ENERJISA ENERJI URETIM A.S.

ALPASLAN II DAM AND HEPP RELOCATION ROADS PROJECT

ENVIRONMENTAL ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PLAN

ENCON ENVIRONMENTAL CONSULTANCY CO.

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AP	Action Plan
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CHC	Central Hunting Commission
CMT	Crisis Management Team
DSI	General Directorate of State Hydraulic Works (Turkish acronym)
EA&BC	Emergency Action and Business Continuity
EAP	Emergency Action Plan
EAT	Emergency Action Team
EBRD	European Bank for Reconstrution and Development
EIA	Environmental Impact Assessment
EHS	Environmental Health and Safety
EMP	Environmental Management Plan
ENERJISA	ENERJISA Power Generation Inc. Co.
EPFI	Equator Principle Financial Institutions
EU	European Union
GDH	General Directorate of Highways
GIS	Geographic Information System
HEPP	Hydroelectric Power Plant
IUCN	International Union for Conservation of Nature
IFC	International Finance Corporation
MoEU	Ministry of Environment and Urbanization
PM	Particulate Matter
TRDB	Red Data Book of Turkish Plants

1. PURPOSE AND SCOPE

The Environmental Assessment and Environmental Management Plan (EMP) for Alpaslan II Dam and HEPP (Hydroelectric Power Plant) Relocation Roads (Mus-Varto Junction-Bulanik Provincial Road Relocation Route and Mus-Solhan Junction-Varto State Highway Relocation Route) Project covers mitigation measures for significant adverse environmental impacts and describes the monitoring and institutional requirements necessary to implement this EMP. Mitigation and monitoring activities are considered for the “Construction” phase of the project.

Each and every lower management plan provided within the scope of this EMP is an attempt to provide a basis for effective management of potential impacts of the Project. These plans can and will be further upgraded and/or extended if such a need arises as the Project proceeds.

The main objectives of this Environmental Management Plan are as the following:

- Prevent or minimize potential adverse impacts to the environment due to project activities.
- Fully comply with applicable Turkish environment protection legislation.
- Comply with environmental guidelines and requirements of ENERJISA Power Generation Inc. Co. (ENERJISA).

The following chapters were prepared to outline the regulatory background for environmental management, organizations that will be responsible for implementation of this EMP, specifications of the Project as well as the area of influence, mitigation plans for construction phase of the Project for the main environmental issues/impacts identified, monitoring plan, emergency action plan and schedule for construction of the Project, requirements for institutional arrangements for the Project.

2. ENVIRONMENTAL POLICY AND LEGAL FRAMEWORK

2.1. National Legislation

Turkish environmental regulations were developed in line with national requirements and international legislations and standards, and most of them have been revised recently to be harmonized with the EU Directives in the scope of pre-accession efforts of Turkey.

The Ministry of Environment and Urbanization (former Ministry of Environment and Forestry) is the responsible organization for the implementation of policies adopted for protection and conservation of the environment, and for sustainable development and management of natural resources. The Ministry of Environment and Forestry was first established as an Under-secretariat of the Prime Minister's office in 1987 and was promoted to the rank of Ministry of Environment in August 1991 by the Establishment Law No. 443. Then, the Ministry of Environment and Forestry was established in 2003 through a merger of the previously separate Ministry of Environment and Ministry of Forestry. Then, in 2011, the environment part of the Ministry of Environment and Forestry was separated and merged with the Ministry of Public Works and Settlement to form the Ministry of Environment and Urbanization (MoEU).

The MoEU has provincial directorates in each province. The central organization in Ankara is mainly composed of the following directorates and departments:

- General Directorate of Geographic Information Systems (GIS)
- General Directorate of Natural Assets Conservation
- General Directorate of Spatial Planning
- General Directorate of Environmental Management
- General Directorate of Environmental Impact Assessment (EIA), Permitting and Auditing
- General Directorate of Structural Works
- General Directorate of Infrastructure and Urban Transformation Services
- General Directorate of Professional Services
- Department of Strategy Development
- Department of EU Investments
- Department of Foreign Relations

The Turkish Environmental Law No. 2872, which came into force in 1983, handles environmental issues on a very broad scope. According to the basic principles that govern the application of the Environmental Law, and as stated in the Constitution, citizens as well as the state bear responsibility for the protection of environment. Complementary to the Environmental Law and its regulations, other laws also govern the protection and conservation of the environment, the prevention and control of pollution, the implementation of measures for the prevention of pollution, health and safety and labor issues. Some of these laws are:

- Environmental Law No: 2872, Official Gazette date: August 11, 1983, No: 18132.

- Occupational Health and Safety Law No: 6331, Official Gazette date: June 30, 2012, No: 28339.
- Labor Law No: 4857, Official Gazette date: June 10, 2003, No: 25134.
- Social Insurances and General Health Insurance Law No: 5510, Official Gazette date: June 16, 2006, No: 26200.
- Public Health Law No: 1593, Official Gazette date: May 6, 1930, No: 1489.

It is also required to comply with various Turkish environmental regulations in line with the activities being or planned to be conducted within the scope of the proposed Project, as well as in implementing related management plans. A comprehensive list of relevant regulations is given below:

- Large Combustion Plants Regulation, Official Gazette date: June 8, 2010, No: 27605.
- Regulation on the Control of Packaging Wastes, Official Gazette date: August 24, 2011, No: 28035.
- Regulation on the Control of Waste Batteries and Accumulators, Official Gazette date: August 31, 2004, No: 25569.
- Regulation on the Control of Waste Oils, Official Gazette date: July 30, 2008, No: 26952.
- Regulation Concerning the General Principles of Waste Management, Official Gazette date: July 5, 2008, No: 26927.
- Regulation Concerning the Landfill of Wastes, Official Gazette date: March 26, 2010, No: 27533.
- Regulation Concerning the Incineration of Wastes, Official Gazette date: October 6, 2010, No: 27721.
- Regulation on the Control of Waste Vegetable Oils, Official Gazette date: April 19, 2005, No: 25791.
- Environmental Impact Assessment Regulation, Official Gazette date: July 17, 2008 and No: 26939.
- Environmental Auditing Regulation, Official Gazette date: November 21, 2008 and No: 27061.
- Regulation Concerning Environmental Land-use Plans, Official Gazette date: November 11, 2008 and No: 27051.
- Regulation on Permits and Licenses that are to be obtained in accordance with the Environmental Law, Official Gazette date: April 29, 2009, No: 27214.
- Regulation on the Assessment and Management of Environmental Noise, Official Gazette date: June 4, 2010, No: 27601.
- Regulation on the Control of Exhaust Emissions, Official Gazette date: April 4, 2009, No: 27190.
- Regulation Concerning the Increase of Efficiency in the Usage of Energy and Energy Resources, Official Gazette date: October 25, 2008, No: 27035.
- Regulation on the Control of Excavation Materials, Construction and Demolition Wastes, Official Gazette date: March 18, 2004, No: 25406.

- The Regulation on Assessment and Management of Air Quality, Official Gazette date: June 6, 2008, No: 26898.
- Regulation on Control of Air Pollution from Heating, Official Gazette date: January 13, 2005, No: 25699.
- Solid Wastes Control Regulation, Official Gazette date: March 14, 1991, No: 20814.
- Regulation on the Control of Waste Tires, Official Gazette date: November 25, 2006, No: 26357.
- Regulation Concerning the Decrease of Ozone Depleting Substances, Official Gazette date: November 12, 2008, No: 27052.
- Regulation on the Control of Polychlorinated Biphenyl and Polychlorinated Terphenyls, Official Gazette date: December 27, 2007, No: 26739.
- Regulation on Control of Air Pollution from Industrial Sources, Official Gazette date: July 3, 2009, No: 27277.
- Water Pollution Control Regulation, Official Gazette date: December 31, 2004, No: 25687.
- Surface Water Quality Management Regulation, Official Gazette date: November 30, 2012, No: 28483.
- Regulation Concerning Quality of Surface Waters Planned or Used as Drinking Water Supply, Official Gazette date: June 29, 2012, No: 28338.
- Swimming Water Quality Regulation, Official Gazette date: January 9, 2006, No: 26048.
- Regulation on the Protection of Wetlands, Official Gazette date: May 17, 2005, No: 25818.
- Hazardous Waste Control Regulation, Official Gazette date: March 14, 2005, No: 25755.
- Regulation on the Control of Pollution Caused by Dangerous Substances, Official Gazette date: November 26, 2005, No: 26005.
- Regulation Concerning the Classification, Packaging, and Labeling of Dangerous Substances and Preparations, Official Gazette date: December 26, 2008, No: 27092, repeated.
- Regulation on the Control of Medical Wastes, Official Gazette date: July 22, 2005, No: 25883.
- Regulation on the Control of Soil Pollution and Polluted Areas by Point Sources, Official Gazette date: June 8, 2010, No: 27605.
- Regulation Concerning Water for Human Consumption, Official Gazette date: February 17, 2005, No: 25730.
- Regulation on Pit Opening Where Sewer System Construction is not Applicable, Official Gazette date: March 19, 1971, No: 13783.
- Regulation on the Environmental Noise Emission caused by Equipment used Outdoors, Official Gazette date: December 30, 2006, No: 26392 (4th repeated).
- Regulation for Starting up and Operating a Work Place, Official Gazette date: August 8, 2005, No: 25902.

- Regulation on Occupational Health and Safety, Official Gazette date: December 9, 2003, No: 25311.
- Noise Regulation, Official Gazette date: December 23, 2003, No: 25325.
- Regulation Concerning Follow up of Greenhouse Gas Emissions, Official Gazette date: April 25, 2012, No: 28274.
- Regulation Concerning Protection of Ground Waters against Pollution and Deterioration, Official Gazette date: April 7, 2012, No: 28257.
- Heavy and Hazardous Works Regulation, Official Gazette date: June 16, 2004, No: 25494.
- Regulations on Methods and Essentials of Work Health and Safety Training for Workers, Official Gazette date: April 7, 2004, No: 25426.
- Manual Load Handling Regulation, Official Gazette date: February 11, 2004, No: 25370.
- Health and Safety Signs Regulation, Official Gazette date: December 23, 2003, No: 25325.
- Regulation Concerning the Use of Personal Protection Equipment at Workplaces, Official Gazette date: February 11, 2004, No: 25370.
- Regulation on Health and Safety Measures in the Use of Work Equipment, Official Gazette date: February 11, 2004, No: 25370.
- Communiqué on Hazard Classes List related to Occupational Health and Safety, Official Gazette date: November 25, 2009, No: 27417.
- Cabinet Decision (Decision Date: December 4, 1973, Decision No: 7/7583), Ordinance on Occupational Health and Safety, Official Gazette date: January 11, 1974, No: 14765.
- Regulation Concerning Operation Certificate, Official Gazette date: December 4, 2009, No: 27422.
- Regulation on the Protection of Buildings from Fire, Official Gazette date: December 19, 2007, No: 26735.
- Ordinance on Precautions Required in Workplaces Working with Flammable, Explosive, Dangerous, and Harmful Substances, Official Gazette date: December 24, 1973, No: 14752.
- Regulation on Protecting Workers from Hazards of Explosive Environments, Official Gazette date: December 26, 2003, No: 25328.
- First Aid Regulation, Official Gazette date: May 22, 2002, No: 24762.
- Vibration Regulation, Official Gazette date: December 23, 2003, No: 25325.
- Regulation on Control of Large-Scale Industrial Accidents, Official Gazette date: August 18, 2010, No: 27676.
- Regulation Concerning Buildings to be built at Earthquake Zones, Official Gazette date: March 6, 2007, No: 26454.
- Regulation Concerning Buildings to be built at Disaster Zones, Official Gazette date: July 14, 2007, No: 26582.

In addition environmental regulation mentioned above, Turkish national policy and regulation on protection of cultural heritage and conservation of biological resources has

also been constituted on the base of relevant international agreements that Turkey is a party to.

The international agreements and conventions on biological conservation that Turkey had ratified are:

- Paris Convention on the Protection of the World Cultural and Natural Heritage (acceded by Law no. 2658 published in the Official Gazette dated 4 February 1983 and no. 17959);
- Bern Convention on Protection of Europe's Wild Life and Living Environment (acceded by the Decision of the Council of Ministers dated 9 January 1984 and published in the Official Gazette dated 20 February 1984 and no. 18318);
- Barcelona Convention on the Protection of the Mediterranean Sea Against Pollution
- International Convention for the Prevention of Pollution From Ships (MARPOL) (published in the Official Gazette dated 16 May 1998 and no. 23344
- Convention to Combat Desertification (acceded by the Decision of the Council of Ministers dated 3 May 1990 and published in the Official Gazette dated 24 June 1990 and no. 20558)
- Ramsar Convention on Wetlands of International Importance Especially as Wildfowl Habitat (acceded by the Decision of the Council of Ministers dated 15 March 1994 and published in the Official Gazette dated 17 May 1994 and no. 21937);
- Convention on International Trade in Endangered Species of Wild Flora and Fauna (acceded by Law no. 4041 and published in the Official Gazette dated 20 June 1996 and no. 22672);
- UN (Rio) Convention on Biological Diversity (ratified by Law no. 4177 published in the Official Gazette dated 27 December 1996 and no. 22860);
- European Convention on the Protection of the Archaeological Heritage (1999).

Within this context, there are various laws and regulations on protection and conservation of natural habitats, wildlife and cultural heritage.

It is within ENERJISA's institutional environmental policy that the company complies with the requirements of current national legislations and codes of practice, and fulfills all other legal requirements. Therefore, during each and every stage of the planned project and implementation of related management plans, all activities will be carried out within certain standards and limits set by the above mentioned laws and regulations.

2.2. International Requirements and Agreements

In addition to the national legislation, the Environmental Assessment and Environmental Management Plan (EMP) for Mus-Varto Junction-Bulanik Provincial Road Relocation Route and Mus-Solhan Junction-Varto State Highway Relocation Route has been prepared to form a basis for specifying the environmental provisions to ensure that the construction phase of the Project will be carried out in an environmentally sound manner in accordance with the international standards. In this regard, requirements of the EU Legislation, as well the requirements of the International Finance Corporation (IFC) performance standards, European Bank for Reconstrution and Development (EBRD) and Equator Principles, which will be followed during implementation of the EMP, are provided below.

EU environmental legislation is divided into sectoral legislation and horizontal legislation. The directives applicable to all sectors are called horizontal sector legislation and include such directives as EIA directive (85/337/EEC), Strategic EIA directive (2001/42/EC), and directive on environmental information (2003/4/EC).

Council Directive 85/337/EEC (as amended by Directive 97/11/EC and codified by Directive 2011/92/EU) on the assessment of the effects of certain public and private projects on the environment (EIA Directive) is seen as one of the EU's principal pieces of environmental legislation. The prime purpose of EIA is to identify any significant environmental effects of a major development project, and where possible to design mitigation measures to reduce or remedy those effects, in advance of any decision to authorize the construction of the project. As a tool to aid decision making, EIA is widely seen as a proactive environmental safeguard that can help to meet the EU's wider environmental concerns and policy principles.

Afterwords, the EIA Directive has been revised. The first amendment was adopted in 1997 (Directive 97/11/EC) to widen the mandatory application of EIA and strengthen the EIA procedure by adding new requirements for screening and optional scoping. The second amendment (Directive 2003/35/EC) was approved in 2003 to ensure that the EIA Directive is fully consistent with the UN/ECE Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention).

International Finance Corporation (IFC) is the lower arm of World Bank Group and provides financial support to private sector. In the projects, which they are funding, they implement the Performance Standards in order to manage social and enviromental risks and impacts. These Performance Standards may also be applied by other financial.

The following eight Performance Standards establish the environmental and social requirements that the Project owner is to meet throughout the life of an investment supported by IFC or other relevant financial institution using these Standards:

Performance Standard 1:	Social and Environmental Assessment and Management System
Performance Standard 2:	Labor and Working Conditions
Performance Standard 3:	Pollution Prevention and Abatement
Performance Standard 4:	Community Health, Safety and Security
Performance Standard 5:	Land Acquisition and Involuntary Resettlement
Performance Standard 6:	Biodiversity Conservation and Sustainable Natural Resource Management
Performance Standard 7:	Indigenous Peoples
Performance Standard 8:	Cultural Heritage

Performance Standard 1 establishes the importance of: (i) integrated assessment to identify the social and environmental impacts, risks, and opportunities of projects; (ii) effective community engagement through disclosure of project-related information and consultation with local communities on matters that directly affect them; and (iii) management of social and environmental performance throughout the life of the Project. The objectives of this Standard are as follows:

- To identify and assess social and environment impacts, both adverse and beneficial, in the project's area of influence,
- To avoid, or where avoidance is not possible, minimize, mitigate, or compensate for adverse impacts on workers, affected communities , and the environment,
- To ensure that affected communities are appropriately engaged on issues that could potentially affect them,
- To promote improved social and environment performance of companies through the effective use of management systems.

Performance standards 2 through 8 establish requirements to avoid, reduce, mitigate or compensate for impacts on people and the environment, and to improve conditions where appropriate. While all relevant social and environmental risks and potential impacts should be considered as part of the assessment, Performance Standards 2 through 8 describe potential social and environmental impacts that require particular attention in emerging markets. Where social or environmental impacts are anticipated, the project owner is required to manage them through its Social and Environmental Management System consistent with Performance Standard 1.

To ensure that its Environmental and Social Policy results in successful practical outcomes, EBRD has adopted a set of 10 specific Performance Requirements (PRs) that its clients are expected to meet, covering key areas of environmental and social impacts. PRs reflect the EBRD's commitment to promote European Union (EU) environmental standards as well as the European Principles for the Environment. EBRD expects its clients to assess and manage the environmental and social issues associated with their projects so that projects meet the PRs. Performance Requirements should be read in

conjunction with EBRD's Environmental and Social Policy and Procedures[1].The Project will also comply with EBRD's Performance Requirements which are as follows:

- PR 1: Environmental and Social Appraisal and Management
- PR 2: Labour and Working Conditions
- PR 3: Pollution Prevention and Abatement
- PR 4: Community Health, Safety and Security
- PR 5: Land Acquisition, Involuntary Resettlement and Economic Displacement
- PR 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
- PR 7: Indigenous Peoples
- PR 8: Cultural Heritage
- PR 9: Financial Intermediaries
- PR 10: Information Disclosure and Stakeholder Engagement

The Equator Principles, on the other hand, serve as a financial industry benchmark for determining, assessing and managing social and environmental risk in project financing. The Equator Principles Financial Institutions (EPFIs) have adopted 10 Principles to ensure that the Projects financed are developed in a manner that is socially responsible and reflect sound environmental management practices. The principles adopted by the EPFIs (commercial banks/financial institutions) can be summarized as follows:

Principle 1: Review and Categorization
The environmental and social screening criteria of the International Finance Corporation (IFC) are used.

Principle 2: Environmental and Social Assessment
For each Project assessed as being either Category A or Category B, the borrower will conduct a Social and Environmental Assessment ("Assessment").

Principle 3: Applicable Environmental and Social Standards
The Assessment will refer to the applicable IFC Performance Standards and the applicable Industry Specific Environmental Health and Safety Guidelines ("EHS Guidelines").

Principle 4: Environmental and Social Management System and Equator Principles Action Plan
The borrower will prepare an Action Plan (AP) to manage the impacts and risks identified in the Assessment. Borrowers will maintain or establish a Social and Environmental Management System.

[1] http://www.ebrd.com/environment/e-manual/e31ebrd-performance-requirements.html

Principle 5: Stakeholder Engagement

To facilitate Stakeholder Engagement, the client will, commensurate to the Project's risks and impacts, make the appropriate Assessment Documentation readily available to the Affected Communities, and where relevant Other Stakeholders, in the local language and in a culturally appropriate manner.

Principle 6: Grievance Mechanism

To ensure that consultation, disclosure and community engagement continues throughout construction and operation, the borrower will, scaled to the risks and adverse impacts of the Project, establish a grievance mechanism as part of the management system.

Principle 7: Independent Review

An independent expert not directly associated with the borrower will review the Assessment, AP and consultation process documentation in order to assist EPFI's due diligence, and assess Equator Principles compliance.

Principle 8: Covenants

The borrower will covenant in finance documentation:

a) to comply with all relevant host country social and environmental laws, regulations and permits;
b) to comply with the AP;
c) to provide periodic reports in a format agreed with EPFIs; and
d) to decommission the facilities, where applicable, in accordance with an agreed decommissioning plan.

Principle 9: Independent Monitoring and Reporting

To ensure ongoing monitoring and reporting over the life of the loan, EPFIs will require appointment of an independent environmental and/or social expert, or require that the borrower retain qualified and experienced external experts to verify its monitoring information which would be shared with EPFIs.

Principle 10: Reporting and Transparency

Each EPFI adopting the Principles commits to report publicly at least annually about its implementation processes and experience, taking into account appropriate confidentiality considerations.

3. ORGANIZATONS AND AGENCIES RESPONSIBLE FOR IMPLEMENTATION OF ENVIRONMENTAL MANAGEMENT PLAN

For the construction ohase of the project, the key organization for the implementation of EMP will be ENERJISA Power Generation Inc. Co. (ENERJISA) as the responsible party to construct the Project. In addition, during different phases of the Project, different parties (construction sub-contractor(s), Provincial Directorate of Environment and Urbanization, General Directorate of Highways, etc.) will be responsible for some of the issues specified in this EMP, coordination of which will still be under the responsibility of ENERJISA. Impacts, mitigation measures against to these impacts and monitoring plans provided in the following chapters of this EMP summarize the principle roles and responsibilities appointed to specific organizations and agencies for management of a particular issue.

It will be effective that the tender dossiers for the construction should include environmental obligations the constructor(s) has to fulfill. These consist of:

- EMP requirements.
- Environmental and health and safety related legal obligations, which additionally may arise as part of any necessary permit (from e.g. Ministry of Environment and Urbanization, Ministry of Health, etc.).
- Other environmental considerations, which may arise in the meantime and have to be managed.

4. DESCRIPTION OF THE PROJECT AND PROJECT AREA

4.1. Location and Scope of the Project

Alpaslan II Dam and HEPP Project started to be constructed by Alpaslan II Enerji Uretim Madencilik San. Tic. A.S. are designed to be situated on Murat Rriver, subbasin of Firat River basin, in Mus Province and approximately 34 km away from the city centre at 1,265.00 m thalweg level of this river.

The first research which was done within the scope of Alpaslan II Project by General Directorate of State Hydraulic Works started in the year of 1982. From the upstream to downstream, three different axis dam places, called Zorova, Arincik, Mercimekkale, respectively has been researched for dam construction. Due to the length of Mercimekkale axis and the social causes, Mercimekkale axis was eliminated. Similarly, Zorova axis alternative was removed because of the landslide occured at right coastal upstream. The detailed studies were done at Arincik axis place. The feasibility report was prepared on September, 1994. Furthermore, the precise report was created by Alpaslan II Consortium in the year of 2004.

As a result of site research made, it is considered that geotechnical problems in the place of Alpaslan II Dam axis can be bigger than the problems described in the precise project and this will lead the problem diagnosis to increase and the implementation time of construction to extend. For this reason, the alternatives of dam axis places are searched within the scope of “Alpaslan II Dam and HEPP Assessment Report”. Zorova axis place which is studied by the General Directorate of State Hydraulic Works and is disclaimed due to landslide at 4 km upstream level of existing dam axis is observed. Since there is no important problem at the Zorova dam axis place apart from the landslide at a crest level and this place is also closer to material borrow site, fundamental research and preliminary project started this dam axis place on October, 2009 by assessing that the place of this dam axis is appropriate to be observed by detailed geological research program. As a result of studies done, it is appropriate that the dam is constructed on the place of Zorova dam axis.

Zorova axis of Alpaslan II Dam is placed on route of Mus-Varto-Erzurum Highway and dam axis is reached by this way. The asphalted way goes along the route of river flow and it is open to the transportation every season of the year.

Mus-Varto Junction-Bulanik Provincial Road and Mus-Solhan Junction-Varto State Highway pass from Alpaslan II reservoir. Relocation need for these roads become a current issue because of the fact that some parts of the roads will be inundated by the completion of Alpaslan II Dam and HEPP Project. As a result of the studies within this context, approval about 3.5 km route of Mus-Solhan Junction-Varto State Highway’s and its details has been received from General Directorate for Highways. Approved part is evaluated in “Alpaslan II Dam and HEPP Project EIA Report” which is prepared in 2012 and relocation works of the road had been finished while construction works of the dam project continue. Relocated road has 24 m width and 4 lanes, 2 lanes per each way.

It is stated in aforementioned EIA report prepared for Alpaslan II Dam and HEPP Project and approved by Ministry of Environment and Urbaning that a new EIA report will be prepared for remainder of the road. However, in accordance with the relevant article of EIA Regulation, Alpaslan II Dam and HEPP Project had been taken into lodgement program before 07.02.1993. Therefore, there is no need for preparing an EIA Report and complying relevant EIA regulations for aforementioned project's road works. Ministry of Environment and Urbanization, Environmental Impact Assessment, General Directorate of EIA Permit and Auditing 28.05.2013 dated official letter about this subject is represented in Appendix-A.

The aim of the project implementation to be planned is that the ways to be inundated before their operation of project of Alpaslan II dam and HEPP starts become usable by relocating.

The project area is located within the boundary of Varto district. Varto district is situated in northwestern part of project area. The project area is surrounded by the city of Erzurum in the north and the city of Bingol in the west direction, the district of Bulanik in the east and Merkez district in the south. The project area is approximately 33 km far away from the Mus city centre.

Mus-Solhan Juction-Varto State Highway providing the transportation between Mus Province and Varto district while Mus-Varto Junction-Bulanik Provincial Road providing the transportation between Mus province and Bulanik district are mostly in line with the coast of Murat River and Bingop Stream in existing situation. The start of the project of Alpaslan II Dam and HEPP Project will cause the transportation on Mus-Solhan Juction-Varto State Highway to interrupted. Also, approximately 25 km of Mus-Varto Junction-Bulanik Provincial Road length will be inundated because of the completion of the project.

Location map of the project area is presented in Figure 4.1. The display of the project area on the 1/25,000 scaled map is presented in Figure 4.2.

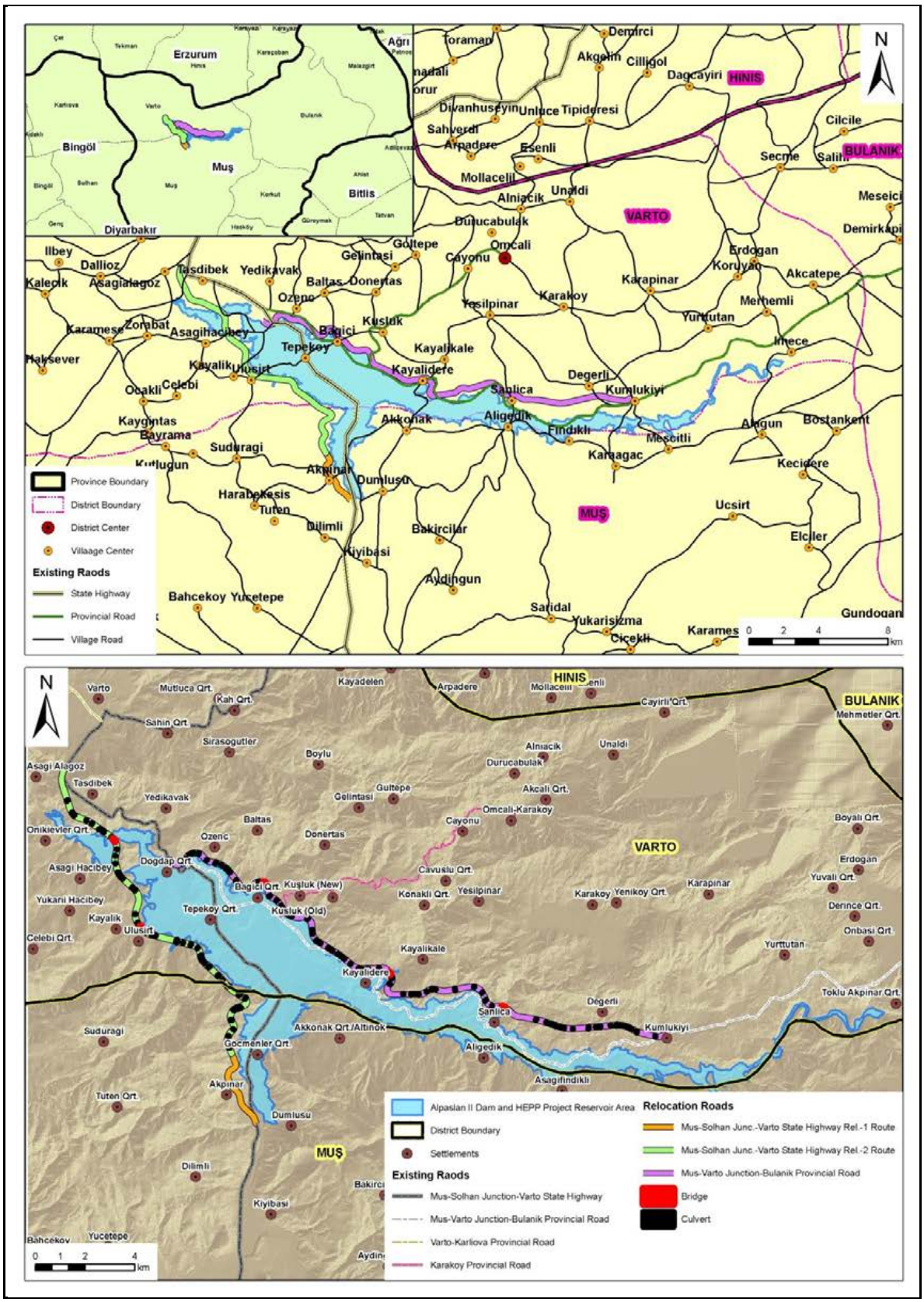


Figure 4.1. Location Map of the Project Area

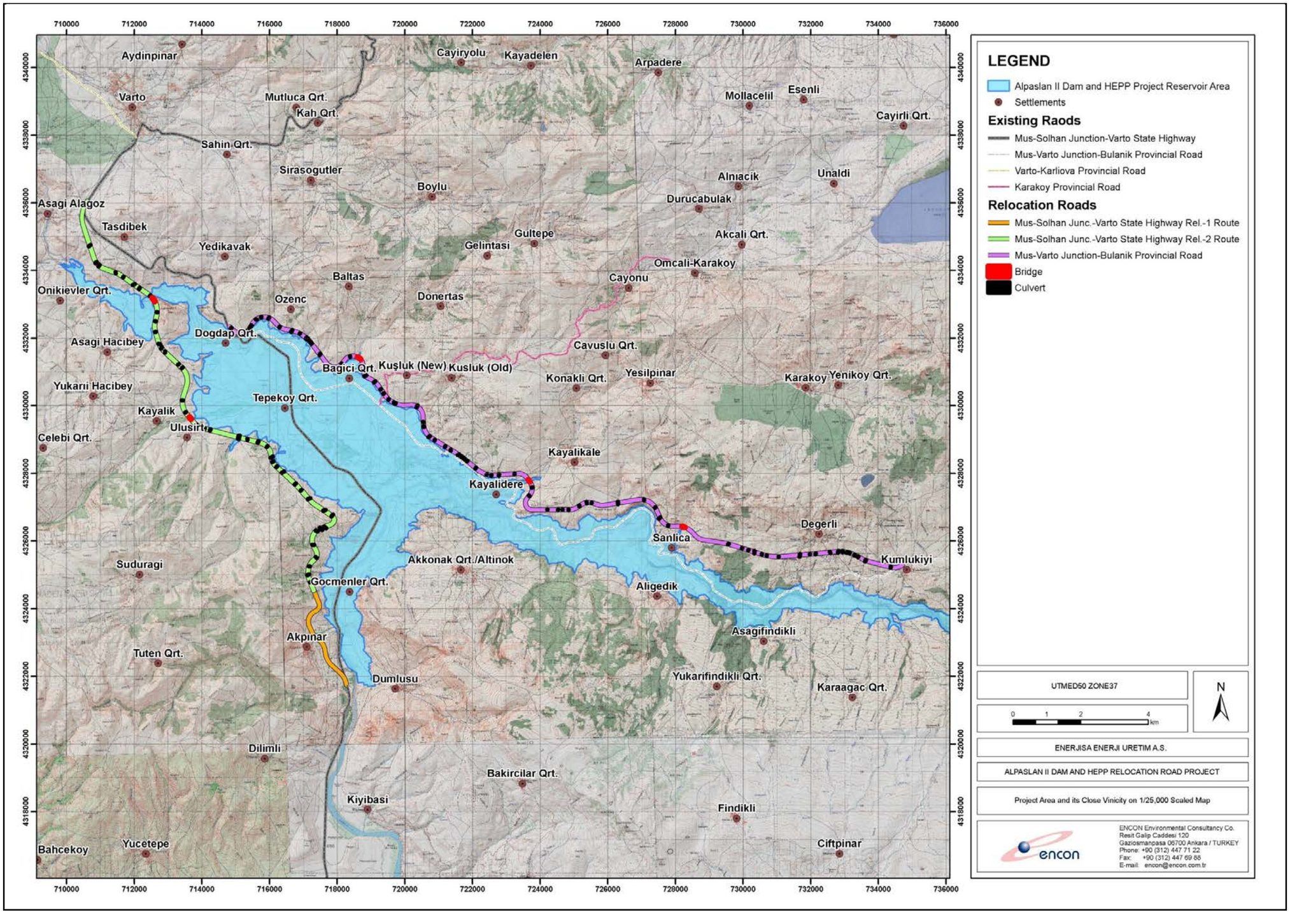


Figure 4.2. Display of the Project Area on 1/25,000 Scaled Map

In current situation, highway providing transportion between Mus and Varto is mostly in line with the coast of Murat River and Bingol Stream. The start of Alpaslan II Dam and HEPP Project construction will cause transportation to be distrupted along these ways. For this reason, the compulsion of constructing a new way reveals at a 1,371.00 m level of maximum overflow. Because of this, change of the dam axis place causes the need of the relocation.

