mtskheta municipality. The below are most renounced:

- Bebri fortress – early middle ages;
- Svetitskhoveli ensemble: domed monastery built in 1010-1029;
- Samtravro – domed church dating back to IX-XI c.c., Samtavro burial – III millennium B.C.;
- St. Nino’s domed church – V-VI c.c.
- Antioch church – V-VI c.c.
- Mtskheta Jvari (Cross) monastery – VI-VII c.c.
- Mtskheta sepulcher – I-II c.c.

Marneuli municipality

406. Historical-architectural monuments have been preserved in Marneuli municipality. Georgian architectural monument located near village Akhkerpi – monastery complex Khujabi (XIII c.) is noteworthy. Monastery Khojorni dating back to the middle ages is also important. Tsopio fortress, which functioned in VI-XIII c.c. should be noted. It was built on a rocky mountain. Remnants of village are located near Tsopio fortress. Opreti fortress near village Opreti is important. Historical sources first mention it in X c. Tserakvi monastery complex is significant as well – it is located near village Tserakvi. The complex comprises a church and other structures.
D.4.5 Current Use of Lands and Resources for Traditional Purposes by Indigenous Peoples

Khobi municipality

407. The main resource of the municipality is land. Subtropical crops are significant – tea, citruses and ether bearing plants. The municipality is also rich in inert material: sand-gravel, coarsely crushed stone. Proceeding from the specifics of Kolkheti lowland, turf supply is significant as well.

408. In terms of development Khobi municipality is an agrarian district. 44 % of the area, i.e. 29942 ha, is agricultural land. 45 % of the agricultural land, i.e. 13515 ha, are arable land, 12588 ha – pastures, 11 ha – hay meadows, 3828 ha – perennial crops.

409. The major sector for municipality population is plant growing and development of livestock breeding, which is achieved through maximal utilization of arable land and pastures. Cereals (mainly maize) play significant role in greens growing; citruses, hazel nut, laurel and tea – in perennial crops.

Senaki municipality

402. The main resource of the municipality is land.

410. In terms of development Senaki municipality is an agrarian district. 22260 ha are agricultural land from 520.7 sq. km territory of the municipality. It is 42.7 % of the total area, of which arable land is 10953 ha (49 %), pastures – 7025 ha (32 %), hay meadows – 20 ha (0.1 %), perennial crops – 3907 ha (17 %), unused (due to land plot turnover) – 349 ha (1.5 %). The municipality is located in Kolkheti lowland, the characteristic of which is inclination of the territory from hilly area to the lowland. Humus-carbonate, yellow, podzol and alluvial soils are mainly represented. The main sectors of agriculture are plant growing and livestock breeding. Maize and soy production play significant role in plant growing. Vegetable growing is more or less developed. The following are important from perennial crops: citruses, fruits, tea, vineyard, laurel, subtropical persimmon, kiwi, etc.

411. There is comprehensive resource for the development of agriculture in the municipality. The municipality has good tradition and experience in production of soy of elite varieties. If irrigation-drainage networks are rehabilitated, agricultural land could be maximally utilized. After completion of respective measures in plantations covered with shrubbery, unused or amortized land plots which are unused could be included in the turnover.

412. 3,631.6 ha (55.6 %) of the agricultural land is privatized. Privatization of 6,532 ha is expected stimulating the interest of land owners in wise land use. Hence, there is large resource of agriculture development in the municipality, which could result in establishment of a strong sector if suitable encouragement is facilitated.

Mtskheta municipality

413. The total land of the municipality, according to the situation of January 1, 2010, is 636.52 sq. km. Despite the fact that part of the municipality land is owned by the state, it is noteworthy
that 52.7% of the agricultural land is transferred to the private ownership, namely, 63.9% of arable land, perennial crops – 93.8%, orchards – 98.3%, vineyards – 89.1%, small area of hay meadows – 19.4% and pastures – 15.3%. 52.7% of the municipality are covered with forests, total agricultural land – 23636 ha, of which:

- Arable land – 12195 ha;
- Perennial crops – 3905 ha;
- Hay meadows – 271 ha;
- Pastures – 7265 ha;
- Forests – 27166 ha;
- Protected areas (reserve) – 22425 ha.

**Marneuli municipality**

414. Agricultural land fund of the municipality is 57,052.59 ha. Agricultural land comprises the following: arable land – 22,271.29 ha; hay meadows – 1,724.98 ha; pastures – 30,945.8 ha; perennial crops – 2,110.52 ha (Table 3). 6512 ha of land of Iaghluji and Babakari pastures of the municipality are used by: t. Marneuli, communities of Kapanakhchi, Algeti, Kachaghani and Kasumlo. 33,230 ha of agricultural land are privatized.

415. The following landraces are cultivated in the municipality – wheat, barley, maize, rye, sunflowers; from vegetables: potato, cabbage, carrot, onion, garlic, haricot, cucumber, tomato, etc.
E. Anticipated Environmental Impacts and Mitigation Measures

E.1 Summary of Activities and Anticipated Impacts

416. This paragraph provides a brief description of anticipated site-specific impacts related to the construction and operation phases of the project “Georgia: Regional Power Transmission Enhancement Project”.

Table 9. Summaries of Activities and Anticipated Impacts

<table>
<thead>
<tr>
<th>#</th>
<th>Potential Impacts During Construction Works</th>
<th>Yes/No</th>
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</tr>
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<tbody>
<tr>
<td></td>
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<td>Severity</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Impacts on Archaeological Sites</td>
<td>No</td>
<td>Land works are not planned for Ksani and Menji substation rehabilitation process. The new sites (Marneuli and Khorga) development does not encroach upon or affect any known area of historical cultural significance. During construction activities special care should be taken not only at the construction sites, but also at construction camps and storage areas.</td>
</tr>
<tr>
<td>2</td>
<td>Contamination of the water during the construction activities</td>
<td>Yes Minor</td>
<td>During construction wastewater will arise from domestic sewage from site workers, contamination due to spillage of oil and other lubricants, contamination due to disposal of construction wastes and wastewater from washing of construction equipment and vehicles.</td>
</tr>
<tr>
<td>3</td>
<td>Noise and Dust Caused by Construction Activities and Emissions of Harmful Substances into the Atmosphere Air</td>
<td>Yes Minor</td>
<td>The project does not imply land works in the process of rehabilitation of Ksani and Menji substations. Earth work for substation foundations (Marneuli and Khorga) would have limited impacts due to a long distance to the residential areas.</td>
</tr>
<tr>
<td></td>
<td>Transport related Impact</td>
<td></td>
<td>The construction process will produce large number of movement by heavy trucks on the roads served the site, delivery construction materials. This can cause a number of impacts.</td>
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<tr>
<td>---</td>
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</tr>
<tr>
<td>4</td>
<td>Transport related Impact</td>
<td>Yes. Medium (Marneuli and Khorga)</td>
<td>The project does not imply significant increase in the movement of heavy technique during the rehabilitation process of the substations.</td>
</tr>
<tr>
<td>5</td>
<td>Noise pollution from vehicle operation during construction in populated areas. Local noise.</td>
<td>No (Ksani and Menji)</td>
<td>Transportation of construction materials and equipment would traverse though a busy market area in Marneuli</td>
</tr>
<tr>
<td>6</td>
<td>Hazardous driving conditions where construction interferes with pre-existing roads.</td>
<td>Yes Medium (Marneuli)</td>
<td>The new area for extension would cause a blockage to the existing local road. Construction of a by-pass will be required.</td>
</tr>
<tr>
<td>7</td>
<td>Hazardous driving conditions.</td>
<td>Yes Medium (Marneuli)</td>
<td>The access road to the construction object and sheep movement route coincide. During sheep movement season the speed of technique on the way to the construction section will significantly decrease especially if the technique route coincides with the movement direction of the sheep.</td>
</tr>
<tr>
<td>8</td>
<td>Damage to secondary contamination sources</td>
<td>Yes Medium (Marneuli)</td>
<td>According to the statistics, the risk of secondary contamination is high during land works along the routes of livestock movement – i.e. spread of anthrax.</td>
</tr>
<tr>
<td>9</td>
<td>Hazardous Construction Wastes.</td>
<td>Yes Minor</td>
<td>Small quantities of hazardous wastes will be generated as a result of vehicle operations and the maintenance activities.</td>
</tr>
<tr>
<td>10</td>
<td>Hazardous Waste oils.</td>
<td>Yes Medium</td>
<td>Hazard impacts would result from improper disposal of use oils to be released from old transformers at Ksani and Menji substations</td>
</tr>
<tr>
<td>11</td>
<td>Construction Related Impacts at the Quarrying Sites.</td>
<td>Yes (Marneuli,Khorga)</td>
<td>The exploration of the borrow pits should be conducted by the licensed companies or the Constructing Contractor has to obtain its own license. However, potential impact of the increased</td>
</tr>
</tbody>
</table>
quarrying activities on river bed and floodplain landscape, ichthyofauna and groundwater should be considered.

<table>
<thead>
<tr>
<th>13</th>
<th>Health and safety</th>
<th>Yes</th>
<th>Medium</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Each herd is accompanied by 10-15 shepherd dogs for protection. The mentioned dogs are prominently aggressive. They are also large and their fighting ability is high. The risk that these dogs will be aggressive towards the staff of the construction contractor is high.</td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>14</th>
<th>Environmental disturbances associated with the maintenance of lines (e.g. routine control of vegetative height under the lines).</th>
<th>No</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The power lines associated with the project will be only installed in Marneuli substation. The total length of the lines will be 700-800 m. The soil is characterized by salty composition and fruit does not grow in the area.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Operation Phase**

<table>
<thead>
<tr>
<th>1</th>
<th>Electric shock hazards.</th>
<th>Yes</th>
<th>Electric shock hazards from transmission lines and substations are a reality for which the public must be adequately protected. Thus, careful design utilizing appropriate technologies to minimize hazards to the public and wildlife is essential.</th>
</tr>
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</tbody>
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<table>
<thead>
<tr>
<th>2</th>
<th>Inadequate provision for workers health and safety.</th>
<th>Yes</th>
<th>Potential health and safety issues for workers during operation of substations and power lines include:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Electric shock hazards</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Fire/Explosion hazards</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Inadequate training</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Inadequate sanitation and water supply</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Electromagnetic fields</td>
</tr>
</tbody>
</table>

417. The following management plans should be prepared by construction contractor one month after signing of construction contract:

- "Environmental Management Plan"
- "Environmental Monitoring Program"
- "Fire prevention and management plan"
- "Waste management plan for construction phase"
- "Hazardous materials and waste management and handling plan"
E.2 Air Quality

**Noise and Dust Caused by Construction Activities and Emissions of Harmful Substances into the Atmosphere Air**

418. Noise and emissions of harmful substances are typical impacts of construction. Air quality will be affected during construction by emissions from vessels, equipment, and land vehicles in work activities at work locations. 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.

