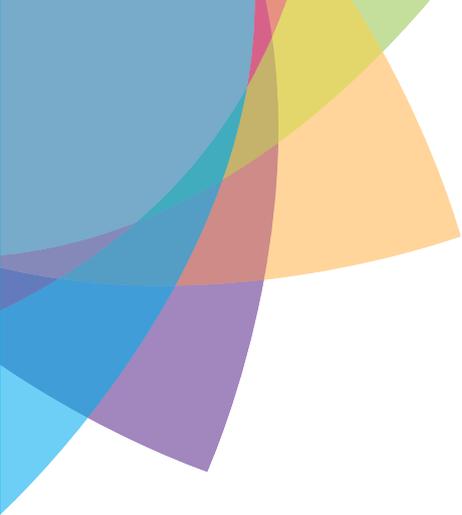


ALPASLAN II DAM AND HYDROELECTRIC POWER PLANT

# Non-Technical Summary of Environmental and Social Impact Assessment





ALPASLAN II DAM HYDROELECTRIC POWER PLANT

Non-Technical Summary  
of  
Environmental and Social  
Impact Assessment  
2014





**Designed by:** Çaęrı Öner

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# Preface

EnerjiSA Enerji Uretim A.S (**Enerjisa**) is seeking to build and operate the **Alpaslan II Dam and Hydroelectric Power Plant (HEPP)** in the Muş province of Turkey – the ‘Project’.

The Project consists of a dam and HEPP, new roads, an electric transmission line and other supporting infrastructure necessary for its construction. The Project has been subject to previous environmental and social studies to meet Turkish regulatory requirements and is currently in the early stages of construction.

The **European Bank for Reconstruction and Development (EBRD)** and **Garanti Bank** (together the ‘Lenders’) are considering providing a loan to Enerjisa for the development of the Project. According to the EBRD’s Environmental and Social Policy (2008), and its associated Performance Requirements (PRs), a project of this type and scale requires a full Environmental and Social Impact Assessment (ESIA). Following a review of the previous environmental impact assessment (EIA) reports prepared for the Project, the EBRD required a number of supplementary environmental and social studies to fill the gaps necessary to meet the EBRD PRs and international good practice. The Project ESIA, therefore, consists of the previous EIA reports and the supplementary studies.

In summary, the documents which make up the Project ESIA are as follows:

## **Non-Technical Summary (this document)**

Its aim is to provide a summary of the results of the Project ESIA in language which is easy to understand.



## Environmental Impact Assessment (EIA) reports

Three reports have been prepared:

- **Alpaslan II Dam and HEPP EIA and ESMP** – an EIA report and Environmental and Social Management Plan (ESMP) were prepared by Enerjisa for the dam and HEPP (as well as supporting activities like quarries) in order to satisfy Turkish EIA Regulations. An ‘EIA Positive’ certificate was issued by the Ministry of the Environment and Urbanization in August 2012. This EIA report has already been disclosed as required by the Turkish EIA Regulations.
- **Relocation Road EIA and EMP** – the reservoir would flood a large area and as a result some existing roads will be lost. The roads to be relocated are exempt from the EIA process in accordance with the Turkish EIA Regulations and an ‘EIA Exempt’ letter was issued by the Ministry of Environment and Urbanization on 10 June 2013. However, in order to identify and appropriately mitigate the potential effects associated with the roads, and to meet its own requirements as well as those of the EBRD, Enerjisa, conducted a separate EIA process and prepared an EIA report and Environmental Management Plan (EMP) for the road relocation. This report has not been previously disclosed.
- **Electricity Transmission Line (ETL) Interim EIA and EMP** – a full EIA of the ETL will be completed by the Turkish Electricity Transmission Company (TEIAS) according to Turkish EIA Regulations. An Interim EIA and EMP have, however, been prepared in advance to inform the Project ESIA and define a likely ETL corridor avoiding constraints and sensitivities and to identify potential impacts associated with the ETL as well as mitigation options. This report has not been previously disclosed.

## Supplementary Reports

The additional reports that have been prepared by Enerjisa in order to meet the **EBRD's PRs** and good international practice are as follows:

<b>Non-technical Summary (NTS)</b>	
<b>Volume I</b>	<ul style="list-style-type: none"> <li>■ Project Description</li> <li>■ Project Alternatives</li> <li>■ Project Area of Influence</li> </ul>
<b>Volume II</b>	Project Operation and Downstream Impact Assessment
<b>Volume III</b>	Cumulative Impact Assessment (CIA)
<b>Volume IV</b>	Transboundary Impact Assessment
<b>Volume V</b>	Greenhouse Gas Assessment
<b>Volume VI</b>	Environmental and Social Management Plan (updates)
<b>Volume VII</b>	Preliminary Resettlement Action Plan (RAP)
<b>Volume VIII</b>	Stakeholder Engagement Action Plan (SEAP)
<b>Volume IX</b>	Preliminary Social Impact Assessment Report (including the Social Management Plan)

While not part of the Project ESIA, a draft Environmental and Social Action Plan (ESAP) has also been prepared in agreement with the EBRD. The ESAP sets out the key actions and measures that Enerjisa will need to implement to meet the EBRD PRs during the disclosure period, during ongoing construction and during operation. The ESAP will form part of the EBRD loan agreement with Enerjisa and is disclosed together with the Project ESIA. The ESAP will be updated, revised and finalised before the Project is presented to the EBRD's Board of Directors for consideration.

## Disclosure of the Project ESIA

The Project ESIA is being disclosed to the public and other stakeholders in order to explain the likely significant effects of the Project, describe the measures that will be taken to avoid, minimise, mitigate

or offset/compensate these effects, and to allow people to comment on the Project prior to the Lenders deciding whether to provide a loan to Enerjisa. The EBRD requires that the Project ESIA is disclosed for a period of 60 days.

The Project is complex and multi-faceted and it is recognised that there remain some gaps in our knowledge of the effects of the Project (e.g. the full ETL EIA is still to be completed and additional baseline studies needed to be carried out). It was determined that sufficient information was available to enable disclosure now but on the condition that where information about a particular impact is not fully known, this is stated clearly in the documents to be disclosed and a mechanism for obtaining a comprehensive understanding of the impacts is identified.

All of the additional information requirements and actions are set out in the ESAP together with associate timelines. Many of these actions need to be implemented prior to the consideration of the Project by the EBRD's Board of Directors. Where additional studies and assessments are conducted, the results thereof, together with relevant Project updates, will be disclosed as per the Stakeholder Engagement Action Plan.

## Where can I get more information?

English and Turkish versions of the Project ESIA are available at the following locations:

**Online:** [www.enerjisa.com.tr](http://www.enerjisa.com.tr)

**Direct links** English <http://www.enerjisa.com.tr/en-US/Generation/OurProjects/Pages/Hydroelectricity.aspx>

Turkish <http://www.enerjisa.com/tr-TR/ElektrikUretimi/Pages/HidroelektrikProjelerimiz.aspx>

**Enerjisa Project Office in Muş:** Muş - Varto Karayolu 40 km Dumlusu Koyu Mevkii Muş

**Enerjisa Head Office in Ankara:** Ceyhun Atif Kansu Cad. No:106 Kat:8 Balgat Ankara

**State Hydraulic Works (DSİ):** XVII. Regional Directorate 172. Branch Elazığ Yolu Üzeri Merkez / Muş

**Village Mukhtars** of Dumlusu Village/Muş, Tepeköy Village/Muş, Bağiçi Village/Muş, Kayalidere Village/Muş, Sanlıca Village/Muş, Aligedik Village/Muş

**Muş Municipality** Minare Mahallesi Merkez/Muş

**Varto District Governor's Office-Muş** Jandarma Sok. Hükümet Konağı Varto/ Muş

**Special Provincial Administration-Muş** Karayolları Kavşağı Bitlis Yolu Üzeri Merkez/Muş

**The Enerjisa Contact Person:** Murat Yağcı

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E-mail: [murat.yagci@enerjisa.com](mailto:murat.yagci@enerjisa.com) / [alpaslan@enerjisa.com](mailto:alpaslan@enerjisa.com)

The Project ESIA is also available at the following EBRD offices:

### EBRD, Regional Office Istanbul

Buyukdere Caddesi, 185; Kanyon Ofis Binası, Kat: 2; Levent; Istanbul 34394; Turkey

Email: [RO-Istanbul@ebrd.com](mailto:RO-Istanbul@ebrd.com)

Tel: +90 212 386 11 00

### EBRD Business Information Centre, London

One Exchange Square; London, EC2A 2JN; United Kingdom

Tel: +44 207 338 60 00

This NTS together with the SEAP and ESAP are available on the EBRD's website:

[www.ebrd.com/pages/project/eia.shtml](http://www.ebrd.com/pages/project/eia.shtml).

# 1 Introduction



## What is the Project?

The Alpaslan II Dam and Hydroelectric Power Plant (HEPP) Project (the 'Project') is an energy generation development proposed by EnerjiSA Enerji Uretim A.S (Enerjisa).

The Project is located in the Muş province in the Eastern Anatolia Region of Turkey on the Murat River which forms a sub-basin of the Fırat (Euphrates) River Basin (see Figure 1 and Figure 2). The City of Muş is located 30 km to the south and downstream of the Project.

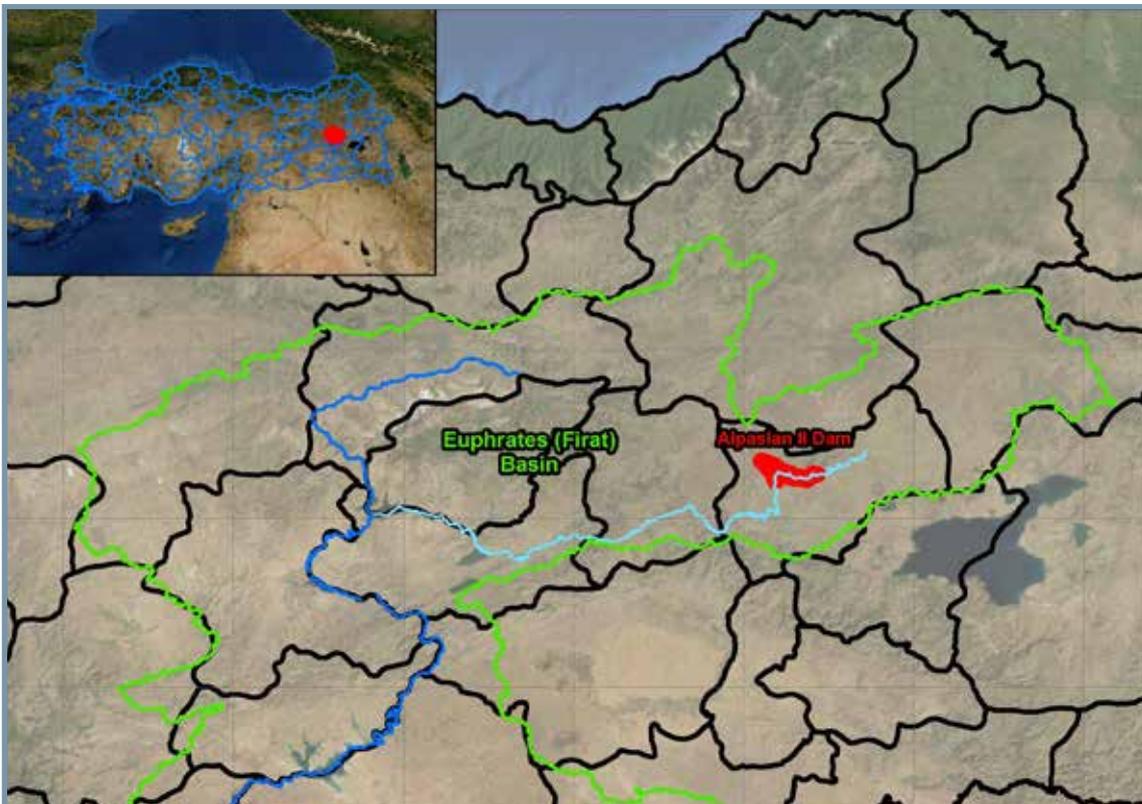


Figure 1: Project Location in the Euphrates (Firat) Basin

## Why is the Project Needed?

The Project is needed to meet the increasing energy demand in Turkey. Turkey has become one of the fastest growing energy markets in the world. The Turkish energy strategy promotes the use of domestic sources to reduce reliance on energy imports. One of the objectives of the strategy is to increase the share of renewable energy sources including further increasing the use of hydroelectric power.