By the completion of Alpaslan II Dam and HPP Project, Mus-Varto State Highway will be inundated. Because of that reason, Mus-Varto State Highway Project that has been approved by 11th Regional Directorate for Highways at 27.08.2009. But, after the preparation of this project, location of dam axis of Alpaslan II Dam axis has been changed to Zarova where is accepted as more economical and less problematic. In this context, studies have been done on approved and realized Mus-Solhan Junction-Varto State Highway Project, for carrying the project more economical and for increasing its standards. Within the scope of these studies, project modification has been come up in two different parts on approved route. Information about modificated parts are given above:

- ***Mus-Solhan Junction-Varto State Highway Relocation-1 Route Project***

Since chaneged axis of Alpaslan II Dam is located at the more downstream of Zorova dam axis, considering this axis place in previous General Directorate of Highways (GDH) project, the route leaving out of existing road is necessarily designed to be on the cancelled dam axis.

There is need for expropriation in these parts of the area because of the reason that it is cultivated and possessed. In addition to that, parts of the route in Akpinar Village, which is located on Zorova dam axis, are very hard places for construction. But, as the location od dam axis shifted to the direction of upstream, Mus-Solhan Junction-Varto State Highway Relocation-1 Route, which is approved by GDH in 29.06.2012 will be used. Aforementioned route is better in expropriation cost, construction ease and project Standard.

This route separates from approved project at KM°12+400, continues with existing road till KM°16+800, goes on at Bezirgan fountains location and passes 200 m east of Akpinar Village at KM°18+000. After that, route continues in the direction of northwest, turns to northeast direction at KM°19+000, goes on west at Armutluk Edge region, reunites with project at KM°20+000 and finishes. Route representation on map is presented at Figure 4.3.

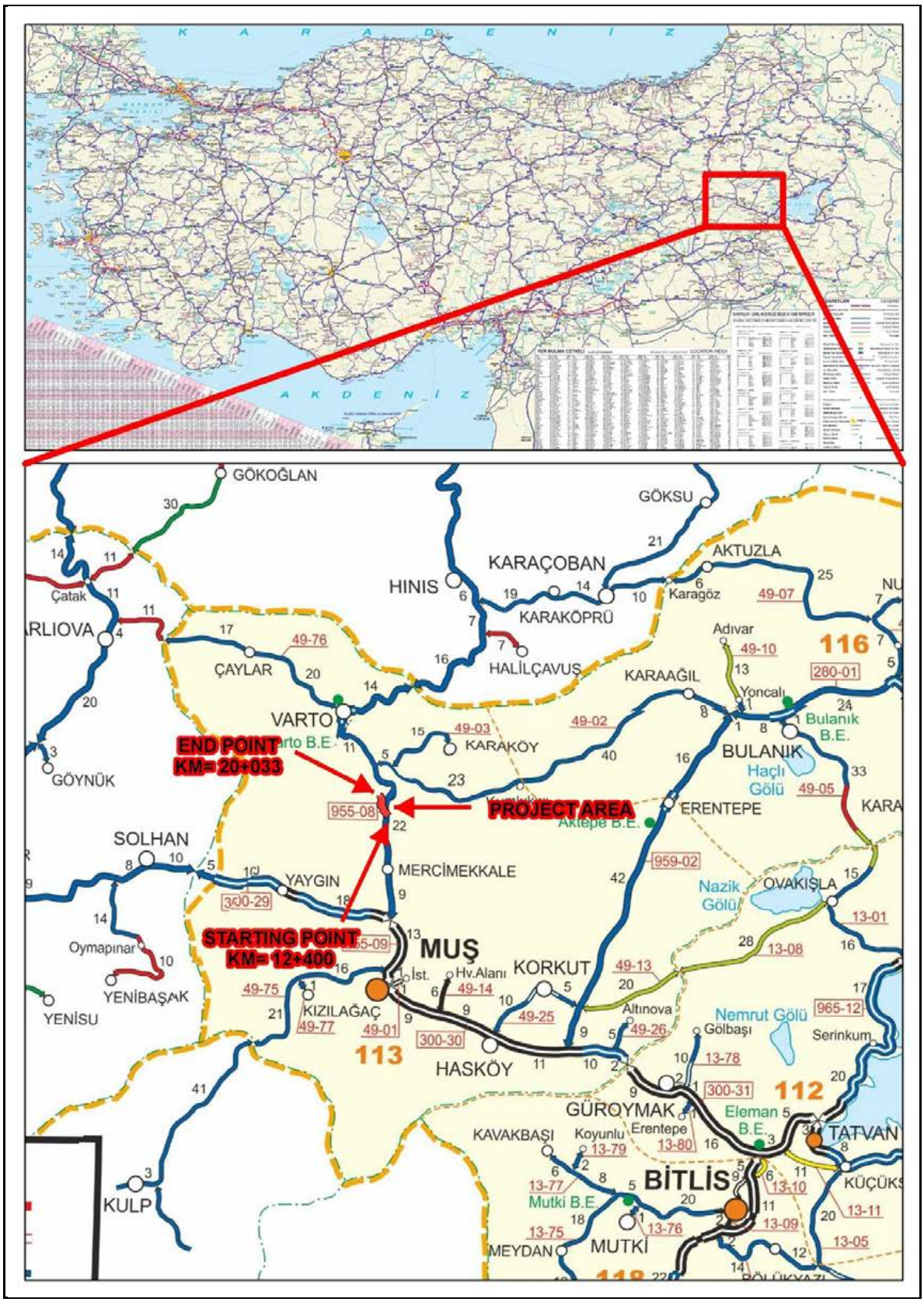


Figure 4.3. Mus-Solhan Junction-Varto State Highway Relocation-1 Route on Map

- ***Mus-Solhan Junction-Varto State Highway Relocation-2 Route Project***

Other route of mentioned relocation road is named as Mus-Solhan Junction-Varto State Highway Relocation-2 Route and is located between existing approved projects' KM°27+250-KM°34+668.

In this part, route that approved by GDH passes Murat River with a 447 m long bridge. However, this bridge projected on both horizontal curve and vertical curve and also a 9% slope used on bridge. Because of the geometrical properties of the bridge, (corrections on structural bearings where crossbeams stand on, covering concrete's casting etc.) it seems impossible to realize the project. Besides, weaker and incompetent soil basement is surfaced on abutment base. Quaternary-current aged non-tighten and non-petrified young sediments, which are composed of irregular mixture of bulk and fine material, are specified as alluvion and their hydrological permeability is very high. Consequently, a passage in this location could be more expensive and problematic. Besides, there are so many landslides after bridge passage. Because of these reasons, especially landslides, man serious problems can be observed in construction and operation phases of the project.

Mus-Solhan Junction-Varto State Highway Relocation-2 Route separates from approved GDH project at KM°27+250, turns north after Ulusirt Village and passes near Kavakli Hill at KM°30+500. After that, it follows west side of Dagdapkale Hill between KM°31+000-32+000. After passing from Alpaslan II Dam Lake to the east, with a bridge on a narrow valley, it reunites with approved project around KM°34+670. On proposed Dagdapkale Hill-Kale Hill passage in this part, valley space is 130 m long. Pliocene aged basalt and mudstone is surfaced on valley basement. While bridge length was 447 m in approved project, with relocation, horizontal standard of the road is increased and length of the bridge becomes 136 m. So bridge cost is also decreased.

Route representation on map is presented at Figure 4.4.

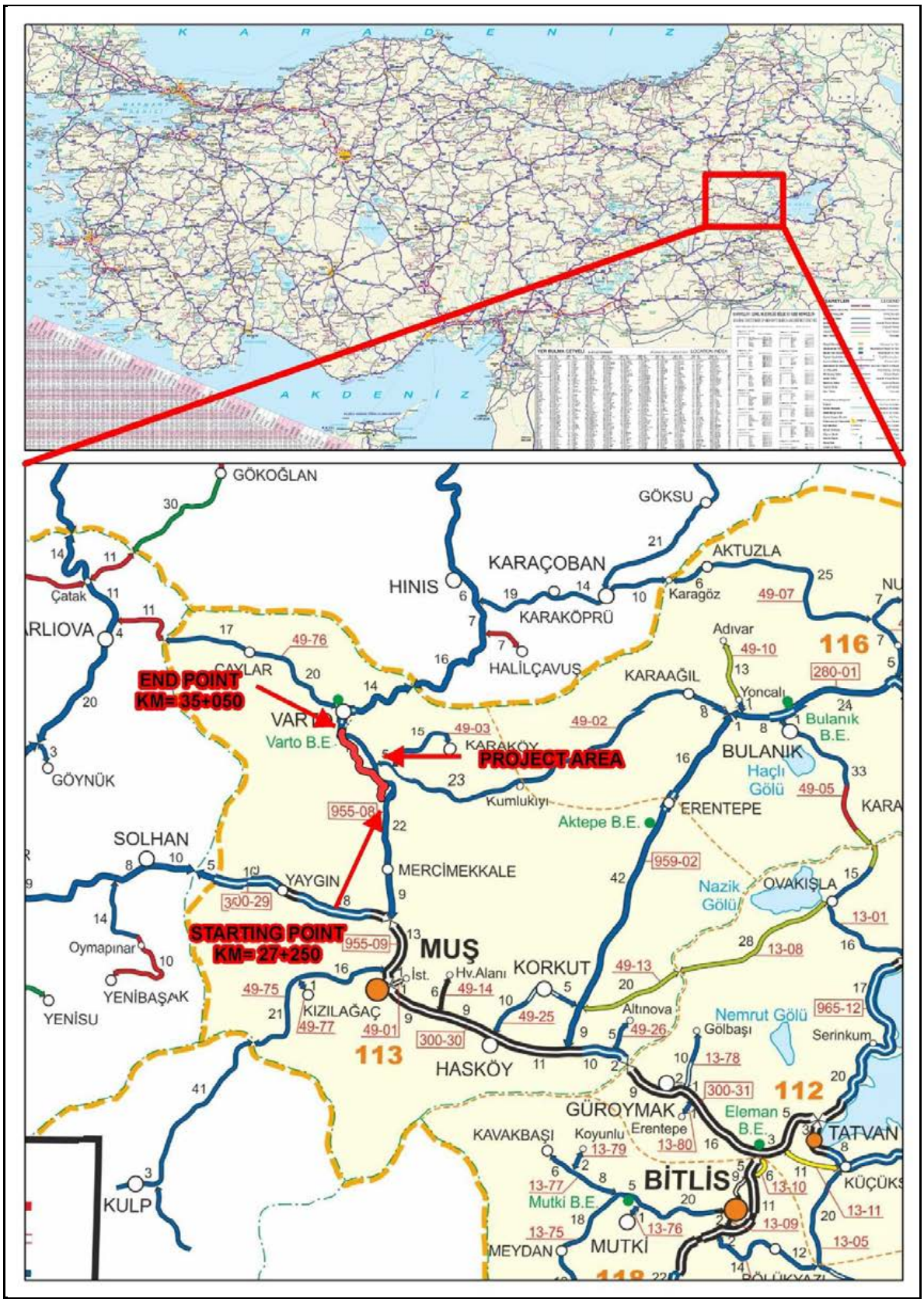


Figure 4.4. Mus-Solhan Junction-Varto State Highway Relocation-2 Route on Map

Mus-Varto Junction-Bulanik Provincial Road Relokasyon Route

In current situation, state road providing transportion between Varto and Bulanik is in line with the coast of Murat River and Bingol Stream. The completion of Alpaslan II Dam and HEPP Project will cause 25 km of Mus-Varto Junction-Bulanik Provincial Road will be inundated. Because of this, this part of the road should be relocated at a distance of 1,371.00 m above maximum overflow level before the dam reservoir as the construction of Alpaslan II Dam is completed.

The route mentioned in project starts from 1 km away of Abdurrahmanpasa bridge on existing Mus-Varto Junction-Bulanik Provincial Road and ends by linking to the existing highway at a KM 24+440. The demonstration of route on the map is presented on Figure 4.5.

The project route adjusted to start from 1 km away of Abdurrahmanpasa bridge going above crest level of the dam at a level of KM 2+300 passes from 500 m south of Özenç village, passes Bagderesi at a level of KM 4+830 by bridge and follows the dam reservoir to a level of KM 12+000. After this route at a level of KM 12+000 passes Hamurpet stream at a distance of 1 km southwest of Kayalikale village, the route goes up 60-70 km of dam reservoir level. Then, it goes down to dam level in Magara stream at a level of almostly KM 17+670 and passes through this stream by bridge. The route leaving reservoir level again passes 300 m south of Degerli village at a level of KM 22+500 and ends at a level of KM 24+440 by reconsolidation to the existing road.

Figure 4.5. Mus-Varto Junction-Bulanik Provincial Road Relocation Route on Map

4.2. Physical Properties of the Project

Mus-Varto Junction-Bulanik Provincial Road and Mus-Solhan Junction-Varto State Highway Relocation Project, which is planned to be constructed by ENERJISA, is located in Varto District of Mus Province. Mentioned project is described with two part below:

- ***Mus-Varto Junction-Bulanik Provincial Roar Relocation Project***

Existing Mus-Varto Junction-Bulanik Provincial Road starts from Abdurrahmanpasa Bridge and goes parallel with Bingol Creek around 2 km. After separation from Bingol Creek coast, the road passes through Bagici and Kayalidere towns respectively and comes closer to Murat River coast. After then, road separates from Murat River coast at 3 km before Kumlikiyi Town and arrives to Bulanik.

Existing Mus-Varto Junction-Bulanik Provincial Road mostly follows stream bed. The roads' horizontal and vertical routes', which is in the corridor that broad and ease at valley bottom and be obliged to climb to side slopes at narrowed places of valley, do not meet provincial road standards. It can be observed that geometrical and physical properties of the existing road get worse in settlements.

While existing provincial road's platform width is around 6 m at valley bottom, it varies according to terrain regions. Required shoulder widths and wayside ditches are absent from place to place. Streams that traverse road are drained by mostly unfunctional pipe culverts and rarely by vent holes. There is not any engineering structure that suitable to technical criteria on road.

Even if surface coating of the existing part, which is subject to relocation, have been completed, it is deteriorated completely at most regions. At some regions, surface coating is completely destroyed and traffic flows at deteriorated basement and existing ground.

Relocation road route is separated at 4 km of Varto-Bulanik road to the east. It is separated to start at KM°0+000 from existing road and turns back to existing road at KM°24+440. Relocation road finishes there. While the width of the existing road is 6°m, it is planned to build a 12°m width relocation road.

200 is designed as horizontal curve radius geometry. Curve radius of 200 is just used because of the rugged characteristic of the terrain that situated at after 600 m of Hamurpet Bridge. Highways design criteria, necessary sight distances and speed limits are taken into consideration while using small radius curves

Engineering Sturucture

It is foreseen to build 3 bridges which are on Bagici Creek (KM°4+830), Hamurpet Creek (KM°11+670) and Magara Creek (KM°17+670) as engineering sturucture. Besides, it is planned to build the biggest engineering structure as box culvert (2x(2,50x2,50) at close to Kusluk Creek (KM°7+291)

Besides, it is foreseen to build 3 grade junctions for connections of Baltas, Kusluk and Kayalidere towns.

Properties about engineering sturucture are presented at Table 4.1.

Table 4.1. Engineering Sturucture Mus-Varto Junction-Bulanik Provincial Road Relocation Project (KM 0+000-24+440)

Bridge		
Bridge Name	**Kilometer Interval**	**Length**
Bağiçi Bridge	4+765 - 4+895	130 m
Hamurpet Bridge	11+635 - 11+720	85 m
Mağara Bridge	17+620 - 17+715	95 m
Culvert		
Kilometer	**Type**	**Size (m)**
0+082.251	BOX	1.50 x 1.50
0+597.596	BOX	1.50 x 1.50
0+744.547	BOX	1.50 x 1.50
1+063.556	BOX	1.50 x 1.50
1+226.081	PIT BOX	1.50 x 1.50
1+454.129	BOX	2.00 x 2.50
1+876.110	BOX	1.50 x 1.50
2+260.665	BOX	1.50 x 1.50
2+511.442	BOX	1.50 x 1.50
2+745.374	BOX	1.50 x 1.50
2+795.078	BOX	1.50 x 1.50
2+878.674	BOX	1.50 x 1.50
2+970..048	BOX	1.50 x 1.50
3+377.390	BOX	1.50 x 1.50
3+928.920	BOX	1.50 x 1.50
4+208.357	BOX	1.50 x 1.50
4+546.807	BOX	1.50 x 1.50
5+404.021	BOX	1.50 x 1.50
5+735.847	BOX	1.50 x 1.50
6+021.301	BOX	1.50 x 1.50
6+174.039	BOX	1.50 x 1.50
6+394.507	BOX	1.50 x 1.50
6+585.916	BOX	1.50 x 1.50
6+636.311	BOX	1.50 x 1.50
7+290.000	BOX	2 (2.50 x 2.50)
7+958.860	BOX	1.50 x 1.50
8+293.931	BOX	1.50 x 1.50
8+482.012	BOX	1.50 x 1.50
8+848.158	BOX	1.50 x 1.50
9+040.439	BOX	1.50 x 1.50
9+317.545	BOX	1.50 x 1.50
9+438.365	BOX	1.50 x 1.50
9+517.305	PIT BOX	1.50 x 1.50

Table 4.1. Engineering Sturucture Mus-Varto Junction-Bulanik Provincial Road Relocation Project (KM 0+000-24+440) (Cont.)

Culvert		
Kilometer	**Type**	**Size (m)**
9+633.834	BOX	1.50 x 1.50
9+955.135	BOX	1.50 x 1.50
10+334.783	BOX	1.50 x 1.50
10+476.368	BOX	1.50 x 1.50
10+701.221	BOX	1.50 x 1.50
11+161.041	BOX	1.50 x 1.50
11+900.579	BOX	1.50 x 1.50
12+169.034	BOX	1.50 x 1.50
13+177.968	BOX	1.50 x 1.50
13+497.534	BOX	1.50 x 1.50
13+628.962	BOX	1.50 x 1.50
13+803.348	BOX	1.50 x 1.50
14+393.802	BOX	1.50 x 1.50
15+333.699	BOX	1.50 x 1.50
16+112.451	BOX	1.50 x 1.50
16+529.989	BOX	1.50 x 1.50
16+862.795	BOX	1.50 x 1.50
17+205.687	BOX	1.50 x 1.50
19+131.918	BOX	2.00 x 2.00
19+550.254	BOX	1.50 x 1.50
19+746.997	BOX	1.50 x 1.50
19+933.248	BOX	1.50 x 1.50
20+160.191	BOX	1.50 x 1.50
20+311.919	BOX	1.50 x 1.50
20+669.145	PIT BOX	1.50 x 1.50
21+298.364	BOX	2.50 x 2.50
21+595.767	BOX	1.50 x 1.50
21+768.307	BOX	1.50 x 1.50
22+191.022	BOX	1.50 x 1.50
22+432.260	BOX	1.50 x 1.50
22+562.195	BOX	1.50 x 1.50
22+694.980	BOX	1.50 x 1.50
22+776.776	BOX	1.50 x 1.50
22+932.366	BOX	1.50 x 1.50
23+055.658	BOX	1.50 x 1.50
23+298.201	BOX	1.50 x 1.50
24+069.322	BOX	1.50 x 1.50

Borrow Pits

Material that comes to existence at construction phase is planned to use as packing material. Material that observed during research studies of access roads of K2 and K3 borrow pits can also be used. Besides K2 and K3 basalt borrow pits are also usable.

It is possible to use licensed borrow pits of GDH which are around the region.

- ***Mus-Solhan Junction-Varto State Highway Relocation Project***

Existing Mus-Solhan Junction-Varto State Highway, starts from Bingol junction, passes through Mercimekkale town by 5 km and comes closer from place to place to Murat River. After then, it passes to left coast by Abdurrahmanpasa Bridge at Dagdap town, separates from river shore and arrives to Varto.

At relocation regions, existing road mostly follows stream bed. The roads' horizontal and vertical routes' ,which is in the corridor that broad and ease at valley bottom and be obliged to climb to side slopes at narrowed places of valley, do not meet provincial road standards. It can be observed that geometrical and physical properties of the existing road get worse in settlements.

Mus-Solhan Junction-Varto State Highway's platform width is around 8-10 m at valley bottom and 6 m at rugged regions. Required shoulder widths and wayside ditches are mostly absent. Streams that traverse road are drained by mostly unfunctional pipe culverts and rarely by vent holes. There is not any engineering structure that suitable to technical criteria on road.

Even if surface coating of the existing part, which is subject to relocation, have been completed, it is deteriorated completely at most regions because of winter conditions. At some regions, surface coating is completely destroyed and traffic flows at deteriorated basement and existing ground.

At the route determination phase of the Mus-Solhan Junction-Varto State Highway Relocation Project, it is tried to fit existing road's horizontal and vertical geometry at side road connections and settlements. Besides, it is also tired to raise the standards of the project.

By completion of Alpaslan II Dam and HEPP Project, project route will be inundated. Because of that reason Mus-Solhan Junction-Varto State Highway Project prepared and confirmed. However, the location of the dam axis has been changed and because of that reason a revision need has been occurred.

Mus-Solhan Junction-Varto State Highway Relocation-1 Project

Relocation-1 route separates from approved Mus-Solhan Junction-Varto State Highway Project from KM°12+400 at west side of Murat River valley, continues with existing road until KM°16+800 and reunites with approved project at KM°20+000.

Engineering Structures

There is not any important creek for bridge construction on project route. However, many culverts along the route, with different sizes are available. Properties about aforementioned culverts are given at Table 4.2. It is foreseen to build a box culvert with 2x(3.00x3.00) dimensions which correlates with the dimension with existing culvert on KM°16+600 at Degirmen Creek.

Besides, it is foreseen 2 grade junctions for Akpinar and Suduragi connections of project route.

Table 4.2. Culvert List of Mus-Solhan Junction-Varto State Highway Relocation-1 Project (KM 12+400-19+985)

Culvert		
Kilometer	**Type**	**Size(m)**
12+933.57	BOX	1.50 x 1.50
13+312.74	BOX	1.50 x 1.50
13+548.50	BOX	1.50 x 1.50
13+874.33	BOX	2.00 x 2.00
14+307.93	PIT BOX	2 (1.50 x 1.50)
14+630.48	PIT BOX	1.50 x 1.50
14+924.24	PIT BOX	1.50 x 1.50
15+311.55	BOX	1.50 x 1.50
15+535.49	BOX	1.50 x 1.50
15+966.44	BOX	1.50 x 1.50
16+255.30	BOX	1.50 x 1.50
16+599.72	BOX	2 (3.00 x 3.00)
16+848.72	BOX	1.50 x 1.50
18+368.28	BOX	1.50 x 1.50
18+589.70	BOX	1.50 x 1.50
18+896.46	BOX	2.00 x 2.00
19+178.98	PIT BOX	1.50 x 1.50
19+381.99	PIT BOX	1.50 x 1.50
19+752.76	BOX	1.50 x 1.50
19+971.29	BOX	1.50 x 1.50

Borrow Pits

Material that comes to existence at construction phase is planned to use as packing material. Material that observed during research studies of access roads of K2 and K3 borrow pits of Alpaslan II Dam and HEPP Project can also be used. Besides K2 and K3 basalt borrow pits are also usable.

It is possible to use licensed borrow pits of GDH which are around the region.

There is a 447 m bridge on the part of approved project that will be relocated. But, as it was mentioned before, because of bridge properties and indurable basement material, realization of the project is impossible. So, need for Relocation-2 project has been occurred between KM°27+250-35+050 of project route for increasing project standard.

Within this scope, it is planned to create a new route which separates from approved Mus-Solhan Junction-Varto State Highway Project at KM°27+250 and reunites at KM°34+668.

Engineering Structures

It is proposed to construct 3 grade junction for connections of Aynakoy, Ulusirt and Asagikoy of planned route. Besides, it is foreseen to construct 1 return junction.

In addition to that, there is need for 2 bridge construction in the scope of the project. An 83 m long Karatas Bridge that passes from Karatas Creek on KM°28+100 is foreseen. Furthermore, reservoir area is surpassed by Koskar Bridge after KM°32+000. Most of the culverts' dimensions', which are box culverts, are 1.50x1.50, but it is foreseen to build box culverts with 3.00x3.00 and 2.00x2.00 dimensions where creeks surpassed. Information about needed culverts and bridges are given at Table 4.3.

Table 4.3. Engineering Structure List of Mus-Solhan Junction-Varto State Highway Relocation-2 Projetc (KM 27+250-Back 35+184 and Further 35+250)

Bridge		
Bridge Name	**Kilometer Interval**	**Length**
Karataş Bridge	28+072 - 28+155	83.00 m
Koşkar Bridge	32+004 - 32+140	136.00 m
Culvert		
Kilometer	**Type**	**Size (m)**
i27+403.59	BOX	3.00 x 3.00
i27+573.11	BOX	1.50 x 2.00
i27+825.66	BOX	1.50 x 1.50
i28+331.72	BOX	1.50 x 1.50
i28+707.54	BOX	2.00 x 2.00
i29+725.47	BOX	1.50 x 1.50
i29+878.57	BOX	1.50 x 1.50
i30+418.13	BOX	1.50 x 1.50
i30+577.26	BOX	1.50 x 1.50
i30+707.72	BOX	1.50 x 1.50
i31+089.06	PIT BOX	1.50 x 1.50
i31+407.45	BOX	1.50 x 1.50
i31+677.99	PIT BOX	1.50 x 1.50
i32+226.04	PITBOX	1.50 x 1.50
i32+610.16	BOX	1.50 x 1.50
i32+805.29	BOX	2.00 x 2.00
i33+193.58	PIT BOX	1.50 x 1.50
i33+453.94	BOX	1.50 x 1.50
i33+987.53	BOX	1.50 x 1.50
i34+117.95	BOX	2.00 x 2.00
i34+653.67	BOX	1.50 x 1.50

In addition to these, there are two retaining walls on left side of Relocation-2 route between KM 31+232-31+768, KM 21+976-23+004, KM 32+140-32+157, KM 34+052-34+160

Borrow Pits

Material that comes to existence at construction phase is planned to use as packing material. Material that observed during research studies of access roads of K2 and K3 borrow pits of Alpaslan II Dam and HEPP Project can also be used. Besides K2 and K3 basalt borrow pits are also usable.

It is possible to use licensed borrow pits of GDH which are around the region.

4.3. Geological Characteristics of the Project Area

4.3.1. General Geology

Through the project route, from bottom to top, shallow marine clastic turbidites of Oligocene-Lower Miocene rocks with cutting them through, Pliocene shallow marine clastic sedimentary rocks of turbidites and intruding Posttektonik acid alkaline volcanic rocks of Pliocene existed.

Stratigraphy

Stratigraphic relations outcropping of rock and soil in the project area for each route are described separately below:

- ***Mus-Varto Junction-Bulanik Provincial Road Relocation Route***

a) Argilltite (Oligocene; olkk)

The oldest rock unit featured in the study area is turbiditic argilltite. It was described by previous researchers as “Ebulbahar Formation”, and then by Akay v.d. (1989) as "Yazla Formation". After a geotechnical study which was carried out in a narrow geological unit, it was described as "Claystone" considering the dominant rock type.

This unit is located between the sections KM 0+000-2+090, KM 4+540-7+380, KM 7+775-7+795 of the the route.

The unit has medium-thick line made up of a thin layer or solid and mostly observed in colors of greenish gray, yellowish and brownish gray. Despite the development of the folding, top discontinuities developed. Intermediate levels of turbiditic sandstone rarely

included. Those cuts, which are more wear-resistant, form steep slopes and cornice segments. Therefore, intermediate levels in the form of massive thick claystone easily recognizable in these segments, are concentrated in the upper levels of the unit from place to place. As it is near the village of Akpinar due to increase of carbonate / lime ratio, calcareous claystone / marl development occurs.

The lower contact of argilltite is in lateral and vertical transition with clastic and carbonate rocks of Mus Tertiary (H, et al, 1989) basin which is unconformably on the Bitlis Massif. The upper contact, on the other hand, is laterally and vertically transitional to the Adilcevaz Formation. The thickness is 3,290 m.

Claystone, as stated in the previous regional geological exploration, developed in deep shelf or turbidites. Based on the fossil content, it is Middle-Upper Oligocene old (Akay et al, 1989).

b) Claystone-Sandstone (Oligocene;olkk)

The Claystone-Sandstone sequence is one of the other rock types in the study area. Concentrated cuts in the upper levels of sandstone, is defined as claystone-sandstone. With their high endurance, they are resistant to erosion and forms cornice cuts. They are also gray, grayish-green, etc. colored with medium thick to massive bedded, sparsely discontinuity (jointed), low-medium hard, low-medium strength and uneroded. They have non detachability and small amount of water retention characteristics.