419. The construction process for Marneuli and Khorga substations will produce large number of movement by heavy trucks on the roads served the site, delivery construction materials and sand. This can cause a number of impacts for local population especially in Marneuli were construction materials and equipment would traverse though a busy market area.

420. Effects on air quality are not expected during the post-construction period. Non significant impacts on air quality during the post-construction period are expected during repair or rehabilitation activities.

421. The project does not imply significant increase in the movement of heavy technique during the rehabilitation process of Menji and Ksani substations. There is no land works planned for the mentioned substations within the Project.

**Mitigation Measures**

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

- Require adherence to engine maintenance schedules and standards to reduce air pollution.
- Use of defined, well planned haulage routes and reductions in vehicle speed where required;
- Periodically water down temporary roads on site;
- Wet or cover trucks carrying stone/ sand/ gravel;
- Haul materials to and from the site in off peak traffic hours;
- Halting work during excessive winds.
- No truck movements in inhabited areas between 22:00 and 6:00.

E.3 Water Quality

423. During construction wastewater will arise from domestic sewage from site workers, contamination due to spillage of oil and other lubricants, contamination due to disposal of construction wastes and wastewater from washing of construction equipment and vehicles.
Such waste water if not properly controlled has the potential to pollute nearby water bodies, underground water and namely drainage channels and irrigation canals.

424. Water quality can be affected during construction by runoff of soil particles, organic matter and other material during rainfall as a result of vegetation removal and subsequent soil erosion (Marneuli and Khorga substations).

**Mitigation Measures**

425. These impacts can be reduced by a variety of measures; good international practices will be adopted, including:

- Fuel, oil and hazardous materials will be stored in designated areas with temporary impermeable bunds at distance of at least 100 m from any water course.
- Refueling of machinery, equipment and vehicles will be undertaken at distance of at least 100 m from any water course.
- Any major work including oil changing and engine maintenance with the potential for oil to be spilled will be done in designated areas at distance of at least 100 m from any water course and with containment to prevent any oil spills washing away.
- Waste oil shall be collected and taken away for recycling.
- Oil contaminated material shall be disposed off at designated waste disposal facilities.

**E.4 Soil Pollution**

426. Potential pollutants from the project of this nature include the following:

- Diesel fuel, lubrication oils and hydraulic fluids, antifreeze, etc. from construction vehicles and machinery
- Miscellaneous pollutants (e.g. cement and concrete)
- Construction wastes (packaging, stones and gravel, cement and concrete residue, wood, etc.)
- 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.

**Mitigation Measures**

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

428. 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. 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.
429. All fuel/hydrocarbon dispensing nozzles are to be of a drip control design and securely locked when not in use.

430. 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.

E. 5 Risks Related to Sheep Movement (Marneuli Subproject)

431. The exact dates for seasonal sheep movement both to summer and winter pastures change by years and mainly depend on the climate conditions. The dates are regulated by the order of the minister of agriculture of Georgia #2-190 dated August 17, 2005 “on the Approval of Veterinary-Sanitation Rules for Animal Movement (Including Movement to Summer and Winter Pastures)”. According to Paragraph 1, Article 1 of the mentioned order, “seasonal movement of animals to pastures in Georgia are accomplished within the terms set by the order of the veterinary department of the ministry of agriculture of Georgia.”

432. Sheep movement lasts for a month and about 200 000 sheep will pass in the vicinity of Marneuli substation project area twice a year. Construction contractor will face various problems during these periods:

1. Proceeding from the fact that access road to the object and sheep movement route coincide, during sheep movement season the speed of technique on the way to the construction section will significantly decrease especially if the technique route coincides with the movement direction of the sheep.
2. If sheep happen to wander to the construction object, the risk of physical damage or death of the animal is high.

3. Each herd is accompanied by 10-15 shepherd dogs for protection. The mentioned dogs are prominently aggressive. They are also large and their fighting ability is high. The risk that these dogs will be aggressive towards the staff of the construction contractor is high.

4. The mentioned route of sheep movement has functioned for a decade. Due to poverty of the past years the vaccination of sheep as stipulated by legislation has not been in place prior to each movement of sheep. As a result, the sick sheep often died during the movement process. The dead animal was buried on place or consumed by shepherd dogs. According to the statistics, the risk of secondary contamination is high during land works along the routes of livestock movement – i.e. spread of anthrax.

Mitigation Measures

433. The following measures should be implemented during land works for Marneuli substation rehabilitation as well as the season of sheep movement:

- The representative of the infectious disease service of the disease control center should be present during the land work, the process of substation extension (widening) and installation of new poles. The representative will conduct research in case of discovery of bones, if necessary – suspend the works and complete the required procedures. The work will continue only after the completion of the required procedures.

- The construction section should be fenced with stable structure to avoid wandering of sheep and shepherd dogs.

- All shepherds should be instructed on the safety requirements during movement through the construction section.

- Special training should be facilitated to the staff of the construction contractor, who will be present at the construction object during sheep movement season.

- Special billboards on the location and progress of the project should be installed along the both sides of the road to the construction camp at the resting camps of the shepherds.

- Special training should be facilitated to drivers, who will have to use the access road to the construction object during the season of sheep movement.

E.6 PCB in oil of Ksani and Menji Transformers

434. Uninstallation and substitution of old transformers are planned within the project of rehabilitation of Ksani and Menji substations. 3 transformers should be substituted in Ksani
substation. 1 transformer should be substituted in Menji substation. Each transformer contains 600 l of oil, in total - 1800 l.

435. In addition, at Ksani sub-station 8 circuit breakers will be changed (Circuit Breaker MMO – 110 kV). According to the information gained from GSE, the amount of oil in each circuit breaker is 450 l. No PCB-containing oils are used in Circuit Breakers MMO – 110 kV.

436. Therefore, the total amount of the used oils generated as a result of the project implementation is 6.000 l.

437. PCBs are a group of some 209 individual chemical compounds, produced in a various industrial mixtures. In common with several other organochlorine compounds, PCBs show a high degree of resistance to biodegradation in the environment and tend to accumulated in the food chain. Consequently, PCBs are included in the large group of substances that are termed persistent organic pollutants (POPs)

438. PCB is composed of two linked benzene rings together with 1-10 chlorine atoms attached to the rings. It is relatively simple to synthesise a product primarily composed of PCB with 3, 4 or 5 chlorine atoms. PCB is chemically stable and heat resistant, and has particularly useful dielectric properties. Consequently, it was used world-wide, especially as a dielectric in electrical components (transformers and capacitors).

439. In former USSR the oil containing PCB was produced under three brand-names (Sovol, Sovtol and Trichlorobiphenyl) from which the oil named Sovtol-10 were used in transformers.

440. According to US EPA, a transformer is ‘a transformer that contains PCB’ if the concentration of PCBs is higher than 500 ppm. Oil containing between 50 and 499 ppm PCBs is considered to be polluted with PCB and specific methods for disposal are necessary (e.g. specific incineration plants). According to EU Directive 75/439/EEC and amendments oil containing less than 50 ppm PCB can be burned in a regular incineration plant.

Identification of PCB Oils

441. The type of current transformers installed in Ksani and Menji substations is – “CTтф3м-220 Б-III YI” (See Figure 18).

442. According to the information obtained from GSE the oil used in these transformers is T-1500 type of oil.

443. T-1500 transformer oil does not consist of the PCB and has following characteristics:

- T-1500 - Transformer oil of sweet oils and sulfuric acid selective purifications. It is used to fill transformers, oil circuit breakers and other high voltage equipment as the primary insulating material.
- Oil T-1500 combines high insulation properties with active cooling fluid and coolant. In oil circuit breakers, it performs the function of arc-extinguishing fluid.
• Oil T-1500 contains antioxidant additive ionol (2,6 ditertiary butilparakrezol), which provides the most important property of oil - oxidation stability, and securely stores all of its performance after prolonged use.

• Oil T-1500 does not contain water and mechanical impurities but provides high dielectric strength of the oil.

444. Notwithstanding the above mentioned was important to identify accurately PCB fluids in the transformers. The ideally is a simple test that can be carried out rapidly, after sampling from the suspected transformer.

445. There are no rapid tests that can be used for the identification of PCBs. The analysis of these substances is generally done in a laboratory using various types of chromatography:

- packed column gas chromatography;
- thin layer liquid chromatography; and
- high performance liquid chromatography (HPLC).

446. Such analytical tests are indispensable if precise dosages of PCBs are required. However, quantitative tests are generally not required in the first stage of identification of the contents of a transformer. There are fortunately two types of methods that can give a rapid, if not necessarily accurate indication of PCB presence and/or content:

a) Density test. Because of their content of chlorine, which is a fairly heavy atom, PCB oils generally have quite high densities. This allows them to be distinguished in particular from mineral oils. The latter are usually lighter than water. PCB oils on the other hand can have a specific gravity of up to 1.5. This means that a PCB oil will always sink to the bottom of a mixture with water, while mineral oils will tend to float on the top.

b) Chlorine test. Fortunately, the presence of chlorine can be detected by simple chemical tests. There are "test strips" that are sensitive to the presence of chlorine. Also, when a chlorine-containing compound is burnt in the presence of copper, it will give a green flame. This is because the chlorine forms small amounts of copper chloride at the copper surface, and this substance volatilises to give a characteristic green flame.

447. After carrying out these simple tests it was confirmed that the transformer oil contains no detectable PCB and can be considered to be practically free of any PCB and no special treatment or special disposal procedure has to be followed. Thus this oil can either be recycled and reused or burned in a regular oil fired power plant without any environmental constraints.

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Wrong management of used oil (spill, incorrect temporary storage, transportation) could result in negative impact on the environment – i.e. contamination of soil, which could, in its turn, cause pollution of surface and ground waters.

**E.6.1 Used oil management plan**

**Oil from the replacement from transformers: collection, transport and treatment**

Used oil whether it is PCB-free is the hazardous waste, can have harmful effects if it is released into the environment. In addition, people’s health can be affected if used oil is handled improperly.

In order to verify the findings of the previous analyses, oil from each transformer shall be tested for PCB before it is sent to treatment plant. If PCB is found in the oil an expert study has to be performed what to do with the oil. Oil from the transformer replacement shall not be mixed with other hazardous liquid wastes.

**Relevant Regulations and Infrastructure**

A number of international agreements and national laws require regulation and control of collection, transportation and disposal of dangerous wastes by the state.

One of the tools for regulating production and transportation of dangerous wastes in Georgia could be the permit for production and transportation of “materials of limited turnover”. But, due to impossibility to merge different International Conventions and national requirements into one procedure, the relevant regulation has failed to work and is currently suspended.

As for prohibition of use certain substances, no mechanism for implementation of such requirement exists in Georgia today. Consequently, despite requirements of a number of
international agreements (see table 10), regulation/control of production, transportation and use of chemicals could not be implemented at present in Georgia.