The HEPP will have an installed capacity of 280 MW and will generate 880 GWh of energy annually. This is the equivalent of the annual electricity requirements of 400,000 households.

## Who is Enerjisa?

Enerjisa is a leading Turkish energy company owned by Haci Omer Sabanci Holding A.S and E.ON SE.

## What is an Environmental and Social Impact Assessment?

An **Environmental and Social Impact Assessment (ESIA)** is a method for describing and assessing the potential positive and negative effects of a development, identify actions to mitigate or compensate for these effects, and for informing the public and stakeholders about the development in order that they can comment on the development proposal.

The Alpaslan II ESIA consists of a number of documents (see Preface above). The results of the assessment are presented in this Non-Technical Summary document.

## Why has the ESIA been produced?

The **European Bank for Reconstruction and Development (EBRD)** and **Garanti Bank** (together the 'Lenders') are considering providing a loan to Enerjisa for the development of the Project. According to the EBRD's Environmental and Social Policy (2008), a project of this type and scale requires a full Environmental and Social Impact Assessment (ESIA). The Project will need to meet the EBRD Performance Requirements (PRs) and comply with Turkish legislation.

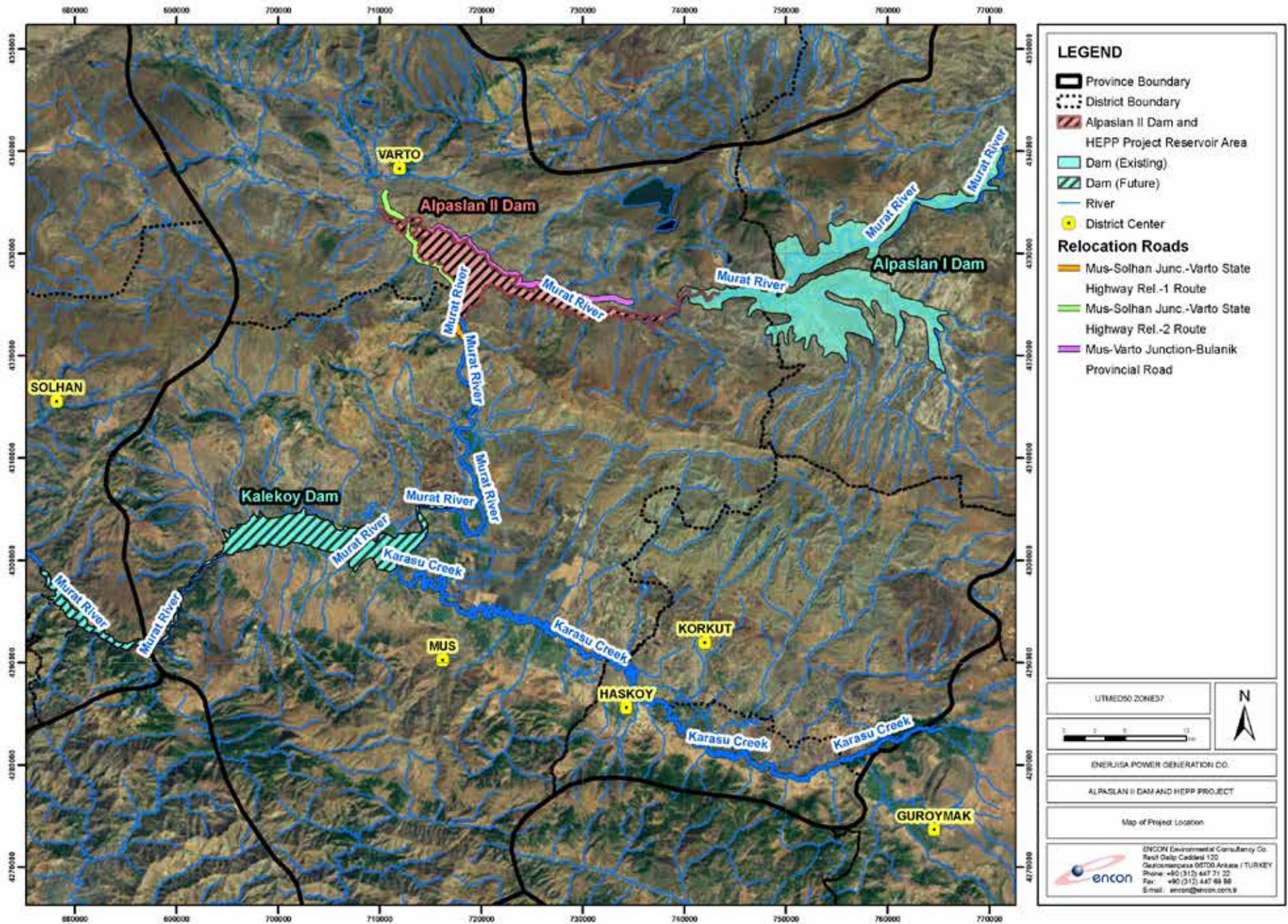


Figure 2: Alpaslan II Project Location on the Murat River

2

# Project Description



## The Project consists of a number of separate elements:

### I. Dam and Hydroelectric Power Plant (HEPP)

The main part of the Project is the dam and HEPP. A diagram of the dam and spillway structure is shown in Figure 3 to provide a sense of its scale and position on the Murat River (photograph taken from the west bank facing east). The dam body will have a height of 116 m and a crest length of 800 m.

A 1700 m long spillway will be constructed to provide a safe path for flood water to flow around the dam.

There will be two diversion tunnels (with a length of 875 m and 950 m each) built to divert the river so that the construction can be done in dry conditions. These would be used as energy tunnels during operation.

Figure 4 shows how the Dam and HEPP will generate electricity. Water flows from the reservoir through the energy tunnels into the penstock and then to the HEPP. The water drives turbines located inside the HEPP to generate electricity. The HEPP will house 4 Francis-Vertical Axis type turbines, 2 of them will produce 110 MW each and the other 2 will produce 30 MW each leading to 280 MW in total. The water then flows back into the Murat River.

### II. Reservoir

The reservoir, which is the artificial lake created by constructing the dam across the river, will have a surface area of approximately 55 km<sup>2</sup> with a volume of approximately 2 billion m<sup>3</sup>. At its deepest points



Figure 3: Model of Alpaslan II Dam and Spillway on the Murat River

the water depth will range from a minimum of 68 m to a maximum of 96 m. The reservoir area is shown on Figure 5.

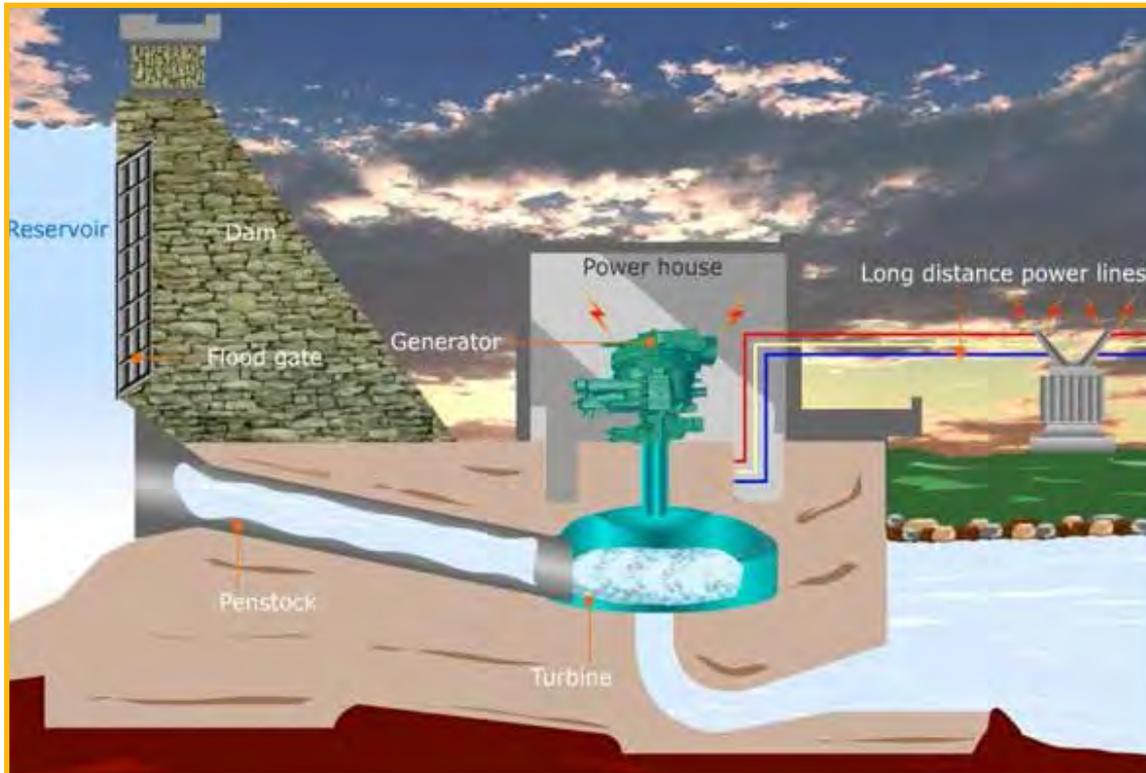


Figure 4: Typical Scheme for a Hydroelectric Power Plant

### III. Energy Transmission Line and Sub-Station

The energy generated by the HEPP will be connected to the national grid by a 380 kV overhead energy transmission line (ETL). The ETL will be approximately 50 km long starting from the Alpaslan II HEPP Substation and connected to the Yukari Kalekoy HEPP Substation as shown in Figure 6. The precise route and design of the ETL will be finalised by Turkish Electricity Transmission Company (TEIAS) during the local EIA permitting process.

The ETL will have approximately 85 steel towers which will have height of between 30 to 50 meters. The 380 kV Alpaslan II HEPP Substation will have dimensions of 202 m x 132 m and will be constructed in an open area close to the right bank below the dam.

### IV. Relocation Roads

Due to the formation of the reservoir, parts of Mus-Varto (30 km) and Mus-Bulanik (24 km) roads will have to be relocated (see Figure 5). The relocation roads would be constructed by Enerjisa and thereafter

handed over to the General Directorate of State Highways (KGM). The standards of the KGM (such as road width, surface and curvature, driver visibility, etc.) have been followed whilst designing the new roads.