This unit is existed in the route section between KM 2+090-3+385.

c) Tuff-Tuffite-Agglomerate-Basaltic slag-Basalt (Pliocene plta)

Mainly, pyroclastic volcanic rocks such as tuff, tuffite, agglomerate, basalt slag and less than the percentage of basalt lavdan are the rock types showing the wide spread of the study area. Pyroclastic units are white, off-white, yellowish-white, gray and black where basaltic lava units are black, gray, black and brownish black in color. They were identified in the previous regional geological studies as, "Solhan Volcanics" (Yilmaz et al, 1987), "Solhan Formation" (Akay et al, 1989), and "Mus Volcanics" (Türkecan, 1991) respectively. Fine-grained tuff tuffite, agglomerate and basaltic slag levels are medium-thick bedded or massive, soft less harsh, incompetent or less strength and less differentiated.

Agglomerate levels are massive or thick layered. They consist of well-rounded pebbles, block dimensional coarse material and tuff matrix. They are also loosely fastened, and competent.

Basaltic cinder is massive -built, hollow, lightweight and low-moderate resistance.Basaltic lavas cut pyroclastics in the form of veins and dykes. They have flow structures from place

to place but mostly massive. They are medium hard-hard, fracture-cracked, undifferentiated, and competent.

Unit levels that can hold water other than tuff-tuffite, existed in the route section between KM 9+315-11+610, KM 11+635-11+720, KM 11+815-24+440.

Volcanism in the study area shows a regionally wide spread, alkaline, peralkaline and tholeiitic properties. As a result of the Lower-Middle Miocene continental to continental collision (Tethys closure), down to the deep mantle cracks developed in the areas of tension under the influence of compressional forces (Sengor,1980).

Age of volcanic stones, cutting Clay with hot contact, is Pliocene according to statigrafic relations and radiometric results (Turkecan, 1991).

d) Basalt-Basaltic slag (Pliocene; plβ)

Mus volcanic rocks in the study area show a large adsorption. They are black, grayish black and brownish black in color, hydrophilic, massive, competent, undifferentiated and with plenty of fractured cracks basaltic lavas and slags are defined as "basalt-basaltic slag".

This unit is existed in the route section between KM 3+385-4+540, KM 7+380-7+775, KM 7+795-9+315, KM 11+720-11+815, KM 11+610-11+635.

The bazalt, cutting tuff, tuffite and agglomerates can be observed in the forms of vessel, dykes, sills or lava flows and can go up to the surface with fractured cracks and great crevices, reaching all the way down to the mantle. According to the statigrafik relations and radiometric results, age of the basalt is Pliocene (Turkecan, 1991).

- ***Mus-Solhan Junction-Varto State Highway Relocation-1 Route***

a) Argilltite (Oligocene; olkk)

Detailed information on the subject is given under the title “Mus-Varto Junction-Bulanik Provincial Road Relocation Route”.

This unit is existed in the route section between KM 13+360-13+480, KM 14+850-15+260, KM 16+040-16+220, KM 17+015-18+170, KM 18+260-19+200, KM 19+300-19+985.

b) Limestone (Upper Oligocene Lower Miocene; olmkct)

Another type of rock showing adsorption on the route, mainly formed of sandstone, siltstone and limestone sequences, is defined as "Adilcevaz Formation+Adilcevaz Limestone" on the previous studies and observed in the form of a thick limestone rocks

from place to place. Through the route, unit observed in the form of limestone, argillaceous limestone and marl is defined as limestone by taking into account the dominant rock type.

This unit is existed in the route section between KM 18+170-18+260 and KM 19+200-19+300.

White, off-white, yellowish-white and beige colors observed in the unit, which is also thin-medium-thick, parallel layered and place to place massive and developed a wide-angle folds. The limestone surfaces, that are more resistant to erosione, form cornice structures and steep slopes which makes identification much easier.☒

The limestone unit is low-medium hard and erosion-resistant. For this reason, things have evolved perpendicular or nearly perpendicular. Stratigraphy well developed outside the discontinuities. The unit, of wihch bottom contact passes laterally and vertically through the claystone, is cut with hot contact by Pliocene old post tectonic acid alkaline volcanics. Thickness is 900 m. Massive limestone is 200 m (Akay, v.d., 1989).

Shallow marine featured unit is Upper Oligocene-Lower Miocene old (Akay,v.d., 1989).

c) Alluvion (Quaternary; Qa)

The unit, which is formed of clay, sand, gravel and a lesser extent of blocks, in other words, alluvial, old alluvial and terrace; surfacing in the wide plains of Murat River valley, with low slope (<10) valley declivity, alluvial cones of the aqueous-thirsty mouths of creeks reaching the valley and the former valley floors is identified as "alluvium".

This unit is existed in the route section between KM 12+400-13+360, KM 13+480-14+850, KM 15+260-16+040, KM 16+220-17+015.

Alluvial layers are in the horizontal position, loose and attached. Alluviums are 1st class of agricultural areas. Here very little grains, vegetables and fruit are produced. They can be seen at grasslands more. The vegetation consists mostly of poplar and willow trees.
Alluvium, placed on all the units incompatible is Quaternary old.

- ***Mus-Solhan Junction-Varto State Highway Relocation-2 Route***

a) Argilltite (Oligocene; olkk)

Detailed information on the subject is given under the title “Mus-Varto Junction-Bulanik Provincial Road Relocation Route”.

This unit is existed in the route section between KM 27+250-27+425, KM 28+940-32+040 and KM 32+300-35+190.

b) Basalt-Basaltic slag (Pliocene; plβ)

Detailed information on the subject is given under the title “Mus-Varto Junction-Bulanik Provincial Road Relocation Route”.

This unit is existed in the route section between KM 27+425-28+045, KM 28+190-28+940 and KM 32+040 32+300.

c) Alluvion (Quaternary; Qa)

A small portion of the study area in the valley of the creek Karatas, Quaternary old and soil stage featured alluvium forms with the properties; gray, grayish brown and brown, non-layered, horizontal positioned, loose, incompetent, and consisting mainly block, gravel, sand and clay-sized irregular mixture and accumulation of coarse and fine grained material.
This unit is existed in the small portion of the route section KM 28+045-28+190 with an incompatibility with all old sections.

4.3.2. Structural Geology

Northwest-southeast trending Mus Tertiary Basin overlie Paleozoic, Mesozoic basic with incompatibility. It is an Interior/Intermontane/Graben basin and completed the development by the Alpine movements. It is filled by, marine-terrestrial featured clastic and carbonate rocks with post-tectonic volcano and volcanic rocks. Structural elements, such as folding and fracture geometry of the basin developed in accordance with the northwest-southeast direction. Fine-grained clastic rocks such as claystone are often more pronounced and narrow-angle folds, while the limestone is shallower and wide angled. Folding of post-tectonic rocks is undeformed and horizontal located.

Over the area, which is developed over Lower Middle Miocene, under the influence of the tectonic compression due to continental collision and shaped as rugged topography, tension forces are quite effective. As a result, posttectonic stage (Upper Miocene-present) many fractures, fissures and tension cracks formed. These structures down to the depths of the mantle ensured the rise of the volcanism to the surface. Those bio-featured faults shows effect over examine area and surroundings. They are, Dumlusu Zorova, Akpinar and Murat Suyu faults.

Dumlusu-Zorova Faults: Best observation can be made from 2 km southeast of the Alpaslan Dam, Dumlusu village and valley. The horizontal components, as well as the vertical components, are also improved. They advance right leterally and continue northwest to the Murat River valley through Zarova village. Near-vertical slopes near Dumlusu and Zorova have caused the passive Zorova and active Dumlusu landslides.

Akpinar Fault: Developed at Akpınar village, 1 km southwest of the Alpaslan II Dam and HES axis. The difference can easily be observed due to the near-vertical glacis. It is dominated by the vertical component and caused the passive Akpinar landslide.

Murat River Fault: Extends along Bingöl Creek and Murat Suyu valley over the northern edge of the plain Murat Suyu at close north of the route. It caused several landslides along the path of Varto-Bulanik or faults.

Hot water and gas outputs, combining with the existence of travertine formations over the examination area and surroundings, indicate tectonic activity.

The old valley bottom sediment and terraces at the Murat Suyu valley refers to epirogenic movements or vertical rise. The continuous deepening of the river bed of Murat River, is a result of these movements.

4.3.3. Natural Disaster

Seismicity

According to the Seismic Zoning Map of Turkey (see Figure 4.6-a), prepared by the Department of Earthquake of T.C Presidency of Prime Ministry Disaster and Emergency Management, a large part of the province Muş is considered as "1st Degree Earthquake Zone ". The earthquake map of the province of Mus is available as Figure 4.6-b.

Turkey is on the Alpin earthquake zone from seismical aspect. According to that,

e) North Anatolian Fault
f) East Anatolian Fault Zone
g) West Earthquake Belt exists.

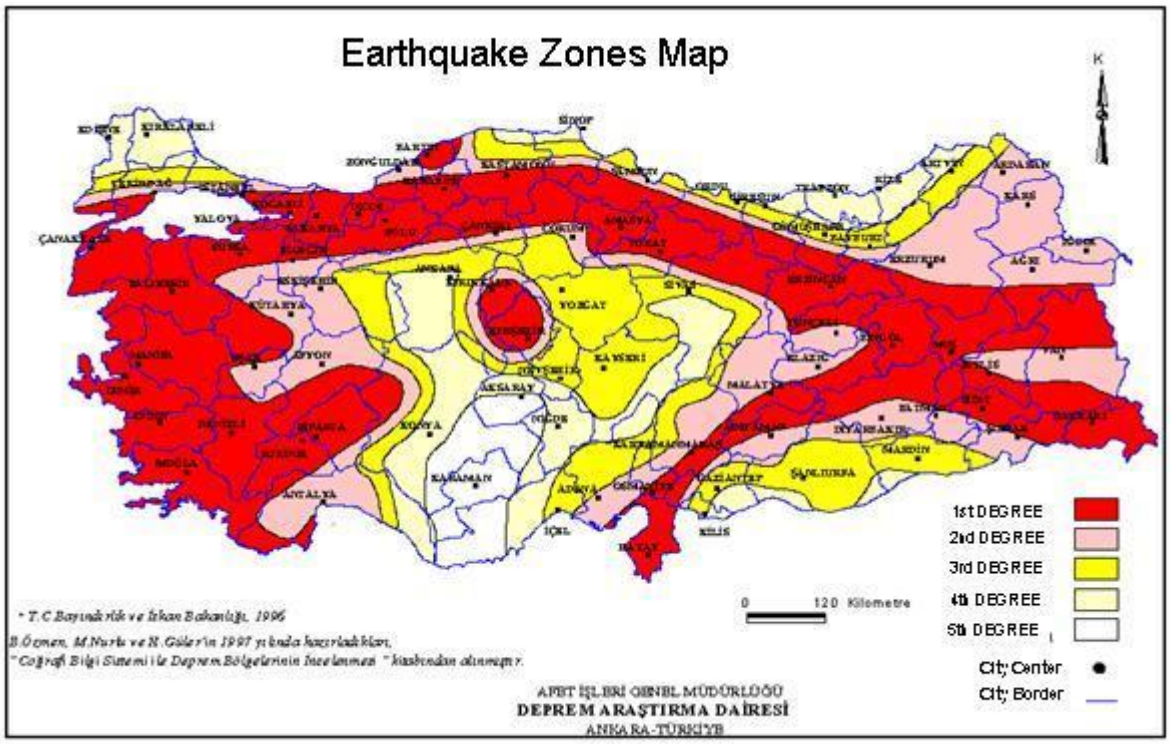
Project area is located at southeast of Karliova Varto region, which is at the the crossroads of the North Anatolian and East Anatolian faults, and north of Mus Joint. In Figure 4.7, map of active faults located near vicinity of the project area is also available. Many earthquakes over the attitude 4 according to the Richter scale were recorded along Mus Province and around.

Landslide

Regions between Mus-Varto Junction-Bulanik Provincial Road Relocation Route KM 1+850-1+940, KM 2+190-2+330, KM 2+680-2+930 are located on landslides ranges. Additional studies will be caried out in order to determine the geotechnical positions of landslides developing at readily biodegradable and portable soft-rock featured claystone.

At the Mus-Varto Junction-Bulanik Provincial Road Relocation-1 Route, both active and passive Akpinar landslide took place. Passive Akpinar landslide developed, with the effect of active Akpinar fault, at near-east northeast of the Akpinar village between KM 18+315-18+900 developed with the effect of active fault Akpinar. The planned route passes over the lanslide body, affecting a large area, which previously acted passively and is still lying passively. Active Akpinar lanslide is located at close northeast of the Akpınar village, next to the passive Akpinar landslide and moves down the slope when shallow developed current slope debris concentrates with water during rainy periods. Identification of this activity and maintenance of geotechnical research of the route will be supported by further studies.

In the Relocation-2 part of the route; the indirect effects of landslides developing from clay stones at KM 33+200-33+600 interval and the effects of landslides developing on the regions KM 33+850, KM 33+950, KM 34+200 and KM 34+300 will be examined later geotechnical studies.



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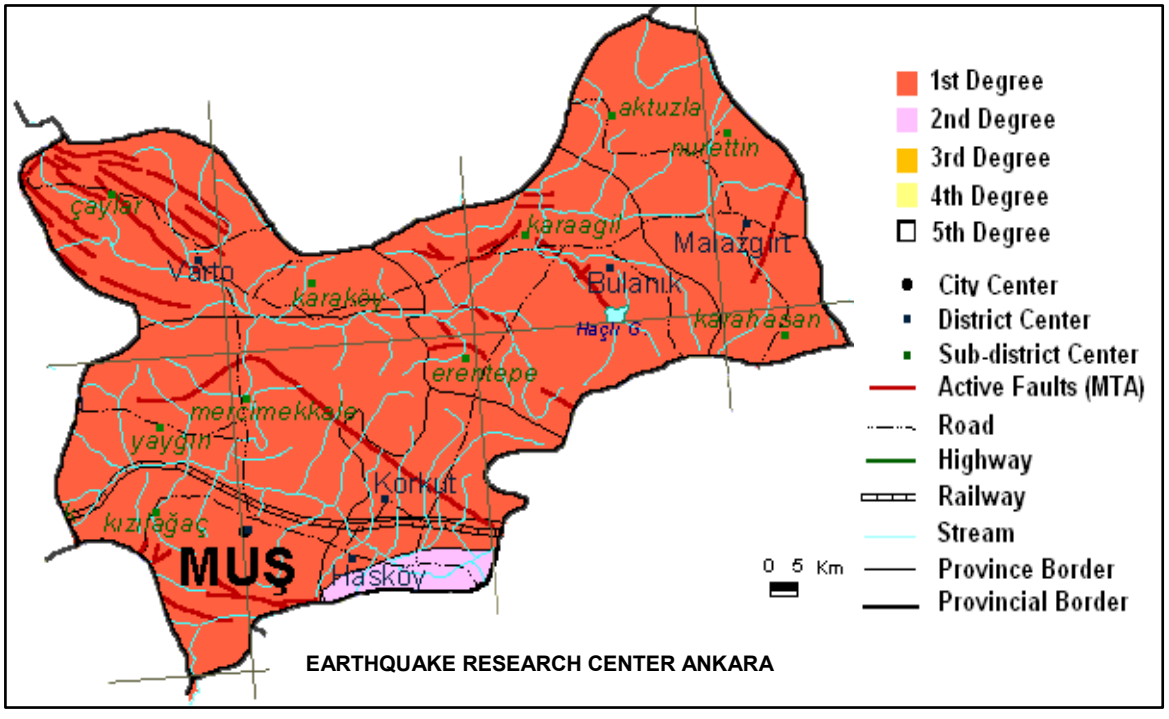


b

Figure 4.6. a) Seismic Zone Map of Turkey,
b) Earthquake Map of Mus Province
(Source:Republic of Turkey Prime Ministry Disaster and Emergency Management Presidency, Earthquake Department)

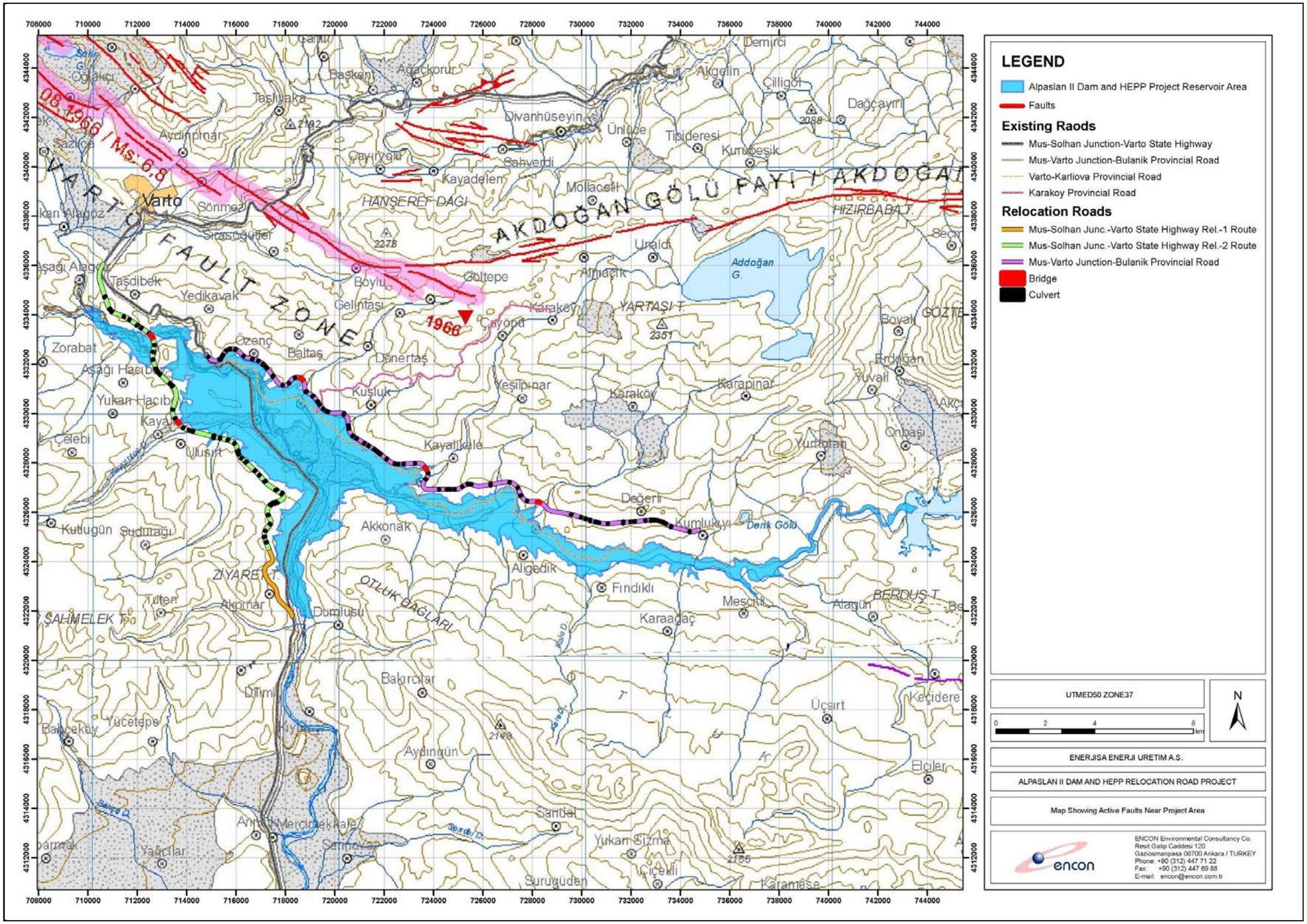


Figure 4.7. Map Showing Active Faults Near Project Area *(Source: www.mta.gov.tr)*

4.4. Soil Characteristics, Land Use and Conservation Areas

4.4.1. Soil Characteristics

Information about soil characteristics in Mus Province that is compiled from data of "Mus Province Environmental Status Report" and previous studies are given below.

When the deepness of the soil profile is being observed; it is clearly obvious that; it's colour is getting brighter. That situation depends on the lime which is being washed and passes through to lower layers. Heavy rainfall and long-term snow cover wash the lime of soil and bring it to deeper levels of soil that plants can not utilize. Organic matter amount of the operating territory is also less than sufficient. That amount is 0.11% 1.5% in the hillsides and 1.5% 10.31% in the mid-areas/parts. Deficiency of the organic matters in the soil results in the formation of large cracks in the soil after they become dry. Operating lands are generally have clayey characteristics and clay rate is approximately 62%. Clay rate in the deeper layers of soil profile is 50%.

In the course of time, depending on the topography and variations of base rock major soil groups were formed in Mus. The existing soil types within the boundaries of Mus province are as follows;

Alluvial Soils: In general alluvial soils are found on the base of surface waters or on the early sediments those are transported and agglomerated by the rivers. They are early soils with the slight slopes. The total area of this soil is 66,315 ha in the province.

Colluvial Soils: They are usually found at the skirts of the steep valley slopes. They are soils, which are formed on the drifted materials by gravity, landslide, surface flow and tributary rivers. The total area of this soil is 41,200 ha, in the province.

Chestnut Soil: They show distribution within an area of 307,425 ha.

Brown Forest Soils without Limestone: Chestnut Forest Soils without Limestone are usually formed under the forest cover of deciduous. These soils cover area of 50,675 ha.

Basaltic Soil: These soils show similar characteristics with the Brown and Reddish Brown soils in the same climate conditions, which are formed on limestone. These soils cover area of 37,780 ha.

Vertisol Soil: These soils cover area of 98,590 ha.

Brown Soils without Limestone: These soils cover area of 97,835 ha.

Regosol Soil: These soils cover area of 12,800 ha.

Map shows large soil groups is presented in Figure 4.8.

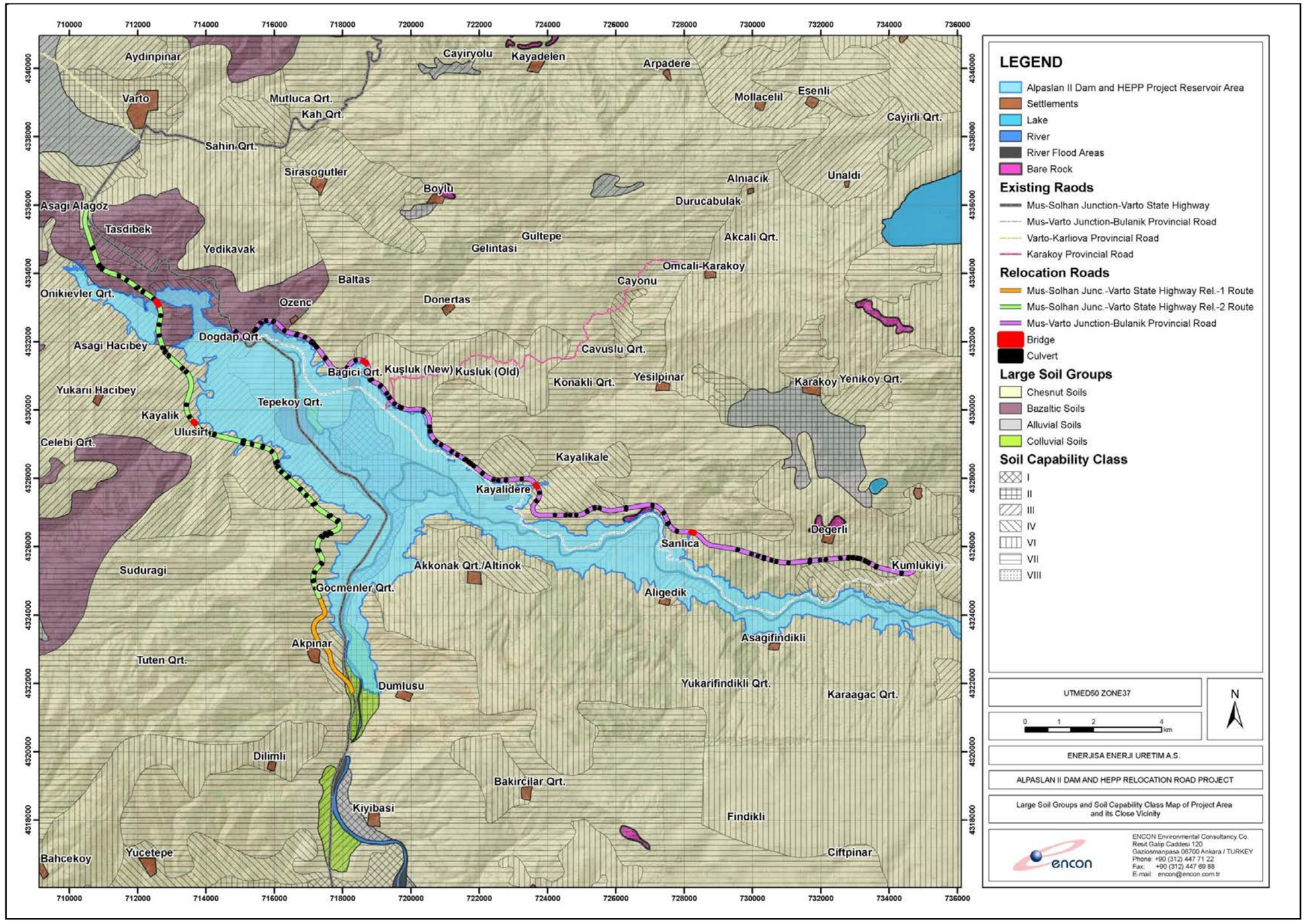


Figure 4.8. Large Soil Groups and Soil Capability Class Map of Project Area and its Close Vicinity

4.4.2. Land Use

According to the data obtained from Environmental State Report of Mus Province the total surface area of the city is 819,600 ha; while 335,049 ha of this is agricultural land, 278,673 ha is pasture land, 97,333 ha is meadow land, 57,147 ha is forest land. 7,149 ha is garden land and the rest 44,229 ha is nonarable lands. This distribution is given in Table IV.18 and in Figure 4.9.

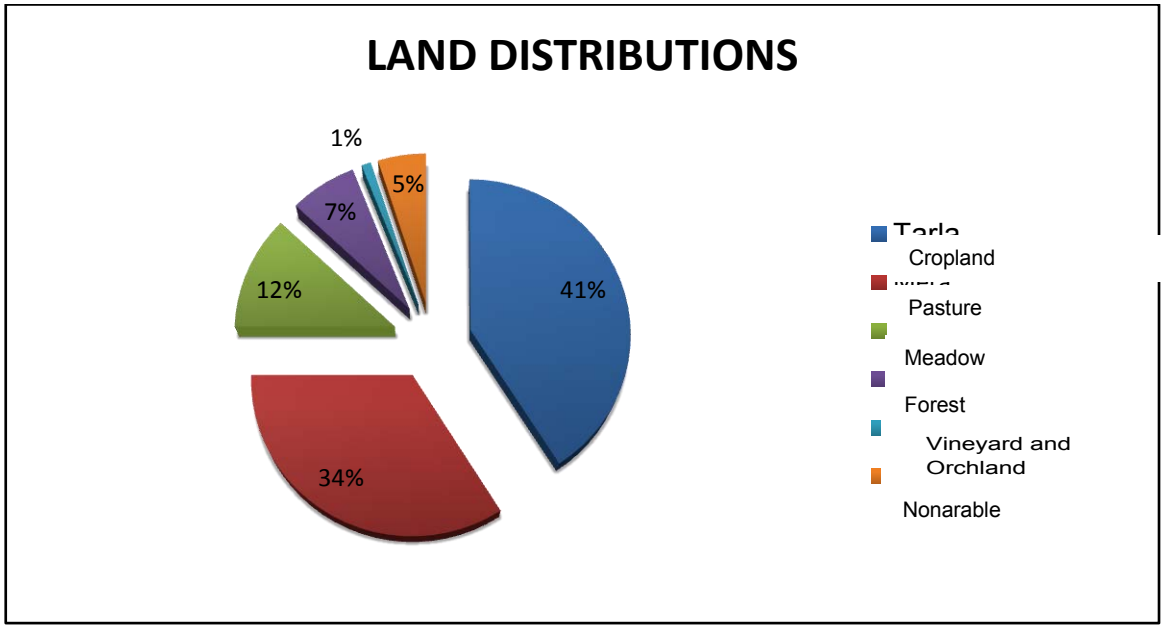


Figure 4.9. Land Distribution of Mus Province

As it is seen in the figure; proportion of meadow-pasture lands (46%) within Mus province is higher than the forest lands (7%). In Turkey, proportion of meadow-pasture lands and forest lands are equal to each other (26%), High proportion of meadow and pasture lands creates a significant potential for stockbreeding. However, they will also lead to constraints on the precipitates and landslides. According to the sub-regional distribution of the lands it is seen that the region with maximum field of cropland and pasture-meadow is Bulanik-Malazgirt-Varto districts, which is identified as 2nd sub-region.

Although the irrigable agricultural land is 158,215 ha; irrigated land is 64,280 ha. 19,261 ha of this land is being used by the General Directorate of Rural Services while 19,100 ha is being used by SHW. Besides, 26,459 ha of this area is being used by the locals.

The planted crops on this area are as follows; 190,150 ha of grain, 23,807 ha of pulse, 16,050 ha of industrial plant, 105,314 ha of forage plants, 2,179.08 ha of vegetable plants and 36,901 ha of fruit products.

Land use map of the project area and its close vicinity is given in Figure 4.10.

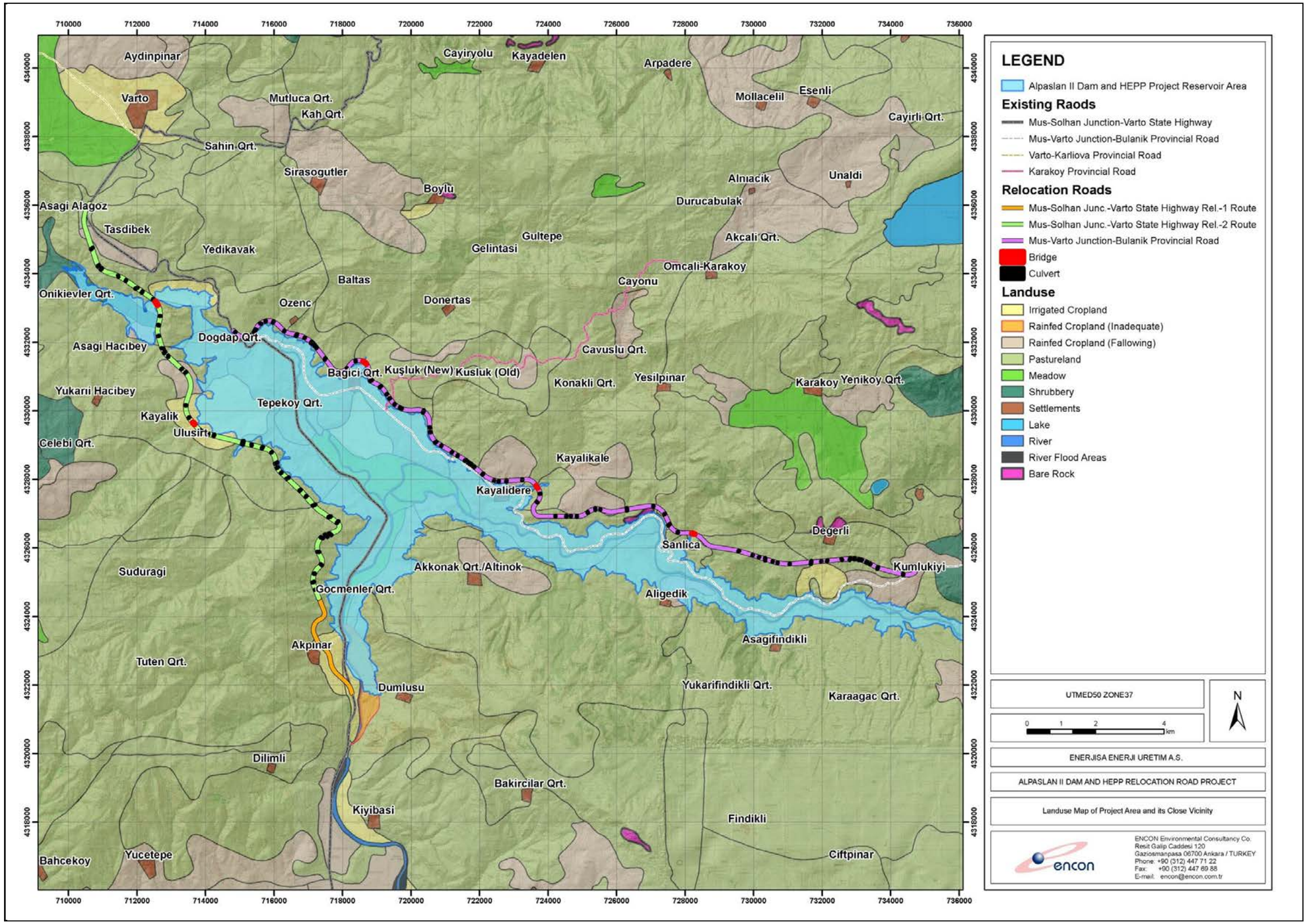


Figure 4.10. Land Use Map of Project Area and its Close Vicinity

There are 8 land use capability classes. Characteristics of the land, in terms of agricultural production, vary from Class I to VII. First four classes have the ability of growing crops, forest, and meadow and pasture plants adapted to the region under the control of a good soil management. In case soil and water protection measures are taken some special plants can grow in Class V and VI. By the implementation of some kind of efficient and rehabilitation studies crop production can be actualized; however the produced crops will not meet the capital expenditure within the current market situations.