**Table 10. Requirements of international agreements on regulation of production and transportation of dangerous chemicals and wastes.**

<table>
<thead>
<tr>
<th>#</th>
<th>Legal document</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Paris Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and of Their Destruction</td>
<td>To regulate, limit or prohibit production, use and transfer of the substances included in Paris Convention annexes.</td>
</tr>
</tbody>
</table>

454. In Georgia management of hazardous wastes is explicitly problematic as the country has no capacities for proper treatment or disposal of such wastes. The only landfill for hazardous wastes is almost completely devastated and represents a serious threat for the environment. There are few small medical waste incinerators in the country - one of them serves Adjara AR, the rest - the big private hospitals. The rest of the hazardous wastes are disposed at municipal landfills with minimal or no treatment at all.

**Oil collection**

455. The contractor has to ensure that during collection of used oil not any oil will pollute the soil. For that the area of the collection site shall be concreted and fitted with a bund that not any oil can reach the soil. This area shall be monitored continuously during taken over the oil visually that not any oil is reaching non concreted parts and pollute the soil. In case of danger the action has to be stopped immediately and appropriate measures have to be applied and following steps are to be taken:

1) A crew should respond immediately upon notification that an oil spill has occurred.

2) All clean-up personnel handling oil and/or engaged in the actual clean-up are to wear personal protective clothing.

3) It is extremely important that any oil fluid must be prevented from reaching storm drains, sewers, drainage ditches, or any other place where water is flowing. The crew is to exercise every available option open to them to contain the oil spill, including temporary diversion or bonding (use of retaining walls). In addition, the crew should anticipate and prevent water from
flowing into the contaminated area from sources such as nearby sprinkler systems and/or street gutter runoff. Every reasonable effort should be made to stop or retard the flow of oil and contain that which has been discharged, using such manpower, equipment and material as is on site or immediately available.

4) Barricades should be placed around the contaminated areas to prevent pedestrians and vehicles from entering until the spill material is cleaned up and removed.

6) In most cases, oil absorptive material is a useful clean-up tool. If used, it should be spread on the contaminated area and should be left in place for at least one hour, or as long as necessary to ensure that all oil fluids have been absorbed.

7) After the spilled fluids have been absorbed, the absorptive material, along with any contaminated soils, should be placed in the steel containers provided for that specific disposal purpose. If conditions are such that oil penetration cannot be determined, then at least 15 cm of soil depth should be removed.

8) All surfaces exposed to the spilled fluid should be decontaminated with swabs containing an efficient solvent.

9) Any contaminated steel structures, wood racks, cable trays (all types) etc., should also be washed down with solvent. All equipment on these structures that may be contaminated by a PCB spill, but will not be removed, must also be similarly cleaned. Caution will be used with the solvent to prevent further contamination of equipment, vehicles etc. in the spill area.

10) All types of structures, building, private vehicles etc. that may be contaminated are to be washed down with solvent (taking care that the solvent does not damage the vehicle varnish). All necessary measures must be taken to prevent solvent and oil from entering into any sewer or drainage system.

11) All contaminated items, including tools, clothing, boots, and other equipment, must either be thoroughly cleaned with solvent where practical, or disposed of in the steel containers provided specifically for disposal purposes.

12) All drums should be clearly identified and stored or loaded onto a vehicle. Drums must be carefully secured to avoid further spills.

13) The vehicle carrying the drums must also be labeled in accordance with transportation procedures.

14) The containers are to be taken directly to a temporary storage area for subsequent shipment to a disposal point.

15) At large spills in densely populated areas, the spill area will be continuously manned until the spilled oil and all clean-up materials have been removed from the site, secured in drums, or otherwise neutralized.
17) Spills into water require special consideration.

Oil Transportation

456. The used oil containers have to be fixed in a safe manner. On a schematic map the staff of Ministry of infrastructure provided a detailed map and marked dangerous parts of the road associated with seasonal and weather conditions to attract the driver's attention to possible hazards. The driver has to be informed about the properties before start of their tour.

457. This list including phone numbers that can be used in case of a contingency shall be handed over to all drivers transporting oil from Menji and Ksani Substations to treatment plant (Tbilisi). If an accident occurs, the contractor has to be informed immediately (all drivers have to keep phone numbers of responsible persons and organizations). Contractor will start needed actions as are e.g.

- inform responsible police station;
- inform the responsible water authority in case of a pollution of the River with oil;
- inform the nearest firefighting brigade, if needed;
- in case of major oil spills to the Mtkvari River (in Ksani Substation) with a risk of a trans boundary pollution (Azerbaijan) inform the Ministry for Foreign Affairs.

458. In the unlikely event of an accident, spill or leakage during shipment, certain emergency response measures must be taken immediately. Steps must be taken first of all to avoid unauthorized persons from approaching the area.

459. If used oil is leaking from a vehicle or from damaged or spilled containers, the drivers and/or safety personnel should attempt to control the spread of liquids. Spilled material should be prevented from entering sewers, streams or other bodies of water if at all possible. As soon as is practical to do so, the driver's supervisor or responsible official at the utility should be notified. The vehicle should not be left unattended until the spill is cleaned up.

460. If the operator of the vehicle is incapacitated, the emergency services must rely on the shipping papers to identify the type of quantities of hazardous material being transported. The shipping papers must be kept on the driver's seat or in the driver's side door container. In any accident, a timely and proper response can prevent a minor accident and spill from becoming a major catastrophe.

461. Transportation of used oil is high risk areas for potential spills or leaks. Most problems occur during loading or unloading of the vehicle. Loading areas should have adequate spill response materials and spill prevention measures should be taken and spill control and clean-up materials should be available, should they be needed. Any subsequent movement of the contaminated wastes shall be made in strict accordance with the provisions of the Basel Convention on hazardous waste movements.
Oil Treatment

462. Contactor will submit the used oil treatment methodology and management plan to ADB for approval within six months after award of the Works contract. Contractor will need to distribute the approved oil treatment plan to responsible parties at least three months before any collection and transport of waste oil is carried out under the Project.

Conclusion

463. Contractor will submit an emergency response plan (ERP) as part of the IEE to ADB for approval within six months after award of the Works contract. The ERP, to be prepared by Construction contractor with assistance from PIC as a separate manual, shall identify responsible parties and actions to be taken in the event of an emergency relating to the collection of waste oil and its transport from Ksani and Menji substations to waste oil treatment plant. Contractor will need to distribute the approved ERP to responsible parties at least three months before any collection and transport of waste oil is carried out under the Project.

Figure 20. Uncorrect storage of used transformers

464. Alternative II: At present the state energy system of Georgia temporarily stores the used oil of substations (if such occur) within the territory of the substation. Transformers with used oil temporarily stored within the substation also exist at Ksani substation. These transformers are not stored according to the environmental requirements. If decision is made to temporarily store the used oil within the territory of the substation, the below requirements should be met:

- Hazardous liquid waste containers must be placed in the secondary protective basins with the capacity of 110% of the container.
• in case if several hazardous waste containers are placed in the secondary protective basin, its capacity must be not less than 25% of the total capacity of all containers and 110% of the biggest container.

• Only those individuals may have access to hazardous waste that passed relevant trainings.

E.7 Hazardous Construction Wastes

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

466. Under the project, 4 transformers and 8 circuit breakers will be changed during the rehabilitation of Ksani and Menji sub-stations. After the used oils are disposed from the used transformers and circuit breakers and handed over to the contractor, the given equipment will be subject to technical control. If they are possible to operate, they will be used at other sub-stations.

467. If the equipment or part thereof is impossible to exploit, the given kind of waste must be managed as hazardous waste.

468. As for the management of the waste polluted with oil, their maximum amount may reach 12 000 kg. Mostly, this will be the metal remains polluted with oil and small amounts of oil-saturated cardboard or polluted china remains. The weight of the transformers (without oil) is 1.400 kg, and that of the circuit breaker is 800 kg. As already mentioned, the generated waste belongs to the category of hazardous waste.

Mitigation Measures

469. 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.

470. At the first stage, the waste polluted with oil will be disposed at a special premise on the territory of the sub-station. A new building should be constructed, or a single room assigned within the existing building and renovated. A hazardous waste storage facility should meet the following requirements:

• Avoid water leakage from the roof, prevent flooding of the building due to a storm;
• A building must be isolated, closed and inaccessible for unknown persons;
• A building must have a ventilation system in place.

471. Set up and equipping of the temporary storage facility for accumulation of the hazardous
waste as follows:

- Containers must be made of proper material and have proper marking.
- Number of containers and their dislocation in the workshop must be planned based on the number of job places and job specifics, so that to prevent contamination of the territory.
- Places for storage of containers and vessels must be arranged according to the following rules:
  - Avoid any contact of different hazardous waste or their mixing;
  - Avoid any physical damage of the container;
  - Avoid any contact with waste-water or other waters;
  - Avoid any contact of the unknown persons both with the hazardous and nonhazardous waste;
  - Avoid any contact of rodents or insects with the hazardous waste;
  - Avoid spread of unpleasant smell from the container with the hazardous waste content;
  - Avoid spread of the hazardous waste due to the wind.

472. At the following stage, the generated hazardous waste will be handed over to a licensed sub-contractor, who will neutralize the hazardous waste polluted with oil.

**E.8 Other Wastes from Construction Activities**

**E.8.1 Municipal Waste**

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

474. Before construction started contractor should prepare “waste management plan for construction phase”

475. The following should be taken into account:

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

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

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

477. Burning of waste on any construction site is forbidden with the exception of stub and small branches from felled trees and bushes, which is better to be burned in order to avoid pest dissemination.
E.8.2 Medical Waste

478. Medical waste is generated in the Medical Care and Control Point and belongs to hazardous waste category. This waste is collected in special plastic boxes and is transferred to a contractor for farther incineration. It is recommended that the medical waste is directly transferred to a contractor from the place of its consolidation.

479. While disposal of the medical waste the following requirements are to meet:

1. Medical waste must be disposed in special plastic boxes, which can be hermetically closed.
2. Medical waste for farther incineration should be transferred to a certified contractor (Batumi municipal waste operator).

E.8.3 Non Hazardous Construction Waste

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

481. While disposal construction wastes both on the sites and at the temporary storage facilities the following requirements are to meet:

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

E.9 Construction Related Impacts at the Quarrying Sites
(Marneuli and Khorga substations)

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

Mitigation Measures

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

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

E.10 Impacts on Archaeological Sites

486. Land clearance works, grading and excavations are associated with the risks of damaging underground archaeological remnants. However, not listed sites could be as sensitive as already known archaeological sites. The known sites have been identified just during major construction works, particularly during construction of the existing project. The other sites have not been studied systematically. Therefore, special care should be taken not only at the new construction sites, but also at construction camps and storage areas.