Currently, the existing road that will be inundated has 2 lanes (1 lane per each way). The new roads will have 4 lanes (2 lanes each way). This is because the Government has future plans to upgrade the existing roads outside the reservoir area to 4 lanes.

## **V. Supporting Infrastructure**

In order to construct the Project the following additional infrastructure will be required:

- Five rock quarries, four impermeable material (clay) borrow sites and three permeable (sand and gravel) borrow sites to provide material for construction most of which will be located within the future reservoir area,
- Five material storage areas,
- One crushing-screening-washing facility,
- Two construction camps, which will provide accommodation for the workers

## How long will it take to fill the reservoir?

It will take 8 to 15 months to fill the Alpaslan II reservoir depending on hydrological conditions. Filling of the reservoir is likely to commence in July 2015 or July 2016. During filling a downstream flow of water will be maintained at all times. The downstream flow will include both downstream irrigation needs and the minimum environmental flow that was calculated during the EIA process to sustain environmental condition, including habitats and species of fauna and flora, in the Murat River downstream of the Project.

## How long will it take to build the Project and when will it be operating?

The construction period for the Alpaslan II Dam and HEPP Project is planned to last for five years and is carried out in two phases. Phase I civil works (including structures such as diversion tunnels, water intake structures, gate shafts) were started in June 2012 and Phase II civil works (spillway, energy tunnels, powerhouse building) started in April 2013. Work on the dam body will start in 2014 after the

river diversion takes place in May 2014. The civil works for Mus-Varto (30 km) and Mus-Bulanik (24 km) roads that will be relocated are scheduled to start in summer 2014. ETL civil works are scheduled to also start in summer 2014 after the finalisation of the full EIA study by TEIAS.

It is expected that the Project will be generating electricity by March 2017.

## How will the dam be operated?

The Project will be operated by Enerjisa for the purposes of energy generation. Enerjisa is required to operate the Project in line with the regulation requirements it has agreed with the State Hydraulic Works (DSI) through a "Water Usage Rights" agreement. The DSI is the authority in charge of the management of water resources in Turkey. On the short and mid-term, the regulation requirements from DSI are limited to lowering the reservoir level during the flood season in order to contribute, with Alpaslan I, to the flood mitigation objectives pursued by DSI for the protection of the Murat plain. The regulation requirements imposed by DSI to Enerjisa can change over time (at DSI's discretion) to serve other purposes.

In accordance with the Alpaslan II Project design, the stored water will be used for power generation with a maximum output of 280 MW and an estimated annual energy production of 880 GWh.

Water will be drawn from the reservoir through tunnels into the penstocks and then into the turbines located in the powerhouse at the base of the dam before being discharged back into the river. The HEPP will produce both base energy as well as peak energy to meet national and regional energy requirements. During base energy production one or two turbines will be operation while during peak energy production three or all four turbines will be in operation. During peak energy production (between 17:00 - 22: 00 daily) water flow below the dam will be up to 344 m<sup>3</sup>/s when all turbines are working. During off-peak times (between 22:00 to 17:00 daily) flow will reduce to a minimum of 36 m<sup>3</sup>/s when only one turbine is in operation. During off-peak times flow may increase if a second turbine is brought into operation to meet small peaks in energy demand. The daily changes in water discharged by the turbines will also result in changes in water levels in the Murat River although the effect of which will decrease further downstream of the Project (see Section 5).

The necessary downstream environmental flow (18.5 m<sup>3</sup>/s during July to February and 27 m<sup>3</sup>/s from March to June as determined in the EIA) will be discharged from the bottom outlet of the dam during

the filling of the reservoir. During the operation phase the minimum environmental flow will be met at all times through a minimum discharge from the dam of 36 m<sup>3</sup>/s (met by one small turbine)

## What is the lifespan of the Project?

The economic lifetime of hydropower projects is generally dictated by the filling of the reservoir with sediment. DSI requires that dams have a minimum lifespan of 50 years. However, the actual life of Alpaslan II will be much longer (in excess of 100 years).

## How were the Project site and technology selected and what alternatives were considered?

In 1967, a preliminary development plan for the Euphrates Basin was prepared by DSI. Following this, individual feasibility and design studies have been carried out for all relevant dams and HEPPs and irrigation projects in the Euphrates Basin. The preliminary studies for the realisation of the Alpaslan II Project date back to 1982. The initial feasibility study for the Alpaslan II Project was done in 1994.

As a result of an initial review of the topography of the region, three alternative dam axis locations (respectively from upstream to downstream; Zorova, Arincik and Mercimekkale) were considered for the Alpaslan II Dam. As a result of detailed geotechnical studies and taking into account also the economic, environmental and social dimensions, Zorova axis was chosen as the preferred site to build the dam.

During the various feasibility and design studies, different Project design alternatives were considered mainly from economic and technical perspectives but also from an environmental and social perspective to the extent possible at the time. The alternatives considered can be summarised under the following topics:

- Energy generation systems.
- Dam site location (including spillway, diversion and energy tunnel locations, quarries/material areas, construction camps).
- Type of dam and cofferdam (including construction method selected).
- Operation mode (including number of turbines selected).
- Energy Transmission Line (ETL) route selection.
- Relocation Road route selection.
- No action (no project implementation) alternative