Soils with different characteristics in the province can be explained with variety of climate and geological structures of Mus province

Distribution of the lands in Mus province, in terms of classes, is given in Table 4.4 and Figure 4.8 on map.

Table 4.4. Distribution of Lands in Mus Province, in terms of Classes

Class	Amount in the Province (ha)		Land Use Capability Status
	ha	%	
I	34.389	4,2	Smooth slope, well drained, easy machinable, deep, fertile, available to raise any kind of plant.
II	141.248	17,2	Available to raise any kind of plant, less available for planting as compared to Class-I lands, needs special mitigation measures for soil and water protection.
III	120.026	14,6	These are the lands those have severe restraint factors regarding the topography and surface flow , have fewer crops as compared to first two classes, and need special protection measures.
IV	70.004	8,5	Soil depth has severe restraint factors relevant to stony, wetness and slope. However, planting of special plant species can be implemented by appropriate plough
V	21	0,0	Agriculture cannot be implemented by plough, smooth/slightly smooth slope, stony or very wet lands. Can be utilized as meadow or woodland.
VI	141.303	17,3	Sloping, have severe restraint factors such as low soil depth. Can be utilized as meadow or woodland.
VII	302.333	36,9	Have severe restraint factors such as; low soil depth, stone, rock, slop and erosion. Not feasible for agricultural planting; however feasible for pasture and planting forest trees.
VIII	10.276	1,3	Not feasible for herbal products. Can be utilized as entertainment area and sanctuary for game animals.
TOTAL	**819.600**	**100**	

Source: Environmental State Report of Mus Province, 2008

Class I-IV agricultural land exists in Mus Province is 365,073 ha; and 335,049 ha of these areas are being used for cultivated agriculture. Pasture and forest areas, ranked as 2nd after the agricultural lands, are intensified on Class II, III and IV lands. There are 8 land use capability classes. Characteristics of the land, in terms of agricultural production, reduce from Class I to VII. The soil characteristics and distribution of soils of the province, in terms of classes are given below.

Class - I: Topography is smooth or nearly leveled (0-2%). The total area of Class I lands are 34,389 ha, which constitutes 4.2% of the surface area. Class I lands are composed of; 13,343 ha (38%) of alluvial soils, 3,212 ha (9.3%) of colluvial soils, 921 ha (2.6%) of brown forest soils without limestone and 16,913 ha (49.1%) of chestnut soils.

23,287 ha of these lands are being used for dry farming while 8,134 ha is being used for irrigated farming. Besides, 2,968 ha of these lands are being used as meadow-pasture (597 ha meadow, 2,371 ha pasture) areas.

Class - II: The total area of Class – II lands are 141,284 ha, which constitutes 17.2% of the surface area. Class II lands are composed of; 27,778 ha (19.6 %) of alluvial soils, 3,578 ha (2.5%) of colluvial soils, 69,785 ha (49.3%) of vertisol soils, 294 ha (0.2%) of regosol soils, 2,640 ha (1.8%) brown forest soils without limestone, 9,372 ha (6.63%) of limeless brown soils, 26,383 ha (18.6%) of chestnut soils and 1,454 ha (1.02%) basaltic soils.

98,996 ha of these lands are being used for dry farming while 6.942 ha are being used for irrigated farming. Besides, 33,888 ha of these lands are being used as meadow-pasture (7,888 ha meadow, 26,000 ha pasture) areas and 715 ha of is forest-scrub areas. Average slope is 1-6%.

Class - III: The total area of Class – III lands are 120,026 ha, which constitutes 14.6% of the surface area. Class II lands are composed of; 7,105 ha (5.9%) of alluvial soils, 3,345 ha (2.7%) of colluvial soils, 1,365 ha (1.13%) of vertisol soils, 2,480 ha (2.06%) of regosol soils, 3,409 ha (2.8%) brown forest soils without limestone, 84,786 ha (70.6%) of chestnut soils, 4,656 ha (3,8%) basaltic soils and 6,762 ha (5.6%) limeless brown soils.

81,424 ha of these lands are being used for dry farming while 698 ha are being used for irrigated farming. Besides, 35,228 ha of these lands are being used as meadow-pasture (26,559 ha pasture, 8,669 ha meadow) areas and 2,585 ha of is forest-scrub areas.

Class – IV: The total area of Class – IV lands are 70,004 ha, which constitutes 8.5% of the surface area. Class II lands are composed of; 6,106 ha (8.72%) of alluvial soils, 836 ha (1.19%) of colluvial soils, 327 ha (0.46%) of regosol soils, 1,212 ha (1.7%) brown forest soils without limestone, 14,827 ha (21.1%) limeless brown soils, 34,619 ha (49.4%) of chestnut soils and 12,067 ha (17%) basaltic soils.

12,887 ha of these lands are being used for dry farming while 3.870 ha are being used for irrigated farming. Besides, 36,072 ha of these lands are being used as meadow-pasture (1,793 ha meadow, 34,279 ha pasture) areas and 2,737 ha of is forest-scrub areas.

Class - V-VIII: The total area of Class – V-VIII lands are 453,897 ha, which constitutes 55.3% of the surface area. Class II lands are composed of; 1,852 ha (0.4%) of alluvial soils, 857 ha (0.18%) of hydromorphic alluvial soils, 1.093 ha (0.24%) of colluvial soils, 4,469 ha (0.98%) of regosol soils, 99,191 ha (21.8%) brown forest soils without limestone, 43,935 ha (9.6%) limeless brown soils, 195,250 ha (43%) of chestnut soils and 94,810 ha (20.8%) basaltic soils. 7,308 ha of these lands are being used for dry farming; 168 ha of the land used for dry farming is Class VII while the rest 7,139 ha is Class VI. Besides, 19 ha of these lands are being used for irrigated farming on the soils regarded as Class VII. In addition, total of 857 ha is being used as meadow area while 809 ha of these areas are Class VII and the remaining 48 ha is regarded as Class V soil type. Although

335,267 ha of the land is pasture area, only 170,517 ha is available to be used as pasture lands; because the remaining part of this land has lost its characteristics. 83,895 ha of these lands are being used as forest-scrub areas.

Different topography of the province, variations of the climate and geological characteristics and variation of the vegetation lead to constitution of soils with different characteristics. This is also true for plant food elements.

Soil Texture: Agricultural lands of Mus province involve 4.2% loam, 48.5% clayey-loamy, 46.9% clay and 0.4% sand.

Soil Salinity: Soils used for cultivated agriculture are 100% saltless.

Calcerous Soil ($CaCO_3$): Calcerous status of the soils of the province; 5.1% slight calcerous; 34.1% medium calcerous; 17.7% high calcerous; and 7.1% very high calcerous.

Organic Substance: Most of the agricultural lands are poor in terms of organic substances. In line with the average of the results of the analysis; organic substance status of the soils are as follows: 5.7% slight, 17.1% low, 43.1% medium, 3.3% very good.

Phosphorus: Phosphorus status of the soils are as follows: 51.1% slight, 21.8% low, 16.1% medium, 7.3% high, 7.3% very high.

Potassium: Potassium level of the soils within the province is high and it is, in general, sufficient.

Agricultural Lands

It is mostly fallow agriculture that is practiced. At all dry farming land, fallowing is practiced. However, if perennial crops are planted (like clover, trefoil) fallowing is not applied. In 61% of agricultural land in the province, there is dry farming. These areas products are mostly barley, wheat, clover, trefoil, common vetch and little amounts of watermelon, chickpea and beans. In areas where there is irrigated agriculture, products like vegetables, fruits, sugar beet, corn, and sunflower are grown, and there are also vineyards.

Even in areas of irrigated agriculture, due to climatic conditions and soil structure, there is only one product a year. The second product does not grow due to lack of rain, temperature, number of sunny days, and insolation.

The main product in Mus is grain. Forage crops have also increased in recent years and taken the second place, followed by industrial plants and legumes.

At agricultural facilities, animal husbandry and vegetative production are carried out together. The small-scale of these facilities,, which are comprised of many sections, causes the yield to stay at low levels.

Irrigated agricultural land in Mus, from a technical and an economic perspective, equals 1,582,150 decares. However, due to limited means of irrigation, only 649,480 decares of this land is irrigated. In 2008, approximately 2,440,921 decares land was used for vegetative production.

Forest Lands

8,9% of the forest lands of Mus is composed of oak coppice areas. 90% of oak forests are degraded and arid forest lands. Valonia oak, Cyprus oak, Taurus oak, common oak, quaking aspen, oriental plane, walnut tree, mountain alder, common ash, witch elm, willow and hawthorn, wild pear, gumwood, crab apple, red dogwood are very common within the boundaries of province.

The province and its districts have very little amount of productive forest areas. The distribution of 57,147 ha of forest areas is as follows: 1,280.5 ha of fertile high forest; 1,280.5 ha of fertile high forest; 1,280.5 ha of degraded high forest; 2,561 ha of fertile coppice forest. Degraded coppice forest area generates an area of 51,230 ha.Distribution of forest areas within the province is given in Figure 4.11.

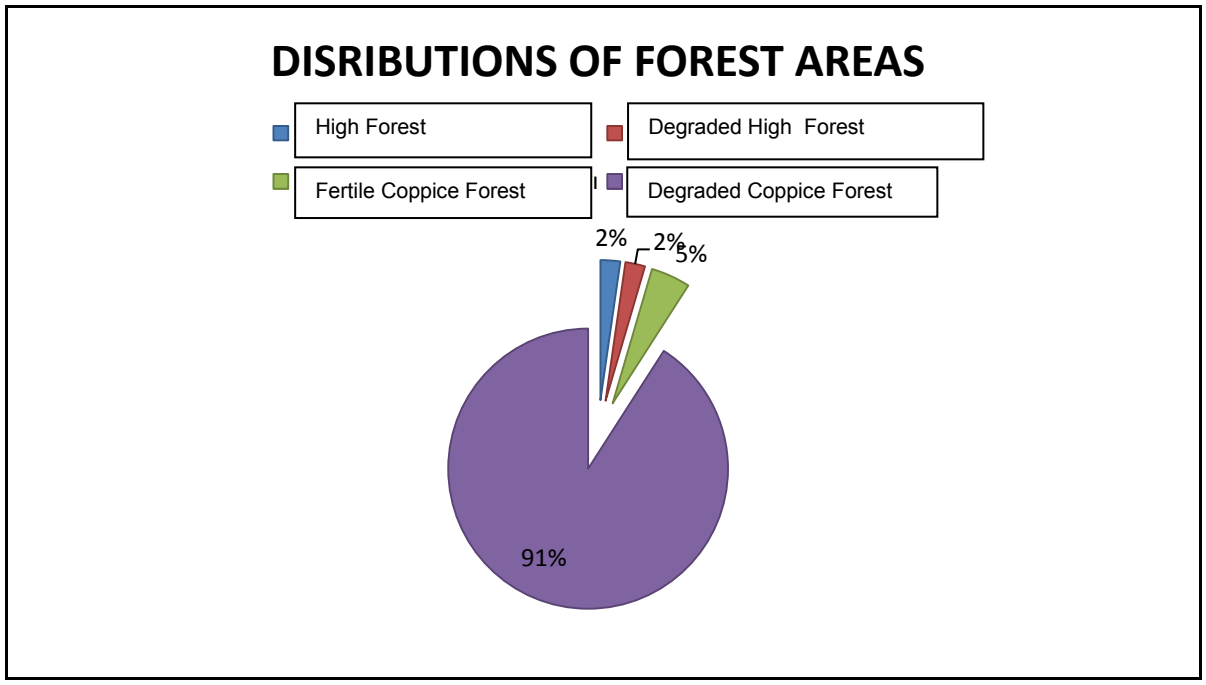


Figure 4.11. Distribution of Forest Areas within the Province

Meadow and Pasture Lands

According to the data from Environmental State Report of Mus Province, the distribution of 279,564 ha of pasture lands in the province are; an area of 67,906 ha in Merkez district, 63,086 ha in Bulanik district, 4,426 ha in Haskoy district, 30,498 ha in Korkut district, 59,995 ha in Malazgirt district and 53,653 ha in Varto district.

Within the scope of Pasture Law (Law no: 4342), which came into force in 1998; 2,701,707 decare of this areas were partially determined and applications and assignments were performed in the pastures of 43 settlements units by the studies performed by the Provincial Directorate of Agriculture and by Pasture Commission and technical team of pastures. Pastures and meadows are being utilized by the villagers as for grazing.

The most important problem of the pastures in Mus is irregular and over capacity grazing. By the beginning of partial snowmelt, grazing starts. Grazing causes smashing of plants before they emerge from underneath the soil. Therefore, fertility decreases and the existing vegetation are replaced with weeds and plants that have lower nutritional value. Late grazing in fall, on the other hand, does not let pasture plants to store enough nutrition to survive through winter and grow again next spring. Plants in general are under the pressure of heavy grazing.

Meadows are one of the important roughages within the province. Meadows compose of lush developer and tall plants. Most of the meadow areas are present in Varto. 80% of the meadows in Varto are party lands. These lands are being utilized by the parties by mowing. 3.000 meadow lands belonging to treasure in Varto has been included into to the law No. 4342 by the pasture commission of the province.

Total meadow and pasture lands in Mus province are 445,000 ha (20,000 ha of meadow and 425,000 ha of pasture). Cadastral work has been completed on 376,000 ha of these areas. The distributions of 376,000 ha are 97,333 ha of meadow and 278,673 ha of pasture.

Pasture and forest areas are mostly intensified on Class V-VIII lands. 170,517 ha of these areas are located on Class V-VIII lands and 36,072 ha on Class IV, 35,228 ha on Class III, 33,888 ha on Class II, 2,968 ha on Class lands.

Forest and Vegetation map of the project area and its close vicinity is presented in Figure 4.12.

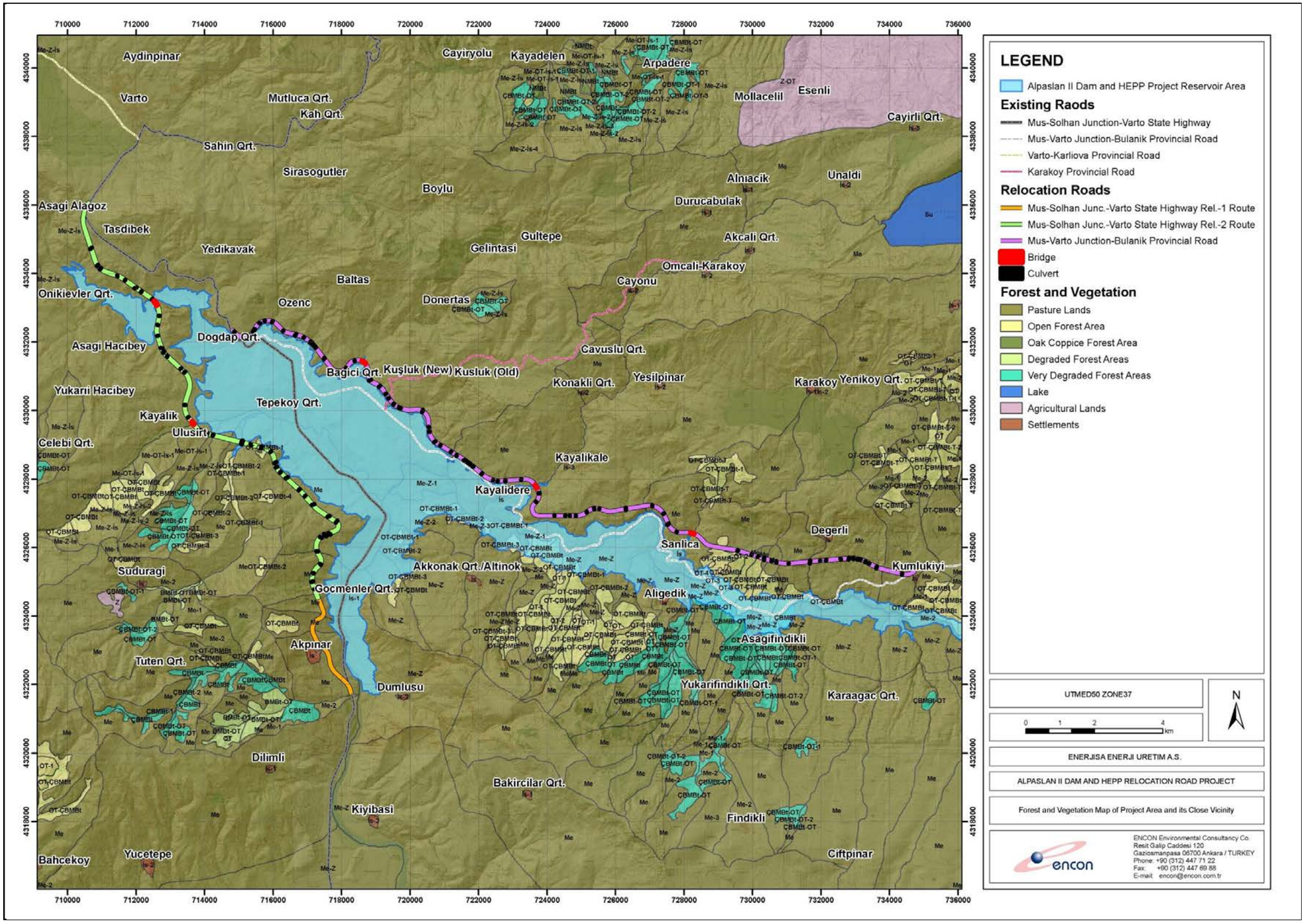


Figure 4.12. Forest and Vegetation Map of Project Area and its Close Vicinity

4.4.3. Conservation Areas

Within the scope of survey carried out for conservation areas in and near the vicinity of the project area, all areas that are defined and protected with laws and regulations were evaluated.

Specially protected environment area, national park, nature reserve area and natural park and wildlife protection area are not present within the boundaries of Mus Province. However, “80. Yıl Cumhuriyet Hatira Ormani” in Merkez district has been announced as “nature park” in July 11, 2011. The distance between project area and this nature park is about 32 km.

Within the Mus Province conservation areas with different status and areas where hunting is forbidden is given in Figure 4.13.

According to the Provincial Environmental Status Report, the following wetlands are located within the Mus provincial boundaries that are protected by Regional Environmental Commission Decision:

- Buyuk Hamurpet Lake
- Kucuk Hamurpet Lake
- Hacli Lake
- Kaz Lake
- Degerli Lake
- Kumlukiyi Lake
- Yurttutan Kuru Lake
- Korkut Sazlikbasi Marsh
- Merkez Bostankent Marsh
- Merkez Kiyik Marsh
- Bulanik Sorgol Marsh

These wetlands are not located within the project area. The nearest of these wetlands to the reservoir is Kucuk Hamurpet Lake. The distance between Kucuk Hamurpet Lake and the reservoir is about 7.5 km.

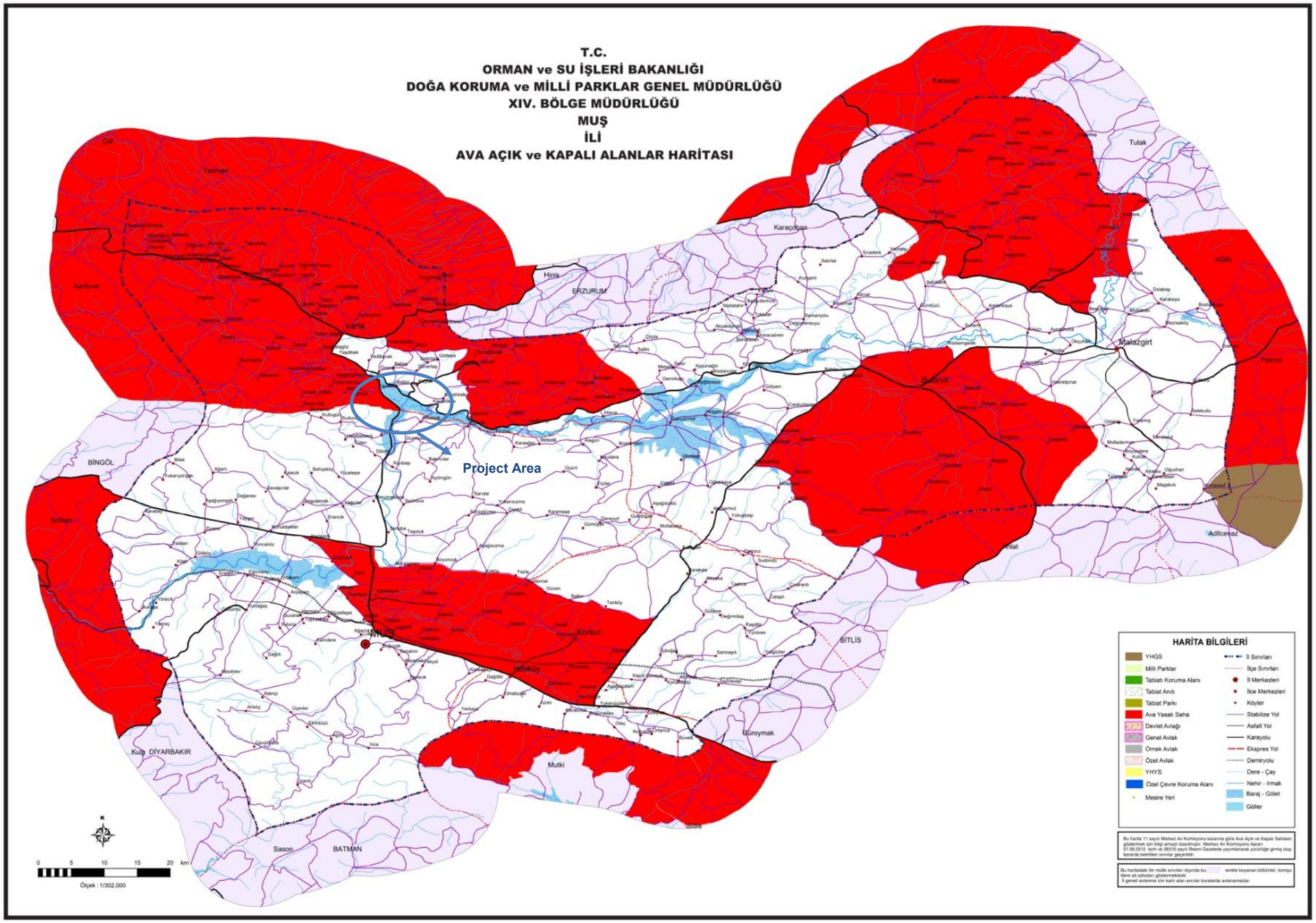


Figure 4.13. Map Showing Hunting-Allowed Areas Ad and Hunting-Forbidden Areas for Year 2013
Source: http://mak.ormansu.gov.tr

4.5. Water Resources

4.5.1. Surface Water

Murat River, where Alpaslan II Dam and HEPP Project will be constructed on, is located within the project area. It originates at Aladag Mountain near Diyadin district in Agri province then flows to the east direction and passes through Agrı Province and it merges with another tributaries coming from North. Towards the end up Agri Plain, it merges with Seryan Creek from west. Then it flows to the South direction and enters a narrow valley, which has length of about 70.00 km, then passes Malazgirt and Bulanik Plains. It merges with Nadirseyh and Hinis from North and Patnos from South and reaches Alpaslan I Dam site. It flows in the direction of east-west and merges with Bingol Creek, which is the most important tributary on the North and it turns its direction to the North-South. Then it reaches to Alpaslan II Dam site. After Alpaslan II Dam site it passes through Mus Plain.

There are existing projects in Murat River basin implemented for the purpose of irrigation, energy generation and utilization of drinking-potable water at the upstream of Alpaslan II Dam. The most important one of these is Alpaslan I Dam, which construction is in completion phase. Alpaslan I Dam located at the upstream of Alpaslan II Dam serves for the purpose of energy production and flood prevention. Alpaslan II Dam was implemented for the purpose of irrigation, energy production and flood control and its precipitation area is about 17,505 km^2.

For the purpose of utilizing the water potential of the basin, Patnos Dam, Sekerova Dam, Yazici Dam, Nadirseyh Dam, Murat Dam, Aydintepe Dam, Karahalit Dam, Baskoy Dam, Agacli Dam and Sancaktar Dam was planned to be constructed at the upstream of the Project. Patnos Dam and Yazici Dam were taken into operation, and others are under planning and design phases.

4.5.2. Groundwater

While the summers are dry and warm for the study area, a significant amount of precipitation as snow and rain occurs in winters. This water is transported by all aqueous and non-aqueous streams to Murat River and then reaches the Fırat River. Some part of that water accumulates in the rocks, and then discharges in the form of sources while some part creates groundwater bodies at aquifer featured beds.

Groundwater basin in the project area is formed by alluviums of Murat River Valley and Mus Plain. Spring and precipitation water is transported to those basins by Murat River. Springs along the route is developed on permeable-impermeable rock, tuff basalt and basalt clay stone contacts. Sources are mostly in form of leak or low flow. Depth of groundwater bodies in alluvium is same as Murat River flow. Murat River carries study area water to the Mus Basin.

Considering the hydrological permeability of the units surfacing on the routes, it can be said that clay stone and tuff is impermeable, water repellant and does not show swelling. On the other hand, basalts show discontinuities and water-holding property. With its granular and porous structure, alluvium has high hydraulic permeability and contains underground water.

Mostly partaking at small fissure fills but once in a while placing along big-not too big--small fissure fills, does not affect Murat River. Side creeks reaching Murat River and affecting the route are either dry or low flow. Therefore it is thought that those creeks do not affect the route and create problems.

4.5.3. Hydrogeology

Geological and hydrological properties of the rocks and soils surfacing on the routes are given below:

- ***Mus-Varto Junction-Bulanik Provincial Road Relocation Route***

a) Argilltite (Oligocene; olkk)

Thin medium thick bedded or massive structured claystone, exists in the relocation route section between KM 0+000-2+090, KM 4+540 7+380, KM 7+775-7+795. Occasionally, not too thick turbidite sandstone conglomerate layers can be seen. Since they are clay cemented, their porosity and water-holding capacity is near zero. Impermeable claystones' contacts with limestone and basalt develop low-flow sources.

b) Claystone - Sandstone (Oligocene;olkk)

Claystone-sandstone exists in the route section KM 2+090-3+385 with properties such as, gray, grayish-green, etc. colored, medium-thick bedded to massive, sparse attached, clay cemented with low porosity, low-medium-hard, low-medium strength, undifferentiated, low water-holding, non-detachable. The areas with high sandstorm densitiy with those properties are called claystone – sandstorm.

c) Tuff-Tuffite-Agglomerate-Basaltic slag Basalt (Pliocene; plta)

At the region between relocation route KM 12+400-13+360, KM 13+480-14+700, KM 15+295-16+040, KM 16+220-17+015 sections, tuff, tuffite, agglomerate, basalt slag and basalt lava rock types are present which can be observed as white, off-white, yellowish-white, gray, black, gray, black and brownish black colors. Non-basalt parts are fine-coarse grained, medium-thick or massive, soft-less rigid, incompetent-less strength and locally differentiated. Segments, other than fine-grained tuff and tuffit segments have water-holding ability.

d) Basalt-Basaltic slag (Pliocene; plβ)

At the region between relocation route KM 3+385-4+540, KM 7+380-7+775, KM 7+795-9+315 and KM 11+610-11+635 sections there are basalt formations with grayish black, brownish black and brown color, massive, dense fractured-cracked, semi-hard strength, undifferentiated, non-detachable, water holding and including basalt slug cones. Low-flow resources are developed due to contact with impermeable units.

- ***Mus-Solhan Junction-Varto State Highway Relocation-1 Route***

a) Argilltite (Oligocene; olk)

Argilltite, the oldest rock unit featured in the study area, exists in the relocation route section between KM 13+360-13+480, KM 14+850-15+260, KM 16+040-16+220, KM 17+015-18+170, KM 18+260-19+200, KM 19+300-19+985. Intermediate levels of turbiditic sandstone conglomerate does not have a good water holding quality because of its clay-cemented and non-porosite formation. The contact of limestone and basalt developed low-flow resources. Those resources show no negative effect on route.

b) Limestone (Upper Oligocene Lower Miocene; olmkct)

This unit is existed in the route section between KM 18+170-18+260 and KM 19+200-19+300.

Discontinuities observed in the reef featured. Massive parts of claystone, passing on the horizontal and vertical directions in the limestone. In those parts, probably karstic spaces are developed. Although clay limestone and marl levels are well-developed, discontinuities did not. The unit can hold a little bit of water. That water develops low-flow resources when it contacts with impermeable units, such as claystone or tuff. Those resources show no negative effect on route.

c) Alluvion (Quaternary; Qa)

This unit is existed in the route section between KM 12+400-13+360, KM 13+480-14+850, KM 15+260-16+040, KM 16+220-17+015 with an incompatibility with all old sections.

Alluvion, formed at small plains of the Murat River, contains a significant amount of groundwater. Groundwater flow level is same as Murat River flow rate. Groundwaters show no negative effect on route.

- ***Muş-Solhan Junction-Varto State Highway Relocation-2 Route***

a) Argilltite (Oligocene; olkk)

Claystone is formed at the region between relocation route KM 27+250-27+425, KM 28+940-32+040 and KM 32+300-35+190 sections and has thin-medium-thick layered or massive structure. Detailed information on the subject is given under the title “Mus-Solhan Junction-Varto State Highway Relocation-1 Route"

b) Basalt-Basaltic slag (Pliocene; plβ)

This unit is existed in the route section between KM 27+425-28+045, KM 28+190-28+940 and KM 32+040-32+300. Detailed information on the subject is given under the title “Mus-Varto Junction-Bulanik Provincial Road Relocation Route”.

c) Alüvyon (Kuvaterner; Qa)

At the region KM 28+045-28+190, A small portion of the area in the valley of the creek Karatas, Quaternary old and soil stage featured alluvium forms with the properties; gray, grayish brown and brown, non-layered, horizontal positioned, loose, groundwater-holding, incompetent, and consisting mainly block, gravel, sand and clay-sized irregular mixture and accumulation of coarse and fine grained material.