Mitigation Measures

487. Monuments or 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 earth-works is necessary. Supervisory procedures and all other necessary measures should be agreed with the Ministry of Culture when obtaining the construction permit, in accordance with the rules of the permit issuance. According to the article14 of the Law on Cultural Heritage, Permit on conducting quarrying activities in Georgia, as well as construction of an object of a special importance as it may be defined under the legislation of Georgia, is issued by a competent authority based on the positive decision of the Ministry of Culture of Georgia. The basis for the conclusion is the archeological research of the proper territory to be carried out by the entity wishing to accomplish the ground works. The entity wishing to do the earth-works is obliged to submit the Ministry the documentation about the archeological research of the territory in question. The preliminary research should include field-research and laboratory works.

488. At the construction stage archaeological monitoring should be ensured by the constructing contractor under the supervision of the Ministry of Culture, Monument Protection of Georgia. The budget necessary for the archeological supervision and other agreed works should be fixed under the construction works appraisal.
E.11 Worker Camps

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

- Potential damage of topsoil
- Contamination related to fuel storage and fuelling operations
- Waste management
- Wastewater and sanitation

Mitigation Measures

- Temporary worker camps will be required to be provided with appropriate sanitation facilities, including water supply, and washing facilities, temporary toilets, and waste containers.

- Toilets should either be of a pit type that are at least 20 m from any water body, or porta-potty type. If the latter, toilets should be emptied on a regular or as needed basis, and the effluent disposed of at an approved waste disposal facility.

- Worker camp sanitation facilities should be developed in consultation with relevant local authorities and have all required local, province and national approvals.

- All worker camps should be decommissioned when no longer required and restored to their natural condition.

E.12 Electrical and Magnetic Fields

(Operational phase)

490. Electric and magnetic fields (EMF) are invisible lines of force emitted by and surrounding any electrical device (e.g. power lines and electrical equipment). Exposure to EMF depends on the strength of the field which is related to the voltage level, the distance of the person from the source, and the duration of exposure.

491. Although there is public and scientific concern over the potential health effects associated with exposure to EMF (not only high voltage power lines and substations, but also from everyday household uses of electricity), there is no empirical data demonstrating adverse health effects from exposure to typical EMF levels from power transmission lines and equipment. However, while the evidence of adverse health risks is weak, it is still sufficient to warrant limited concern.

492. The mitigation measure to address EMF exposure is to follow international good practice by adhering to the principle of “prudent avoidance”, in which the HVTLs are sited as far as practicable from any sensitive locations, such as houses, schools, hospitals and offices. This will minimize exposure time. Farming will continue to be carried out within the RoW, but the time of exposure will be short term and periodic, and no mitigation measures are considered
necessary or practicable for this. In addition, monitoring will be undertaken periodically to ensure EMF levels are within national and international standards/guidelines.
F. ANALYSIS OF ALTERNATIVES

493. Only Khorga subproject comprises the construction of a new substation from the four substations included in the project. Other three subprojects deal with the rehabilitation and extension of the existing substations. Hence, only no-project alternative was discussed.

F.1 No-Project Alternative

494. Development of energy system is declared as one of the priorities of Georgia. Hundreds of millions are spent both on the construction of new HPS and rehabilitation of the existing ones. The amount of electricity produced in Georgia has increased recently requiring respective supporting infrastructure (high voltage substations and transmission lines) for supply of the consumers within the country and abroad. Proceeding from all of the above, the energy system of Georgia faces the urgent objective of rehabilitation and improvement of the existing infrastructure.

495. The project of rehabilitation of Ksani, Menji and Marneuli substations could not be regarded as separate projects. They are part of the energy system of Georgia, the many components of which have been improved throughout the recent period. The amount of electricity produced in Georgia has also increased. The efficiency of funds already spent is under question without the increase in capacity of the mentioned substations.

496. In case of Khorga substation both no-project and location selection alternatives were considered:

497. If the Khorga substation was not to be built there would be two significant impacts. In the first instance in order to replace the functionality of regional power export capability, many other 220 kV line and substation adjustments would be required to provide the transmission network flexibility that Khorga substation will offer. This would mean that in other areas additional transmission infrastructure including lengthy transmission lines will be required particularly in the central and western areas of Georgia. The additional transmission infrastructure required to compensate for not having Khorga substation would likely result in environmental impacts which would be significantly greater from a cumulative perspective, than the relatively minor and easily mitigatable impacts associated with Khorga substation.

498. In the second instance if the Khorga substation was not built, additional 220kV lines from Menji or Vektori would be required to service the significant projected load growth in the Poti area. Similarly as above, the additional transmission infrastructure required would result in an overall increase in the scope, magnitude and significance of impacts as compared with the currently proposed Khorga substation.

499. From a technical perspective the specific site selection for Khorga substation is optimal in that it reduces the amount of transmission line interfacing to a minimum especially given that it sits directly on the intersection with Paliastomi 2 220kV line. This in turn avoids environmental impacts related to associated facilities. Furthermore, the proposed Khorga site is of low value from a biodiversity point of view and is considered relatively low value agricultural land. Social/resettlement impacts will be negligible.
500. The proposed projects as described below is among the top investment priorities of GSE’s Strategic Development Plan 2012-2020 and, once implemented, will further enhance the reliability and stability of GSE’s transmission and interconnection infrastructure and remarkably improve the capability of cross-border energy exchange for export, import and transit.

501. It should be noted that the level of negative impact on the environment as a result of the project is not high. All project territories are located in urban areas with significant anthropogenic impact.

502. Proceeding from all of the above mentioned, the economic effect from the project significantly exceeds the negative impact on the environment as a result of the project.

G. Information Disclosure, Consultation, and Participation

503. In order to comply with the Georgian legislation and the ADB requirements and to ensure meaningful consultations, the following actions were done. Most of the main stakeholders have already been identified and consulted during preparation of this IEE, and any others that are identified during project implementation will be brought into the process in the future. Stakeholders of this project include:

- People who live, and work near construction sites;
- GSE as implementing agency;
- Other government regulatory institutions
- NGOs working in the affected communities;
- Owners and managers of the businesses;
- Other community representatives;

504. See annex 3 - Record of Meetings during preparation of this IEE.

Disclosure of documents

505. The electronic versions of the draft IEE is placed on the GSE and ADB web-site.

506. Hard copies of Project environmental documentation (draft IEE and Executive Summary) will be placed at the offices of:

- Senaki, Khobi,, Mtskheta and Marneuli Municipalities; and
- GSE.

H. Grievance Redress Mechanism

507. Most of the impacts are construction related, and therefore it is anticipated that improper or inadequate implementation of EMP may lead to disturbance and inconvenience to local people during construction. In order to provide a direct channel to the affected persons for approaching project authorities and have their grievance recorded and redressed in an appropriate time frame, GSE will establish a Grievance Redress Mechanism. A Complaint Cell and a Grievance
Redress Committee will be established in project municipalities to function throughout the construction period.

508. Two scenarios can be distinguished:
   a) Accidental environmental pollution,
   b) Individual grievances related to damage of health, property or other complaints related with environmental or social issues.

   a) In cases of accidental environmental pollution the local/national environmental authority (State Inspectorate for Environmental and Technical Safety), will have to be directly informed and legal procedures started.
b) The Complaint Cell (CC) at the Municipality of the project area will accept complaints regarding the environment safeguard or social issues in implementation of the project. A three stage grievance redress mechanism is indicated in Figure below. The grievances received and actions taken will be included into the environmental and/or social monitoring reports submitted to ADB.

(i) Complaints received (written or oral communication) by the Complaint Cell (CC) will be registered in database system, assigning complaint number with date of receipt; Complaint Cell will inform the complainant the time frame in which the corrective action will be undertaken.

(ii) The Complaint Cell and Investment Program Management Office (IPMO) will investigate the complaint to determine its validity, and assess whether the source of the problem is indeed subproject activities; if invalid, the Complaint Cell will intimate the complainant and may also provide advice on the appropriate agency to be approached.

(iii) If the complaint is valid, the Complaint Cell will check the environmental management plan (EMP) of the project whether this issue was identified and mitigation was suggested; if yes, the Complaint Cell and IPMO will direct the civil works Contractor to take immediate actions as per the EMP.

(iv) If this is an unanticipated issue, the IPMO will to identify mitigation measures and advice the civil works Contractor accordingly and a corrective action should be taken and a Corrective Action Plan (CAP) prepared.

(v) The Complaint Cell will review the civil works Contractor’s response on corrective action and update the complainant within two weeks.

(ix) If the complainant is dissatisfied with the action taken or decision, he/she may approach the Grievance Redress Committee (GRC, see below) established in the town

509. Grievance Redress Committee (GRC). A GRC will be established to resolve the unresolved issues at Stage 1 and this will function throughout the construction period, and will have hearings on need-basis. GRC will have following members:

- Chairman, Project area Municipality or an elected member nominated by the Chairman
- GSE Representative
- Member of IPMO

510. Considering the anticipated impacts, it is not expected that there is any likely issue which will remain unresolved in the Stage 2 of the process. In the unlikely event of dissatisfaction after Stage 2, the complainant can approach ADB with the complaint. ADB has in place a system under the ADB Accountability Mechanism, where people adversely affected by ADB-assisted projects can voice and find satisfactory solutions to their problems. An affected person can file a complaint (mail, facsimile, electronic mail, or by hand delivery) with:

511. The Office of the Special Project Facilitator (OSPF), ADB, 6 ADB Avenue Mandaluyong City, 0401 Metro Manila, Philippines
Tel: (63-2) 632-4825; Fax: (63-2) 636-2490; Email: spf@adb.org
Or
Georgia Resident Mission, which will forward it to OSPF.
512. Community leaders will act as informal mediators in case of complaints. However APs have the option to choose a different representative or directly liaison with the Grievance Redress Committee (GRC) staff, designated for grievance redress. All grievances and their resolution process shall be documented.

513. NGOs will monitor grievance redress negotiations, assist with grievance arbitration, raise public awareness. APs need to be informed that in case of problems with the local administration they can address NGO staff or the construction supervision consultant to follow up their complaint.

514. The grievance mechanism is designed to avoid lengthy court procedures, but does not limit the citizen’s right to submit the case straight to the court of law just in the first stage of grievance process.
515. ADB is not directly a part of the Grievance procedure but shall receive reports, which complaints were received and how they have been followed up / mitigated.

516. The constructor shall include the provisions for the grievance mechanism in his budget.

I. Environmental Management Plan

517. The construction/rehabilitation, operation, and maintenance of the substations could have a minor impact on the local environment. Mitigation measures are required to ensure that potential impacts arising from the project are either avoided or reduced to acceptable levels. GSE will need to ensure that proper design, construction and operation and maintenance procedures are implemented throughout the project, and that the mitigation measures identified below are incorporated into requirements for design, construction, operation and maintenance of the substations.

I.1 Institutional Arrangements

518. Following agencies will be involved in implementing the Investment Program:

519. GSE is the executing agency (EA) for the Project. Consultations with GSE noted that there is a "virtual" project implementation unit (PIU) established within GSE for the Project. GSE’s Reporting & International Projects Coordination Department will lead and coordinate project implementation which will be undertaken by staff appointed to the PIU.