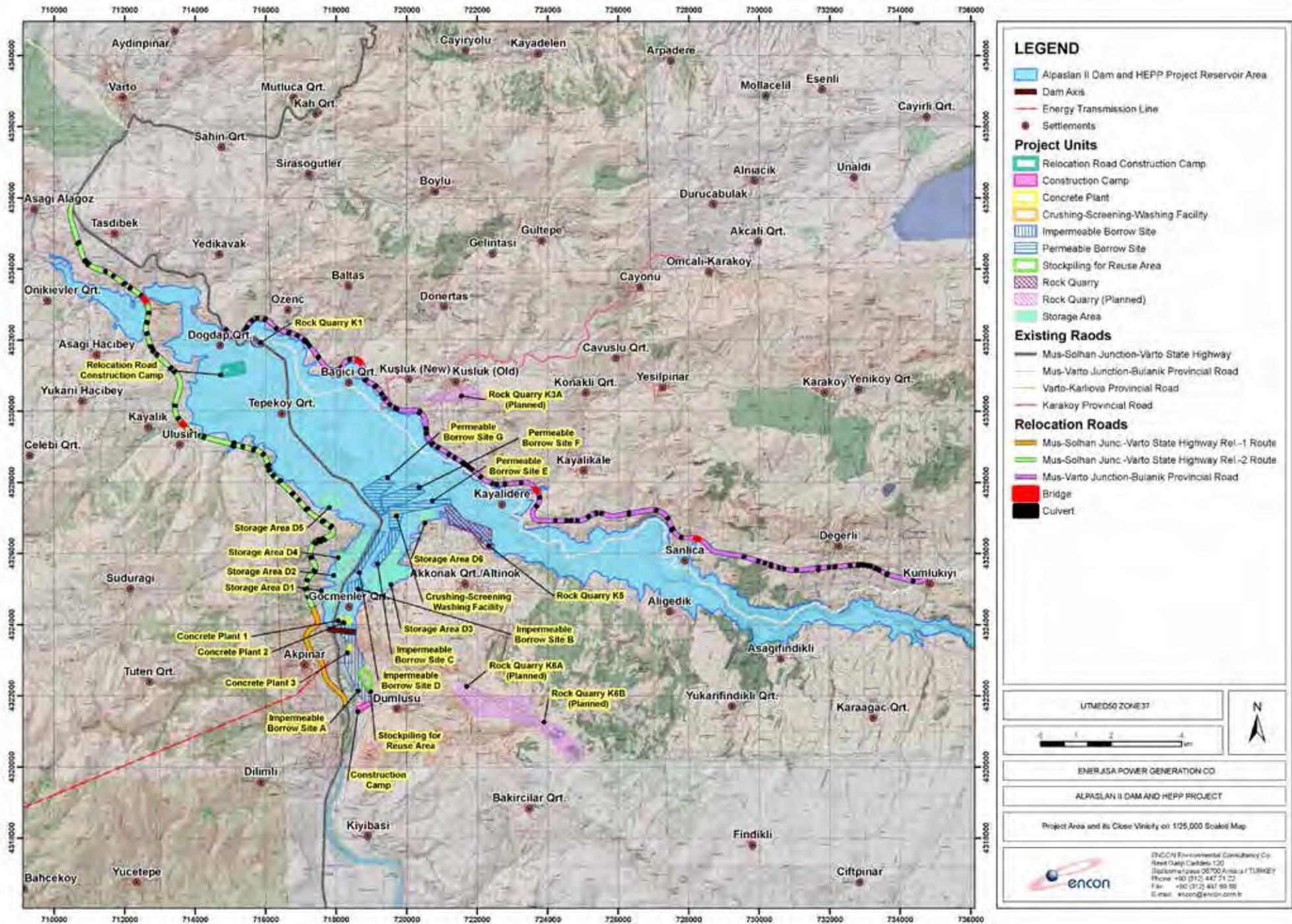


Figure 5: Alpaslan Dam and HEPP, ETL and Relocation Roads

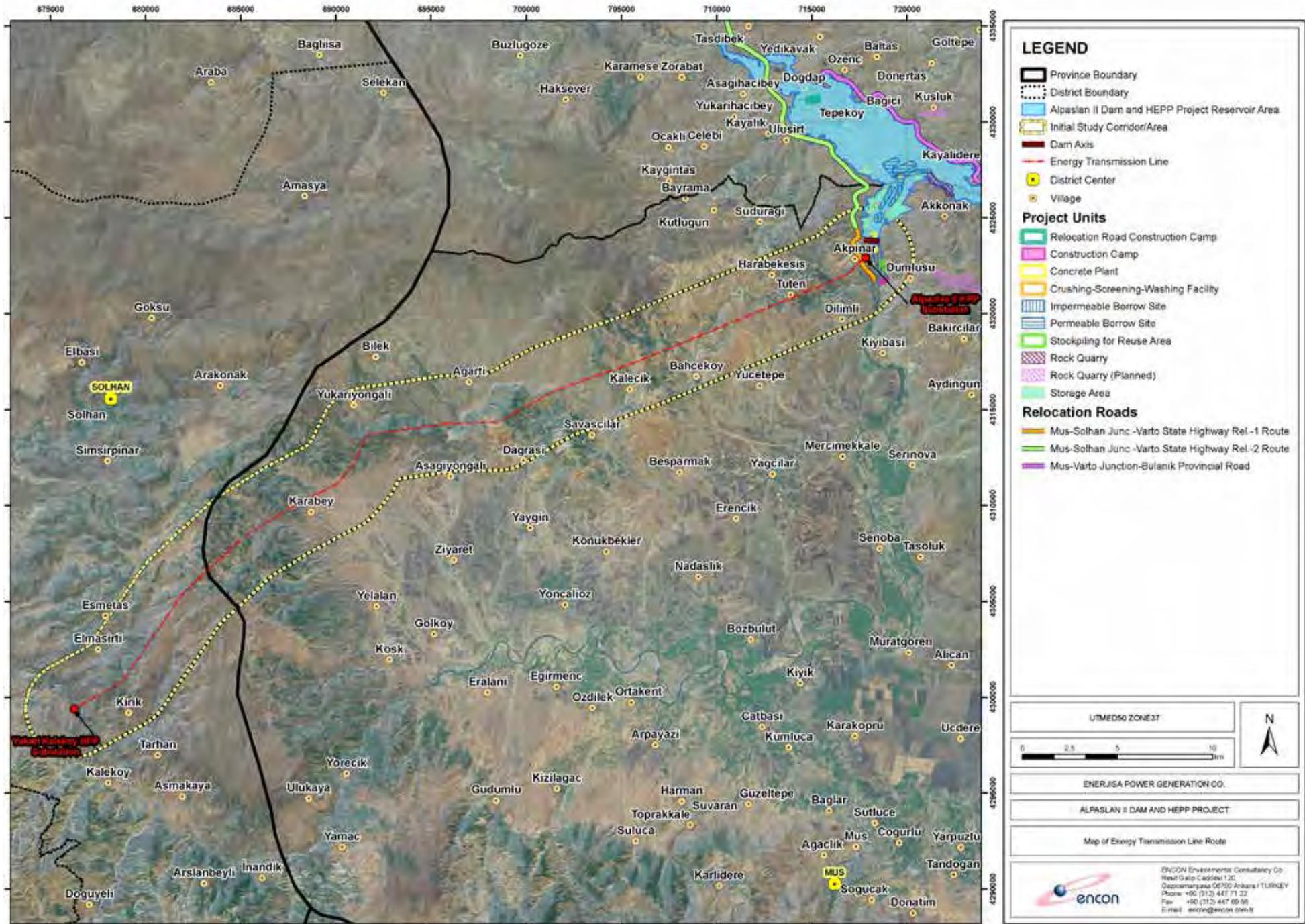


Figure 6: Preliminary Route (within a 5 km corridor) for the ETL

3

# Stakeholder Consultation



## Who will you be talking to about this project?

Enerjisa will speak to all people and organisations that may be impacted, directly or indirectly by the Project, or that have an interest in the Project (the Project stakeholders). Enerjisa has developed a Stakeholder Engagement Action Plan (SEAP), which identifies stakeholders, defines their roles and capacities, and presents options and constraints for their engagement. The goal of the SEAP is to make sure that all stakeholders can participate in the Project in a manner which is inclusive, responsive, and collaborative. The main stakeholder groups for the Alpaslan II Project are:

- Civil society:
  - Local communities;
  - Individuals;
  - Civil Society (CSO) and Non-Governmental Organisations (NGOs);
- Governmental departments and agencies;
- Groups and associations representing commercial interests; and
- The media.

## What interactions have you had with the people so far?

Enerjisa has been speaking to local people about the Project since 2011. Initially, Enerjisa conducted preliminary studies including an assessment of land uses and ownership for the Project affected areas and this involves much interaction with local communities affected by the Project in particular the





reservoir area. Enerjisa also informed the local people and the other stakeholders about the Project including construction works, land requirements and the land acquisition processes

Enerjisa first set up offices in the Central District of Muş and then in the Project area during 2011. Enerjisa started speak to the public in May 2011 and led various participatory public information sessions. Enerjisa has engaged with stakeholders through:

- **Meetings** with stakeholders during the local EIA process in 2011. This included meetings with local communities, the Provincial Governor, District Sub-Governor, Mus Mayor, Varto Mayor, State Hydraulic Works (DSI), Special Provincial Administration, Directorate General of National Property and the Ministry of Environment and Urban Planning.
- **Census surveys** with 22 Project affected villages in May 2013.
- Distribution of **Project information brochures** to Project affected settlements in May 2013.
- **Socio-economic surveys** with Project affected settlements in June 2013.
- **Focus group meetings** with the youth, workers, women at the 22 Project affected villages in June 2013.
- Focus group meetings on pasture use and private sector in October 2013.
- Weekly **community meetings** at Project affected villages from October 2013 onwards.



## How will local level communication with the people be managed?

Enerjisa's on-site project community relations specialists are responsible for establishing close relationships with local people, governmental bodies and other interest groups. They are responsible for informing people about the Project, listening to their concerns and recording them, receiving demands and complaints and sharing the feedback with Enerjisa's Project Team in Ankara and Istanbul to overcome them as soon as possible.

Enerjisa community relations specialists have an established schedule where they visit the affected villages and update people about the construction schedule, land acquisition and the resettlement progress as well as other general information about the Project. In addition to this, annual town hall meetings will be held in Mus Central and Varto districts in order to inform and update stakeholders in the wider area about the Project and to understand any potential concerns or requests.



The community relations schedule for Project affected villages is shown below:

Timing	Stakeholder to be visited
1st and 3rd weeks of every month (13:30-17:30)	The villages to be inundated (6 villages) are visited monthly (Tepekoy, Bagici, Sanlica, Kayalidere, Akkonak, Aligedik)
2nd and 4th weeks of every month (13:30-17:30)	The remaining 16 villages that are not subject to the resettlement are visited bi-monthly. (Akpinar, Degerli, Mescitli, Kayalikale, Kayalik, Asagi Hacibey, Kumlukiyi, Yurttutan, Ulusirt, Dumlusu, Tasdibek, Zorobat, Asagialagoz, Ozenc, Alagun, Kusluk)
Saturdays and Wednesdays	Free visit to the social liaison office at the project field office

Ongoing consultation and the disclosure of Project information will be guided by the Stakeholder Engagement Action Plan (SEAP).

## What information is planned to be made available to the public during and after the construction?

Enerjisa aims to receive and take into consideration stakeholder opinions and concerns in the development of the Project. To facilitate this, Enerjisa will make relevant environmental and social documentation available to the public through various channels appropriate to different stakeholders. This information will include, as a first step, the Project ESIA, of which this document is a summary. This will be followed by updates on ongoing studies, updates on the construction schedule, land acquisition and safety information during Project operation as such information becomes available.

The availability of the Project ESIA, in Turkish and English, is described in the preface to this NTS. Electronic copies will be available on Enerjisa's website ([www.enerjisa.com.tr](http://www.enerjisa.com.tr)) by 10 April 2014. The NTS, ESAP and SEAP will be placed on the EBRD's website ([www.ebrd.com/pages/project/eia.shtml](http://www.ebrd.com/pages/project/eia.shtml)) with a link to Enerjisa's website. Printed versions of the Project ESIA will also be available at the Project site office, EBRD offices and will further be shared with the following governmental bodies:

- Mus Governorship
- Mus State Hydraulic Works (DSI)
- Mus and Varto Municipality

## Information Meetings

The disclosure of the Project ESIA will be complemented with various public information meetings in order to inform the public of the availability of the Project ESIA and present the findings of the various studies and assessments undertaken by Enerjisa. There will be Kurdish translators available to communicate the content of the meetings to non-Turkish speakers.

The proposed dates and places for these meetings are as below:

- Mus public information meeting: April/May 2014.
- Varto public information meeting: April/May 2014.
- Meetings with affected villages during April/May 2014. This document, together with the Project ESIA, will be available during all meetings.

Sufficient notice will be provided for such meetings through direct communication, notices, newspaper adverts and radio announcements. Section 9 of this document provides contact details for Enerjisa.

Subsequent information to be disclosed to stakeholders is described in the Project's Stakeholder Engagement Action Plan and will be through communication channels similar to those described.

## How will women's needs and concerns be addressed by the Project?

Enerjisa aims to deliver information in such a way that women can access it easily. This will be accomplished through consultation with the women in the Project area by female community relations specialists. This may include separate meetings and individual discussions.



# 4 Environmental and Social Conditions in the Study Area



The key environmental and social conditions in the Project study area are summarised below:

## Hydrology

The Project is located on the Murat River, a tributary of the Euphrates River. The DSI owned and managed Alpaslan I dam is located upstream of the Project and regulates water flow in the Murat River. The Bingol Creek flows into the Murat River from the west below Alpaslan I but upstream of the Alpaslan II dam site. Both the Murat River and Bingol Creek would flow into the Alpaslan II reservoir. The confluence of these two rivers is located within the reservoir area.

Over a 41 year period (1970-2011), the annual average water flow in the Murat River at the dam site is approximately 124 m<sup>3</sup>/s. For the same period, monthly minimum and maximum flows are 65.60 m<sup>3</sup>/s and 326.00 m<sup>3</sup>/s. Monthly flow rates

in the river have been modified slightly with the presence of the Alpaslan I Dam upstream of the Project through its regulation capacity. Long term average water flow rates are typically 218.96 m<sup>3</sup>/s on average during the wet season and 66.80 m<sup>3</sup>/s during the dry season. Lowest flows were recorded during

September and maximum flows during May. The Project will maintain a minimum flow at all times (36 m<sup>3</sup>/s) with daily fluctuations up to 344 m<sup>3</sup>/s during normal operation.

### Water Flow Rates in Murat River

65.60 m<sup>3</sup>/s

Monthly minimum water flow in Murat River (btw. 1970-2011)

326.00 m<sup>3</sup>/s

Monthly maximum water flow in Murat River (btw. 1970-2011)

## Sediment transport in the river

The Alpaslan I reservoir is located upstream of Alpaslan II and has been in operation since 2012. According to the analysis carried out by utilising drainage areas and sediment yield calculations along Murat River, it was determined that 88% of the sediment load that would have been carried into the Alpaslan II reservoir is captured in Alpaslan I. Sediment transport is limited.

## Water quality

Various water samples were taken from the Murat River and Bingol Creek and evaluated according to Turkish Regulations (Water Pollution Control regulation and Surface Water Quality Management Regulation). The regulations define water quality classes. For the Murat River and Bingol Creek most of the parameters analysed were found to be within the limits of Class I which is the highest quality rating for surface water. However, due to high temperature, electrical conductivity, total phosphorus and total coliform levels the water in the Murat River was overall classified as Class II (water with a low level of contamination) and due to high temperature and pH levels water in the Bingol Creek was classified as Class III (contaminated water). Enerjisa will continue to monitor water quality during the life of the Project.

## Air quality

The Project is located in a rural area located to the north of the City of Mus. There are no major sources of air pollution that are adversely affecting air quality. The present air quality in the area is generally good.

## Soils and land use

The Project area mainly consists of chestnut soils (more than 75% of the area). According to the land capability classification of Turkey, the reservoir area is composed mainly (80%) of Class VI and Class VII land while the rest is classified as Class II. Class II land is more suited to agriculture while class VI and VII land is more suitable for use as pasture land due to steep slopes and low soil depth. Land in the Project area is used mainly for pastoral activities (more than 70%). Meadows and irrigated agriculture land each cover about 10% of the area.

Land Capability of Project Area



## Noise and vibration

There are no significant noise and vibration sources in the area due to its rural nature. According to the background noise measurements taken by Enerjisa, background noise in the area is below the limits of relevant Turkish Noise Regulations.

## Plants



The Project is located in a region dominated by steppe vegetation. Scattered oak forest is present in areas less affected by human activities while riparian vegetation is present along the rivers and stream banks. Field surveys carried out in the study area (larger than the Project footprint) identified a total of 257 plant species from 51 plant families. 13 of the identified species are endemic or native to Turkey. Four of these species are endemic to the East Anatolian region while nine are widespread across Turkey. Considering that 34% of Turkish plant species are endemic, endemism rate of the area is quite low. Furthermore, the Eastern Anatolia Region of Turkey has low habitat diversity and generally endemism rates are quite low. The four plant species endemic to the region that were identified in the study area, together with their IUCN<sup>1</sup> category, are: Pesmen (*Ferula huber-morathii* - Endangered), Arabacı & Dirmancı (*Cirsium yildizianum* - Endangered), Reichardt (*Centaurea fenzlii* - Vulnerable) and Boiss. & Kotschy ex Murb (*Verbascum macrosepalum* - Vulnerable).