4.6. Wildlife Habitats and Species

The project area, which is located in the region of Erzurum-Mus is not well known with its floristic property. Through the Alpaslan II Dam and HEPP Project EIA studies, a new species (*Cirsium yildizianum*) has been discovered on the research area. This shows that, the region is interesting in terms of flora and was not searched effectively until now. Habitat types show very poor diversity therefore, in the region, flora is not so rich and endemism rate is relatively low. This region is a perfect member of Iran-Turan Plant Geography in terms of plant geography. In terms of the climate, on the other end, continental climate effects all over the region.

In order to determine the flora of the region, month July has chosen as the best period of the vegetation and then a site visit arranged to research field. In addition, field studies and prepared EIA report about Alpaslan II Dam and HEPP Project by the same authors were also carried out. Thus, the list of plant species on the flora table identified on the basis of observations and collected plants.

Floristic list is given as, Gymnosperms (softwoods) and closed angiosperms (Angiospermae) respectively. Families and genera is in alphabetical order. While genres writing, if exists any Turkish names, phytogeographical regions, endemic situations,

danger status, regional or prevalence state of endemics, habitats and abundance situation of all detected species are given respectively.

In the study area (expansion area and reference areas) national and international threat statuses of flora and fauna species identified in the area in the light of the above-mentioned resources were determined according to IUCN (International Union for Conservation of Nature) List of 2012, CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) of 2004, and BERN Convention of 2002. In addition, for flora species, Red Data Book of Turkish Plants (TRDB), which is based on 1994 (ver. 2.3) criteria of IUCN (October et al., 2000), was used. National danger status of birds are determined based of specified categories described in the Pocket Book of Birds of Turkey (Kiziroglu, 2009). Additionally, hunting status of all fauna elements was determined according to 2013-2014 Decision of the Central Hunting Commission. Flora and fauna species list, identified and evaluated according to the given criteria and lists, is shown as "Flora and Fauna Species List", offered at Appendix B.

Bern Convention is the first international classification which has been put into effect in 1982 for the protection of European wildlife and natural habitats. Flora species protected under the Bern Convention are listed in Annex I of the contract. On the other hand, fauna species are classified into two categories. In Annex II, "Final Protected" species are included which may or may not be threatened with extinction in terms of the IUCN classification therefore they may or may not listed in the IUCN Red List. The second category of fauna species of the Bern Convention, shown in Annex III, is the "protected species" category. The purpose is to maintain the population of those species and provide both legal and administrative protection including the protection and management of habitats. The third category of fauna species in the Bern Convention includes the species that is not in need of special protection. Those species are not listed individually and protected by the approach to habitat protection of Convention.

Bern Convention has been signed by the Council's 26 member states (including Turkey) with the purpose of wildlife protection in Europe by following implementations; preserve and enhance biodiversity, develop national policies for the protection for wild flora, wild fauna and natural habitats, protect the wild flora and fauna from the planned development and some level of pollution, develop protection related trainings, to encourage and co-ordinate with the relevant researches.

All the nations that are party to the Convention, also signed the Convention on Biological Diversity and are obliged to guarantee to take all possible steps, stay consistent with national advancement and protect fragile habitats and endangered species (Council of Europe, 1994). Protected flora and fauna species in this agreement are the following:

- Appendix I: Strictly Protected Flora Species
- Appendix II: Strictly Protected Fauna Species
- Appendix III: Protected Fauna Species

Classification made by CITES, which is an international convention signed by 164 countries (including Turkey), aims to prevent international trade from threatening lives of wild animals and plants. The principles of CITES are based on sustainable trade, which is important for conservation of ecological sources (various wildlife products derived from massive amounts of live animals and plants, products added to food items, exotic leather products etc.). CITES was signed in 1973 and came into force in 1975. Turkey ratified the Convention in 1996.
In CITES, species are provided under three different addition based on protection necessities.

- Appendix I; covers the species, which are under threat of extinction. Trade in the specimens of these species is not allowed except extraordinary circumstances.
- Appendix II includes species, which are not threatened with extinction, but trade in specimens is restricted in order to prevent utilization incompatible with their survival.
- Appendix III includes species for which other parties of CITES is applied for assistance in controlling trade and which are conserved at least in one country.

The IUCN Red List intends to draw attention to species whose populations are at risk or under threat. The IUCN places a species on the Red List only after studying its population and the reasons for its decline. Some countries pay greater attention to IUCN-listed species than Bern-listed species, since the Red List relies on more research. Only three categories of the IUCN Red List; critically endangered (CR), Endangered (EN) and Precision (VU), indicate that a species under threat. Therefore, this list is used as a distinctive caftor in impact assessments. The 1994 (ver.2.3) and 2001 (ver.3.1) categories and criteria of the IUCN Red List are presented below in Table IV.5.

Table 4.5. IUCN Red List Categories and Criteria

IUCN Red List Categories and Criteria 1994 (ver. 2.3)		**IUCN Red List Categories and Criteria 2001 (ver. 3.1)***	
EX	: Extinct	EX	: Extinct
EW	: Extinct in the Wild	EW	: Extinct in the Wild
CR	: Critically Endangered	CR	: Critically Endangered
EN	: Endangered	EN	: Endangered
VU	: Vulnerable	VU	: Vulnerable
LR	: Lower Risk		
	cd: conservation dependent	NT	: Near Threatened
	nt: near threatened	LC	: Least Concern
	lc: least concern		
DD	: Data Deficient	DD	: Data Deficient
NE	: Not Evaluated	NE	: Not Evaluated

** IUCN Red List Categories and Criteria have been formed by means of extensive reviews for developing more transparent, more open and easy to use systems in the recent years. In this respect, corrections were made and adopted by IUCN Council in February 2000 and revised Categories and Criteria (IUCN Red List Categories and Criteria, version 3.1) were published in 2001.*

Samples collected in the area were identified according to the “Flora of Turkey and the East Aegean Islands”. Turkish names of species were based on “Plant Names in Turkish” by Prof. Dr. Turhan Baytop. In determining threat status of flora species identified within the study area “Red Data Book for Turkish Plants (Ekim *et al.*, 2000)” was utilized and treat categories was interpreted in accordance with 1994 IUCN Red List Categories and Criteria.

4.6.1. Flora and Fauna Study Findings

As a result of field surveys carried out in the project area, 202 species from 40 Angiospermae families were identified. A total of 202 plant taxa, 12 of these identified species are endemic. 4 of these species are regional (see Figure 4.14), while 8 of them are widely distributed. Those 4 species are more widely distributed in steppe habitat in the project area. Endemic species and their IUCN threat categories are given in Tablo 4.6.

Tablo 4.6. Endemic Flora Species and Threat Categories

Taxon	Turkish Name	IUCN Threat Category (TRDB)
Regional Endemic Species		
Ferula huber-morathii Peşmen	Caksir	EN: Endangered
Cirsium yildizianum Arabacı & Dirmanci		EN: Endangered
Centaurea fenzlii Reichardt (	Peygamber cicegi	VU: Vulnerable
Verbascum macrosepalum Boiss. & Kotschy ex Murb.	Sigirkuyrugu	VU: Vulnerable
Widespread Endemic Species		
Alyssum filiforme Nyar	Kuduz otu	LC
Bufonia calyculata Boiss. & Bal.		LC
Astragalus eriocephalus Willd. subsp. *elongatus* Chamb. & Mathews	Geven	LC
Cephalaria speciosa Boiss. & Kotschy		LC
Achillea teretifolia Willd.	Civanpercemi	LC
Anthemis wiedemanniana	Papatya	LC
Phlomis capitata Boiss.	Salba	LC
Tulipa sintenisii Baker	Mus lalesi	LC

Centaurea fenzlii

Cirsium yildizianum

Ferula huber-morathii

Verbascum macrosepalum

Figure 4.14. Regional Endemic Species Detected in Project Area

As a result of the fauna studies in the project area; 12 mammals, 57 birds, 13 reptiles and 2 amphibian fauna species were identified. All mammalian species (excluding *Spalax leucodon* classified under the category "DD: Data Deficient" are belong the "LC: Least concern" category with respect to the IUCN Red List Criterias. Based on the Central Hunting Commission (CHC), 7 of the mammals belong to Appendix I while 1 of them to Appendix II and 4 species to Appendix III.

All of the 57 bird species in the study area belong to "LC: At least concern" category according to the IUCN Red List Criteria. According to Bern Convention, 28 of these species are listed in Appendix II while 23 of them are in Appendix III. 6 species 6 do not have any category in kind.

Similarly, all species of reptiles are protected by the Bern Convention and CHC Decision again. According to the IUCN Red List, *Testudo greace* is the only species in the category "VU: Vulnerable".
In addition, both of 2 amphibian species identified in the study area is under protection of Bern Convention and both of them evaluated in the "LC: Least concern" category according to the IUCN Red List.

There are no endemic species of fauna species identified in the study area. In addition, observation sites of the species in the study area, relative abundance, habitats and sources of data are given in the tables presented in Appendix B.

Vegetation Characteristics of the Study Area

East Anatolian Region is located in Iran-Turan geographical region and steppe vegetation is dominant in the study area. Quercus forest could be seen in some regions where anthropogenic impacts are inactive. Vegetation types of the study area and flora species characterizing these vegetations can be listed as the following.

a) **Quercus robur subsp pedunculiflora Forests:** These forests have very limited population on the planned route of the new road. Dominant plant of this vegetation is *Quercus robur* subsp *pedunculiflora*. However this habitat is quite destroyed due to the grazing pressure. Among these trees there are species like *Acer tataricum, Rhamnus petiolaris, Fraxinus angustifolius*.

b) **Steppe Vegetation:** This is the most common vegetation type in the study area. Dominant plants of this vegetation are herbaceous species such as, *Astragalus amblolepis, Astragalus eriocephalus* (see Figure 4.15), *Artemisia austriaca, Eryngium billardieri, Cirsium haussknechtii, Euphorbia macroclada, gundelia tournefortii, and Phlomis capitata*. Species, such as *Crataegus pseudoheterophylla* and *Pyrus elaeagnifolia*, are the woody species that rarely grow in where this vegetation is dominant. In addition, within this area, regionally endemic species such as *Cirsium yildizianum*, *Centaurea fenzlii, Verbascum macrosepalum* and *Ferula huber-morathii* have a good population.

Figure 4.15. *Astragalus eriocephalus* Willd. subsp. *elongatus*

Threat Status and Endemism of Species

As a result of field surveys carried out in the project area a total of 202 plant taxa from 40 families were identified and 13 of these identified species are endemic. Considering that 34% of Turkish flora is endemic, endemism rate of the area is quite low. However, when endemism rate of Eastern Anatolia plants are evaluated, the outcome is as expected. Since Eastern Anatolia Region of Turkey has low habitat diversity, the endemism rates are quite low in general.

Endemic species in this region are concentrated mostly at high mountainous areas. Species of steppe habitat, on the other hand, have very low endemism rates. There are 4 regional endemic species identified in the area. These are; *Ferula huber-morathii* Pesmen (EN), *Cirsium yildizianum* Arabacı & Dirmanci (EN), *Centaurea fenzlii* Reichardt (VU) and *Verbascum macrosepalum* Boiss. & Kotschy ex Murb. (VU). These species are mostly distributed among the steppe habitat within the study area. Although the species in the area are regional endemic, they have fairly healthy populations. However, some other populations will be above the water level and will not be affected. Other endemic species identified in the area are widespread species and their IUCN threat category is “LC: Least Concern”.

Evaluation of Area in terms of Landscape

The project area is located in the East to the Irano-Turanian phytogeographical region therefore suitable for widespread tree species. In this reason, planting common oak (*Quercus robur* subsp. *pedunculiflora*) on the sideways of the route of the new road would be quite appropriate. In this way, both sides of the road will have a green belt as well as the species' population will be protected.

In addition to this species, ash tree (*Fraxinus angustifolia*), which grows naturally in the area, can also be used in that purpose. When the trees grow to a certain size, soil will get richer in terms of organic matter, erosion depending on rain water will be minimized as well as visually beautiful nature is created.

4.6.2. General Evaluation

During site observations and result of field work carried out in the project area, 202 species and subspecies level, plant species have been identified. Only 4 of these plants are endemic and 8 are widespread endemic. Seeds of endemic species are gathered in the "Alpaslan II Dam and HEPP Project Monitoring Studies" process and transferred to the Turkey Seed Gene Bank. Therefore another collection process is unnecessary. Also, since the road will be relocated, populations of regionally endemic species will not be damaged. Because of regional endemic species grows mainly in steppe habitat, spread is in vertical direction. Therefore in this project, as well as every project, loss of the population of regional endemic species is a possibility. However, by transferring seeds of the endemic species to gene bank, future of these species is guaranteed. In general, widespread endemic species are the common species of the Eastern Anatolia in Turkey, therefore this context, as well as the project, is not expected to have a significant negative impact.

Within the scope of the Alpaslan II Dam and HEPP Project, biannual “Acquatic Ecosystem Monitoring Study” has been started. The aim of this study is to determine the existing freshwater species, their population densities and growth status together with the identification of the possible impacts of the HEPP, which is planned to be constructed on the Murat River, on these issues.

4.7. Socio-Economic Characteristics

4.7.1. Population of the Project Surrounding Area

Mus province has become a city after the foundation of Republic and it has temporarily connected to the Bitlis province. The population of the province, which has gained its city centre status back in 1929, is 143,899 by the year 1935. According to Address Based Population Registration System 2012 results, the total population of Mus province is 413,260. The population growth trend 1935-2012 is shown in Figure 4.16. As it seen in the figure the population of Mus was dramatically decreased from 2000 to 2010 and it started to increase after 2010. Besides, the population of Mus has shown a gradual growth after 1940s and reaches to its peak in 2000; which is 453,654..

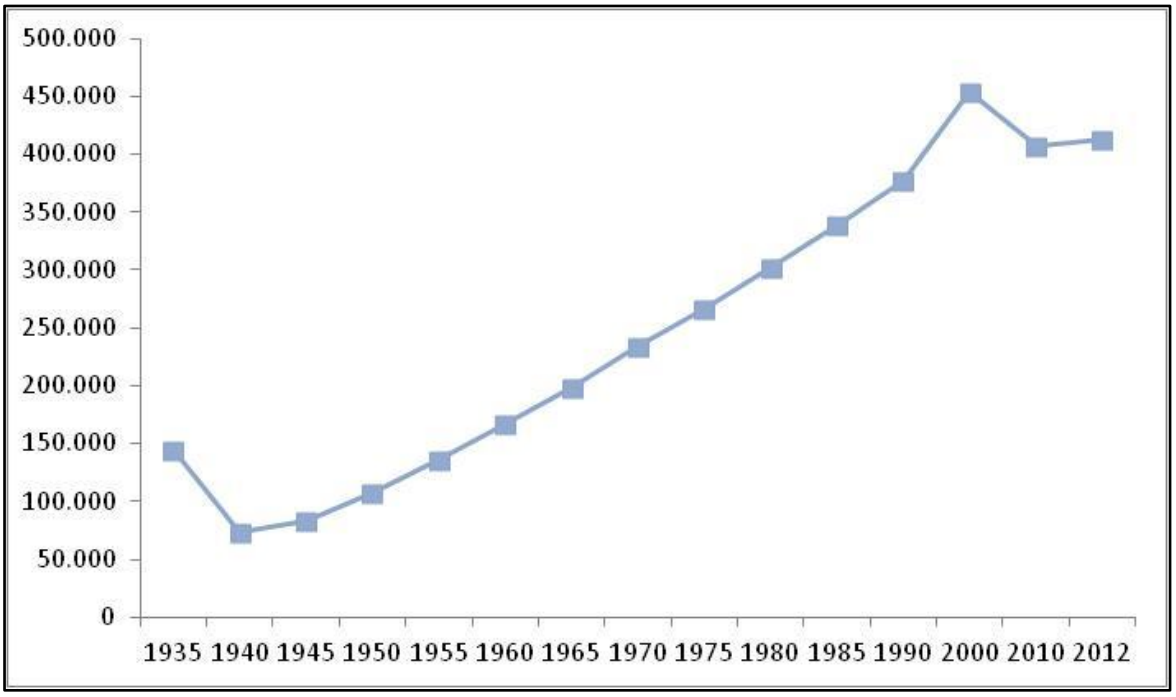


Figure 4.16. Population Change Diagram of Mus Province (1935-2012) TurkStat,2012

The gender distribution of the province is almost balanced with 48.8 percent of male population and 51.2 percent of female population; by the year 2012. Population pyramid of Mus province is given in Figure 4.17. According to the population pyramid it can be said that the fertility rate is high and majority of the population is comprised of young population. In fact, 13.6 percent of the population is in the age group of 10-14, followed by the age group of 5-9 (12.8%), and the age group 0-4 (12.7%); respectively. Although the fertility rate of the Province is high the share of the 0-4 age group within the population shows a decline. In line with all of these statistics, it can be said that the fertility rate of the Province is declining.

As of 2010-2011, net migration in Muş province is -5,768 while the net migration rate is -14.0‰. The three provinces to which the local residents of Mus migrate to are Istanbul, Bursa and İzmir. Besides, these three cities are the first three provinces which Mus receives migration.

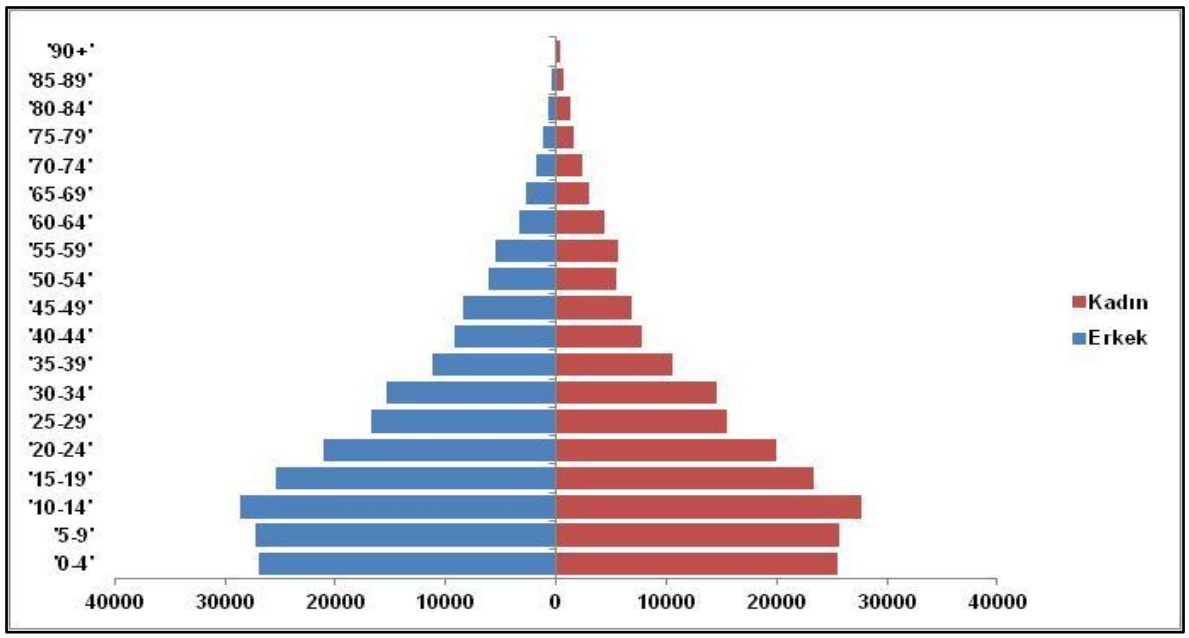


Figure 4.17. Population Pyramid of Mus, TurkStat 2012

Merkez district comprises the majority of the total population of Mus province which is 179,534 and it is followed by Bulanik district (85,114) and Malazgirt district (60,261); respectively (Table 4.7). As of 2012, the rural population of the province composes 62.6% of the province population while the urban population is 37.4 percent of the province population. These urban and rural population rates are slightly lower than the Turkey's average; which are 77.2% and 22.8% respectively. In addition, except for Merkez district of Mus, the population change shows a decline for all of the districts of the town, between 2000 and 2012. Between the years 2000 and 2012 the highest population declined is observes in Haskoy district with the ratio of 44.6 and followed by Varto and Korkut with the percents of -23 and -20.1; respectively.

Tablo 4.7. Population Change of Distrisct of Mus Province Between 2000 and 2012 (TurkStat, 2012)

District	2000			2012			Change %
	Urban	Rural	Total	Urban	Rural	Total	
Merkez	67.927	103.096	171.023	81.764	97.770	179.534	4,7
Bulanik	24.020	75.799	99.819	24.354	60.760	85.114	-17,3
Haskoy	21.342	18.573	39.915	12.822	14.791	27.613	-44,6
Korkut	6.135	26.281	32.416	3.524	23.468	26.992	-20,1
Malazgirt	23.697	45.293	68.990	21.733	38.528	60.261	-14,5
Varto	16.382	25.109	41.491	10.275	23.471	33.746	-23,0
Total	**159.503**	**294.151**	**453.654**	**154.472**	**258.788**	413.260	-9,8

As of 2012, population of Merkez and Varto districts, in which the project area is located, are 179,534 and 33,746, respectively. The rural population rates of Merkez and Varto districts are 54.5% and 69.6%, respectively. Besides, the male and female population of Merkez district is 48.4 and 51.6 percent, respectively; while in Varto district they are 49.4 and 50.6; respectively.

4.7.2. Economical Characteristics, Health and Education

According to the Socio-Economic Development Index (SEDI-2011) of the Ministry of Development, Mus province is on the 81st rank.

The economy of Mus province is based on agriculture and animal husbandry; as the industrial sector is not well-developed in the Province. The animal husbandry is in a progress of development/modernization during last few years. The mostly produced products are wheat and barley as grains, nuts and beans as legumes, sugar beet as industrial plants and cabbage and tomato as vegetables.

In Mus province there are total of 6 governmental hospitals and one of these hospitals is in Merkez district and the one is in Varto district. As of 2011, there are 377 doctors are being employed in the Province and the number of doctor per patient is 1,079. This rate is slightly high as it is compared with the average of Turkey which is 640. In Merkez district there are 22 Family Health Centers

This figure is quite high in compared to Turkey average (640). There are total 22 Family Health Centers in the region and 19 of these are in Merkez district and the rest 3 is in Varto district.

In Mus province there are 680 educational institutions. The total number of classrooms is 3,774 and the total number of students is 135,465. the total number of teachers is 4,654. The number of students per classroom is 33 for primary school, 32 for secondary school and 34 for vocational and technical education.

5. CONSTRUCTION PHASE IMPACTS AND MITIGATION PLAN

Within the scope of the Alpaslan II Dam and HEPP Relocation Roads Project, a number of impacts are possible, some can be minimized and some losses can be replaced. Thus, mitigation measures may take different forms. The mitigation activities required to avoid or reduce the possible adverse environmental impacts of the project are presented in this section and the proposed mitigation measures for each phase of project development are outlined.

Each plan provided below is based on mitigation and performance improvement measures and actions that address potential environmental issues associated with construction phase of the planned Project. Within the scope of this EMP, mitigation measures and actions are identified for all stages of the Project in compliance with the relevant Turkish legislation, as well as the international requirements. In Table 5.1, presented at the end of this chapter, EMPs for construction phase of the Project are summarized together with legislative requirement, responsible parties, time frame and evaluation criteria.

In the context of mitigation planning construction phase covers the construction of the project in accordance with the final project design, using proper management means, implementing the action plans already prepared, improving and detailing these plans when necessary, sustaining cooperation and coordination between the responsible stakeholders and the public. In the following sections mitigation measures are presented addressing the various impacts associated with Alpaslan II Dam and HEPP Relocation Roads Project.

5.1. Erosion and Sedimentation

Erosion risk may change along the route because soil shows different characteristics from place to place. Besides, during the construction period, plant cover removal, top soil excavation and slope may create erosion.

Mitigation measures will be taken to reduce erosion and sediment load to surface waters from construction activities and earthworks. For this purpose the following framework Erosion and Sediment Control Plan is provided. For each construction site, a site specific plan will be established at that site based on site surveys and construction plans to ensure that controls are well-planned and conducted in correct locations.

Erosion and Sediment Control Plan

In accordance with the framework of best practice applications, erosion, landslide and sediment control plan is prepared for the construction phase. Precautions as outlined below will be taken prior to any excavation to reduce erosion and sedimentation risk. The implementation will be monitored to ensure that control measures are in place. Main elements of this plan are as the following:

- The amount of land to be used during the excavation works will be kept at the minimum level.
- Planning phase of the project will be based on slopes that minimize landslide risk.
- Relocation road, designs of construction facilities of the road and slope calculations will be prepared in the scope of the fact of different soil characteristics along the road and erosion and landslide risks which are related to these differences.
- Terracing will be performed to reduce long and continuous slopes.
- Excavation material to be generated as a result of earthmoving works to be conducted within the scope of the Project will be used for refilling, road construction and amelioration works. No surplus excavation material is expected. In the event that there is surplus excavation material, there will be temporary storage areas to be built for storage of excavation waste before it is disposed in accordance with the “Regulation on Control of Excavation Soil, Construction and Demolition Wastes”.
- The height of material stockpiles will be defined on site in accordance with topographic conditions and stockpiles and the disposal area will not be located in floodway zones.
- All stockpiles and disposal area will be arranged, including provision of erosion and sediment control measures.
- Appropriate drainage ditches or diversion canals on the uphill side will be provided to prevent erosion at the disposal site and stockpiles.
- Erosion control measures will be implemented at slopes and disturbed areas to protect them from concentrated flows. These measures, used alone or in combination, prevent erosion by intercepting, diverting, conveying, and discharging concentrated flows in a manner that prevents soil detachment and transport.
- Flatter surfaces will be obtained at slopes and terraces will be formed in areas where erosion risk occurs and these places will be vegetated. This effort will decrease the flow of soil to the surface water.
- A vegetation cover which will immediately stop the surface erosion of cut and fill slopes will be created.
- In order to achieve success at the vegetation works to be realized at the regions with erosion, necessary warning plates will be placed and also fences or vegetative barriers will be formed where necessary to reduce the access to these areas.

5.2. Landscaping and Top Soil Utilization

Project activities and equipments may create some effects on landscape units. It is thought that, by the completion of activities, these effects will disappear. Rich soil would be excavated in the period of land preparation and will be used in landscape works. With help of reclamation works, deteriorated and altered landscape will be restored. Besides, accordance with surroundings will be provided.

The strategies and guidelines that will support rehabilitation at the construction site and stabilization of the landscape are set out under this plan. Every effort will be made to minimize the areas disturbed during construction and progressively reshape and revegetate areas with native species as work phases are completed.

The project area is located in the East to the Irano-Turanian phytogeographical region therefore suitable for widespread tree species. In this reason, planting common oak (*Quercus robur* subsp. *pedunculiflora*) on the sideways of the route of the new road would be quite appropriate. In this way, both sides of the road will have a green belt as well as the species' population will be protected.

In addition to this species, ash tree (*Fraxinus angustifolia*), which grows naturally in the area, can also be used in that purpose. When the trees grow to a certain size, soil will get richer in terms of organic matter, erosion depending on rain water will be minimized as well as visually beautiful nature is created.

To minimize the impacts on the fertile topsoil at the construction sites, soil will be carefully removed and stored in a manner to avoid deterioration taking the weather conditions into consideration. Also, the subsoil that provides formation of the topsoil will be stripped and stored to protect its horizons. While stripping the topsoil, the impurities will be removed from the soil. In order to preserve soil fertility, the piles will be lightly compacted and covered with organic material or green seeding with pioneer plant species. Moreover, the surface of the vegetal soil will be protected against erosion and drying, and will be covered with vegetation like grass, pasture plants, and etc. to maintain its activity. The stripped vegetal soil will be used at the landscape repair works and at the vegetal landscape arrangement of the recreation areas.

Reinstatement and Landscaping Plan

The following measures will be taken in order to minimize the impacts of the Project on topography, landscape and vegetation and to effectively reinstate the Project Site and its surroundings:

- Existing vegetation to be retained will be fenced before the construction works started.
- Temporary construction areas will be as small as practicable.
- Areas required for the construction of the scheme will be sited in locations where effects on the local landscape and on viewers can be minimised.
- A vegetation cover which will immediately stop the surface erosion of cut and fill slopes will be created.
- In passages from cut slopes to fill slopes and vice-versa, on sections of the vehicle routes open to wind, pyramid-formed vegetation will be used as wind shears.
- Covering the unpleasant views with vegetation cover and creating vistas from the points with pleasing perspectives.

- A landscape in harmony with the environment will be obtained by observing the harmony of the suggested plants with the existing vegetation of the area.
- The vegetation planned to be created on slopes will be composed by the species which grows rapidly and which can form its root system in short time thus being effective in protecting the soil against the erosion which may occur on surfaces of cut and fill slopes. Moreover, considering the climatic conditions, durable plant species which do not need much care will be selected. For stabilization of slopes with vegetable materials, generally the “Hydroseeding” method will be applied.
- The vegetation works on slopes will be applied with slope stabilization with Hydroseeding as well as with compositions prepared with scrubs and trees, which will be planted with horizontal root system in line with the form of the slope.
- Different colors, scales and forms of vegetation in road curves will be used so as to facilitate the perception of drivers.
- Visually screen areas of intense construction activity where moving plant, machinery and vehicles may be a source of visual impact will be temporarily fenced.

5.3. Air Quality

Adverse impacts on air quality in construction phase of the Project will be dust formation and vehicle emissions. Necessery mitigation measures will be taken in order not to affect the health of construction workers and be a nuisance for nearby settlements. Dust emitting activities during construction are topsoil scrapping, excavation works, transportation on unpaved roads, loading of excavated material to trucks and unloading of trucks. Dust in the surrounding area is usually the main concern around construction sites, which may cause reduction in quality of crops and soiling of other surfaces with resulting nuisance to residents and other affected people. However, these adverse impacts will be finished after completition of the construction works.

The effects of airborne pollutants are dependent on the concentration and exposure time. In order to control dust and other air emissions, an “Emission and Dust Control Plan” will be implemented.

Emissions and Dust Control Plan

Fugitive dust from site disturbances and emissions from vehicles have the potential to negatively affect air quality in the vicinity of the construction sites and access roads. Prevention methods will be implemented to control dust resulting from construction related activities.

- In order to reduce any possible impacts related to dust dispersion and minimize dust emissions, immediate surroundings of relevant sites will be regularly watered.