520. The PIU will not be physically created (i.e. housed in a separate office) it will consist of specialists and experts from other departments on an as required basis. GSE has already appointed an environmental and social safeguards specialist. As required the PIU will draw upon the experience of people from Project Support Office (PSO) in another entity affiliated with GSE which has since disbanded and those people have been absorbed into GSE and bring requisite expertise to GSE and will be available to the PIU.

521. GSE as responsible PIU for the project will recruit a Construction Supervision Consultant (CSC). The national and international team of consultants will assist GSE as project supervision for the construction of Georgia: Regional Power Transmission Enhancement Project. The Consultant, based on the project needs will also provide capacity building training to construction contractor staff for management and operation and maintenance for the Project. The Consultant will assist GSE in assuring that the project is implemented according to the specified standards.

522. GSE with support from a construction supervision consultant will be responsible for ensuring that the overall project is implemented in accordance with the conditions of the ADB loan agreement including ADB environmental guidelines and Government of Georgia (GoG) environmental regulations. In particular GSE will be responsible for ensuring, on a day-to-day
basis, that the EMP is implemented during each stage of the project (pre-construction, construction and operation). This includes the following activities:

1. Ensuring that:
   - All GoG and ADB requirements and procedures relating to environmental safeguards are complied with prior to construction;
   - The bidding documents include relevant sections of the EMP;
   - EMP implementation is monitored and results are reported regularly;
   - Sufficient environmental staff resources are in place to undertake GSE’s EMP responsibilities;

2. Carrying out regular monitoring of the Contractor’s construction activities to ensure that work is carried out in full compliance with the EMP, and environmental specifications and provisions set out in the construction contract;

3. Monitoring the social conditions associated with the project, including any grievances among villagers towards project construction practices, Contractor activities, impairment of livelihood resulting from damage to or loss of crops as a result of construction activities, loss of access, etc.

4. Holding routine on-site meetings with the Contractor to review work performance relative to environmental and social objectives of the project; identify areas of satisfaction and shortcomings in the Contractor’s work and provide guidance to resolve areas where the work is deficient.

5. The Contractor will be required to prepare and implement a detailed site specific Environmental Management Plan (SEMP) in accordance with the EMP (as provided under IEE and EIA) in the construction contract. The Contractor shall apply for, and GSE will assist the Contractor in obtaining, all necessary permits in order to execute the works according to his proposed working method or modify his working method in accordance with permit conditions.

5. ADB is the donor financing the Investment Program. ADB’s due diligence includes assessment of the borrower/client’s project implementation capacity. For projects where the borrower/client’s capacity is weak, ADB may provide technical assistance to help strengthen institutional capacity and develop staff skills in environmental management.

**I.2 Reporting on EMP Implementation**

5. The contractor will be required to prepare an environmental management monthly to internal (project management) and quarterly external (GSE/CSC) report as part of routine
The environmental management report will identify the work undertaken over the reporting period and document the environmental protection measures that have been carried out, problems encountered, and follow-up actions that were taken (or will be taken) to correct the problems.

526. The construction supervision consultant being also responsible for supervision of all environmental issues shall prepare quarterly reports including the progress of the implementation of the EMP. These reports shall be submitted to GSE and distributed to all involved departments; the report shall contain all discrepancies from the EMP and list all HSE relevant incidents and accidents that occur during the implementation of the refurbishment measures. Based on these reports and on own regular construction site audits the Consultant together with GSE/PIU will prepare semi-annual performance and monitoring reports and submit them to ADB.

I.3 Costs of Environmental Management Plan

527. The monitoring plan for the project is summarized in Environmental Monitoring Plan (Matrix). 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.

528. Most of the mitigation measures require the Contractor to adopt good site practice, which should be part of their normal construction contract, so there are no additional costs to be included in the EMP. Extra costs with respect to environmental mitigation are related to additional measures determined by CSC. All mitigation measures given above are included in the regular construction costs.

529. The Construction Supervision Consultant is also responsible for permanent supervision of all environmental issues. Costs for consultant environmental monitoring will be included in the consulting services costs of the project.

530. In order to supervise appropriate implementation of the EMP an estimate of monitoring cost of 100,600.00 USD will be necessary for Construction Contractor (see table 11). However the CSC will be requested to provide detailed budget for environmental monitoring.

Table 11. Environmental Management Costs for Implementation of EMP

<table>
<thead>
<tr>
<th>Environmental Management Costs</th>
<th>Item</th>
<th>Quantity</th>
<th>Unit Cost</th>
<th>Total Cost (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Management Specialist (local)</td>
<td>30 month</td>
<td>2,500.00</td>
<td>75,000.00</td>
<td></td>
</tr>
<tr>
<td>Used oil samples analysis before rehabilitation started</td>
<td>4 sample</td>
<td>200.00</td>
<td>800.00</td>
<td></td>
</tr>
<tr>
<td>Waste oil treatment</td>
<td>6,000 kg</td>
<td>1.70</td>
<td>10,200.00</td>
<td></td>
</tr>
<tr>
<td>Environmental Capacity Building and Training (for contractors)</td>
<td>2 trainings</td>
<td>3 500.00</td>
<td>7 000.00</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>------------</td>
<td>----------</td>
<td>----------</td>
<td></td>
</tr>
<tr>
<td>H&amp;S Capacity Building and Training (for contractors)</td>
<td>2 Trainings</td>
<td>3 500.00</td>
<td>7 000.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total:</strong></td>
<td></td>
<td><strong>100 600.00</strong></td>
<td></td>
</tr>
<tr>
<td>Project and site.</td>
<td>Stage and site.</td>
<td>Project Activity</td>
<td>Potential Environmental Impact</td>
<td>Proposed Mitigation Measure</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------</td>
<td>------------------</td>
<td>------------------------------</td>
<td>----------------------------</td>
</tr>
<tr>
<td>Pre-Construction</td>
<td>Site preparation: material and equipment staging areas and project area access locations</td>
<td>Possible removal of terrestrial habitat</td>
<td>Sites rehabilitated before contractor leaves site upon completion of construction activities. Planting and stabilization of site, including replacement of any native plant species</td>
<td>GSE</td>
</tr>
<tr>
<td>Pre-Construction</td>
<td>Permanent alienation of land and vegetation for substations and substation access roads</td>
<td>Loss of properties and incomes by local population</td>
<td>Careful sitting of substations to avoid to the maximum extent Possible sensitive ecosystems such as parks and protected forests; other sensitive locations such as houses and schools; and private properties Providing appropriate land acquisition and compensation through the relevant LARP in accordance with relevant ADB and national legislation requirements</td>
<td>GSE</td>
</tr>
<tr>
<td>Pre-Construction</td>
<td>Encroachment into areas of historical/cultural significance.</td>
<td>Loss of values</td>
<td>Historical/cultural/religious sites are avoided.</td>
<td>GSE</td>
</tr>
<tr>
<td>Action</td>
<td>Impact</td>
<td>Details</td>
<td>Responsible Party</td>
<td>Measure</td>
</tr>
<tr>
<td>--------</td>
<td>--------</td>
<td>---------</td>
<td>-------------------</td>
<td>---------</td>
</tr>
<tr>
<td><strong>Encroachment into Farmland.</strong></td>
<td>Loss of agricultural Productivity.</td>
<td>Substation sited on state owned land currently cultivated under an informal leasing arrangement with local farmers. Informal lessees will be compensated in accordance with ADB SPS 2009 policy on Involuntary Resettlement.</td>
<td>GSE</td>
<td>Include in GSE budget.</td>
</tr>
<tr>
<td><strong>Construction (Khorga and Marneuli substations)</strong></td>
<td>Construction site preparation activities.</td>
<td>Loss of topsoil</td>
<td>Contractor</td>
<td>Included in construction contract</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The topsoil will not be handled when: i) The topsoil is frozen; ii) The site is experiencing persistent rainfall; iii) The topsoil is saturated; Segregation from subsoil stockpiles; The storage of topsoil in stockpiles; No more than 2m high with side slopes at a maximum angle of 450; Dedicated storage locations that prevent the stockpiles being compacted by vehicle movements or contaminated by other materials; Erosion protection measures (erosion matting, berms etc.). No storage where there is a potential for flooding. No storage at less than</td>
<td></td>
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</tr>
</tbody>
</table>
25m from river/streams, subject to site specific topography.

Topsoil from the sites, which will not be reinstated to the initial conditions will be distributed carefully on the surrounding area.

<table>
<thead>
<tr>
<th>Construction (Khorga and Marneuli substations)</th>
<th>Construction site preparation activities</th>
<th>Impacts on cultural heritage sites</th>
<th>No cultural heritage sites identified within the Project area. A chance find procedure will be in place:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>- If physical cultural resources are encountered during the construction phase, all works at the find site should be immediately halted.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- The find should be assessed by a competent expert, and procedures to avoid, minimize or mitigate impacts to the physical cultural resources should be developed by the expert in cooperation with the relevant local heritage authority.</td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>Construction site preparation activities.</td>
<td>biological recontamination</td>
<td>Permanent monitoring during land clearance and Contractor Included in construction contract</td>
</tr>
<tr>
<td>(Khorga and especially Marneuli substations)</td>
<td>on during earthworks</td>
<td>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.</td>
<td>National centre for disease control and public health.</td>
</tr>
<tr>
<td>Construction (Khorga and Marneuli substations)</td>
<td>construction</td>
<td>Noise and Dust Caused by Construction Activities and Emissions of Harmful Substances into the Atmosphere Air.</td>
<td>Contractor</td>
</tr>
<tr>
<td>Construction stage</td>
<td>Construction/rehabilitation</td>
<td>potential to pollute nearby water bodies, underground water and namely drainage channels and Fuel, oil and hazardous materials will be stored in designated areas with temporary impermeable bunds at distance of at least 100 m from any water course.</td>
<td>Contractor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Require adherence to engine maintenance schedules and standards to reduce air pollution; Use of defined, well planned haulage routes and reductions in vehicle speed where required; Periodically water down temporary roads on site; Wet or cover trucks carrying stone/ sand/ gravel; Haul materials to and from the site in off peak traffic hours; Halting work during excessive winds; No truck movements in inhabited areas between 22:00 and 6:00.</td>
<td>Included in construction contract.</td>
</tr>
<tr>
<td>Construction stage</td>
<td>Construction/rehabilitation</td>
<td>Refueling of machinery, equipment and vehicles will be undertaken at distance of at least 100 m from any water course. Any major work including oil changing and engine maintenance with the potential for oil to be spilled will be done in designated areas at distance of at least 100 m from any water course and with containment to prevent any oil spills washing away. Waste oil shall be collected and taken away for recycling. Oil contaminated material shall be disposed off at designated waste disposal facilities.</td>
<td></td>
</tr>
</tbody>
</table>

| Contractor Included in construction contract | Included in construction contract |
| Construction and Operation stages (Marneuli) | Construction/rehabilitation/operation | During sheep movement season the speed of technique on the way to the construction section will significantly decrease especially if the technique route coincides with the movement direction of sheep and shepherd dogs.