These species are mostly distributed among the steppe habitat within the study area. Some of the populations will be inundated. *Cirsium yildizianum* is one of the species that is widespread in the reservoir area. This species, however, is also widespread in steppe habitats above the reservoir normal water level. Other endemic species identified in the area are widespread species and their IUCN category is Least Concern.

## Animals

Most habitats in the study area are disturbed through human activities including agriculture and grazing. Field surveys in the study area identified a total of 18 mammal species. Sixteen of these species are listed as of Least Concern by the IUCN. One mammal species, the Anatolian ground squirrel (*Spermophilus xanthophyrmnus*) is considered Near Threatened. One species is data deficient.

Ninety seven bird species were identified although none of them are endemic to the region or Turkey. With the exception of the Egyptian vulture (which is endangered) all bird species are classified as Least

<sup>1</sup> The International Union for the Conservation of Nature (IUCN) Red List of Threatened Species

Concern according to the IUCN. Within a Turkish conservation context, a number of species of bird breeding in the wider area are threatened.



20 reptile species were identified with one species, the common tortoise (*Testudo graeca*), classified as Vulnerable according to the IUCN. Seven amphibian species were identified with one categorised as vulnerable and the rest as of Least Concern.

Thirteen fish species were identified in the Murat River, 9 of which are from the Cyprinidae (or carp) family, two from Balitoridae (or river loaches) and one from Sisoridae (or catfish) families. Among these species only one, chup (*Squalius cephalus*) is categorised by the IUCN, as of Least Concern. Of these species, seven are endemic to Euphrates and Tigris River basins. All non-endemic species are from Cyprinidae family.

There are no endemic species in the Project area and habitat diversity in the wider region is similar to the Project affected areas.



## Landscape and visual amenity

The Project lies in an undulating steppe, grassland landscape that is typical of the region. The reservoir would be in an area formed as a result of the joining of two rivers and is shaped by two different valley structures. In the wider area, agriculture, roads and settlements are the dominant features. Towards the Murat River valley there are forest areas in the form of scattered groups of trees. The landscape does not contain any remarkable and memorable landmarks and the most influencing landscape elements are the Murat River and Bingol Creek.



## Cultural heritage

The relevant authorities for cultural heritage in Turkey, including special committees formed under the General Directorate of Cultural Heritage and Museums, have conducted various studies in the reservoir area and have identified four archaeological/cultural heritage assets, one of which will be fully inundated (covered by water) by the reservoir, while two will be partially inundated. The fourth will not be affected by the reservoir but is located close to the proposed relocation road. These assets include Mescitli Village

Kiz Castle (partial inundation), Tepekoy Tumulus (inundated), Dogdap Castle (not affected by reservoir and Kayalidere Castle (partial inundation). All are classified as first degree archaeological sites in terms of their conservation status (first degree is the highest). Post disclosure of Project ESIA, Enerjisa will continue to investigate, and assess the impacts to, cultural heritage in the Project area together with the relevant authorities in line with local legislation and with the EBRD's PR 8. These ongoing investigations will consider the whole Project including the reservoir area, known cultural heritage assets, the ETL route and pylon footprints and the relocation road corridor.

## Socio-economic conditions



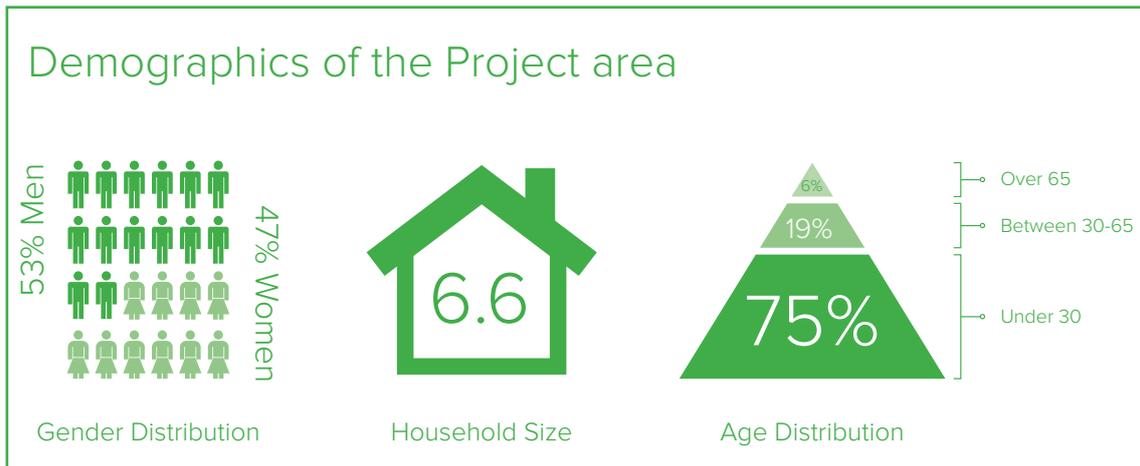
The Project is located in the Muş Central and Varto districts of Muş Province approximately 30km to the north of the City of Muş. Muş Province is the least developed province in Turkey with a development index of 81<sup>2</sup>. The Province is prone to outmigration due to a lack of economic opportunities. Annual population growth of Muş Province was at -0.5 percent in 2012.

### Demographics

According to official census data the total population of the Project area is 7,099 people<sup>3</sup>. A household socio-economic survey of Project Affected People (PAP) was conducted in May 2013. According to the survey results, men constitute 53 percent of the total population whereas 47 percent of the population

<sup>2</sup> [http://www.dpt.gov.tr/DocObjects/view/14197/BASIN\\_A%C3%87IKLAMASI-sege\\_2011-v6.pdf](http://www.dpt.gov.tr/DocObjects/view/14197/BASIN_A%C3%87IKLAMASI-sege_2011-v6.pdf)  
<sup>3</sup> Turkish Standards Institute, 2012

is female. The majority of the people in the Project area are young, with more than two thirds of the total Project area's population under the age of 30. The average age is 26 for females and 25 for men. The elderly (over the age of 65) make up six percent of the overall population.



The household size is very high, (6.6 people per household) which shows that the Project area has large families. This is most likely to be due to a combination of high birth rates and the pattern of extended families where grandparents and other relatives may live together and form part of the same household. Almost two thirds of the households have six people or more in their family.

### Key Social Indicators

**Education:** The level of education is very low in the Project affected settlements. When compared to Turkey's average illiteracy rate of 5 percent<sup>4</sup>, overall average illiteracy in the Project area is almost four times Turkey's average, reaching up to 19 percent. Muş Province education indicators are significantly below Turkey's average with secondary school graduates almost half of Turkey's average. Almost one third of the PAP's are primary school graduates. Even though all PAPs send their children to primary school regardless of gender a gender imbalance is clearly evident in higher education with only 16 percent of the university students being female.

**Health:** In the health sector, the number of hospital beds per 100,000 people is almost a quarter of Turkey's average in the Project area (Muş: 71 beds, Turkey: 252 beds). There are no health facilities in the Project affected settlements, and PAPs use the hospitals in Varto district and Mus central district.

<sup>4</sup> According to TUIK 2012 ADNKS

## Economy

The Project area is predominantly rural. Muş Province lags behind in urbanisation (37%) when compared to Turkey's overall urbanisation rate (77%). The economic opportunities are very limited with agriculture still constituting the main employment sector. 83 percent of the population is employed in the agriculture sector and employment in the industrial sector is almost negligible.



Agriculture is also main source of income in the Project area. After agriculture, labour (industry and services) is the second important source of income. Regular and temporary employment provides income for 8 percent of the population.

Project affected households have multiple sources of income. Income from livestock is a significant source of income for almost 40 percent of PAPs. PAPs also engage in subsistence farming and livestock by-products are important for subsistence. Almost one third of people support their livelihoods with seasonal employment which may be outside of Muş area.

Entrepreneurs and small scale commercial enterprises are almost non-existent in the reservoir area. The only notable commercial enterprises are coffee houses and small grocery stores in three out of 22 Project affected villages. Most of the women declare themselves as a "housewife" even though



they participate actively in agricultural

production. Some women also do handicrafts

at a small scale and generate some income from sales of handicrafts to support their families.



Socio-economic indicators highlight the need for investments in Muş to revive the local economy, and improve the socio-economic structure of the province.

# 5 What are the Environmental and Social Impacts of the Project?



An assessment of the environmental and social impacts of the Project during both the construction and operation phases together with mitigation measures proposed and their residual significance (how big or important is the impact after all mitigation measures are implemented) is given in Table 1. This draws on the various environmental and social impact assessments conducted for the different components of the Project.

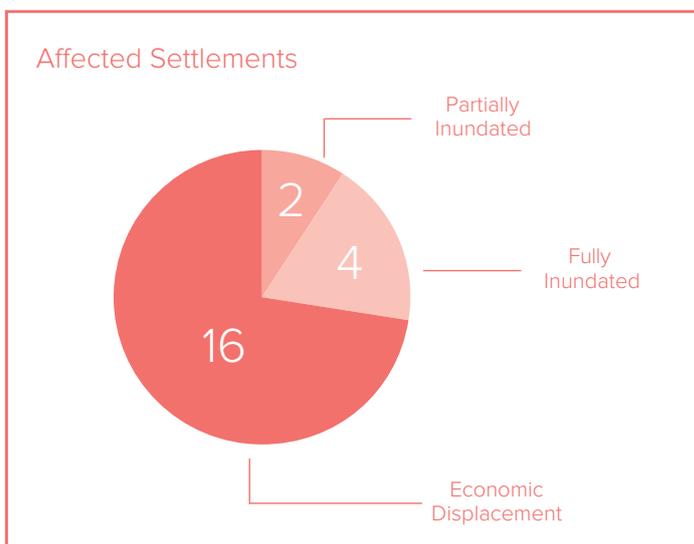
## What are the benefits and opportunities associated with the Project?

- **Energy generation:** The primary purpose of the Project is to generate electricity for the domestic and potentially the regional market. The Turkish energy strategy promotes the use of domestic sources to reduce reliance on energy imports and also seeks to increase the share of renewable energy sources including further increasing the country's use of hydroelectric power. The Project will be a source of both base electricity and electricity for peak periods. The HEPP will have an installed capacity of 280 MW and will generate 880 GWh of energy annually. This is the equivalent of the annual electricity needs of 400,000 households.
- **Employment:** The Project will create job opportunities in the villages affected by the Project and the district of Varto and province of Muş. During the construction period the Project intends to hire approximately one third of workers locally. It is expected that the construction period of the Project will last for 40 months. Project hiring initiatives will focus on the villages affected by and located near the Project. Where additional expertise is required the Project will provide the necessary training for local workers. There will also be programmes to enable local workers to access higher grade employment over time. This will provide them with the skills that they may transfer to other jobs once the Project is operational. During the operation phase the employment opportunities will be limited. However, those that have gained transferrable skills may be able to find employment elsewhere.
- **Improvements to the Infrastructure of the Region:** In parallel to the activities of the project, it is planned to make improvements to infrastructure in the villages around the reservoir area and also to the roads/bridges leading to them. These improvements will have a positive effect on making it easier for the village population to access the surrounding areas. This will be beneficial both to local people for their daily movements and also to businesses that need to transport goods or gain access to specific locations.
- **Contribution to the Local Economy:** Where possible local goods and services will be used for the Project. For example, a portion of the equipment and vehicles to be used during the construction activities will be acquired from the region, and this will have a positive impact on the local economy. The required training, product development and support will be given to

ensure that local suppliers can take advantage of supply chain opportunities from the Project. At the same time, the new roads and bridges will make it easier for the villagers to reach markets in Mus and Varto districts to sell their produce.