- Dust generation during excavations and fills will be significantly prevented by wetting the material. Loading and unloading will be carried out with care and without scattering.
- All transportation vehicles which will carry excavation materials within the site will be covered.
- In order to minimise the potential for dust generation stockpiles will be planned and sited taking into account prevailing wind directions and the locations of sensitive receptors.
- At the temporary storage areas material will be graded, moistened and compacted to prevent the material from being carried away by wind. Wetting the material will depend on the seasonal conditions to maintain its optimum moisture level.
- The maximum velocity of the vehicles travelling on non-asphalt roads will be limited to 30 km/hour.
- Project traffic routing through community areas wherever possible will be reduced and routing through villages will be avoided by use of dedicated site access roads.
- Tires of the trucks will be cleaned where necessary to prevent dirt being carried onto the roads.
- If despite all measures, dust concentrations still reach a level that affects workers' health, construction activities will be decelerated or stopped.
- Modern equipment and vehicles will be selected and used for construction such that they will comply with the relevant emission standards.
- Clean and legal fuel will be utilized.
- The machinery and vehicles will be inspected with regard to their exhaust systems and emission levels and adjusted to comply with relevant local and international requirements, and to protect the health of the workers.
- Respirators will be supplied for the workers who are directly exposed to particulates and the equipment used in construction will be examined periodically for the protection of the health of workers.

5.4. Noise

Noise generation will occur during construction phase of the Project, specifically due to operations on construction site and borrow site and carrying the excavation materials. Besides, it is possible that nearest settlements will be affected by blasting activities if necessary measures would not be taken. In case of detonation, the explosion process will be notified to the local public beforehand, no person will be permitted within the explosion site. The local public will be warned before the explosion. The noise generation from construction activities will be temporal and by the completion of these activities these effects will be disappear.

It is envisaged that the noise level will be low nevertheless the following measures will be taken within the scope of "Noise Control Plan".

If a receptor is detected during the course of construction activities, than all necessary mitigation measures will be taken within the scope of the Regulation on the Assessment and Management of Environmental Noise.

Noise Control Plan

The following is of the noise control measures that will be applied to stationary and mobile equipment during the construction phase of the Project:

- Within the scope of the project, modern and new equipment with lower sound power levels will be selected and regular maintenance of machinery and vehicles will be carried out.
- Silencers, protectors and other noise reducing tools will be used.
- The new construction equipment and tools will comply with the provisions of the Environmental Noise Assessment and Management Regulation.
- Equipment will be selected with consideration to noise emissions. In this respect, new construction equipment and vehicles will comply with the European Directive for equipment used outdoors; EURO I and the Turkish noise control regulations for the exterior sound level.
- If applicable, fixed equipment will be operated within housed structures.
- In order to provide optimum level of efficiency, the machinery will be operated within their design parameters.
- Natural topography will be taking advantage for noise buffer.
- Construction work will only be carried out during the day time; between 7 am and 7 pm, and will not be allowed in the evening or at night.
- Appropriate protective equipment against noise such as helmets, ear mufflers or earplugs will be provided for employees.
- All operators will display the commencement and completion dates of construction as well as working periods. All operators will be trained on the importance of reducing noise on site. Information regarding the permissions of the municipality will be posted on a signboard easily seen in the worksite.
- Speed limits for trucks while travelling to and from construction sites will be implemented.
- Wherever possible the deliveries of materials would be programmed to arrive during daytime hours.
- Vehicles will be routed such that disturbance to local residents would be minimized.
- Delivery vehicles would be prohibited from waiting within the site with their engines running.
- All construction plant will be properly maintained and operated according to manufacturers' recommendations, in such a manner as to avoid causing excessive noise.
- Noise levels will be regularly monitored at the nearby settlements.
- Workers will be trained and instructed for the methods in order to reduce the noise emissions.

5.5. Water Quality

Negative effect on lakes and groundwater is possible if necessary precautions will not be taken during construction period of the planned project. Especially, surface runoff that may come into existence in construction period and excavation material that may transported from excavation material areas, operation of borrow pits, bridge construction works, wastewater discharge and construction works which are close to high groundwater elevation may generate negative effects on surface water and groundwater if construction works will be carried out in an uncontrolled way.

Alpaslan II Dam and HEPP Relocation Roads Project is not expected to cause any adverse impacts on groundwater or surface water resources. There will be a drainage system installed in accordance with the relevant standards to prevent any flooding within the Project Site and its surroundings. Accordingly appropriate drainage will be maintained taking the following measures:

- The amount of land to be used during the excavation works will be kept at the minimum level.
- Terracing will be performed to reduce long and continuous slopes.
- It will be observed that the storm waters will flow in the channels at low speed.
- Stabilizations will be performed on construction entrances, internal roads and parking slots.
- Drainage system will be monitored as per its effective and correct operation.

Besides, a Wastewater Management Plan has been prepared in order to performed in construction phase.

Wastewater Management Plan

The following is a summary of wastewater control measures that will be applied during the construction phase of the Project:

- Wastewater generated within the project will be separated and collected according to wastewater characteristics.
- Necessary collector units will be built in order to avoid water pollution from the construction activities.
- The domestic wastewaters will be treated with package treatment plant in compliance with the related Turkish regulations (Turkish Water Pollution Control Regulation, and Law on Water Products).
- The amount of sludge generated from the domestic wastewater treatment facility will be in ignorable levels and will be collected periodically. The collected sludge will be disposed of accordingly in line with the relevant legislation.
- Drainage units with sedimentation tanks will be provided in order to retain the surface flows from the concrete mixing activities on site during road construction and also to retain sediment transport together with the surface flows.

- Storm water drainages will be disposed.
- The concrete carrying transmixers will be washed at specified areas.
- The wash water of the transmixers will also be kept for a certain time at sedimentation tanks to ensure the settlement of the suspended solid matter. The treated water can again be used for washing process. The unused water will be discharged to Murat River. In this regard, the provisions of the Water Products Law no. 1830 and Water Pollution Control Regulation enacted by being published at the Official Gazette no. 25687 of 31.12.2004.
- The aggregate material obtained from the crushing-sieving-washing plants need to be washed before being used at concrete production. Washing drum and sedimentation tank will be created for the washing process. The aggregate material washed at the washing drum and the wash water will be separated from each other. Then, this wash water rich in suspended solid matter will be taken to the sedimentation tank where a physical separation will enable the settlement of the solid matter.
- The water contaminated with concrete, paint, oil, clay or solvents will not be discharged on land and it will not be permitted for these waters to flow to the river or the discharge line or to be absorbed by soil.

5.6. Waste Management

Within the scope of the project, solid wastes will be generated during land preparation and unit construction, and from the personnel to work at these jobs. The solid wastes to be generated at this phase can be classified under four main groups::

- Construction and excavation wastes,
- Residential type solid wastes,
- Waste sludge coming out of the package treatment plant,
- Sludge coming from the sedimentation tank where the aggregate wash water is present.

Vegetation and soil that may come up from land clearance, contaminated soil, striped road surface material (asphalt included), debris, stilling poll, oil baffle waste and hazardous material (treatment chemicals, cleaning materials wastes) are also included to these wastes.

Wastes generated during the construction phase of the Project will be managed within the scope of the Turkish regulations which are;

- Solid Wastes Control Regulation
- Regulation Concerning the General Principles of Waste Management
- Regulation on the Control of Excavation Materials, Construction and Demolition Wastes
- Hazardous Waste Control Regulation

- Packaging Wastes Control Regulation
- Regulation on the Control of Medical Wastes
- Regulation on the Control of Waste Oils
- Regulation on the Control of Waste Vegetable Oils
- Regulation on the Control of Waste Batteries and Accumulators
- Regulation on the Control of Waste Tires

For the best management of these wastes during the construction phase, solid waste and hazardous waste management plans have been prepared. The details of these plans are provided herewith below:

Solid Waste Management Plan

- All the wastes will be systematically collected and every type of waste will be separated as for recycle, reuse or disposal.
- Recyclable wastes will be collected separately to be sent to licensed recycling facilities.
- Separate collection containers (barrels, cans, buckets or sacks) will be provided for different type of wastes. In order to prevent the wastes being dispersed to the environment by wind and scavengers and attracting wild animals, the container covers will be kept closed.
- The concrete leftover materials will be used as filling material.
- No waste will be dumped or buried at the site. Illegal garbage dumping will not be permitted at the construction camp, near the highways or the surrounding areas
- The construction camp site and surroundings will always be kept clean and orderly, the garbage that has spread around due to wind will be collected.
- The residential type solid wastes from the personnel working within the scope of the project will be retained at the project site, within covered containers suitable for short term preservation and periodically dumped to the garbage site of Mus Municipality. The residential type solid wastes generated at the project site will be collected and disposed as per the “Solid Wastes Control Regulation (SWCR)” enacted by being published at the Official Gazette no. 20814 of 14.03.1991 and “Packaging Wastes Control Regulation” enacted by being published at the Official Gazette no. 26562 of 24.06.2007.
- The sludge coming out of the sedimentation tank and package wastewater treatment plant will be dewatered and then disposed as per the provisions of the Solid Wastes Control Regulation enacted by being published at the Official Gazette no. 20814 of 14.03.1991, “Hazardous Wastes Control Regulation” enacted by being published at the Official Gazette no. 25755 of 14.03.2005, “Regulation on the Amendment of the Hazardous Wastes Control Regulation” enacted by being published at the Official Gazette no. 27339 of 04.09.2009 and the “Regulation on the Regular Storage of Wastes” enacted by being published at the Official Gazette no. 27533 of 26.03.2010.

- Suitable excavation material will be stored temporarily as to be used as filling material at other future construction activities. In the construction site, there will be one Temporary Storage Site. Besides, an Permanent Storage Site for permeable and impermeable material such as clay, aggregate, sand, vegetal soil and rocks. Fine materials such as sand, vegetal soil will be protected from rain and wind. The extra excavation material waste will be stored at the areas specified at the site as per SWCR and the impacts thereof on the environment will be prevented.
- Drainage channels and culverts will be united to avoid the stored material in these storage areas to flow out with water. Thereby, the materials will be kept fixed at their storage site and the river water will be protected against sedimentation.
- By using proper planning and design methods, the generated construction wastes and other wastes will be reused and excess materials recycled, where possible, to minimize waste formation.
- In case scrap metal wastes are formed, these will either be reused or sold to the companies whose main field of activity is scrap.
- If possible, wood and cardboard wastes wastes will be reused.
- Packaging wastes which occur during construction and other wastes planned to be disposed will be collected separately and stored at the temporary storage are within the plant. The location and properties of the temporary storage area will be as per the provisions of the relevant regulations.
- Possible hazardous wastes, nonhazardous construction wastes and residential solid wastes will be separated. The separation of the waste according to their types will be ensured by the trainings to be given to the project workers.
- All the personnel will be trained concerning the waste management procedure.

Hazardous Waste Management Plan

- There will be a list of all the hazardous substances on the site. The list will detail all the types, quantities, storage procedure, pollution prevention measures, management and final disposal method of possible hazardous substance.
- The management, temporary storage and final disposal of the hazardous wastes will be arranged as per the Hazardous Wastes Control Regulation (HWCR).
- After the temporary storage of the hazardous wastes, these wastes will be sent to a licensed waste processing/disposal facility as per HWCR by the hand of a licensed haulage company and the relevant records will be kept.
- Collective systems (traps or impermeable liners, etc.) will be placed under the machines or equipment (e.g. generators, pumps) against the leaking or spreading of hazardous substances (e.g. lubricating oil).
- Routine maintenance and repairs to vehicles, machinery or equipment will be undertaken on site when all the measures are taken against any spillage or leaking.
- Suitable containers will be placed at the fuel supply areas against a possible fuel spill, leak and/or over-filling.

- In the event of spill of a hazardous spill, whether accidental, deliberate or through negligence, on site or during transportation of these substances to/from the site, contractor will immediately implement actions to stop or reduce and contain the spill.
- An Emergency Status Procedure will be prepared to manage the spill or pouring of these substances and the relevant contraction personnel will be made familiarized with this emergency state procedure.
- The contractor is responsible from complying with all the national legislation concerning the safe management, storage, shipment and use of petroleum, chemicals, toxic and hazardous substances and materials.
- The manufacturer's recommendations and MSDS will be complied with for the safe management of these hazardous substances and materials.
- Personal safety equipment will be provided to the workers, especially who are working with chemicals.
- Hazardous waste generation can be placed under control by separation of the batteries and accumulators that can be reused. The directives defined at the Regulation on the Control of Waste Batteries and Accumulators (Publication date at the Official Gazette: 31.08.2008, No: 25569) will be complied with concerning the batteries and accumulators.
- Reusable hazardous wastes and other hazardous wastes will be separated. Furthermore, separation of the wastes at their source will be systematically implemented.
- All the personnel will be trained concerning the proper collection and separation methods for the hazardous wastes.

5.7. Habitat and Wildlife Management

Since natural vegetation will be cleared during the construction phase of the construction site and project route, it is possible to have some lasting effects on the terrestrial flora elements. The primary effect would be loss of the habitat. Presence of endemic species and/or species in endangered category would increase the size of the effects.

During site observations and result of field work carried out in the project area, 202 species and subspecies level, plant species have been identified. Only 4 of these plants are endemic and 8 are widespread endemic. Seeds of endemic species are gathered in the "Alpaslan II Dam and HEPP Project Monitoring Studies" process and transferred to the Turkey Seed Gene Bank. Therefore another collection process is unnecessary. Also, since the road will be relocated, populations of regionally endemic species will not be damaged. Because of regional endemic species grows mainly in steppe habitat, spread is in vertical direction. Therefore in this project, as well as every project, loss of the population of regional endemic species is a possibility. However, by transferring seeds of the endemic species to gene bank, future of these species is guaranteed. In general, widespread endemic species are the common species of the Eastern Anatolia in Turkey,

therefore this context, as well as the project, is not expected to have a significant negative impact.

Similarly, the loss of habitat for fauna species is another possibility. In addition, the dust, development of noise and vibration would likely cause species to leave their habitat and look for a similar one. Given this situation, for species with limited mobility, impact would be greater.

As a result of the improvement of construction sites and landscape there will be vegetation re-growth and formation of more suitable habitats for plant species populations. Also, there will be formation of new habitats for animal species with high mobility, such as reptiles, small mammals and birds. Detailed information on the subject can be found on Chapter 5, under the "Landscape and Land Use" heading.

5.8. Health and Safety

Health and safety measures will be followed as presented for the construction phase in accordance with the "Health and Safety Management Plan":

- Health and safety organization, tasks, responsibilities and authorities will be determined.
- An audit and inspection system will be developed to monitor the health and safety of employees.
- Employees will be trained regarding the health and safety procedures they would be required to follow including handling of machinery and equipment, hazardous materials, fire protection, etc.
- Personal protective equipment for workers will be provided, when necessary to minimize health and safety risks.
- Appropriate health and safety signs such as "Danger", "Entrance Prohibited", etc. will be placed in proper places.

A comprehensive Work Health and Safety Plan will be prepared for the construction activities by the construction contractor in accordance with ENERJISA's health and safety policy.

Table 5.1. Alpaslan II Dam and HEPP Relocation Road sProject Mitigation/Abatement Plan (1)

No	Action	Environmental Risks Liability/Benefits	Legislative Requirement/Best Practice	Investment Needs/Resource/ Responsibility	Implementation Period	Target and Evaluation Criteria for Successful Implementation
1	Implementation of Erosion and Sediment Control Plan	Protection of soil and prevention of soil degradation	Regulation on the Control of Excavation Materials, Construction and Demolition Wastes Best practice	Soil protection procedures will be handled by Contractor	Construction period	Protection of soil Positive results of monitoring reports regarding implementation of Erosion, Landslide and Sediment Control Plan
2	Implementation of Reinstatement and Landscaping Plan	Preventing and mitigating landscape degradation and protection of soil	Regulation on the Control of Excavation Materials, Construction and Demolition Wastes Best practice	Soil protection and landscaping procedures will be handled by Contractor	Construction period	Reduction of landscape impacts No complaints regarding landscape Positive results of monitoring reports regarding implementation of Reinstatement and Landscaping Plan

Table 5.1. Alpaslan II Dam and HEPP Relocation Roads Project Mitigation/Abatement Plan (2)

No	Action	Environmental Risks Liability/Benefits	Legislative Requirement/Best Practice	Investment Needs/Resource/ Responsibility	Implementation Period	Target and Evaluation Criteria for Successful Implementation
3	Implementation of Emissions and Dust Control Plan	Compliance with relevant Turkish legislation and international requirements	Regulation on Control of Air Pollution from Industrial Sources Regulation on Assessment and Management of Air Quality Best practice World Health Organization (WHO) Air Quality Guidelines; Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 – on Ambient Air Quality and Cleaner Air for Europe; General EHS Guidelines of IFC	Emission and dust control carried out and air quality measurements performed by ENERJISA/Contractor	Construction period	Protection of the social and biological environment from adverse impacts of emissions and dust Passing regular monitoring or inspections of relevant authorities successfully Receiving no complaints Positive results of monitoring reports regarding implementation of Emissions and Dust Control Plan

Table 5.1. Alpaslan II Dam and HEPP Relocation Roads Project Mitigation/Abatement Plan (3)

No	Action	Environmental Risks Liability/Benefits	Legislative Requirement/Best Practice	Investment Needs/Resource/ Responsibility	Implementation Period	Target and Evaluation Criteria for Successful Implementation
4	Implementation of Noise Control Plan	Compliance with the applicable Turkish legislation and international requirements	Regulation on the Environmental Noise Emission caused by Equipment used Outdoors Regulation on the Assessment and Management of Environmental Noise Best practice (General EHS Guidelines: Environmental Noise Management of IFC)	Noise control carried out and air quality measurements performed by ENERJISA/Contractor	Construction period	Protection of the environment and workers' health Receiving no complaints Positive results of monitoring reports regarding implementation of Noise Control Plan
5	Implementation of Wastewater Management Plan	Compliance with the applicable Turkish legislation and international requirements	Water Pollution Control Regulation Best Practice (General EHS Guidelines: Wastewater and Ambient Water Quality of IFC, EU's Urban Wastewater Treatment Directive (91/271/EEC)	Package treatment plant for domestic wastewater treatment in camp facilities during construction activities supplied by Contractor Reuse of treated wastewater, where appropriate	Construction period	Maintaining the Water Quality Positive results of monitoring reports regarding implementation of Wastewater Management Plan

Table 5.1. Alpaslan II Dam and HEPP Relocation Roads Project Mitigation/Abatement Plan (4)

No	Action	Environmental Risks Liability/Benefits	Legislative Requirement/Best Practice	Investment Needs/Resource/ Responsibility	Implementation Period	Target and Evaluation Criteria for Successful Implementation
6	Implementation of Solid and Hazardous Waste Management Plans	Compliance with the applicable Turkish legislation and international requirements	Regulation Concerning the General Principles of Waste Management Solid Wastes Control Regulation Hazardous Waste Control Regulation Regulation on the Control of Waste Batteries and Accumulators Regulation on the Control of Waste Oils Regulation on the Control of Medical Wastes Regulation on the Control of Packaging Wastes Regulation on the Control of Waste Vegetable Oils Regulation on the Control of Waste Tires Regulation on the Control of Soil Pollution and Polluted Areas by Point Sources Best Practice	Separate collection and temporary storage of different types of wastes (i.e. hazardous wastes, medical wastes, domestic wastes, etc.), will be provided by Contractor and Subcontractors (after temporary storage, hazardous and special wastes will be collected by licensed companies for proper disposal and this will be provided by Contractor and Subcontractors)	Construction period	Target: Protection of the environment from adverse impacts of solid and hazardous wastes Positive results of monitoring reports regarding implementation of Solid and Hazardous Waste Management Plans

Table 5.1. Alpaslan II Dam and HEPP Relocation Roads Project Mitigation/Abatement Plan (5)

No	Action	Environmental Risks Liability/Benefits	Legislative Requirement/Best Practice	Investment Needs/Resource/ Responsibility	Implementation Period	Target and Evaluation Criteria for Successful Implementation
7	Implementation of Wildlife Management Plan	Stability of the flora and fauna populations Preservation of biodiversity within the project area and its surroundings Better coordination of construction works (i.e. temporary fencing etc.) and monitoring (i.e. animal mortality etc.)	The Environmental Law of Turkey Law on Protection of Cultural and Natural Heritage Law on Forests Regulation on Protection and Development of Wildlife Areas	Funding resources to be provided by Contractor/ENERJISA for construction works such as fencing etc.	Construction period	Less damaged areas, no violations of construction boundaries Conservation of flora and fauna populations inhabiting the area Positive results of monitoring reports regarding implementation of Wildlife Management Plan
8	Implementation of Health and Safety Management Plan	Compliance with the applicable Turkish health and safety legislation and international requirements	Turkish Health and Safety Legislation	Protective equipment will be provided and necessary health and safety trainings will be conducted by Contractor	Construction period	Prevention of injuries and providing safe work place Positive results of monitoring reports regarding implementation of Health and Safety Management Plan

6. CONSTRUCTION PHASE MONITORING PLAN

6.1. Objective

Monitoring is an important part of environmental management and coordination. In this regard, monitoring activities will provide information on; the changes in the environmental conditions by the commencement of the project, the actual level of impacts that are previously estimated, the level of compliance with the mitigation/management plan and success of the mitigation activities to reduce the adverse impacts to acceptable levels.

By using the information collected through monitoring, environmental management plan can be revised when necessary (e.g. adapting mitigation measures to changing situations) throughout project construction to ensure that the anticipated impacts are mitigated. While impact assessment attempts to encompass all relevant potential impacts to identify their significance and include appropriate responses for these impacts, still unanticipated impacts may arise, which can be managed or mitigated before they become a problem using the information obtained through monitoring.

Thus, monitoring will serve the aim of ensuring the implementation of the mitigation/management plans and optimizing environmental protection through good practice at all stages of the Project.

During project construction, monitoring will be a part of ensuring compliance with all relevant legislation, contract requirements and effective implementation of mitigation measures.

In this section, the monitoring activities to be performed during construction period are outlined in Table 6.1, together with the details on how the monitoring activities are planned to be taking place.

6.2. Coordination of Environmental Monitoring

The success of the mitigation/management plan can be assessed by the quality of implementation. According to the proposed management/mitigation plan, the adverse impacts defined for Alpaslan II Dam and HEPP Relocation Roads Project will be remedied or mitigated. All relevant items in the mitigation scenario become commitments of the developer and the monitoring of those are going to be performed according to the monitoring plan and related legislation.

During construction, an environmental site manager (or environmental coordinator) will be designated, who will be responsible for environmental management subjects and environmental monitoring issues. In case the findings of monitoring indicate any deviation from the implementation of the outlined plans aiming at the protection of the environment, or any environmentally unsatisfactory condition should be encountered the environmental site manager will advise corrective actions as necessary. Compliance with national and international environmental regulations will be strictly adhered to in all phases of the Project

and for monitoring activities independent consultants can also be employed, when necessary.

Monitoring records will be kept and regularly prepared by the environmental site manager/environmental coordinator. Generally, reports will be prepared bi-annually to describe the monitoring activities and their results (including any need for improvement and the means of achieving this). These reports will be available to relevant governmental agencies, when required, and to the public as appropriate.

In addition to the above mentioned monitoring requirements, specialists from various ministries may also inspect the project activities, beginning with the construction, till the end of the economic life of the Project. This monitoring will aim to verify whether or not the project activities are conducted in accordance with the requirements of relevant regulations.

Table 6.1. Monitoring Plan Plan for Alpaslan II Dam and HEPP Relocation Roads (1)

No	Phase	What parameter is to be monitored?	Where the parameter is to be monitored?	How the parameter is to be monitored/ type of monitoring equipment?	When the parameter is to be monitored- frequency of measurement or continuous?	Why the parameter is monitored?	Source of Funding	Start Date	Finish Date
1	On-Site Erosion and Runoff	Construction sites	Visual observation	Continuous controls and monthly reporting	To comply with Erosion and Sediment Control Plan	No additional cost	Start of construction works	Completion of construction works	Project Contractor ENERJISA Site Environmental Expert
2	Proper storage and utilization of topsoil and excavation materials	Construction sites and storage areas	Visual observation	Weekly	To control the effectiveness of the relevant mitigation measures and ensure landscaping and formation of natural habitats	No additional cost	Start of excavation works and soil stripping	Completion of construction works	Project Contractor ENERJISA Site Environmental Expert
3	Ambient Air Quality (PM10, Settled Dust)	Close settlements	In-situ measurement and analysis	Monthly (PM10) Seasonal (Settled Dust) Upon complaint	To ensure compliance with local and international requirements regarding air quality and occupational health and safety	Project Budget	Start of construction works	Completion of construction works	ENERJISA

Table 6.1. Monitoring Plan Plan for Alpaslan II Dam and HEPP Relocation Roads (2)

No	Phase	What parameter is to be monitored?	Where the parameter is to be monitored?	How the parameter is to be monitored/ type of monitoring equipment?	When the parameter is to be monitored-frequency of measurement or continuous?	Why the parameter is monitored?	Source of Funding	Start Date	Finish Date
4	Noise	Close settlements, Access routes, Within construction site and border	Noise measurements	Monthly Upon complaint	To ensure compliance with local and international requirements and noise control plan	Project Budget	Start of construction works	Completion of construction works	ENERJISA
5	Wastewater discharge parameters provided in related Turkish regulation and IFC requirement (pH, TSS, BOD, COD, total nitrogen, total phosphorus, oil and grease, total coliform bacteria)	Package wastewater treatment plant	Sampling and analysis	Monthly	To ensure compliance with related Turkish regulations and IFC requirements	Project Budget	Start of construction works	Completion of construction works	Project Contractor ENERJISA
6	Water quality (pH, COD, oil-grease, etc.); parameters provided in related Turkish regulation and IFC requirement	In case of an accident, as a result of spilling waste oil, paint etc. to surface water and groundwater	Sampling and analysis	When an accident such as spill and leakage is reported	To determine a potential contaminant and to comply with Water Pollution Control Regulation	Project Budget	Start of construction works	Completion of construction works	Project Contractor

Table 6.1. Monitoring Plan Plan for Alpaslan II Dam and HEPP Relocation Roads (3)

No	Phase	What parameter is to be monitored?	Where the parameter is to be monitored?	How the parameter is to be monitored/ type of monitoring equipment?	When the parameter is to be monitored- frequency of measurement or continuous?	Why the parameter is monitored?	Source of Funding	Start Date	Finish Date
7	Solid and Hazardous Wastes	Construction sites	Visual investigation	Weekly Seasonal	To comply with related Turkish regulations and international requirements in the scope of Solid and Hazardous Waste Management Plans	Project Budget	Start of construction works	Completion of construction works	Project Contractor ENERJISA
8	Health and Safety	All work places	Observation and inspection	Daily, monthly	To ensure compliance with Health and Safety Management Plan	Project Budget	Start of construction works	Completion of construction works	Project Contractor
9	Soil Quality	Project area	Sampling and analysis	Seasonal	Control of the impact of the project on soil quality	Project Budget	Before the construction works start (baseline for soil quality)	Completion of construction works	ENERJISA

7. EMERGENCY ACTION PLAN FOR CONSTRUCTION PHASE

A framework for emergency action plan (EAP) has been prepared for the emergency situations that could occur in construction phase of the project. In the context of this plan an Emergency Action and Business Continuity (EA&BC) Coordinator will be identified for the Emergency Action Plan (EAP), who is going to have the main responsibility to form an Emergency Action Team (EAT) and to deal with emergencies.

7.1. Purpose and Scope

The general purpose of this EAP is to protect lives that would be affected from emergency events that are not foreseen for construction phase of the Project, such as natural disasters (fire, earthquake, lightning etc.), and incidents within facility (e.g. wrong operation, disordered maintenance, etc.) and reduce the potential impacts of such events. The specific aim of this EAP is to provide a framework for development of detailed EAP(s) by relevant responsible parties.

The most important objective of the EAP is to define the actions to be taken in an emergency case. Natural disasters, fire, accidents and sabotage situations are defined as the "emergency situations" within the scope of this Project. The following are some of the main issues to be included within the detailed EAP(s) to be prepared:

- The tools and equipment required for instant response in case of an emergency (fires, explosions etc.) will be kept in a separate place. Such materials, tools and equipment will include diggers and shovels, face masks, protective eye gear, gloves, various pumps, radios and similar equipment.
- Considering that no epidemic species is found close to the Project Site, the EAP will be prepared by taking into account the natural habitats within the vicinity.
- The methods of interventions by heavy duty machinery like fronted loader and dozer will be planned beforehand and the parking lots of such vehicles will be selected by taking this issue into consideration.
- The EAP will include a list of emergency response/action teams, locations of safety tools and equipment and the escape routes and procedures. Also, telephone numbers for emergency contacts will be included in the plan.
- The EAP will be regularly monitored and periodic examination and maintenance of all relevant equipment will be regularly performed. Key staff will be trained in the subject.
- In case of an emergency, the nearest security force unit will be notified immediately.

In order to implement the EAP an EA&BC Coordinator and an EAT will be assigned. The team members will be trained and their mission will be clearly specified. Thus, it will be ensured that each employee would know his/her own responsibility in a potential emergency situation.

7.2. Duties and Responsibilities

ENERJISA/Contractor

All the activities to be performed during the construction phase of the Project are under the responsibility of ENERJISA and selected contractors. For implementation of these responsibilities, there would be project and site managers. The responsibilities of these managers within the context of the EAP are summarized below:

- Selection of the EA&BC Coordinator and approval of the EATs;
- Attending the annual review meetings related to EAP and approval of the recent version of the EAP;
- Approval of the activities that are not included in EAP during an emergency situation;
- Analyzing the reports prepared after any emergency situation.

Emergency Action and Business Continuity (EA&BC) Coordinator

In general implementation of the activities developed and specified in the EAP, and improving this plan are the main responsibilities of the EA&BC Coordinator. More detailed responsibilities of the EA&BC Coordinator can be summarized as follows:

- Establishment of information flow between the EAT Leaders and the Crisis Management Team (CMT).
- Informing CMT Leader immediately after the announcement of the emergency.
- Following emergency response actions conducted by the EATs and the related reports prepared, and relay these to the CMT.
- Informing the EATs of the decisions made by the CMT and coordinate EATs to act accordingly.
- Coordinating EATs when they need to act together.
- Working in coordination with the Information Technologies Rescue Coordinator.

Emergency Action Team (AET)

EATs will be established from the project staff according to their abilities. These teams can be listed as the following, but the structure is flexible to be changed based on the needs within project site:

- Building/Facility Technical Support and Damage Identification Team
- First Aid Team
- Fire Fighting Team
- Security Team
- Logistics Team
- Communications Team

The specific duties of each EAT will be provided in detail within the EAP to be prepared. For the scope of this framework, general responsibilities of an EAT are given below:

- Attending the training sections and maneuvers for implementing the EAP.
- Reviewing and improving, if necessary, the EAP annually together with the EA&BC Coordinator.
- Informing EA&BC Coordinator when an emergency situation occurs.
- According to type of emergency situation, implementing the necessary measures in accordance with the EAP.
- Notifying the relevant contact people as required in the EAP.
- Reviewing the situation with the EA&BC Coordinator in the aftermath of the emergency situation, and preparation of the report.

Emergency Action Team (EAT) Leader

The responsibilities of the EAT Leader can be summarized as the following:

- Evaluating the situation and declaring an emergency if needed. Informing the EA&BC Coordinator about the situation.
- Responsible for making the emergency announcement. If needed, in order to prevent any panic, is also responsible for making an informative announcement.
- Activating the EAT.
- Coordinating teams that respond to an emergency.
- Having members of the EAT to meet at the emergency meeting point.
- Informing the EA&BC Coordinator about the emergency response actions and related reports prepared.
- Directing the teams under the supervision of the EA&BC Coordinator.
- Managing all activities until the emergency is over.
- Controlling all sites via monitor system.
- Making assignments for the control of systems and respond to emergency situations.
- When the emergency situation is over or taken under control, announcing it through a general call.
- Coordinating the emergency training of workers.
- Improving the EAP whenever needed.