All shepherds should be instructed on the safety requirements during movement through the construction section.

Special training should be facilitated to the staff of the construction contractor, who will be present at the construction object during

| Contractor | Georgian Herdsmen Association. |
| Included in construction contract. |
the sheep. If sheep happen to wander to the construction object, the risk of physical damage or death of the animal is high. sheep movement season. Special billboards on the location and progress of the project should be installed along the both sides of the road to the construction camp at the resting camps of the shepherds.

| Rehabilitation stage (Ksani and Menji substations) | rehabilitation | Wrong management of used oil (spill, incorrect temporary storage, transportation) could result in negative impact on the environment – i.e. contamination of soil, which could, in its turn, cause pollution of surface and ground waters. The best alternative for the management of the used oil is to sign a contract with Kimiani LLC and full transfer of the used oil to the company, although it will increase the project budget for about 10.000 USD. | Contractor | Including in construction contract. |
| Construction stage | Construction Waste Management | potential to pollute soil, air and water around the substations and excess Solid wastes generated from construction activities should not be haphazardly left around construction sites: | Contractor | Included in construction contract |
| Construction stage | Domestic waste management | potential to pollute soil, air and water around the substations and camps. | Temporary worker camps will be required to be provided with appropriate sanitation facilities, including water supply, and washing facilities, temporary toilets, and waste containers. Toilets should either be of a pit type that are at least 20 m from any water body, or portal-potty type. If the latter, toilets should be emptied on a regular or as needed basis, and the effluent disposed of at an approved waste disposal facility. Worker camp sanitation facilities should be developed in consultation with relevant local authorities and has all required local, province and Contracting. **Contractor** Included in construction contract. |
All worker camps should be decommissioned when no longer required and restored to their natural condition.

<table>
<thead>
<tr>
<th>Construction and Operating Stages</th>
<th>Employment Opportunities</th>
<th>Project will increase employment opportunities</th>
<th>Communicate about employment opportunities on a regular basis and demonstrate the efforts being made to accommodate as many people as possible. Be clear about the limited scale and communicate this limitation during the meetings. Ensure transparent process of giving jobs. Give priority to people with cumulative impacts as well as vulnerable families.</th>
<th>constructor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>contractor</td>
<td>Included in construction contract</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Construction Stage</th>
<th>Occupational Health and Safety</th>
<th>Damage to workers health/safety</th>
<th>Prior to the commencement of civil works a construction phase Occupational Health and Safety Plan (OHSP) will be developed. The OHSP should: identify and minimize, so far as reasonably practicable, the causes of potential hazards to workers, including communicable diseases such as HIV/AIDS and vector borne</th>
<th>Contractor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Contractor</td>
<td>Included in construction contract</td>
</tr>
</tbody>
</table>
diseases;
provide preventive and protective measures, including modification, substitution, or elimination of hazardous conditions, with particular attention to live power lines, working at height, EMFs, and exposure to chemicals;
- provide measures for the management and appropriate disposal of hazardous wastes to ensure protection of the workforce and the prevention and control of releases and accidents;
provide for the provision of appropriate personal protective equipment (PPE) to minimize risks;
- provide training for workers, and establish appropriate incentives to use and comply with health and safety procedures and utilize PPE;
- include procedures for documenting and reporting occupational accidents,
<table>
<thead>
<tr>
<th>Operation stage</th>
<th>Operation</th>
<th>Hazards to wildlife/humans</th>
<th>Careful design utilizing appropriate technologies to minimize losses and hazards. Design and installation of components to conform to internationally accepted safety standards.</th>
<th>GSE</th>
<th>Included in operation costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation stage</td>
<td>Operation</td>
<td>Damage to workers health/safety</td>
<td>Careful design using appropriate technologies to minimize hazards. Safety awareness raising. Fire Emergency Action Plan and training given to staff. Provision of adequate sanitation and water supply facilities.</td>
<td>GSE</td>
<td>Included in operation costs</td>
</tr>
</tbody>
</table>
## Environmental Monitoring Plan (Matrix)

### Construction and Operation Phases

<table>
<thead>
<tr>
<th>Project Stage</th>
<th>Monitoring measure</th>
<th>Parameters to be monitored</th>
<th>Location</th>
<th>Measurement</th>
<th>Frequency</th>
<th>Responsibilities</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior to issue of bidding documents</td>
<td>Environmental audit of bidding documents</td>
<td>To ensure relevant sections of the EMP have been included</td>
<td>GSE office</td>
<td>Documents audit</td>
<td>Once Prior to issue of bidding documents</td>
<td>CSC</td>
<td>Included in contract of CSC</td>
</tr>
<tr>
<td>Prior to approval of detailed design of substation</td>
<td>Environmental audit of substation designs</td>
<td>To ensure project design compliance with IEE Guidelines.</td>
<td>GSE office</td>
<td>Documents audit</td>
<td>Prior to approval of detailed design of substations</td>
<td>CSC</td>
<td>Included in contract of CSC</td>
</tr>
<tr>
<td>Prior to approval for construction commence ment.</td>
<td>Audit of environmental permissions</td>
<td>To ensure that all necessary permits for project construction have been obtained</td>
<td>GSE office</td>
<td>Documents audit</td>
<td>Prior to approval for construction commence ment.</td>
<td>CSC</td>
<td>Included in contract of CSC</td>
</tr>
<tr>
<td>After signing of construction contract</td>
<td>Audit of Environmental management plans</td>
<td>Plan to ensure compliance with EMP and Contract Document</td>
<td>GSE office</td>
<td>Documents audit</td>
<td>Once, One month after signing of construction contract</td>
<td>CSC</td>
<td>Included in contract of CSC</td>
</tr>
<tr>
<td>--------------------------------------</td>
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<td>--------------------------</td>
</tr>
<tr>
<td>Before rehabilitation started</td>
<td>Chemical analysis</td>
<td>To ensure that type of used oil is not PCB</td>
<td>Ksani and Menji substations</td>
<td>In a certified laboratory</td>
<td>Once before rehabilitation</td>
<td>Construction Company</td>
<td>Including construction contract</td>
</tr>
<tr>
<td>Rehabilitation</td>
<td>Ensure that used oil management plans activities are implemented and executed</td>
<td>All mitigation actions as given in used oil management plan.</td>
<td>Ksani and Menji substations . Transporta ion and treatment sites.</td>
<td>Visually. Documents audit</td>
<td>Permanently</td>
<td>CSC</td>
<td>Included in contract of CSC</td>
</tr>
<tr>
<td>Construction</td>
<td>Ensure that mitigation activities are implemented and executed</td>
<td>All mitigation actions as given in Section E for construction site</td>
<td>Whole constructio n sites Excess Road. Storage area</td>
<td>Through audits by: Site visits visual inspections interviews record of findings</td>
<td>Weekly throughout construction period.</td>
<td>CSC</td>
<td>Included in contract of CSC</td>
</tr>
<tr>
<td>Before construction</td>
<td>Audit of Environmental H&amp;SE management plans.</td>
<td>Review Contractor’s worker health and safety plan and training</td>
<td>GSE and CSC office</td>
<td>Documents audit</td>
<td>Plan before construction begins</td>
<td>CSC</td>
<td>Included in contract of CSC</td>
</tr>
<tr>
<td>Construction</td>
<td>Ensure that mitigation</td>
<td>All mitigation actions as</td>
<td>Constructio n sites</td>
<td>Ensure chance find</td>
<td>Permanently during</td>
<td>CSC</td>
<td>Included in contract of CSC</td>
</tr>
<tr>
<td>Category</td>
<td>Action Description</td>
<td>Location</td>
<td>Procedure Description</td>
<td>Control</td>
<td>Who Pays?</td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>Ensure that mitigation activities related with biological recontamination during earthworks are implemented and executed</td>
<td>All mitigation actions as given in Section 5</td>
<td>Ensure chance find procedure is in place, and being applied if required</td>
<td>Permanently during earthworks</td>
<td>CSC</td>
<td>Included in contract of CSC</td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>Ensure that mitigation activities related with sheep's driving season are implemented and executed</td>
<td>All mitigation actions as given in Section 5</td>
<td>Ensure chance find procedure is in place, and being applied if required</td>
<td>During sheep movement season</td>
<td>CSC</td>
<td>Included in contract of CSC</td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>Ensure that mitigation activities are implemented and executed</td>
<td>Proper handling and storage of the waste</td>
<td>Through audits visual inspections record of findings</td>
<td>During construction</td>
<td>CSC</td>
<td>Included in contract of CSC</td>
<td></td>
</tr>
<tr>
<td>Operation</td>
<td>Ensure that mitigation activities are implemented and executed</td>
<td>Proper handling and storage of the waste</td>
<td>Through audits visual inspections record of findings</td>
<td>Permanently</td>
<td>GSE</td>
<td>Included in operation costs</td>
<td></td>
</tr>
<tr>
<td>Operation</td>
<td>Ensure that mitigation activities are implemented and executed</td>
<td>Regular audit of substations including environmental health and safety records</td>
<td>Substation(s)</td>
<td>Through audits visual inspections record of findings</td>
<td>Permanently during operation</td>
<td>GSE</td>
<td>Includes in operation costs.</td>
</tr>
</tbody>
</table>
J. Conclusions and Recommendations

1. The Regional Power Transmission Enhancement Project will generate only minor environmental impacts that can be reduced to acceptable levels through implementation of practical mitigation measures normally associated with internationally recognized good engineering practice. Key findings of the IEE are summarized below.

2. No significant natural habitats will be affected by the Khorga, Ksani, Marneuli and Menji substations development due to its location within an area where the natural habitat has been highly modified by recent agricultural activities and human settlement.

3. The Khorga substation site has been selected to avoid environmentally sensitive areas, villages, settlements and religious and cultural/heritage sites and to avoid significant social impacts and costs associated with land acquisition and resettlement.

4. The impact of the substation site on agricultural land is limited and comprises the loss of 13.5 ha of low lying state-owned land that has hitherto been leased informally to local farmers. Compensation for the loss of agricultural production by informal lessees will be paid to project affected people according to the Land Acquisition and Resettlement Plan.

5. The design of Marneuli substation area will cover 3 land plots, with two of them owned privately (one of them is owned by a private person and another one is owned by LTD “Firm Lomtagora”) and the last one owned by the state. The total area of the land area to be purchased to build the substation is 48.373 m² with 23.861 m² to be purchased from private owners and 24.514 m² to be purchased from Company- Ltd LOMTAGORA.

6. For Marneuli substation, full EIA shall be prepared, with public consultations and all requirements under the legislation of Georgia conducted and complied with. Together with other necessary documents, the EIA shall be submitted to the Ministry of Economy and Sustainable Development to obtain a Construction Permit before the start of construction activities.