- **Downstream flood protection:** The flood control capacity of the Project will have positive impact on downstream urban and irrigation areas. By controlling floods with the Project, damages to homes, land, roads and infrastructure will be avoided. For emergency cases where flooding exceeds the dam's capacity, Enerjisa will develop and implement an emergency action plan together with DSI and other responsible authorities.

## Will the reservoir affect people and their land?



The physical footprint of the Project will affect 22 settlements. Four of these will be fully inundated, two of them will be partially inundated and 16 settlements will be affected by economic displacement due to the loss of land. In addition to agricultural land, there are also non-agricultural lands and forest areas in the reservoir area. The reservoir area and dam site will affect 2,769 parcels of land (5,751

hectares). 1,781 of these land parcels (1,862 hectares) are privately owned while the rest of the affected land belongs to the State.

The Project will impact 344 houses, 1,781 land parcels and 2,017 parcel owners as follows:

- On the left bank of the Murat River: Göçmenler (Muhacir Zorova) quarter - 48 houses; Tepeköy village - 117 houses, including Doğdap; Bağıcı village - 77 houses; and Kayalidere village - 44 houses.
- On the right bank: Sanlıca village - 49 houses, Aligedik village - 9 houses.

## How will people be resettled?

A Resettlement Action Plan (RAP), albeit still preliminary, has been prepared by Enerjisa in order to minimise potential adverse impacts due to land acquisition and resettlement. The RAP will be further developed into a final RAP during the disclosure period. Section 8 provides a brief summary of the resettlement strategy for the Project.

## Will irrigation or other users of the river be affected?

There is an existing 10,150 ha area that is being irrigated from Arıncık Weir downstream of the Project. Flow requirements for this irrigation area will continue to be regulated (water flow controlled by turbines) by Alpaslan II. A directed by DSI, the Project may also be required to regulate water for any future planned irrigation areas downstream.

The Murat River is also used for other activities such as livestock watering and recreation. During the operation of Alpaslan II, downstream flows will fluctuate between 36 m<sup>3</sup>/s and 344 m<sup>3</sup>/s. This will cause changes in water levels downstream, which could present a risk to riparian users or their livestock. Farmers along the Murat River (especially upstream of Arıncık Weir but also further downstream) use river water to irrigate small areas of land located by the river. The water level fluctuations may cause damage to their water pumping equipment. Enerjisa will identify, through cooperation with DSI, small scale water pump users from Alpaslan II to the Yukari Kalekoy HEPP and Dam and share information about downstream impact risks and how to avoid and manage them.

In order to mitigate adverse impacts, Enerjisa, in collaboration with DSI, will implement a public awareness and information plan to inform the downstream users of potential water level and flow fluctuations in the river. The plan will include a website for general public information, rapid information tools such as SMS alerts (text messages), awareness campaigns and signs. There will also be pro-active programmes for farmers along the Murat River to help them develop mitigation measures to manage their irrigation and equipment.

Detailed information on riparian users will be collected during the socio-economic survey in the social area of influence of the Project.

## Will the Project affect water quality?

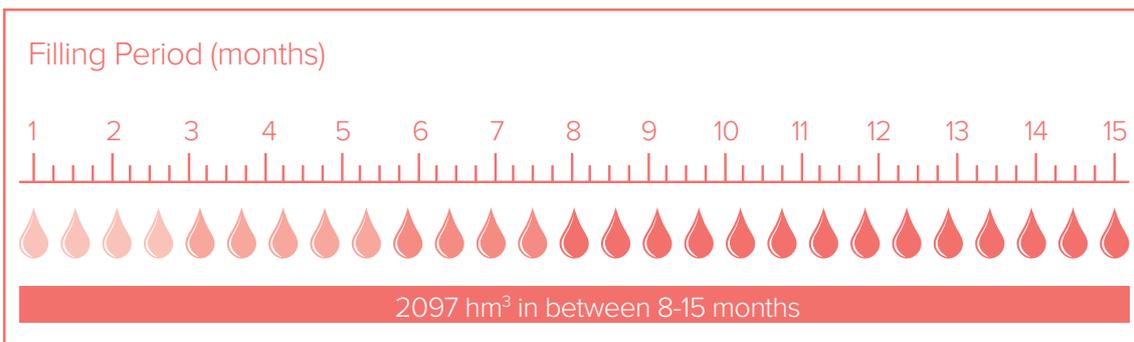
There are a number of potential impacts that the Project could have on water quality. During construction the main impacts would be from sediments being washed downstream. In the first few years after the reservoir is filled, vegetation, soils and other organic material will decompose and this can affect water quality. During operation the quality of the water in the reservoir may be affected (e.g. changes in temperature and the amount of oxygen in the water, pesticides from agricultural runoff, etc.).

To mitigate potential effects a number of techniques will be used:

- During the construction phase, the construction sites will be managed to avoid or minimise run-off and sediment disturbance.
- Trees and other organic material will, as far as possible, be removed or cut back prior to filling the reservoir.
- Water quality will be monitored prior to and during construction and operation to measure key biological, physical and chemical characteristics. This monitoring has already commenced.

## Will the Project affect water availability and flow characteristics in the Murat River?

The filling period of Alpaslan II Dam is expected to last around eight to 15 months depending on hydrological conditions. The total volume that will be impounded in Alpaslan II reservoir during this period will be 2097 hm<sup>3</sup> and therefore total amount of flow into Keban Dam downstream of Alpaslan II Dam will reduce by this amount during impounding. Minimum flows required to sustain the aquatic environment downstream will be maintained at all times during the filling period.



Flows in the Murat River at Alpaslan II dam axis are already regulated by upstream structures such as Alpaslan I. Operation of Alpaslan II will further regulate flows, generally increasing flows during dry months, and decreasing flows during wet months. The impact on the annual water availability is very small, mainly resulting from evaporation from the reservoir surface.

To conclude, there will be negligible impact on Murat and Euphrates River flows as a result of the Project. No significant adverse transboundary impacts

## Will land downstream of the project be flooded?

Alpaslan II is required by the DSI to provide a flood regulation function. Enerjisa will operate the dam to provide flood storage capacity, which will reduce the effects of flooding in downstream areas.

In the case of a flood event which affects the whole basin, Alpaslan II would marginally contribute to flood risk mitigation at the wider Euphrates basin level.

## Will flora and fauna be affected?

Flora and fauna will be affected during both the construction and operation phases of the Project. Terrestrial habitat (predominantly grassland and some woodland) will be lost as a result of temporary and permanent working sites and structures, and the filling of the reservoir (which will occupy an area of about 55 km<sup>2</sup>). Fauna associated with this habitat (including the Anatolian ground squirrel) will be significantly affected through loss of habitat and displacement and there will be mortality of less mobile fauna species during the filling of the reservoir. Habitat for endemic flora (meaning plants species found in this region and nowhere else in the world) will be lost in the reservoir area.

Upstream of the dam the river habitat will be transformed into a lake habitat. Downstream of the dam, changes in water flow may alter the characteristics of the river and affect aquatic habitat. Fish movement will be inhibited by the dam and species less tolerant to lake habitats will be adversely affected. Impacts on ecosystems may also result in impacts on local communities that rely on the land for their livelihoods.

Enerjisa will prepare a Biodiversity Action Plan to set out the specific measures that will be implemented to avoid, reduce or compensate for significant adverse effects on ecology. These measures will include, as a minimum:

- The collection of seeds and cuttings/seedlings of vulnerable and endangered flora prior to construction works and impoundment to be planted later in appropriate areas.
- Areas affected by the project (road verges, quarries, borrow pits, etc.) will be reinstated and rehabilitated and where appropriate used to create new habitats for species of flora and fauna of conservation value.
- An area of forest of at least 55 hectares will be created.
- An aquatic monitoring programme will be carried out and if fish are adversely affected, Enerjisa will implement a habitat restoration programme. To reduce impacts on fish movements, Enerjisa will implement a fish catch and truck system where fish are captured in one part of the river and moved to another.

In addition, it is noted that the formation of the reservoir will result in the creation of a new habitat of benefit to some species of fish and birds.

## Will there be impacts on local air quality?

Emissions to air are expected to occur during the construction phase from activities such as excavations, quarries, transportation of material and emissions from plant and machinery. However, the emissions are not predicted to significantly adversely affect local air quality. There is also the potential for dust nuisance at residential properties. Impacts from dust will be avoided by a number of measures including lightly spraying water on roads and working areas.

Emissions to air are not expected due to the operation of the dam, HEPP and the ETL. The Project does not have any significant sources of air emission and the Project will generate very little additional traffic. However, the relocation of roads will bring traffic closer to some properties and further away from the others. There will be changes in the air quality in the vicinity of the relocation roads; however, there is no likelihood of air quality standards being exceeded in the near future.

## Will the Project contribute to greenhouse gas emissions?

The construction phase of the Project will represent a contribution to the greenhouse gas (GHG) emission due to the embodied energy of construction materials, the use of fuel-based equipment on site and the associated transport emissions from supplying materials to the site. A further construction

aspect is the use of on-site equipment needed to create, manipulate and transport these materials. Due to the scale of the site, various and sizeable construction tools and pieces of equipment are needed and many are likely to run-off generators requiring fuel for lengthy periods during the five year construction phase.

During the operation phase of the project, GHG emissions are likely to arise from limited energy use, which is required and sourced from the national grid, the fugitive emissions relating to Sulphur Hexafluoride (SF6) release from High Voltage switchgear and carbon dioxide (CO<sub>2</sub>) release from the reservoir due to the flooding of land and the associated biochemical processes as a result of inundation.

## Benefits of renewable energy offsetting carbon based generation

The operation of the HEPP will displace other forms of fossil fuel generation and thereby reduce Turkey's GHG emissions each year (in the order of 618,640 tCO<sub>2</sub>e per annum). The GHG emission figures indicate that the project will balance the construction and operational GHG emissions after some 43 months from construction and after this time will be helping to reduce Turkey's GHG emissions each year over the project service life.

## Will the Project cause noise disturbance?

Construction activities are likely to result in noise at nearby settlements. Construction noise will come from a number of sources including plant and machinery, vehicle movements and blasting at quarries. Disturbance will be managed by a number of measures including control of working hours (no night time working) and restricting the timing and frequency of blasting events. Early warnings on blasting will also be given to affected areas.

No significant changes in noise generation are expected to occur during the operation phase of the Project. Noise generated during this phase will be from generator and turbines located inside the HEPP building. However, since the HEPP building will have proper insulation, noise and vibration levels will be limited and no impacts are expected. The noise of water discharged from the turbines will not have a significant impact on the closest settlement, which is located at about 1 km from the HEPP. The ETL will not generate significant noise. There will be noise from traffic on the relocation roads, however,

the Project will not generate any additional traffic but will just relocate the traffic. Some properties will experience an increase in noise from traffic but others will experience a reduction.