7.3. Potential Emergency Situations

7.3.1. Accidents

Potential accidents during construction may cause injuries and even death. In such situations, the first aid will be provided by the EAT and assistance will be sought from the closest health facilities. In any injury encountered in the facilities, first aid will be the responsibility of the EAT team members and/or the medical doctor available at the site In the

meantime, to prevent any further damage, other EAT members will ensure environmental safety, investigate any fire possibility, and clean any spilled materials.

As a result of some accidents, fuel, oil, or other hazardous liquids may reach the surface waters. When fuel or other hazardous materials are seen floating in the surface waters, first EAT will respond, and, if necessary, the closest fire department will be contacted to get assistance. Fuel, oil, and other floating materials will be separated from water via skimming. These skimmed materials will be collected in sealed tanks and disposed in accordance with the Waste Oil Control Regulation.

Duties and responsibilities of the EATs in case of accidents are as the following:

- All of the team members should know the type of injury risk in each work area.
- In emergency situations, team members will check for the persons that might be injured in their area of responsibility.
- The EAT member who identifies a person with injury will provide first aid as proper. If he/she decides that the injury is beyond his/her ability for first aid than a more capable, or authorized, person (such a doctor) will be waited. Any attempt that may worsen the situation of the injured person should be prevented.
- Depending on the type and extent of injury an ambulance may be required. In such a case, a member of the EAT will wait in the road junction (or such) to direct the ambulance to the incident location.
- After the arrival of the ambulance the responsibility passes to the medical personnel that arrived with the ambulance, but EAT member(s) will help first aid activities if needed.
- During the first aid activities, EAT prevents the entrance of irrelevant people to the incident area.
- After the completion of the necessary actions and/or injured person is sent to the hospital, the incident record is prepared.
- If there is no injured person in an accident, EAT secures the incident area and reports to the EA&BC Coordinator.

7.3.2. Fire

Fire possibilities will be minimized at the Project Site and working areas by taking necessary preventive measures. In addition, in relevant work areas fire extinguishing equipment will be kept at proper places for emergency response. Furthermore, no open fires will be allowed within the Project Site and its surroundings.

Duties and responsibilities of the EATs in case of a fire are the following:

- All of the team members should know the fire risk in each work area. They have to know how to extinguish different types of fires as well.
- In emergency situations, team members will check for any fire in their area of responsibility.

- If any fire is determined, or emergency situation is a fire, EAT takes the necessary actions for extinguishing without panic under the control of the team leader.
- Depending on the type and extent of fire, a fire engine may be required. In such a case, a member of the EAT will wait in the road junction (or such) to direct the fire engine to the incident location.
- After fire engine arrives, team members help extinguishing activities, if needed.
- During the fire fighting, EAT prevents the entrance of irrelevant people to the area.

7.3.3. Earthquake

Trainings will be provided to all workers related to actions to be taken during an earthquake for their safety. If an earthquake greater than a scale of 5 or more on Richter scale is determined, and workers on duty feel earth tremor or are exposed to specified earthquake consequences (feeling of the earthquake by everybody, moving/falling of objects in the shelves, moving/falling down of furniture, fracturing of some plasters and walls, quaking of trees and shrubs), the steps given below will be followed:

- General visual check of the project units after the earthquake ceases.
- After completion of the relevant controls and audits, findings will be communicated to the relevant authorities.
- If any project unit is damaged, the relevant authorities will be informed immediately.
- If any project unit is damaged, which is not considered to be significant, necessary technical observations/testing will be made immediately. Then, the assessment will be communicated to the project management and other relevant local and national authorities.

7.3.4. Leakage-Spill

Oil, fuel, dye etc. may spill on the working sites and/or roads that are used for transportation. The activities that will be performed in 30 minutes following these spills are important in terms of prevention of contamination. The actions to be taken in case of a leakage and/or spill after an accident are as the following:

- Leakage source will be determined and if possible, leakage will be stopped.
- In order to prevent spreading of leakage, sandbags will be placed around the leakage source.
- In case of big leakages, depending on the slope of the land, a small canal will be opened in the downstream part of the leakage, and this canal will be filled with absorbent material to collect leakage in this canal and prevent mixing with groundwater.
- Pollutant material, polluted absorbent material and soil will be put into bags that have proper size and durability, and these bags will be labeled properly.
- In case of a big leakage and/or spill, the incident will be reported to the site supervisor immediately.

- Trucks, construction equipment etc. that had an accident on the roads will be brought into their normal position as fast as possible, and by this way more leakage and/or spill will be prevented.

7.4. Emergency Aftermath and Further Actions

When an emergency situation ends and the EA&BC Coordinator approves the safety of the Project Site, relevant units and authorities will informed of the incidence. EATs will make a general assessment together with the EA&BC Coordinator and prepare a report about the emergency. Activities conducted during the emergency will be assessed and any necessary adjustments and/or improvements will be made in the EAP. If the emergency incidence is an unforeseen case, the precaution measures to prevent this type of emergency incidences and the action plan for such emergencies will be developed and integrated into the EAP.

7.5. Contact List for Emergency Situations

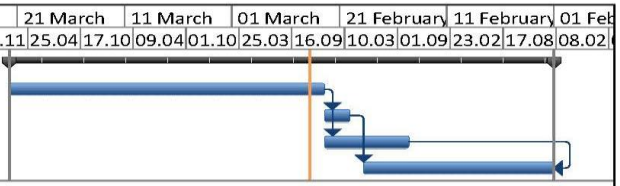
A contact list for emergency situations will be established with relevant contact information. This list will include relevant project management units and persons, and local and central authorities (i.e. village headmen, municipality, district governorship, police department, fire department, General Directorate of Disaster Affairs, Electricity Production Corporation, Electricity Transmission Authority Corporation, etc.).

8. PROJECT SCHEDULE

The construction phase of Alpaslan II Dam and HEPP Relocation Roads Project is planned to be completed in 43 months. A detailed “Construction Plan” is provided in Table 8.1.

Table 8.1. Alpaslan II Dam and HEPP Relocation Roads Project Construction Schedule

ID	Task Mode	Task Name	Duration	Start
1		**ALPASLAN DAM & HEPP RELOCATION ROADS**	**1287 days**	**Thu 24.02.11**
2		Application design studies	745 days	Thu 24.02.11
3		Tender process	60 days	Thu 02.01.14
4		Expropriation process	200 days	Thu 02.01.14
5		Construction of the road	450 days	Mon 12.05.14



Project: RELOCATION ROADS SCH
Date: Fri 15.11.13

Task	External Milestone	Manual Summary Rollup	
Split	Inactive Task	Manual Summary	
Milestone	Inactive Milestone	Start-only	
Summary	Inactive Summary	Finish-only	
Project Summary	Manual Task	Deadline	
External Tasks	Duration-only	Progress	

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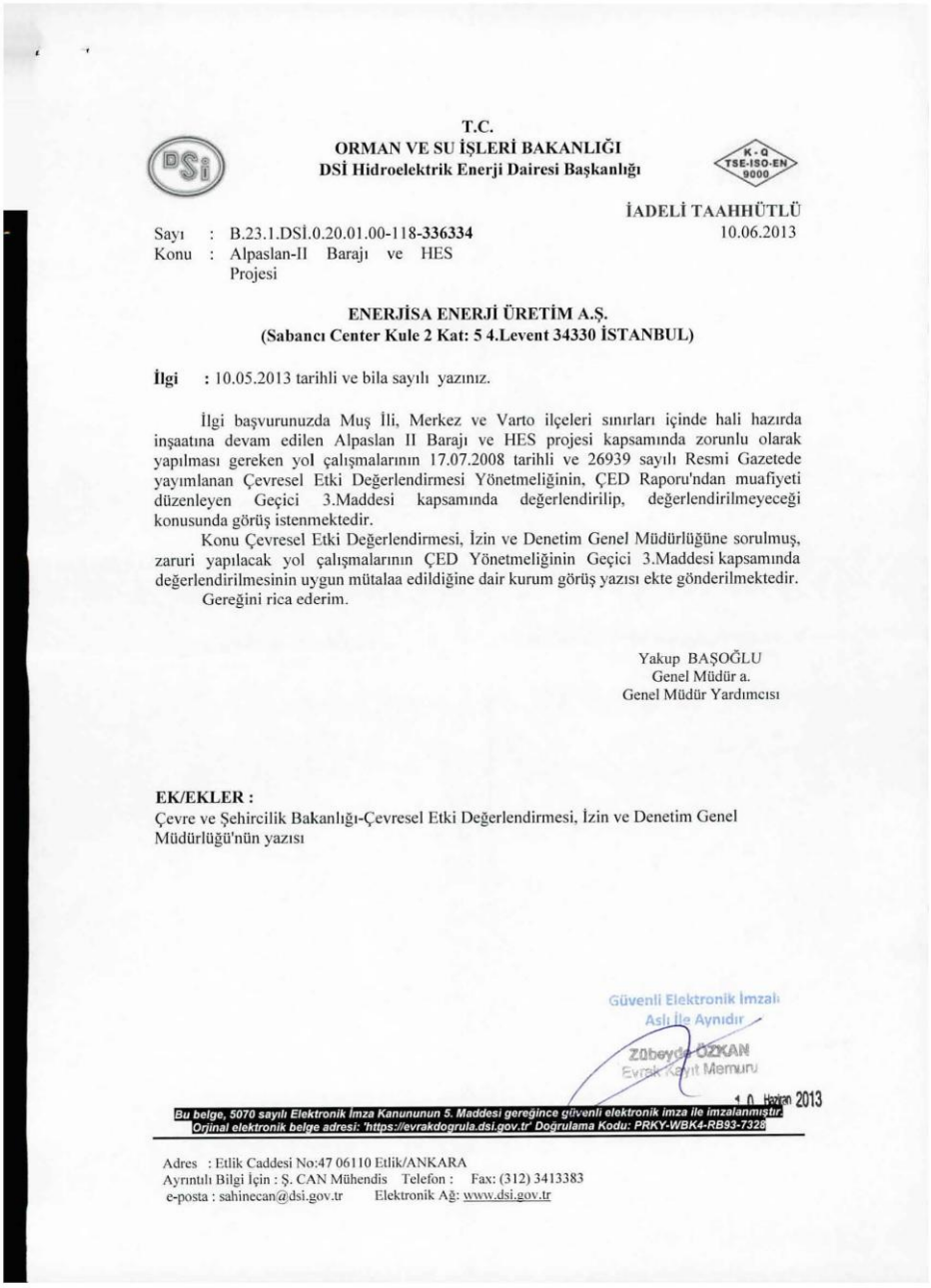
www.mus.meb.gov.tr

APPENDICES

Appendix-A
Official Letters

28.05.2013 Dated Official Letter of Ministry of Environment and Urbanization, Environmental Impact Assessment, General Directorate of EIA Permit and Auditing



T.C.
ORMAN VE SU İŞLERİ BAKANLIĞI
DSİ Hidroelektrik Enerji Dairesi Başkanlığı

İADELİ TAAHHÜTLÜ

Sayı : B.23.1.DSİ.0.20.01.00-118-**336334** 10.06.2013
Konu : Alpaslan-II Barajı ve HES Projesi

ENERJİSA ENERJİ ÜRETİM A.Ş.
(Sabancı Center Kule 2 Kat: 5 4.Levent 34330 İSTANBUL)

İlgi : 10.05.2013 tarihli ve bila sayılı yazınız.

İlgi başvurunuzda Muş İli, Merkez ve Varto ilçeleri sınırları içinde hali hazırda inşaatına devam edilen Alpaslan II Barajı ve HES projesi kapsamında zorunlu olarak yapılması gereken yol çalışmalarının 17.07.2008 tarihli ve 26939 sayılı Resmi Gazetede yayımlanan Çevresel Etki Değerlendirmesi Yönetmeliğinin, ÇED Raporu'ndan muafiyeti düzenleyen Geçici 3.Maddesi kapsamında değerlendirilip, değerlendirilmeyeceği konusunda görüş istenmektedir.

Konu Çevresel Etki Değerlendirmesi, İzin ve Denetim Genel Müdürlüğüne sorulmuş, zaruri yapılacak yol çalışmalarının ÇED Yönetmeliğinin Geçici 3.Maddesi kapsamında değerlendirilmesinin uygun mütalaa edildiğine dair kurum görüş yazısı ekte gönderilmektedir.

Gereğini rica ederim.

Yakup BAŞOĞLU
Genel Müdür a.
Genel Müdür Yardımcısı

EK/EKLER :
Çevre ve Şehircilik Bakanlığı-Çevresel Etki Değerlendirmesi, İzin ve Denetim Genel Müdürlüğü'nün yazısı

Güvenli Elektronik İmzalı
Aslı İle Aynıdır
Zübeyde ÖZKAN
Evrak Kayıt Memuru
10 Haziran 2013

Bu belge, 5070 sayılı Elektronik İmza Kanununun 5. Maddesi gereğince güvenli elektronik imza ile imzalanmıştır.
Orjinal elektronik belge adresi: 'https://evrakdogrula.dsi.gov.tr' Doğrulama Kodu: PRKY-WBK4-RB93-7328

Adres : Etlik Caddesi No:47 06110 Etlik/ANKARA
Ayrıntılı Bilgi İçin : Ş. CAN Mühendis Telefon : Fax: (312) 3413383
e-posta : sahinecan@dsi.gov.tr Elektronik Ağ: www.dsi.gov.tr

28.05.2013 Dated Official Letter of Ministry of Environment and Urbanization, Environmental Impact Assessment, General Directorate of EIA Permit and Auditing (Cont.)

T.C.
ÇEVRE VE ŞEHİRCİLİK BAKANLIĞI
Çevresel Etki Değerlendirmesi, İzin ve Denetim Genel Müdürlüğü

Sayı : 48331039.220.01/8803 28/05/2013
Konu: Alparslan-II Barajı ve HES Projesi.

ORMAN VE SU İŞLERİ BAKANLIĞINA
(DSİ Genel Müdürlüğü)

İlgi: 15.05.2013 tarih ve B.23.1.DSİ.0.20.01.00-118-278535-4238 sayılı yazınız.

İlgi yazınız ile, Muş İli, Merkez ve Varto İlçeleri sınırları içinde, Alparslan-II Enerji Üretim ve Madencilik Sanayi Ticaret A.Ş. tarafından yapılması planlanan "Alparslan-II Barajı ve HES (288.66 MWm / 280 MWe)" projesi kapsamında zorunlu olarak yapılması gereken yol çalışmalarının, ÇED Yönetmeliği'nin Geçici 3.Maddesi kapsamında değerlendirilip değerlendirilemeyeceği hususunda görüşümüz talep edilmektedir.

"Alparslan-II Barajı ve HES" projesi hakkında ÇED Yönetmeliğinin 14. maddesi gereğince Bakanlığımızca "Çevresel Etki Değerlendirmesi Olumlu" kararı verilmiş olup, söz konusu karar 15.08.2012 tarih ve 13937 sayılı yazımız ile tarafınıza iletilmişti.

"Alparslan-II Barajı ve HES" projesinin 07.02.1993 tarihinden önce yatırım programına alınmış olması nedeniyle , söz konusu proje kapsamında yapılacak olan zaruri yol çalışmalarının ÇED Yönetmeliği'nin Geçici 3.Maddesi kapsamında değerlendirilmesi uygun mütaala edilmekte olup, ÇED Yönetmeliği hükümlerinin uygulanmasına gerek bulunmamaktadır.

Nihai ÇED Raporu ve eklerinde belirtilen hususlar ile 2872 sayılı Çevre Kanununa istinaden yürürlüğe giren yönetmeliklerin ilgili hükümlerine uyulması, mer'i mevzuat uyarınca ilgili kurum/kuruluşlardan gerekli izinlerin alınması ve proje kapsamında herhangi bir değişiklik olması durumunda ÇED Yönetmeliği gereğince Bakanlığımıza ve/veya ilgili Valiliğe başvuru yapılması hususunda bilgilerinizi ve gereğini arz ederim.

Dr. R.Çağatay DİKMEN
Bakan a.
Genel Müdür V.

Adres : Vekaletler Cad. No:1 Bakanlıklar/ ANKARA Ayrıntılı Bilgi : Kenan OCAK Çevre Müh.Tel:0312-410 17 62
Faks:0312-4192192 e-posta : kenan.ocak@csb.gov.tr Elektronik Ağ: www.csb.gov.tr

Appendix-B
Flora and Fauna Species List

Legend for Flora nad Fauna Tables

UCN (International Union for Conservation of Nature) Red List of Threatened Species (IUCN 2012. *IUCN Red List of Threatened Species. Version 2012.2*. <http://www.iucnredlist.org>. Downloaded October 17, 2012)	
EX: Extinct	**EX:** Extinct
EW: Extinct in the wild	**EW:** Extinct in the Wild
CR: Critically endangered	**CR:** Critically Endangered
EN: Endangered	**EN:** Endangered
VU: Vulnerable	**VU:** Vulnerable
LR: Lower risk	
cd: conservation dependent	**NT:** Near Threatened
nt: near threatened	**LC:** Least Concern
lc: least concern	
DD: Data deficient	**DD:** Data Deficient
NE: Not evaluated	**NE:** Not Evaluated
EX: Extinct	**EX:** Extinct
BERN Convention	
Annex I: Strictly Protected Flora Species	
Annex II: Strictly Protected Fauna Species	
Annex III: Protected Fauna Species	
CITES (Convention on International Trade in Endangered Species)	
Appendix I: Species threatened with extinction. Trade in specimens of these species is permitted only in exceptional	
Appendix II: Species not necessarily threatened with extinction, but their trade must be controlled to avoid utilization incompatible with their survival.	
Appendix III: Species protected in at least one country, and their trading is under control by CITES.	
NATIONAL HUNTING STATUS (According to Central Hunting Commission, 2013-2014) (for fauna species)	
Appendix I: Wildlife species which are protected by Ministry of Environment and Forestry	
Appendix II: Game animals which are protected by Central Hunting Commission	
Appendix III: Game animals which are allowed to be hunted in predefined seasons by Central Hunting Commission	
Turkish Red Data Book of Turkish Plants (TRDB; Ekim et al., 2000) (for flora species) **Based on IUCN Red List Categories and Criteria 1994 (ver. 2.3)**	
EX: Extinct	
EW: Extinct in the wild	
CR: Critically endangered	
EN: Endangered	
VU: Vulnerable	
NT: near threatened	
LC: least concern	
DD: Data deficient	
NE: Not evaluated	
ENDEMISM (for flora and fauna species)	
R: Regional	
WY: Widespread	
Source of Data	
O: Observation	
L: Literature	
A: Public survey , interviews and questionnaires r	
H: Habitat suitability	

Legend for Flora nad Fauna Tables (Cont.)

NATIONAL THREAT CATEGORIES *(for bird species)* *(Kiziroğlu,İ., 2009. The Pocket Book for Birds of Türkiye, ISBN: 975-7460-01-X, Ankamat Matbaası, Ankara, 564 s.)*
A.1.2.: (CR) Critically endangered and breeding species in Turkey
A.2.: (EN) Endangered and breeding species in Turkey
A.3.: (VU) Vulnerable and breeding species in Turkey
A.3.1.: (D) Declining, vulnerable and breeding species in Turkey
A.4.: (NT) Near threatened. Breeding species do not face to risk now but are likely to qualify for threatened category in the
A.5.: (LC) Least Concern. Breeding species that are widespread in Turkey
A.6.: (DD) Data Defficient. Breeding species on which there is deficient information in Turkey
A.7.: (NE) Not Evaluated. Breeding species which have not been evaluated in Turkey
B.1.2.: **(CR)** Critically endangered and non-breeding species in Turkey
B.2.: (EN) Endangered and non-breeding species in Turkey
B.3.: (VU) Vulnerable and non-breeding species in Turkey
B.3.1.: (D) Declining, vulnerable and non-breeding species in Turkey
B.4.: (NT) Near threatened, non-breeding species do not face to risk now but are likely to qualify for threatened category in
B.5.: (LC) Least Concern, non-breeding species that are widespread in Turkey
B.6.: (DD) Data Defficient, non-breeding species on which there is deficient information in Turkey
B.7.: (NE) Not Evaluated, non-breeding species which have not been evaluated in Turkey
STATUS FOR TURKEY (for bird species) *(Kiziroğlu, İ., 2009. The Pocket Book for Birds of Türkiye, ISBN: 975-7460-01-X, Ankamat Matbbası, Ankara, 564 s.)*
W: Wintering species-birds, wintering regularly
M : Migrationg species-birds migrating regularly and seasonally between breeding and wintering areas
R : Native and breeding species-year birds-breeds regularly
T : Migrationg species-birds migrating as transit and they can be observed in a short time at the migration seasons
V : Vagrant, they can observed as accidentally or randomly r
RELATIVE ABUNDANCE (gözleme dayalı) (flora ve fauna türleri için)
1: Very rare
2: Rare
3: Moderate
4: Abundant
5: Very abundant
HABITAT (for flora species)
1: Steppe
2: Riparian, humid areas
3: Oak forest
4: Agricultural land
HABITAT (for fauna species)
1: Steppe
2: Humid Areas
3: Coppice and oak forest
4. Agricultural land
5. Stony-rocky
6. Settlements

Table B.1. List of Flora Species Identified on the Study Area

FAMILY	NO	TAXON	PHYTOGEOG. REGION	ENDEMISM		INTERNATIONAL THREAT CATEGORIES			NATIONAL THREAT CATEGORIES	HABITAT				RELATIVE ABUNDANCE				
				R	W	IUCN	BERN	CITES	TRDB	1	2	3	4	1	2	3	4	5
RANUNCULACEAE	1	*Consolida orientalis* (Gay) Schröd.	Widespread	-	-	-	-	-	-	x				x				
	2	*Nigella segetalis* Bieb.	Widespread	-	-	-	-	-	-	x				x				
	3	*Thalictrum flavum* L.	Euro-Siberian	-	-	-	-	-	-		x			x				
	4	*Ceratocephalus falcatus* (L.) Pers.	Widespread	-	-	-	-	-	-	x					x			
PAPAVERACEAE	5	*Glaucium grandiflorum* Boiss. & Huet. Var. *grandiflorum*	Widespread	-	-	-	-	-	-	x					x			
	6	*Papaver rhoeas* L.	Widespread	-	-	-	-	-	-	x					x			
	7	*Fumaria vaillantii* Lois.	Widespread	-	-	-	-	-	-	x				x				
CRUCIFERAE	8	*Descurainia sophia* (L.)	Widespread	-	-	-	-	-	-		x				x			
	9	*Hirschfeldia incana* (L.) Lag.-Foss.	Widespread	-	-	-	-	-	-	x					x			
	10	*Alyssum desertorum* Stapf. Var. *desertorum*	Widespread	-	-	-	-	-	-	x				x				
	11	*Alyssum filiforme* Nyar	Widespread	-	x	-	-	-	LC	x				x				
	12	*Camelina rumelica* Vel.	Widespread	-	-	-	-	-	-	x				x				
	13	*Isatis glauca* Aucher ex Boiss. Subsp. *glauca*	Iran-Turan	-	-	-	-	-	-	x				x				
	14	*Leontice leontopetalum* L. subsp. *ewersmannii* (Bunge) Coode	Widespread	-	-	-	-	-	-			x		x				
	15	*Chorispora tenella* (Pall.) DC.	Widespread	-	-	-	-	-	-				x	x				
	16	*Crambe orientalis* L. var. *orientalis*	Iran-Turan	-	-	-	-	-	-	x				x				
	17	*Helianthemum salicifolium* (L.) Miller	Widespread	-	-	-	-	-	-	x				x				
	18	*Cardaria draba* (L.) Desv. Subsp. *draba*	Widespread	-	-	-	-	-	-		x				x			
	19	*Eruca sativa* Miller	Widespread	-	-	-	-	-	-			x			x			
	20	*Bunias erocago* L.	Widespread	-	-	-	-	-	-			x		x				
	21	*Thlaspi perfolatum* L.	Widespread	-	-	-	-	-	-			x		x				
	22	*Capsella bursa-pastoris* (L.) Medik.	Widespread	-	-	-	-	-	-			x			x			
	23	*Sisymbrium officinale* (L.) Scop.	Widespread	-	-	-	-	-	-			x			x			
RESEDACEAE	24	*Reseda lutea* L. var. *lutea*	Widespread	-	-	-	-	-	-			x			x			
CARYOPHYLLACEAE	25	*Minuartia hamata* (Hausskn.) Mattf.	Widespread	-	-	-	-	-	-			x		x				
	26	*Bufonia calyculata* Boiss. & Bal.	Widespread	-	x	-	-	-	LC	x				x				
	27	*Cerastium dichotomum* L. subsp. *dichotomum*	Widespread	-	-	-	-	-	-	x				x				
	28	*Dianthus cyri* Fisch. & Mey.	Iran-Turan	-	-	-	-	-	-	x				x				
	29	*Holosteum umbellatum* L. var. *umbellatum*	Widespread	-	-	-	-	-	-	x					x			
	30	*Velezia rigida* L.	Widespread	-	-	-	-	-	-	x					x			
	31	*Silene vulgaris (Moenc) Garcke var. vulgaris*	Widespread	-	-	-	-	-	-	x					x			
ILLECEBRACEAE	32	*Herniaria incana* Lam.	Widespread	-	-	-	-	-	-	x				x				
POLYGONACEAE	33	*Polygonum cognatum* Meissn.	Widespread	-	-	-	-	-	-	x					x			
	34	*Polygonum arenastrum* Bor.	Widespread	-	-	-	-	-	-			x		x				
	35	*Polygonum pulchellum* Lois.	Widespread	-	-	-	-	-	-			x		x				
	36	*Rumex scutatus* L.	Widespread	-	-	-	-	-	-	x					x			
AMARANTHACEAE	37	*Amaranthus albus* L.	Widespread	-	-	-	-	-	-		x				x			
GUTTIFERAE	38	*Hypericum triquetrifolium* Turra	Mediterranean	-	-	-	-	-	-			x			x			
	39	*Hypericum perforatum* L.	Widespread	-	-	-	-	-	-			x		x				
GERANIACEAE	40	*Erodium cicutarium* (L.) L. Herit subsp. *cicutarium*	Widespread	-	-	-	-	-	-			x		x				
MALVACEAE	41	*Malva neglecta* Wallr.	Widespread	-	-	-	-	-	-				x	x				
	42	*Althea officinalis* L.	Widespread	-	-	-	-	-	-	x				x				
	43	*Alcea hohenackeri* (Boiss.& Huet) Boiss.	Widespread	-	-	-	-	-	-	x				x				
CHENOPODIACEAE	44	*Chenopodium foliosum* (Moench) Aschers	Widespread	-	-	-	-	-	-				x	x				

Table B.1. List of Flora Species Identified on the Study Area (Continued)

FAMILY	NO	TAXON	PHYTOGEOG. REGION	ENDEMISM		INTERNATIONAL THREAT CATEGORIES			NATIONAL THREAT CATEGORIES	HABITAT				RELATIVE ABUNDANCE				
				R	W	IUCN	BERN	CITES	TRDB	1	2	3	4	1	2	3	4	5
	45	*Salsola ruthenica* Iljin	Widespread	-	-	-	-	-	-				x		x			
	46	*Noaea mucronata* (Forssk.) Aschers. Schweinf. Subsp. *tournefortii* (Spach) Aellen	Widespread	-	-	-	-	-	-	x					x			
LEGUMINOSAE	47	*Astragalus angustifolius* C. Koch subsp. *angustifolius*	Iran-Turan	-	-	-	-	-	-	x				x				
	48	*Astragalus amblolepis* Fischer	Iran-Turan	-	-	-	-	-	-	x					x			
	49	*Astragalus eriocephalus* Willd. Subsp. *elongatus* Chamb. & Matthews	Iran-Turan	-	x	-	-	-	LC	x					x			
	50	*Astragalus gummifer* Lab.	Iran-Turan	-	-	-	-	-	-	x					x			
	51	*Astragalus oleifolius* DC.	Iran-Turan	-	-	-	-	-	-	x					x			
	52	*Coronilla orientalis* Miller var. *orientalis*	Widespread	-	-	-	-	-	-	x					x			
	53	*Glycyrrhiza glabra* L. var. *glandufera* (Waldst. & Kit.) Boiss.	Widespread	-	-	-	-	-	-		x				x			
	54	*Lotus corniculatus* L. var. *corniculatus*	Widespread	-	-	-	-	-	-		x				x			
	55	*Ononis spinosa* L. Subsp. *leiosperma* (Boiss.) Sirj.	Widespread	-	-	-	-	-	-	x					x			
	56	*Trigonella monantha* C.A. Meyer subsp. *Monantha*	Iran-Turan	-	-	-	-	-	-	x				x				
	57	*Vicia cracca* L. subsp. *stenophylla* Vel.	Widespread	-	-	-	-	-	-	x				x				
	58	*Vicia seriocarpa* Fenzl var. *seriocarpa*	Widespread	-	-	-	-	-	-	x				x				
	59	*Trifolium campestre* Schreb.	Widespread	-	-	-	-	-	-	x					x			
	60	*Trifolium arvense* L. subsp. *arvense*	Widespread	-	-	-	-	-	-	x					x			
	61	*Trifolium diffusum* Ehrh.	Widespread	-	-	-	-	-	-	x					x			
	62	*Medicago lupulina* L.	Widespread	-	-	-	-	-	-	x					x			
	63	*Medicago x varia* Martyn	Widespread	-	-	-	-	-	-	x					x			
	64	*Melilotus officinalis* (L.) Desr.	Widespread	-	-	-	-	-	-		x				x			
	65	*Medicago rigidula* (L.) All. Var. *rigidula*	Widespread	-	-	-	-	-	-	x					x			
ROSACEAE	66	*Cerasus brachypetala* Boiss. Var. *bornmuelleri* (Schneider) Browicz	Iran-Turan	-	-	-	-	-	-	x				x				
	67	*Crataegus pseudoheterophylla* Pojark.	Iran-Turan	-	-	-	-	-	-	x				x				
	68	*Potentilla recta* L.	Widespread	-	-	-	-	-	-	x					x			
	69	*Pyrus elaeagnifolia* Pallas subsp. *kotschyana* (Boiss.) Browicz	Widespread	-	-	-	-	-	-	x				x				
	70	*Rosa canina* L.	Widespread	-	-	-	-	-	-	x				x				
	71	*Rosa hemispherica* J. Herm	Iran-Turan	-	-	-	-	-	-	x				x				
	72	*Sanguisorba minor Scop. Subsp. muricata (Spach)Brig*	Widespread	-	-	-	-	-	-	x				x				
LYTHRACEAE	73	*Lythrum salicaria* L.	Euro-Siberian	-	-	-	-	-	-		x			x				
ONAGRACEAE	74	*Epilobium angustifolium* L.	Widespread	-	-	-	-	-	-		x			x				
	75	*Epilobium parviflorum* Schreber	Widespread	-	-	-	-	-	-		x			x				
UMBELLIFERAE	76	*Bupleurum croecum* Fenzl.	Iran-Turan	-	-	-	-	-	-	x					x			
	77	*Scandix iberica* Bieb.	Widespread	-	-	-	-	-	-	x				x				
	78	*Eryngium campestre* L. var. *campestre*	Widespread	-	-	-	-	-	-	x						x		
	79	*Falcaria vulgaris* Bernh.	Widespread	-	-	-	-	-	-	x					x			
	80	*Ferula huber-morathii* Peşmen	Iran-Turan	x	-	-	-	-	EN	x					x			
	81	*Ferula rigidula* DC.	Iran-Turan	-	-	-	-	-	-	x					x			
	82	*Daucus carota* L.	Widespread	-	-	-	-	-	-	x				x				
	83	*Turgenia latifolia* (L.) Hoffm.	Widespread	-	-	-	-	-	-	x				x				
DIPSACACEAE	84	*Scabiosa argentea* L.	Widespread	-	-	-	-	-	-	x					x			
	85	*Cephalaria syriaca* (L.) Schrader	Widespread	-	-	-	-	-	-	x				x				
	86	*Cephalaria speciosa* Boiss. & Kotschy	Iran-Turan	-	x	-	-	-	LC	x					x			
COMPOSITAE	87	*Bellis perennis L.*	Widespread	-	-	-	-	-	-	x				x				
	88	*Senecio vernalis* Waldst. et Kit	Widespread	-	-	-	-	-	-				x	x				