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

8. It is considered that the project will contribute positively to the economic development of the Country through:

   Improved functionality of the national grid

   Improved reliability and security of power supply to the region

   Meet the increased power demand of the regions

   Guarantee transmission of energy to Turkey
9. Based on the analysis conducted in this assessment it is concluded that overall the Project will result in significant positive socioeconomic benefits, and those potential negative environmental impacts that have been identified are small-scale and localized, and can be minimized adequately through good design and the appropriate application of mitigation measures. It is therefore recommended that the Project be supported by ADB.
Annex 1. Bibliography

3. Janiashvili A, Zoogeography ,1974;
4. Javakhishvili S, Climate in Georgia;
5. Maruashvili L, “Physical Geography of Georgia”, - “Tsodna” (knowledge) , Tbilisi, 1964
8. Tatashidze Z, “Physical Geography of Georgia”, - “Metsniereba” (Science), Tbilisi, 2000;
10. Urushadze T, “Main Soils of Georgia” “-„Metsniereba”; (Science), Tbilisi , 1997;
14. “Chemical Profile of Georgia” - Strategic Approach to International Chemicals Management (SAICM) Quick Start Programme Trust Fund Tbilisi 2009
Annex 2. RAPID ASSESSMENT CHECKLIST

RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST

Instructions:

(i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to Environment and Safeguards Division (RSES) for endorsement by Director, RSES and for approval by the Chief Compliance Officer.

(ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB’s (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.

(iii) Answer the questions assuming the “without mitigation” case. The purpose is to identify potential impacts. Use the “remarks” section to discuss any anticipated mitigation measures.

Country/Project Title: GEO/ Regional Power Transmission Enhancement Project

Sector Division: CWEN

<table>
<thead>
<tr>
<th>Screening Questions</th>
<th>Yes</th>
<th>No</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. PROJECT SITING</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IS THE PROJECT AREA ADJACENT TO OR WITHIN ANY OF THE FOLLOWING ENVIRONMENTALLY SENSITIVE AREAS?</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Screening Questions</td>
<td>Yes</td>
<td>No</td>
<td>Remarks</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------------</td>
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<td>----</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>• CULTURAL HERITAGE SITE</td>
<td></td>
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</tr>
<tr>
<td>• PROTECTED AREA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• WETLAND</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• MANGROVE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• ESTUARINE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• BUFFER ZONE OF PROTECTED AREA</td>
<td></td>
<td></td>
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<tr>
<td>• SPECIAL AREA FOR PROTECTING BIODIVERSITY</td>
<td></td>
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</tr>
<tr>
<td><strong>B. POTENTIAL ENVIRONMENTAL IMPACTS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WILL THE PROJECT CAUSE…</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• encroachment on historical/cultural areas, disfiguration of landscape and increased waste generation?</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• encroachment on precious ecosystem (e.g. sensitive or protected areas)?</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• alteration of surface water hydrology of waterways crossed by roads and resulting in increased sediment in streams affected by increased soil erosion at the construction site?</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• damage to sensitive coastal/marine habitats by construction of submarine cables?</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• deterioration of surface water quality due to silt runoff, sanitary wastes from worker-based camps and chemicals used in construction?</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• increased local air pollution due to rock crushing, cutting and filling?</td>
<td>X</td>
<td></td>
<td>Earth work for substation foundation would have limited impacts due to a long distance to the residential areas</td>
</tr>
<tr>
<td>• risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Screening Questions</td>
<td>Yes</td>
<td>No</td>
<td>Remarks</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------------</td>
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<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>• chemical pollution resulting from chemical clearing of vegetation for construction site?</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>• noise and vibration due to blasting and other civil works?</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>• dislocation or involuntary resettlement of people?</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>• disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>• social conflicts relating to inconveniences in living conditions where construction interferes with pre-existing roads?</td>
<td></td>
<td>X</td>
<td>The new area for extension would cause a blockage to the existing local road. Construction of a by-pass will be required. Transportation of construction materials and equipment would traverse though a busy market area in Marneuli</td>
</tr>
<tr>
<td>• hazardous driving conditions where construction interferes with pre-existing roads?</td>
<td></td>
<td>X</td>
<td>The new area for extension would cause a blockage to the existing local road. Construction of a by-pass will be required. Transportation of construction materials and equipment would traverse though a busy market area in Marneuli</td>
</tr>
<tr>
<td>• creation of temporary breeding habitats for vectors of disease such as mosquitoes and rodents?</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>• dislocation and compulsory resettlement of people living in right-of-way of the power transmission lines?</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>• environmental disturbances associated with the maintenance of lines (e.g. routine control of vegetative height under the lines)?</td>
<td></td>
<td>X</td>
<td>The short realignment would take place over an empty grassland</td>
</tr>
<tr>
<td>• facilitation of access to protected areas in case corridors traverse protected areas?</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>• disturbances (e.g. noise and chemical pollutants) if herbicides are used to control vegetative height?</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Screening Questions</td>
<td>Yes</td>
<td>No</td>
<td>Remarks</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------------</td>
<td>-----</td>
<td>----</td>
<td>-------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>• large population influx during project construction and operation that cause</td>
<td></td>
<td>X</td>
<td>increased burden on social infrastructure and services (such as water supply and sanitation systems)?</td>
</tr>
<tr>
<td>operation that cause increased burden on social infrastructure and services</td>
<td></td>
<td></td>
<td>(such as water supply and sanitation systems)?</td>
</tr>
<tr>
<td>• social conflicts if workers from other regions or countries are hired?</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>• poor sanitation and solid waste disposal in construction camps and work sites,</td>
<td></td>
<td>X</td>
<td>and possible transmission of communicable diseases from workers to local populations?</td>
</tr>
<tr>
<td>and possible transmission of communicable diseases from workers to local</td>
<td></td>
<td></td>
<td>populations?</td>
</tr>
<tr>
<td>populations?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• risks to community safety associated with maintenance of lines and related</td>
<td></td>
<td>X</td>
<td>facilities?</td>
</tr>
<tr>
<td>facilities?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• community health hazards due to electromagnetic fields, land subsidence, lowered</td>
<td></td>
<td>X</td>
<td>groundwater table, and salinization?</td>
</tr>
<tr>
<td>groundwater table, and salinization?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• risks to community health and safety due to the transport, storage, and use and</td>
<td></td>
<td>X</td>
<td>and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?</td>
</tr>
<tr>
<td>or disposal of materials such as explosives, fuel and other chemicals during</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>construction and operation?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• community safety risks due to both accidental and natural hazards, especially</td>
<td></td>
<td>X</td>
<td>where the structural elements or components of the project (e.g., high voltage wires, and transmission towers and</td>
</tr>
<tr>
<td>where the structural elements or components of the project (e.g., high voltage</td>
<td></td>
<td></td>
<td>lines) are accessible to members of the affected community or where their failure could result in injury to the</td>
</tr>
<tr>
<td>wires, and transmission towers and lines) are accessible to members of the</td>
<td></td>
<td></td>
<td>community throughout project construction, operation and decommissioning?</td>
</tr>
<tr>
<td>affected community or where their failure could result in injury to the</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>community throughout project construction, operation and decommissioning?</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Transportation of construction materials and equipment would traverse though a busy</td>
<td></td>
<td></td>
<td>Hazard impacts would result from improper disposal of oils (or possible PCBs-containing oils) to be released from</td>
</tr>
<tr>
<td>market area in Marneuli.</td>
<td></td>
<td></td>
<td>old transformers at Ksani substation</td>
</tr>
<tr>
<td>Hazard impacts would result from improper disposal of oils (or possible PCBs-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>containing oils) to be released from old transformers at Ksani substation</td>
<td></td>
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</tr>
</tbody>
</table>
The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.

<table>
<thead>
<tr>
<th>Climate Change and Disaster Risk Questions</th>
<th>Yes</th>
<th>No</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes (see Appendix I)?</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Could changes in precipitation, temperature, salinity, or extreme events over the Project lifespan affect its sustainability or cost?</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., increasing traffic or housing in areas that will be more prone to flooding, by encouraging settlement in earthquake zones)?</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Appendix I: Environments, Hazards and Climate Changes**

<table>
<thead>
<tr>
<th>Environment</th>
<th>Natural Hazards and Climate Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arid/Semi-arid and desert environment</td>
<td>Low erratic rainfall of up to 500 mm rainfall per annum with periodic droughts and high rainfall variability. Low vegetative cover. Resilient ecosystems &amp; complex pastoral and systems, but medium certainty that 10–20% of dry lands degraded; 10-30% projected decrease in water availability in next 40 years; projected increase in drought duration and severity under climate change. Increased mobilization of sand dunes and other soils as vegetation cover declines; likely overall decrease in agricultural productivity, with rain-fed agriculture yield reduced by 30% or more by 2020. Earthquakes and other geophysical hazards may also occur in these environments.</td>
</tr>
<tr>
<td>Humid and sub-humid plains, foothills and hill country</td>
<td>More than 500 mm precipitation/yr. Resilient ecosystems &amp; complex human pastoral and cropping systems. 10-30% projected decrease in water availability in next 40 years; projected increase in droughts, heat waves and floods; increased erosion of loess-mantled landscapes by wind and water; increased gully erosion; landslides likely on steeper slopes. Likely overall decrease in agricultural productivity &amp; compromised food production from variability, with rain-fed agriculture yield reduced by 30% or more by 2020. Increased incidence of forest and agriculture-based insect infestations. Earthquakes and other geophysical hazards may also occur in these environments.</td>
</tr>
<tr>
<td>River valleys/ deltas and estuaries and other low-lying coastal areas</td>
<td>River basins, deltas and estuaries in low-lying areas are vulnerable to riverine floods, storm surges associated with tropical cyclones/typhoons and sea level rise; natural (and human-induced) subsidence resulting from sediment compaction and ground water extraction; liquefaction of soft sediments as result of earthquake ground shaking. Tsunami possible/likely on some coasts. Lowland agri-business and subsistence farming in these regions at significant risk.</td>
</tr>
<tr>
<td>Small islands</td>
<td>Small islands generally have land areas of less than 10,000km² in area, though Papua New Guinea and Timor with much larger land areas are commonly included in lists of small island developing states. Low-lying islands are especially vulnerable to storm surge, tsunami and sea-level rise and, frequently, coastal erosion, with coral reefs threatened by ocean warming in some areas. Sea level rise is likely to threaten the limited ground water resources. High islands often experience high rainfall intensities, frequent landslides and tectonic environments in which landslides and earthquakes are not uncommon with (occasional) volcanic eruptions. Small islands may have low adaptive capacity and high adaptation costs relative to GDP.</td>
</tr>
<tr>
<td>Mountain ecosystems</td>
<td>Accelerated glacial melting, rock falls/landslides and glacial lake outburst floods, leading to increased debris flows, river bank erosion and floods and more extensive outwash plains and, possibly, more frequent wind erosion in intermontane valleys. Enhanced snow melt and fluctuating stream flows may produce seasonal floods and droughts. Melting of permafrost in some environments. Faunal and floral species migration. Earthquakes, landslides and other geophysical hazards may also occur in these environments.</td>
</tr>
<tr>
<td>Volcanic environments</td>
<td>Recently active volcanoes (erupted in last 10,000 years – see <a href="http://www.volcano.si.edu">www.volcano.si.edu</a>). Often fertile soils with intensive agriculture and landslides on steep slopes. Subject to earthquakes and volcanic eruptions including pyroclastic flows and mudflows/lahars and/or gas emissions and occasionally widespread ashfall.</td>
</tr>
</tbody>
</table>
Annex 3. Records of Meetings