## What are the effects on cultural heritage?

The Project has the potential to impact cultural heritage through the impoundment of the reservoir and the construction of the dam, road, ETL and supporting facilities. In the area affected by the reservoir and relocation road four cultural assets (registered as first degree archaeological sites i.e. of national importance) will be affected by the Project. One site (Tepekoy Tumulus) will be completely inundated while Kayalidere Castle and Mescitli Village Kiz Castle will be partially inundated. Dogdap Castle will not be affected by the reservoir. The relocation road route is currently being revised to avoid impacts to Dogdap Castle. Further investigations of these sites will be carried out by the Ministry of Culture and Tourism prior to impoundment and road construction. The Ministry of Culture and Tourism will identify the necessary mitigation measures which will be carried out prior to construction impacting these sites. The measures have not yet been defined but may include, for example, detailed recording of the sites, removal and partial or full preservation (if practicable). However, despite these measures it is likely that the Project will have a significant adverse impact on these sites.

Post disclosure of Project ESIA, Enerjisa will continue to investigate, and assess the impacts to, cultural heritage in the Project area together with the relevant authorities in line with local legislation and with the EBRD's PR 8. This will include the development of a Cultural Heritage Management Plan that includes specific measures to avoid, and where avoidance is not possible, manage impacts to cultural heritage appropriately as well as consultation with local communities. These ongoing investigations will consider the whole Project including the reservoir area, the ETL route and pylon footprints and the relocation road corridor. Both tangible and intangible cultural heritage will be considered.

With respect to the cemeteries and graves which are present in the area impounded by the reservoir, Enerjisa will prepare a strategy for the relocation of these sites. Recognizing the sensitivity of this issue, all decisions will be made with the close participation of local communities.

In addition, there is the potential for unknown archaeology to be present in the area affected by the Project. A chance finds procedure will be established to outline the actions to be taken if previously unknown cultural heritage is encountered.

## What are the effects on landscape and visual amenity?

For the construction phase of the Project, the presence of construction sites, quarries etc. will cause local landscape changes and visual impacts on local residents.

For the operation phase of the Project, the formation of the reservoir, the area of the dam structure and permanent presence of the new roads and steel towers of the ETL will cause permanent changes to the landscape.

## Will access to the river and reservoir be restricted?



There will be no access restrictions to the river. However, access to the reservoir will be restricted by DSI due to possible risks to community health and safety. There will be no fence around the reservoir but there will be signs warning people not to approach the banks of the reservoir. A key part of the stakeholder engagement will be regular communication to local people about safety requirements near the reservoir and the river. The communication will be tailored to the needs of different users. So for example in order to reach young people, training on safety measures will be carried out in the local schools. This will not be a one-off event but will be carried out regularly through the operation of the Project.

## What happens if there is an accident?

Modern dams are constructed to be safe and avoid the risk of failure from all potential causes, including seismic and extreme flood events. In the unlikely event of an accident occurring (such as dam failure or

flood events) an Emergency Action Plan will be implemented by Enerjisa to reduce the risks to people and their property.

Enerjisa will set a flow and water level measurement system to inform DSI about high flow and risky conditions for downstream population. People downstream will be informed and warning signs will be put in place by DSI and Enerjisa to prevent any danger to local people and their properties. Enerjisa will communicate with authorities that are responsible for the emergency actions and inform them on their operation.

With regard to seismic risk, since the Project area is in a First Degree Seismic Zone (high earthquake risk zone) the dam and relevant structures have been designed to withstand significant earthquakes.

## How environmental and social impacts were assessed?

### Assessment Methods

The key stages for the impact assessment were as follows:

- Description of the Project.
- Scoping study to define key issues
- Identification of the area of influence/study area for the construction and operation phases taking into account the Project Description and the key environmental and social issues.
- Baseline studies in the Project study area for all key environmental and social issues.
- Assessment of the potential impacts of the key E&S issues,
- Identification of mitigation measures (to be incorporated into the design or as additional actions),
- Assessment of the residual impacts with reference to their significance.



## Summary of the results of the assessment

The environmental and social impacts of the Project during both construction and operation phases together with mitigation measures proposed and their residual significance is summarised in Table 1 below.

The following criteria were used to assess the significance impacts before and after mitigation:



Significant Adverse

- Permanent, widespread, long term or irreversible change in baseline conditions, livelihoods, culture heritage, quality of life, ecological conditions or resources.
- A likely exceedence of limits (e.g. water quality) above prescribed standards.



Minor Adverse  
Not significant

- Temporary or reversible change in baseline conditions.
- An effect will be experienced, but the impact is sufficiently small and within accepted standards, and/or the receptor is of low sensitivity/value.
- An inconvenience may be caused, but with little or no consequence to long-term livelihoods, culture, quality of life, or resources.



Neutral

- Either, no change expected in environmental or social baseline conditions, or where positive effects (e.g. as a result of mitigation) fully compensate for potential negative effects.



Beneficial Effect

- A positive change in environmental or social baseline conditions.

Table 1: Summary of Impacts and Mitigation

Environmental and social issue	Phase/Project Component Causing Impact	Description of Impact	Potential Impact Significance	Mitigation	Residual Significance
<b>Hydrology</b>					
Change in quantity of water	Impoundment of the reservoir	Temporary reduction in quantity of water downstream during impoundment.	 Significant Adverse	The environmental flow and downstream irrigation needs downstream of the Project will be maintained at all times.	 Minor Adverse
	Operation of the reservoir	Minor reduction in quantity of water downstream due to reservoir evaporation.	 Minor Adverse	The environmental flow and downstream irrigation needs downstream of the Project will be maintained at all times. A minimum flow of 36m <sup>3</sup> /s will be discharged which is more than the necessary environmental flow. Through base load and peaking production average annual flows will be maintained and the only losses from the Project will be due to evaporation.	 Minor Adverse
Change in flow characteristics	Impoundment of the reservoir	Temporary reduction in water flow downstream leading to consequential effects on geomorphology, ecology and land use.	 Minor Adverse	Additional hydrological modelling will be established to study the effects on geomorphology, ecology and communities. Potential impacts will be assessed and if needed mitigation measures will be put in place.	 Minor Adverse *subject to further analysis
	Operation of the reservoir	Increased regulation of flows in the Murat River, generally increasing flows during dry months and decreasing flows during wet months	 Minor Adverse	No mitigation proposed. A minimum flow of 36m <sup>3</sup> /s will be discharged which is more than the necessary environmental flow and current irrigation requirements.	 Minor Adverse
	Operation of the reservoir	Daily fluctuations in flow and water level downstream due to peak and off-peak generating flows leading to consequential effects on geomorphology, ecology, land use, health and safety for local communities living/working close to the river	 Significant Adverse	Additional hydrological modelling will be established to study the effects on geomorphology, ecology and communities. Potential impacts will be assessed and if needed mitigation measures will be put in place. A public awareness and information plan will be implemented to inform riparian users.	 Minor Adverse *subject to further analysis

Environmental and social issue	Phase/Project Component Causing Impact	Description of Impact	Potential Impact Significance	Mitigation	Residual Significance
<b>Water Quality</b>					
Sediment transport	Construction of HEPP & dam, road	Sediment transport to river due to the erosion risk at the construction site. The sediments in the diversion tunnels will be washed downstream leading to a temporary increase in suspended load in the river.	 Significant Adverse	In areas where there are erosion risks, terracing will be done to reduce long and continuous slopes and these areas will be vegetated. Thus, adverse effects on surface water will be reduced (surface runoff will reduce and sediment transport to the river will decrease). Key physical, chemical and biological parameters (such as water temperature, flow, chemical composition including micro-pollutants) will be monitored.	 Minor Adverse
	Operation of the dam and HEPP	Sediment transport along the river will change/ be reduced.	 Significant Adverse	Additional hydrological modelling will be established and will be used to characterise erosion and sedimentation along the river. Potential impacts will be assessed and if needed mitigation measures will be put in place.	 Minor Adverse *subject to further analysis
Build-up of organic matter	Impoundment of the reservoir	Build-up of organic matter at the bottom of the reservoir during impoundment that might lead to deterioration of the water quality.	 Significant Adverse	Before impoundment, biomass (trees and other significant areas of vegetation) will be removed or cut back. Local people will be encouraged to harvest crops and cut down trees prior to impoundment.	 Minor Adverse
Wastewater discharge	Construction of HEPP & dam, ETL, road	Domestic wastewater discharge to river.	 Significant Adverse	On-site wastewater treatment before discharge to Murat River (emission limits in line with Water Pollution Control Regulation)	 Neutral
Accidental spills	Construction of HEPP & dam, road	Accidental spills that might occur at the construction sites.	 Significant Adverse	Drainage system installed (and monitored) to prevent spills/flooding at the project site and its surroundings.	 Minor Adverse
Physical, chemical and biological changes	Operation of the reservoir	Physical, chemical and biological changes in the stored water in the reservoir are possible. The main change expected is due to temperature change and oxygen levels in the water.	 Minor Adverse	Key physical, chemical and biological parameters (such as water temperature, flow, chemical composition including micro-pollutants) will be monitored (as a continuation of the environmental monitoring conducted during the construction phase).	 Minor Adverse *subject to further analysis

Environmental and social issue	Phase/Project Component Causing Impact	Description of Impact	Potential Impact Significance	Mitigation	Residual Significance
<b>Air Quality (including GHG emissions)</b>					
Dust emissions	Construction of HEPP & dam, ETL, road	Dust emissions from construction activities	 Significant Adverse	<ul style="list-style-type: none"> <li>■ When needed, access roads will be sprayed with water to reduce dust emissions.</li> <li>■ At the borrow sites, controlled loading/unloading will be made to avoid dust. The surface will be covered and the top layers will be watered and compacted to avoid dust.</li> <li>■ Dust emissions will be monitored at the nearby residential areas according to the monitoring plan.</li> <li>■ Dust formation during excavation works will be controlled and minimized by wetting the material.</li> <li>■ All vehicles carrying excavation materials will be covered.</li> <li>■ Vehicle tires will be cleaned where necessary so as to prevent road contamination.</li> <li>■ Stockpiles will be located so as to avoid prevailing wind directions and sensitive receptors.</li> </ul>	 Minor Adverse
Emissions to air	Construction of HEPP & dam, ETL, relocation road	Emissions to air from vehicles and machinery used during construction	 Significant Adverse	To reduce emissions from vehicles, new and well-maintained vehicles will be used as much as possible and speed limits will be applied.	 Minor Adverse
Emissions to air from traffic on the relocation roads	Operation of the relocation road	The Project will not generate any additional traffic but just relocate the traffic. No likelihood of air quality standards being exceeded.	 Neutral	No mitigation required	 Neutral
GHG Emissions	Construction and operation of HEPP & dam, ETL, relocation road	GHG emissions due to construction and operation of the Project. The GHG emission figures indicate that the project will balance the construction and operational GHG emissions after some 43 months from construction and after this time will be helping to reduce Turkey's GHG emissions each year over the project service life.	 Beneficial	No mitigation required.	 Beneficial