Table B.1. List of Flora Species Identified on the Study Area (Continued)

FAMILY	NO	TAXON	PHYTOGEOG. REGION	ENDEMISM		INTERNATIONAL THREAT CATEGORIES			NATIONAL THREAT CATEGORIES	HABITAT				RELATIVE ABUNDANCE				
				R	W	IUCN	BERN	CITES	TRDB	1	2	3	4	1	2	3	4	5
	89	*Achillea biebersteinii* Afan	Widespread	-	-	-	-	-	-				x	x				
	90	*Achillea vermicularis* Trin	Widespread	-	-	-	-	-	-	x				x				
	91	*Achillea teretifolia* Willd.	Iran-Turan	-	x	-	-	-	LC	x				x				
	92	*Artemisia austriaca* Jacq.	Widespread	-	-	-	-	-	-	x				x				
	93	*Artemisia campestris* L.	Widespread	-	-	-	-	-	-		x			x				
	94	*Centaure iberica* Trev. Ex Sprengel	Widespread	-	-	-	-	-	-	x				x				
	95	*Centaurea fenzlii* Reichardt	Iran-Turan	x	-	-	-	-	VU	x				x				
	96	*Centaurea behen* L.	Iran-Turan	-	-	-	-	-	-	x				x				
	97	*Centaurea solstitialis* L. subsp. *solstitialis*	Widespread	-	-	-	-	-	-	x					x			
	98	*Centaurea virgata* Lam.	Widespread	-	-	-	-	-	-	x					x			
	99	*Crupina vulgaris* Cass.	Widespread	-	-	-	-	-	-	x					x			
	100	*Cnicus benedictus* L.	Widespread	-	-	-	-	-	-				x		x			
	101	*Cichorium intybus* L.	Widespread	-	-	-	-	-	-				x		x			
	102	*Scariola viminea* (L.) F.W. Schmidt	Widespread	-	-	-	-	-	-	x					x			
	103	*Anthemis tinctoria* L	Widespread	-	-	-	-	-	-	x					x			
	104	*Anthemis wiedemanniana* Fisch. & Mey.	Widespread	-	x	-	-	-	LC	x				x				
	105	*Onopordum acanthium* L.	Widespread	-	-	-	-	-	-	x				x				
	106	*Picnomon acarna* (L.) Cass.	Mediterranean	-	-	-	-	-	-	x					x			
	107	*Carduus pycnocephalus* L.	Widespread	-	-	-	-	-	-	x					x			
	108	*Carduus nutans* L. sensu lato	Widespread	-	-	-	-	-	-	x					x			
	109	*Cirsium elodes* Bieb.	Widespread	-	-	-	-	-	-		x				x			
	110	*Cirsium haussknechtii* Boiss.	Iran-Turan	-	-	-	-	-	-	x					x			
	111	*Cirsium lappaceum* (Bieb.) Fischer subsp. *anatolicum Petrak*	Widespread	-	-	-	-	-	-	x					x			
	112	*Cirsium yildizianum* Arabacı & Dirmenci	Iran-Turan	x	-	-	-	-	EN	x					x			
	113	*Cousinia canascens* DC.	Iran-Turan	-	-	-	-	-	-	x				x				
	114	*Chondrilla juncea* L . var. *juncea*	Widespread	-	-	-	-	-	-	x					x			
	115	*Lactuca serriola* L.	Widespread	-	-	-	-	-	-	x					x			
	116	*Crepis sancta* (L.) Babcock	Widespread	-	-	-	-	-	-	x					x			
	117	*Crepis pulchra* L. var. *pulchra*	Widespread	-	-	-	-	-	-				x		x			
	118	*Crepis foetida* L. subsp. *commutata* (Spreng.) Babcock	Widespread	-	-	-	-	-	-	x					x			
	119	*Echinops pungens* Trautv. var. *pungens*	Widespread	-	-	-	-	-	-	x					x			
	120	*Gundelia tournefortii* L. var. *tournefortii*	Widespread	-	-	-	-	-	-	x					x			
	121	*Helichrysum plicatum* DC. Subsp. *plicatum*	Widespread	-	-	-	-	-	-	x					x			
	122	*Picris strigosa* Bieb. Subsp. *strigosa*	Widespread	-	-	-	-	-	-	x					x			
	123	*Xanthium spinosum* L.	Widespread	-	-	-	-	-	-		x			x				
	124	*Xanthium strumarium* L. subsp. *strumarium*	Widespread	-	-	-	-	-	-		x				x			
	125	*Xerathemum longipapposum* Fisch. & Mey.	Widespread	-	-	-	-	-	-	x					x			
	126	*Xeranthemum annuum* L.	Widespread	-	-	-	-	-	-	x					x			
CAMPANULACEAE	127	*Asyneuma virgatum* (Labill.) Bornm. Subsp. *virgatum*	Widespread	-	-	-	-	-	-	x					x			
PRIMULACEAE	128	*Androsace maxima* L.	Widespread	-	-	-	-	-	-	x					x			
ASCLEPIADACEAE	129	*Vincetoxicum tmoleum* Boiss.	Iran-Turan	-	-	-	-	-	-	x				x				
BORAGINACEAE	130	*Echium italicum L.*	Mediterranean	-	-	-	-	-	-	x					x			
	131	*Buglossoides arvensis* (L.) Johnston	Widespread	-	-	-	-	-	-	x					x			
	132	*Cerinthe minor* L. var. *auriculata* (Ten.) Domac	Widespread	-	-	-	-	-	-	x					x			

Table B.1. List of Flora Species Identified on the Study Area (Continued)

FAMILY	NO	TAXON	PHYTOGEOG. REGION	ENDEMISM		INTERNATIONAL THREAT CATEGORIES			NATIONAL THREAT CATEGORIES	HABITAT				RELATIVE ABUNDANCE				
				R	W	IUCN	BERN	CITES	TRDB	1	2	3	4	1	2	3	4	5
	133	*Anchusa strigosa* Labill.	Widespread	-	-	-	-	-	-	x				x				
	134	*Anchusa leptophylla* Roemer & Schultes subsp. *incana* (Ledeb.) Chaub.	Widespread	-	-	-	-	-	-	x					x			
	135	*Heliotropium europaeum* L.	Widespread	-	-	-	-	-	-	x				x				
	136	*Heliotropium ellipticum* Ledeb.	Widespread	-	-	-	-	-	-	x				x				
	137	*Onosma dicroıonthum* Boiss.	Iran-Turan	-	-	-	-	-	-	x				x				
	138	*Rochelia disperma* (L.fil) C. Koch var. *disperma*	Widespread	-	-	-	-	-	-	x				x				
SCROPHULARIACEAE	139	*Verbascum macrosephalum* Boiss. & Kotschy ex murb.	Iran-Turan	x	-	-	-	-	VU	x				x				
	140	*Verbascum cheiranthifolium* Boiss. Var. *cheriranthifolium*	Widespread	-	-	-	-	-	-	x				x				
	141	*Veronica gentianoides* Vahl.	Euro-Siberian	-	-	-	-	-	-		x			x				
	142	*Lagotis stolonifera* (C.Koch) Maxim.	Widespread	-	-	-	-	-	-	x				x				
	143	*Parentucellia latifolia* (L.) Caruel *subsp. latifolia*	Mediterranean	-	-	-	-	-	-	x					x			
CONVOLVULACEAE	144	*Convolvulus arvensis L.*	Widespread	-	-	-	-	-	-	x					x			
	145	*Convolvulus betonicifolius* Miller subsp. *betonicifoılius*	Widespread	-	-	-	-	-	-	x				x				
OROBANCHACEAE	146	*Orobanche alba* Stephan	Widespread	-	-	-	-	-	-	x				x				
GLOBULARIACEAE	147	*Globularia trichosantha* Fisch. & Mey.	Widespread	-	-	-	-	-	-						x			
LABIATAE	148	*Acinos rotundifolius* Pers.	Widespread	-	-	-	-	-	-	x					x			
	149	*Marrubium parviflorum* Fisch. & Mey subsp. *oligodon* (Boiss.) Seyboıld	Widespread	-	-	-	-	-	-	x					x			
	150	*Phlomis capitata* Boiss.	Iran-Turan	-	x	-	-	-	LC	x					x			
	151	*Phlomis rigida* Labill.	Iran-Turan	-	-	-	-	-	-	x					x			
	152	*Salvia multicaulis* Vahl.	Iran-Turan	-	-	-	-	-	-	x					x			
	153	*Salvia virgata* Jacq.	Widespread	-	-	-	-	-	-	x					x			
	154	*Sideritis montana* L. subsp. *montana*	Mediterranean	-	-	-	-	-	-	x					x			
	155	*Teucrium chamaedrys* L. subsp. *syspirense (C.Koch) Rech.fil.*	Iran-Turan	-	-	-	-	-	-	x					x			
	156	*Teucrium orientale* L. var. *orientale*	Iran-Turan	-	-	-	-	-	-	x					x			
	157	*Teucrium polium L.*	Widespread	-	-	-	-	-	-	x					x			
	158	*Thymus fallax* Fisch. & Mey.	Iran-Turan	-	-	-	-	-	-	x					x			
	159	*Ziziphora capitata* L.	Iran-Turan	-	-	-	-	-	-	x					x			
	160	*Lamium amplexicaule* L.	Iran-Turan	-	-	-	-	-	-				x		x			
	161	*Prunella laciniata* (L.) L.	Euro-Siberian	-	-	-	-	-	-		x			x				
	162	*Stachys annua* (L.) subsp. *annua* var. *annua*	Widespread	-	-	-	-	-	-	x				x				
PLUMBAGINACEAE	163	*Plumbago europaea* L.	Euro-Siberian	-	-	-	-	-	-	x				x				
PLANTAGINACEAE	164	*Plantago lanceolata* L.	Widespread	-	-	-	-	-	-		x				x			
THYMELAEACEAE	165	*Thymelaea passerina* (L.) Cosson & Germ.	Widespread	-	-	-	-	-	-	x				x				
FAGACEAE	166	*Quercus robur* L. subsp. *pedunculiflora* (C.Koch) Menitsky	Iran-Turan	-	-	-	-	-	-			x			x			
EUPHORBIACEAE	167	*Euphorbia herniariifolia* Willd. Var. *herniariifolia*	Widespread	-	-	-	-	-	-	x					x			
	168	*Euphorbia macroclada Boiss.*	Widespread	-	-	-	-	-	-	x					x			
	169	*Euphorbia virgata* Waldst. & Kit.	Widespread	-	-	-	-	-	-	x					x			
URTICACEAE	170	*Urtica dioica* L.	Widespread	-	-	-	-	-	-		x				x			
ULMACEAE	171	*Celtis tournefortii* Lam.	Widespread	-	-	-	-	-	-		x			x				
RUBIACEAE	172	*Cruciata taurica* (Pallas ex Willd.) Ehrend.	Iran-Turan	-	-	-	-	-	-	x					x			
	173	*Asperula stricta* Boiss. Subsp. *libanotica* (Boiss.) Ehrend.	Iran-Turan	-	-	-	-	-	-	x					x			
LILIACEAE	174	*Asphodeline damascena* (Boiss.) Baker subsp. *damascena*	Iran-Turan	-	-	-	-	-	-	x					x			
	175	*Allium atroviolaceum* Boiss.	Widespread	-	-	-	-	-	-	x					x			
	176	*Alliumö kharputense* Freyn & Sint.	Iran-Turan	-	-	-	-	-	-	x					x			

Table B.1. List of Flora Species Identified on the Study Area (Continued)

FAMILY	NO	TAXON	PHYTOGEOG. REGION	ENDEMISM		INTERNATIONAL THREAT CATEGORIES			NATIONAL THREAT CATEGORIES	HABITAT				RELATIVE ABUNDANCE				
				R	W	IUCN	BERN	CITES	TRDB	1	2	3	4	1	2	3	4	5
	177	*Bellavalia pycnantha* (C.Koch) A. Los.-Los	Iran-Turan	-	-	-	-	-	-	x					x			
	178	*Colchicum kotschyi* Boiss.	Iran-Turan	-	-	-	-	-	-	x					x			
	179	*Gagea luteoides* Stapf	Widespread	-	-	-	-	-	-	x					x			
	180	*Muscari armeniacum* Leichtlin ex Baker	Widespread	-	-	-	-	-	-	x					x			
	181	*Muscari longipes* Boiss.	Widespread	-	-	-	-	-	-	x					x			
	182	*Ornithogalum oligophyllum* E.D.Clarke	Widespread	-	-	-	-	-	-	x					x			
	183	*Tulipa sintenisii* Baker	Iran-Turan	-	x	-	-	-	LC	x					x			
IRIDACEAE	184	*Crocus cancellatus* Herbert subsp. *damascenus (Herbert) Mathew*	Iran-Turan	-	-	-	-	-	-	x				x				
	185	*Gladiolus atroviolaceus* Boiss.	Iran-Turan	-	-	-	-	-	-	x					x			
GRAMINEAE	186	*Aegilops cylindrica* Host	Iran-Turan	-	-	-	-	-	-	x					x			
	187	*Bromus tectorum* L.	Widespread	-	-	-	-	-	-	x					x			
	188	*Bromus scoparius L*	Widespread	-	-	-	-	-	-	x					x			
	189	*Bromus japonicus* Thunb. subsp. *japonicus*	Widespread	-	-	-	-	-	-	x					x			
	190	*Bromus tomentellus* Boiss.	Iran-Turan	-	-	-	-	-	-	x					x			
	191	*Festuca valesiaca* Schleicher ex Gaudin	Widespread	-	-	-	-	-	-	x					x			
	192	*Cynodon dactylon* (L.) Pers.	Widespread	-	-	-	-	-	-	x					x			
	193	*Elymus hispidus* (Opiz) Melderis subsp. *barbulatus* (Schur) Melderis	Widespread	-	-	-	-	-	-	x					x			
	194	*Lolium perenne* L.	Euro-Siberian	-	-	-	-	-	-	x					x			
	195	*Koeleria cristata* (L.) Pers.	Widespread	-	-	-	-	-	-									
	196	*Stipa holosericea* Trin.	Iran-Turan	-	-	-	-	-	-	x					x			
	197	*Poa bulbosa* L.	Widespread	-	-	-	-	-	-	x					x			
	198	*Dactylis glomerata* L. subsp. *hispanica* (Roth) Nyman	Mediterranean	-	-	-	-	-	-	x					x			
	199	*Melica ciliata* L.subsp. *ciliata*	Widespread	-	-	-	-	-	-	x					x			
	200	*Hordeum bulbosum* L.	Widespread	-	-	-	-	-	-	x					x			
	201	*Echinaria capitata* (L.) Desf.	Widespread	-	-	-	-	-	-	x					x			
	202	*Taeniatherum caput-medusae* Nevsk subsp. *crinitum* (Schreber) Melderis	Mediterranean	-	-	-	-	-	-	x					x			

Table B.2. List of Amphibian and Reptile Species Identified on the Study Area

ORDO	FAMILY	NO	SPECIES	ENGLISH NAME	INTERNATIONAL THREAT CATEGORIES			NATIONAL THREAT CATEGORIES	ENDEMISM	GÖZLENDİĞİ ALAN			RELATIVE ABUNDANCE	HABITAT	DATA SOURCE
					IUCN	BERN	CITES	CHC 2013-2014		Within the Project Area	Within the Project Impact Area	Outside the Project Area			
CLASS: AMPHIBIA															
ANURA	Bufonidae	*1*	*Pseudepidalea viridis*	Green Toad	LC	ANN-2	-	-	-	+	+	+	3	2,4,6	O-L
	Ranidae	*2*	*Pelophylax ridibundus*	Eurasian Marsh frog	LC	ANN-3	-	-	-	+	+	+	5	2,4,6	O-L
CLASS: REPTILIA															
TESTUDINES	Tesdudinidae	*1*	*Testudo graeca*	Spur-thighed Tortoise	VU	ANN-2	-	APP-1	-	+	+	+	2	1,3,4,5,6	O-L
SQUAMATA	Gekkonidae	*2*	*Hemidactylus turcicus*	Turkish Gecko	LC	ANN-3	-	APP-1	-	+	+	+	2	6	O-L-A
	Lacertidae	*3*	*Lacerta trilineata*	Balkan green lizard	LC	ANN-2	-	APP-1	-	+	+	+	3	1,3,4,5	O-L
	Lacertidae	*4*	*Ophisops elegans*	Wester sanke-eyed lizard	LC	ANN-2	-	APP-1	-	+	+	+	4	1,3,4,5	O-L
	Scincidae	*5*	*Trachylepis aurata*	Levant skink	LC	ANN-3	-	APP-1	-	-	-	+	-	1,3,4,5	L
	Boidae	*6*	*Eryx jaculus*	Spurred snake	LC	ANN-3	-	APP-1	-	-	-	+	-	1,3,4,5	L
	Colubridae	*7*	*Dolichopis jugularis*	Black whip snake	LC	ANN-2	-	APP-1	-	-	-	+	-	1,3,4,5	L-A
	Colubridae	*8*	*Platyceps najadum*	Dahl's whip snake	LC	ANN-2	-	APP-1	-	-	-	+	-	1,3,4,5	L
	Colubridae	*9*	*Hemorrhois ravergieri*	Spotted whip snake	NE	ANN-3	-	APP-1	-	-	-	+	-	1,3,4,5	L
	Colubridae	*10*	*Dolichopis schmidti*	Schmidt's whip snake	LC	ANN-3	-	APP-1	-	-	-	+	-	1,3,4,5	L-A
	Colubridae	*11*	*Eirenis modestus*	Ring-headed dwarf snake	LC	ANN-3	-	APP-1	-	+	+	+	1	1,3,4,5	O-L
	Colubridae	*12*	*Elaphe quatuorlineata*	Four-lined Snake	LC	ANN-2	-	APP-1	-	-	-	+	-	1,3,4,5	L-A
	Viperidae	*13*	*Vipera labetina*	Great Viper	-	ANN-2	-	APP-1	-	-	-	+	-	1.5	L-A

Tablo B.3. List of Bird Species Identified on the Study Area

ORDO	FAMILY	NO	SPECIES	ENGLISH NAME	INTERNATIONAL THREAT CATEGORIES			NATIONAL THREAT CATEGORIES		MEVSİMSEL STATÜSÜ	ENDEMISM	GÖZLENDİĞİ ALAN			RELATIVE ABUNDANCE	HABITAT	DATA SOURCE
					IUCN	BERN	CITES	CHC 2013-2014	RDB 2009			Within the Project Area	Within the Project Impact Area	Outside the Project Area			
CICONIIFORMES	CICONIIDAE	1	*Ciconia ciconia*	White stork	LC	ANN-2		APP-1	A.3.1	G-Y	-	+	+	+	1	1,2,3,4,5,6	O
ACCIPITRIFORMES	ACCIPITRIDAE	2	*Milvus migrans*	Black kite	LC	ANN-3	APP-2	APP-1	A.3	Y	-	+	+	+	2	1,2,3,4,5	O
		3	*Circaetus gallicus*	Short-toed snake eagle	LC	ANN-3	APP-2	APP-1	A.4	Y	-	-	+	+	1	4	O
		4	*Circus cyaneus*	Northern harrier	LC	ANN-3	APP-2	APP-1	A.1.2	Y	-	+	+	+	1	4	O
		5	*Accipiter nisus*	Sparrowhawk	LC	ANN-3	APP-2	APP-1	A.3	Y	-	+	+	+	1	4	O
		6	*Buteo buteo*	Buzzard	LC	ANN-3	APP-2	APP-1	A.3	Y	-	+	+	+	1	1,2,3,4,5	O
		7	*Buteo rufinus*	Long-legged buzzard	LC	ANN-3	APP-2	APP-1	A.3	Y	-	+	+	+	3	1,2,3,4,5	O
FALCONIFORMES	FALCONIDAE	8	*Falco tinnunculus*	Common kestrel	LC	ANN-2	APP-2	APP-1	A.2	Y	-	+	+	+	1	1,2,3,4,5,6	O
GALLIFORMES	PHASIANIDAE	9	*Alectoris chukar*	Chukar partridge	LC	ANN-3		APP-3	A.2	Y	-	+	+	+	2	1.5	O
		10	*Perdix perdix*	Partridge	LC	ANN-3		APP-2	A.2	Y	-	-	+	+	1	1.5	L-A
		11	*Coturnix coturnix*	Quail	LC	ANN-3		APP-3	A.3	Y	-	-	+	+	1	1,4,5,	O
COLUMBIFORMES	COLUMBIDAE	12	*Columba livia*	Rock pigeon	LC	ANN-3		APP-3	A.5	Y	-	+	+	+	3	2	O
		13	*Streptopelia decaocto*	Collared dove	LC	ANN-3		APP-2	A.5	Y	-	+	+	+	1	3,4,6	O
		14	*Streptopelia turtur*	Turtle dove	LC	ANN-3		APP-3	A.3.1	G	-	-	+	+	1	3,4,5,6	O
STRIGIFORMES	STRIGIDAE	15	*Athene noctua*	Little owl	LC	ANN-2	APP-2	APP-1	A.2	Y	-	+	+	+	1	4.6	O
APODIFORMES	APODIDAE	16	*Apus apus*	Swift	LC	ANN-3		APP-1	A.3.1	G	-	+	+	+	3	1,2,3,4,5,6	O
CORACIIFORMES	MEROPİDAE	17	*Merops apiaster*	Bee-eater	LC	ANN-3		APP-1	A.3.1	G	-	+	+	+	3	1,2,3,4,5	O
	UPUPIDAE	18	*Upupa epops*	Hoope	LC	ANN-2		APP-1	A.2	G	-	+	+	+	2	1,2,3,4,5	O
PICIFORMES	PICIDAE	19	*Dendrocopus medius*	Middle-spotted woodpecker	LC	ANN-2		APP-1	A.1.2	Y	-	+	+	+	1	3	O
PASSERIFORMES	ALAUDIDAE	20	*Melanocorypha calandra*	Calandra lark	LC	ANN-2		APP-1	A.5	Y	-	+	+	+	1	4	O
		21	*Melanocorypha bimaculata*	Bimaculated lark	LC	ANN-2		APP-1	A.3	Y	-	+	+	+	1	4	O
		22	*Galerida cristata*	Crested lark	LC	ANN-3		APP-2	A.3	Y	-	+	+	+	3	1,2,3,4,5	O
	HIRUNDINIDAE	23	*Ptyonoprogne rupestris*	Crag martin	LC	ANN-2		APP-1	A.5	G	-	+	+	+	3	5	O
		24	*Hirundo rustica*	Barn swallow	LC	ANN-2		APP-1	A.5	G	-	+	+	+	3	1,2,3,4,5	O
		25	*Delichon urbicum*	House martin	LC	ANN-2		APP-1	A.3	G	-	+	+	+	2	2,4,6	O
	MOTACILLIDAE	26	*Anthus campestris*	Twany pipit	LC	ANN-2		APP-1	A.2	G	-	+	+	+	1	2.4	O
		27	*Anthus spinoletta*	Mountain pipit	LC	ANN-2		APP-1	A.3	Y	-	+	+	+	1	2.4	O
	TURDIDAE	28	*Erithacus rubecula*	Robin	LC	ANN-2		APP-1	A.3	Y	-	+	+	+	2	2,3,4,5,6	O
		29	*Phoenicurus ochruros*	Black redstart	LC	ANN-2		APP-1	A.2	Y	-	+	+	+	1	2,3,4,5	O
		30	*Phoenicurus phoenicurus*	Redstart	LC	ANN-2		APP-1	A.3	Y	-	+	+	+	1	2,3,4,5	O
		31	*Saxicola rubetra*	Whinchat	LC	ANN-2		APP-1	A.3	Y	-	+	+	+	1	2.4	O
		32	*Saxicola torquata*	Stonechat	LC	ANN-2		APP-1	A.3	Y	-	+	+	+	1	2.4	O
		33	*Oenanthe isabellina*	İsabelline wheather	LC	ANN-2		APP-1	A.3	Y	-	+	+	+	3	1,2,3,4,5	O
		34	*Oenanthe oenanthe*	Wheather	LC	ANN-3		APP-1	A.3	G	-	+	+	+	2	1,2,3,4,5	O
		35	*Turdus torquatus*	Ring ouzel	LC	ANN-2		APP-1	A.1.2	Y	-	+	+	+	1	3	O
		36	*Turdus merula*	Blackbird	LC	ANN-2		APP-3	A.3	Y	-	+	+	+	3	3	O
		37	*Turdus viscivorus*	Mistle thrush	LC	ANN-2		APP-2	A.2	Y	-	+	+	+	1	3	O
	MUSCICAPIDAE	38	*Muscicapa striata*	Spotted flycatcher	LC	ANN-2		APP-1	A.3	G	-	+	+	+	1	2.3	O
	PARIDAE	39	*Parus major*	Great tit	LC	ANN-2		APP-1	A.3.1	Y	-	+	+	+	2	2.3	O
	SITTIDAE	40	*Sitta europaea*	Wood nuthatch	LC	ANN-2		APP-1	A.3	Y	-	+	+	+	1	5	O
	LANIIDAE	41	*Lanius collurio*	Red-backed shrike	LC	ANN-3		APP-1	A.2	G	-	+	+	+	1	2,3,4	O

Tablo B.3. List of Bird Species Identified on the Study Area (Cont.)

ORDO	FAMILY	NO	SPECIES	ENGLISH NAME	INTERNATIONAL THREAT CATEGORIES			NATIONAL THREAT CATEGORIES		MEVSİMSEL STATÜSÜ	ENDEMISM	GÖZLENDİĞİ ALAN			RELATIVE ABUNDANCE	HABITAT	DATA SOURCE
					IUCN	BERN	CITES	CHC 2013-2014	RDB 2009			Within the Project Area	Within the Project Impact Area	Outside the Project Area			
		42	*Lanius excubitor*	Great gray shrike	LC	ANN-3		APP-1	A.1.2	G-K	-	+	+	+	1	2,3,4	O
	CORVIDAE	43	*Garrulus glandarius*	Jay	LC	-		APP-3	A.3.1	Y	-	+	+	+	3	3	O
		44	*Pica pica*	Magpie	LC	-		APP-3	A.5	Y	-	+	+	+	4	1,2,3,4,5,6	O
		45	*Corvus monedula*	Jackdaw	LC	-		APP-3	A.5	Y	-	+	+	+	4	1,2,3,4,5,6	O
		46	*Corvus frugilegus*	Rook	LC	-		APP-3	A.5	Y	-	+	+	+	5	1,2,3,4,5,6	O
		47	*Corvus corene*	Carrion crow	LC	-		APP-3	A.5	Y	-	+	+	+	4	1,2,3,4,5,6	O
		48	*Corvus corax*	Raven	LC	ANN-3		APP-2	A.5	Y	-	+	+	+	1	3.6	O
	PASSERIDAE	49	*Passer domesticus*	House sparrow	LC	-		APP-3	A.5	Y	-	+	+	+	4	1,2,3,4,5,6	O
		50	*Passer montanus*	Tree sparrow	LC	ANN-3		APP-2	A.3	Y	-	+	+	+	3	1,2,3,4,5,6	O
	FRINGILLIDAE	51	*Fringilla coelebs*	Caffinch	LC	ANN-3		APP-2	A.4	Y	-	+	+	+	3	2,3,4,5,6	O
		52	*Serinus pusillus*	Red-fronted serin	LC	ANN-2		APP-1	A.3	Y	-	+	+	+	1	2	O
		53	*Carduelis chloris*	Greenfinch	LC	ANN-2		APP-1	A.3	Y	-	+	+	+	1	3	O
		54	*Carduelis carduelis*	Goldfinch	LC	ANN-2		APP-1	A.3.1	Y	-	+	+	+	3	2,3,4,5,6	O
		55	*Carduelis spinus*	Siskin	LC	ANN-2		APP-1	A.3	Y	-	+	+	+	1	3	O
	EMBERIZIDAE	56	*Emberiza hortulana*	Ortolan bunting	LC	ANN-3		APP-2	A.3	G	-	+	+	+	1	1.5	O
		57	*Miliaria calandra*	Corn bunting	LC	ANN-3		APP-2	A.4	Y	-	+	+	+	2	2,3,4,5	O

Tablo B.4. List of Mammal Species Identified on the Study Area

ORDO	FAMILY	NO	SPECIES	ENGLISH NAME	INTERNATIONAL THREAT CATEGORIES			NATIONAL THREAT CATEGORIES	ENDEMISM	GÖZLENDİĞİ ALAN			RELATIVE ABUNDANCE	HABİIAT	DATA SOURCE
					IUCN	BERN	CITES	CHC 2013-2014		Within the Project Area	Within the Project Impact Area	Outside the Project Area			
INSECTIVORA	ERINACEIDAE	1	*Erinaceus concolor*	Southern White-breasted Hedgehog	LC	-	-	APP-1	-	+	+	+	2	2,3,4,6	O-A
	SORICIDAE	2	*Crocidura leucodon*	Bicolored Shrew	LC	ANN-3	-	APP-1	-	-	+	+	-	2.4	L
CHIROPTERA	RHINOLOPHIDAE	3	*Rhinolophus hipposideros*	Lesser Horseshoe Bat	LC	ANN-2	-	APP-1	-	-	+	+	-	2,4,5	L
	VESPERTILIONIDAE	4	*Pipistrellus pipistrellus*	Common Pipistrelle	LC	ANN-3	-	APP-1	-	+	+	+	2	2,5,6	O
LAGOMORPHA	LEPORIDAE	5	*Lepus europaeus*	European Hare	LC	-	-	APP-3	-	+	+	+	2	2,3,4,	O-A
RODENTIA	SPALACIDAE	6	*Spalax leucodon*	Lesser Mole Rat	DD	-	-	APP-1	-	+	+	+	3	4	O
	MURIDAE	7	*Apodemus slyvaticus*	Long-tailed Field Mouse	LC	-	-	APP-1	-	+	+	+	2	4	O-L
CARNIVORA	CANIDAE	8	*Canis lupus*	Gray Wolf	LC	ANN-2	APP-2	APP-1	-	-	+	+	-	3.4	L-A
	CANIDAE	9	*Vulpes vulpes*	Red Fox	LC	-	APP-3	APP-3	-	+	+	+	2	1,2,3	O-A
	MUSTELIDAE	10	*Mustela nivalis*	Least Weasel	LC	ANN-3	-	APP-2	-	-	+	+	-	2.6	L-A
	MUSTELIDAE	11	*Martes foinea*	Stone Marten	LC	ANN-3	APP-3	APP-3	-	-	+	+	-	5	L-A
ARTIODACTYLA	SUIDAE	12	*Sus scrofa*	Wild Boar	LC	ANN-3	-	APP-3	-	+	+	+	2	2.3	O-L-A