<table>
<thead>
<tr>
<th>Data</th>
<th>Agency/ Institution</th>
<th>Place</th>
<th>Name of Person consulted</th>
<th>Position</th>
<th>Reason for Visit</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.03.2013</td>
<td>LTD &quot;Lomtagora&quot;</td>
<td>Marneuli</td>
<td>Kakha Lashkhi Director</td>
<td>591 918288</td>
<td>Consultation related with Marneuli project.</td>
</tr>
<tr>
<td>22.03.2013</td>
<td>Georgian Association of herdsmen</td>
<td>Tbilisi</td>
<td>Beka Gonashvili President</td>
<td>599 567131</td>
<td>Consultations related with Marneuli project.</td>
</tr>
<tr>
<td>24.03.2013</td>
<td>Ministry of Environmental</td>
<td>Tbilisi</td>
<td>Alverd Chanqseliani</td>
<td>551420030 Mein specialist od Waste Management Department</td>
<td>Consultation related with used oil management.</td>
</tr>
<tr>
<td>24.03.2013</td>
<td>Ministry of Environmental</td>
<td>Tbilisi</td>
<td>Merab Gaprindashvili</td>
<td>599 255852 Deputy of Geology office</td>
<td>Consultation</td>
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<td>25.03.2013</td>
<td>Independ Expert (Anthrax)</td>
<td>Tbilisi</td>
<td>Gela Gliglashvili</td>
<td>555618759</td>
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<td>03.03.2013</td>
<td>Georgian State Electrosystems</td>
<td>Tbilisi</td>
<td>Maia Pitskhelauri Keti dgebuadze</td>
<td>577 220011 577 23 29 37 Department of project management</td>
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<td>20.03.2013</td>
<td>Marneuli Municipality</td>
<td>Marneuli</td>
<td>Davit Davadze</td>
<td>877955278 Head Specialist. Marneuli Municipality</td>
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<td>01.04.2013</td>
<td>LTD &quot;Kimiani&quot; Tbilisi</td>
<td>Avtandyl Dolidze</td>
<td>Professor, Iv. Javakhishvili Tbilisi State University/Institute of Physical and Organic Chemistry</td>
<td>Used oil management</td>
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<td>Lairi Zazashvili</td>
<td>Head of Scientific Council</td>
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<td>07.04.2013</td>
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<td>Zaal beria</td>
<td>599 856136, Head of Khorga Municipality</td>
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<td>Nona Beraia</td>
<td>Consultant 595 507219</td>
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<td>08.07.2013</td>
<td>Senaki sakrebulo Senaki</td>
<td>Zurab Khaburdzania</td>
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<td>Wood Department Tbilisi</td>
<td>Nino Lomidze</td>
<td>599 955935, Main specialist</td>
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<td>Sergei kandaurow</td>
<td>599 192547, Expert</td>
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<td>13.03.2013</td>
<td>Mtskheta Municipality Mtskheta</td>
<td>Darejan kareli</td>
<td>577 240355, Specialist</td>
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8 April 2011

The aim of the consultation meeting was to deliver information to interested stakeholders and project affected land owners during the Land Acquisition and Resettlement Policy preparation process about the resettlement policy and principles, compensation eligibility and entitlements, complaints and grievance redress mechanism. The comments and opinions provided by interested stakeholders during early stage of public consultation process will be addressed in the final draft of the LARP. This allows timely and full consideration of the opinions and comments around the project expressed by the interested parties.

a. Attendees

Medgar Chelidze – ADB, Resettlement Specialist (RETA program); Keti Dgebuadze – Social Safeguard Specialist; Mirian Amiranashvili – GSE representative; Levan Badurashvili – GSE representative; Giorgi Giorgadze – village Rtsmunebuli (Local authority).

b. Meeting discussions

K. Dgebuadze and M. Chelidze delivered information to village Rtsmunebuli and GSE representatives about the ADB’s Land Acquisition and Resettlement Policy and principles, in particular: For construction of Khorga s/s additional requirements of the ADB will be met to ensure that all affected persons are compensated at the replacement costs and/or receive adequate allowances according to severity of impacts and vulnerability status. Experts also talked about compensation entitlements and documents for ownership rights, in particular: Land acquisition and resettlement tasks under the project will be implemented according to a compensation and entitlement matrix following the approved land acquisition and resettlement framework in compliance with active Georgian laws and ADB’s policy on involuntary resettlement.

After discussions with village Rtsmunebuli, it was clarified that the territory (about 13.8 ha) for Khorga s/s is State owned and 3 or 4 lessees cultivate this land. The village Rtsmunebuli has been requested to organize meeting with the lessees. Meeting with lessee - Tristan Putkaradze (mob: 893 117290) was organized at the same day, he informed the consultants that he held the land under lease (about 13 ha) in 2005 for 3 years and in 2008 the lease expired. He cultivated the land for maize together with his relative - Givi Grigalashvili on equal rights. But from 2008 Tristan Putkaradze does not cultivate this land parcel any more. He informed the consultants that about 3-households are informally using/cultivating the land parcels within the GSE owned land plot since 2008. These are non-titled users (squatters). Mainly they cultivate this land for maize. He provided with the names of non-titled users:

Givi Grigalashvili (890 804 760),

Nodar Grigalashvili (898 685 189 – son - Giorgi),

Leo Tsartsidze.
The Consultants tried to meet with non-titled users but they were not at place by this moment. The village Rtsmunebuli was asked to organize the meeting with non-titled users and a Survey Team for the next week (11-13 April).

B. Public Consultations in v. Khorga, Khobi rayon

13, 14 April 2011

The Consultants – Maia Ochigava, Environmental Expert and Keti Dgebuadze, Social Safeguard Expert have conducted public consultation meeting with affected households (AH) related to the preparation of Initial Environmental Evaluation and Land Acquisition and Resettlement Plan in the village Khorga of Khobi Rayon on 13th of April, 2011 together with the local authority (village Rtsmunebuli – Giorgi Gorgadze).

The aim of the public consultations at the early stage of the project development allows timely and full consideration of the opinions and comments around the project expressed by the interested parties.

After the detailed measurement survey (DMS) conducted by the Survey Team on 11-12 April, 2011 at Khorga SS territory it was clarified that only 3-households (Givi Grigalashvili, Nodar Grigalashvili, Leo Tsartsidze) are informally using/cultivating the land parcels for maize within the State owned land plot (13, 5 ha), in particular: (Givi Grigalashvili – cultivates 1.83 ha; Nodar Grigalashvili cultivates – 1.61 ha and Leo Tsartsidze cultivates – 1.4 ha).

a. Attendees

Keti Dgebuadze – Social Safeguard Specialist; Giorgi Gorgadze – village Rtsmunebuli (Local Government); Maia Ochigava – Environmental Expert; and affected households (AHs) of Khorga village:

1. Givi Grigalashvili
2. Nina Grigalashvili
3. Nodar Grigalashvili
4. Giorgi Grigalashvili
5. Leo Tsartsidze
6. Kakha Tsartsidze

b. Meeting discussions

K. Dgebuadze, Social Safeguards Expert, informed the meeting participants about the institutions implementing and financing the project as well as about the ADB policy of social and environmental safeguards and procedures and Georgian legislation in connection to the public awareness and consultations of the parties concerned. She talked about the ADB’s Land
Acquisition and Resettlement Policy and principles for construction of Khorga s/s, and emphasized that all affected persons will be compensated at the replacement costs and/or receive adequate allowances according to severity of impacts and vulnerability status.

K. Dgebuadze informed participants about Complaints and Grievance Redress Mechanism. A grievance mechanism will be available to allow an AP appealing any disagreeable decision, practice or activity arising from land or other assets compensation.

M. Ochigava, Environmental Expert, described the project aim, possible impacts of the project on natural and social environment, appropriate mitigation measures and legislative base which is necessary to comply with during the project implementation process.

The experts have delivered information leaflets to affected households.

The presentation was followed by a Q&A session. The questions and comments of different participating parties were responded to by the relevant experts of the project: The questions and answers are given in Table A1.

Table A1. Question-and-answer session:

<table>
<thead>
<tr>
<th>No.</th>
<th>Question/Comment</th>
<th>Author</th>
<th>Expert comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>How will the harvest be compensated?</td>
<td>G. Grigalashvili</td>
<td>APs (i.e. informal users and leaseholders) will be compensated for damages to losses of crops due to restriction for cultivation of the land previously leased or used informally. In any case, crop compensation for 1 year will be given to APs in cash at market rate by default</td>
</tr>
<tr>
<td>2</td>
<td>Will the productivity of the land be envisaged during the land compensation process?</td>
<td>G. Tstartsidze</td>
<td>Yes, during the identification process of land prices land productivity will be taken into account.</td>
</tr>
<tr>
<td>3</td>
<td>Will the local population be employed during the Substation construction process?</td>
<td>Village Rtsmunebuli</td>
<td>During the construction period in tender documents the employment of local population will be taken into account (it concerns qualified and non-qualified employees). But first of all priority will be given to the vulnerable people who also will</td>
</tr>
<tr>
<td></td>
<td>Question</td>
<td>Person</td>
<td>Response</td>
</tr>
<tr>
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<tr>
<td>4</td>
<td>During the building of TL will the population disturbed by noise, vibration and construction waste?</td>
<td>N. Grigalashvili</td>
<td>The Khorga substation is located in an unpopulated area with the nearest residence 160 m from the substation site boundary and separated from the site by a railway line and roadway such that noise nuisance from the substation operation will not be a problem.</td>
</tr>
<tr>
<td>5</td>
<td>Will TL negatively influence the health of the population? during the construction and/or during its operation?</td>
<td>K. Tsartsidze</td>
<td>To minimize such risks GSE will ensure that the construction contractor complies with statutory requirements for worker and public safety.</td>
</tr>
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<td>6</td>
<td>May the drainage channels which are situated near the territory of the TL be damaged during the construction?</td>
<td>Village Rtsmunebuli</td>
<td>The design of the substation will ensure that the existing drainage system will be protected and where necessary additional drainage diversion structures will be included in the works. As a result of such measures the construction and operation of the substation will have no significant impact on the existing drainage system.</td>
</tr>
</tbody>
</table>