Environmental and social issue	Phase/Project Component Causing Impact	Description of Impact	Potential Impact Significance	Mitigation	Residual Significance
<b>Soil Quality</b>					
<b>Erosion risk</b>	Construction of HEPP & dam, ETL, road	Erosion risk at construction site as a result of vegetation cover removal, top soil stripping and slopes.	 Significant Adverse	<ul style="list-style-type: none"> <li>In areas where there are erosion risks, terracing will be done to reduce long and continuous slopes and these areas will be vegetated (by species which grows rapidly and which can form its root system in a short time thus being effective in protecting the soil against the erosion). Thus, adverse effects on surface water will be reduced (surface runoff will reduce and sediment transport to the river will decrease).</li> <li>Appropriate drainage ditches or diversion canals on the uphill side will be provided to prevent erosion at the disposal site and stockpiles.</li> </ul>	 Minor Adverse
	Operation of the reservoir	Erosion risk at the river banks downstream during peak production	 Significant Adverse	A downstream erosion prevention plan will be prepared in consultation with DSI including measures to address any erosion as well as a detailed emergency response plan and public awareness plan.	 Minor Adverse
	Operation of the reservoir	Erosion risk at the banks of the reservoir.	 Significant Adverse	<p>Enerjisa will</p> <ul style="list-style-type: none"> <li>Complete the EIA climate description to understand reservoir ice and waves patterns during future conditions;</li> <li>Assess potential erosion and hillside stability risk areas around the reservoir edge. Where risks are identified ensure that appropriate safety information is disclosed to the public. Communicate the results of the assessment to the DSI.</li> <li>Based on the outcomes of the assessment, monitor reservoir bank and hillside stability during impoundment and operation.</li> <li>Define and implement any mitigation measures or further monitoring requirements.</li> </ul>	 Minor Adverse

Environmental and social issue	Phase/Project Component Causing Impact	Description of Impact	Potential Impact Significance	Mitigation	Residual Significance
<b>Noise and vibration</b>					
Increased noise levels	HEPP & Dam, ETL, road construction works	Increased noise levels (temporary) at the nearby residential areas as a result of construction activities.	 Significant Adverse	<ul style="list-style-type: none"> <li>Construction equipment used will comply with the provisions of the Regulation on the Assessment and Management of Environmental Noise.</li> <li>If applicable, fixed equipment will be operated within housed structures. Silencers, protectors and other noise reducing equipment will be used.</li> <li>Construction work will only be carried out during the day time and will not be allowed in the evening or at night.</li> <li>Noise levels will be regularly monitored and reported during construction activities. If limit values as stipulated in the relevant Turkish legislation are exceeded necessary mitigation measures (e.g. renewal of construction equipment) will be put in place.</li> </ul>	 Minor Adverse
Traffic noise	Operation of the road	The Project will not generate any additional traffic but just relocating traffic.	 Neutral	No mitigation required.	 Neutral
<b>Aquatic and terrestrial flora/fauna</b>					
Loss of terrestrial habitat	HEPP & Dam, ETL, road construction	Loss of terrestrial habitat (predominantly grassland and some woodland). Habitats of some species will be deteriorated because of reservoir formation. Impoundment area which is 54 km <sup>2</sup> consists of 70% pasture land, 10% meadow, 10% agricultural land and 10% other (river, roads, residential areas and forest).	 Significant Adverse	<p>Enerjisa will prepare a Biodiversity Action Plan to set out the specific measures that will be implemented to avoid, reduce or compensate for significant adverse effects on ecology. These measures will include, as a minimum:</p> <ul style="list-style-type: none"> <li>The collection of seeds and cuttings/seedlings of vulnerable and endangered flora prior to construction works and impoundment to be planted later in appropriate areas.</li> <li>Areas affected by the project (road verges, quarries, borrow pits, etc.) will be reinstated and rehabilitated and where appropriate used to create new habitats for species of flora and fauna of conservation value.</li> <li>An area of forest of at least 55 hectares will be created.</li> </ul>	 Significant Adverse

Environmental and social issue	Phase/Project Component Causing Impact	Description of Impact	Potential Impact Significance	Mitigation	Residual Significance
Loss of endemic flora	Impoundment area	Loss of endemic flora species (4 plants are regional endemic and 8 are widespread endemic).	 Significant Adverse	Seeds of endemic species are gathered and transferred to the Turkey Seed Gene Bank and after construction they will be planted in the upper elevations of the reservoir area. Details will be provided in the Biodiversity Action Plan.	 Minor Adverse
Loss of fauna habitat and potential mortality	Impoundment area	Loss of fauna habitat and potential mortality of less mobile fauna species	 Significant Adverse	Some animals will have time to escape and there will be alternative habitats in the vicinity of the Project area for some species. Impoundment will take place gradually and mobile fauna species will have time to escape. Details will be provided in the Biodiversity Action Plan.	 Significant Adverse
Aquatic habitat	Operation of the dam and HEPP	Change of flow characteristics downstream will affect aquatic habitat	 Significant Adverse	Additional hydrological modelling will be established to study the effects on geomorphology and ecology. Potential impacts will be assessed and if needed mitigation measures will be put in place in collaboration with DSI.	 Minor Adverse *subject to further analysis
Fish	Operation of reservoir	Inhibiting fish movement and change of habitat from flowing water to a lake	 Significant Adverse	Many fish species living in Murat River are tolerant to still water system. The benefits of fish transportation to upstream areas will be investigated. Options include the catch and truck method.	 Minor Adverse
Birds	Operation of the ETL	Potential bird collision risk	 Significant Adverse	Bird deflectors will be placed on ETL to prevent birds colliding with the ETL.	 Minor Adverse
	Operation of reservoir	Creation of habitat by reservoir formation	 Beneficial	None required.	 Beneficial

Environmental and social issue	Phase/Project Component Causing Impact	Description of Impact	Potential Impact Significance	Mitigation	Residual Significance
<b>Waste Generation</b>					
<b>Waste generation</b>	HEPP & Dam, ETL, road construction works	Generation of: <ul style="list-style-type: none"> <li>■ Construction and excavation wastes,</li> <li>■ Domestic type solid wastes,</li> <li>■ Hazardous wastes,</li> <li>■ Waste sludge coming out of the package waste water treatment plant,</li> <li>■ Sludge from the sedimentation tank for wash water treatment</li> </ul>	 Significant Adverse	<ul style="list-style-type: none"> <li>■ Waste will be systematically collected and separated for recycle, reuse or disposal as stipulated in relevant Turkish legislation and in line with the waste management plan</li> <li>■ Suitable excavation material will be stored temporarily as to be used as filling material at other future construction activities</li> <li>■ Surplus excavation material should be used for land levelling after tower set up and eventually, there will be no excavation waste.</li> <li>■ Hazardous wastes will be collected separately, temporarily stored and disposed of to a licenced waste processing/disposal facility as stipulated by the Regulation on Control of Hazardous Wastes</li> <li>■ Recyclable solid wastes will be collected separately sent to licensed recycling facilities.</li> <li>■ Domestic type of solid waste will be periodically sent to landfill of Mus Municipality.</li> <li>■ Sludge from package waste water treatment plant and sedimentation tank for wash water treatment will be dewatered and disposed of as stipulated in relevant Turkish legislation</li> </ul>	 Minor Adverse
	Operation	The dam and HEPP will generate very small amounts of waste which will be managed by municipal facilities.	 Neutral	No mitigation required.	 Neutral

Environmental and social issue	Phase/Project Component Causing Impact	Description of Impact	Potential Impact Significance	Mitigation	Residual Significance
<b>Landscape and Visual Impacts</b>					
Landscape effects due to construction	HEPP & Dam, ETL, road construction works	Temporary presence of construction sites, quarries etc. causing local landscape changes and visual impacts on local residents.	 Significant Adverse	<ul style="list-style-type: none"> <li>■ Locations selected to avoid residential areas.</li> <li>■ Good housekeeping and management during construction.</li> <li>■ Closure and reinstatement of construction work sites including quarries and borrow pits.</li> </ul>	 Minor Adverse
Landscape change due to reservoir formation	Operation of the reservoir	The reservoir will result in a significant change to the landscape in the area and the character of this landscape is likely to be adversely affected. Whether the visual impact is detrimental or beneficial will depend on the on the perception and opinion of the observer.	 Significant Adverse	No mitigation available.	 Significant Adverse
Landscape change due to dam structure	Operation of the dam	This large permanent structure which will dominate the local landscape.	 Significant Adverse	Limited mitigation available. Landscaping in area including tree planting.	 Significant Adverse
Landscape change due to steel towers of the ETL	Operation of the ETL	Permanent structures will alter the local landscape character.	 Significant Adverse	The ETL will be subject to a more detailed environmental impact assessment at a later stage. Adjustments to the route may be made to reduce its landscape and visual impacts.	 Significant Adverse *subject to further analysis

Environmental and social issue	Phase/Project Component Causing Impact	Description of Impact	Potential Impact Significance	Mitigation	Residual Significance
<b>Socio-Economics</b>					
Out migration from the project area of influence	HEPP & Dam Construction and Operation	The project leads to involuntary physical resettlement, which will lead to changes in demographic profile of the area of influence. The project may impact the population size by permanent out migration	 Significant Adverse	Local resettlement alternatives will be devised for the physically displaced population.	 Minor Adverse
In migration	HEPP & Dam Construction phase	The construction phase of the Project will provide employment opportunities. The Project area lacks skilled workforce, therefore the Project is expecting influx of skilled workers. The influx of skilled labour could lead to tensions with local populations. Tensions could be caused by wage differences amongst qualified and unqualified workforce, cultural differences with the migrant workforce, or disturbance to daily life of local population by increased population.	 Significant Adverse	The Project has a solid employment strategy. The employment policy is fair and follows national and international guidelines for worker health and safety.  The Project will set up training programmes to enable local people to access more skilled employment in the long term.  Workers will be given training on codes of conduct as well as health care and safety awareness.	 Minor Adverse
	HEPP & Dam Construction phase	The influx of skilled labour and increased population will also increase demands for local goods and services. The population increase may foster entrepreneurship.	 Significant Adverse	The Project will increase local capacity for entrepreneurship by training, which will be devised as part of community development program.	 Beneficial
Local economy	HEPP & Dam Construction phase	The Project will create employment and work opportunities. The demand for locally produced building materials will be high; their extraction, production and transportation will generate additional demand for labour. There will be a large demand for local services, especially for transportation and construction of various components of the project.	 Beneficial	Employment and local procurement will be limited to construction phase, yet the Project will invest in trainings and capacity building to improve the economic livelihood generation.  The Project will create a programme to ensure that local businesses and individuals can benefit from supply chain opportunities.	 Beneficial
Agricultural income	Reservoir Area, construction site, camp site	Project affects mostly agricultural land. Agricultural income is impacted by two factors. These are loss of land, and the effects of construction activities. Parallel to loss of land impact, income driven from land-based sources will also be affected by the Project. There may be a loss of crops and livestock due to construction impacts (dust, noise, equipment). Once land is acquired by the Project, income generated from land affected by the Project will also be lost.	 Significant Adverse	The Project is taking necessary health and safety measures to minimise damages to livestock. However, in case of an accident, the Project will compensate for damage to crops and livestock. In order to mitigate losses of agricultural income due to land loss, land acquisition will be conducted at full capitalisation value in order to restore livelihoods. RAP fully illustrates income restoration strategy.	 Significant Adverse

Environmental and social issue	Phase/Project Component Causing Impact	Description of Impact	Potential Impact Significance	Mitigation	Residual Significance
Impact on employment	Construction of HEPP, dam, relocation roads etc	During peak construction, the Contractors will hire up to a total of 1,200 workers both skilled and unskilled on site. Where possible unskilled workers will be drawn from the villages closest to the construction sites and project affected villages subject to availability of suitable candidates. It is anticipated that the Project may be able to draw a large number of the unskilled workforce from the local area.	 Beneficial	The Project aims to emphasise local employment for unqualified workforce, and provide opportunities for qualified workforce. Moreover, the Project aims to train the workforce on higher grade construction related activities such as welding, which will also have the benefit of creating a trained qualified workforce that will be beneficial to the development of the economy.	 Beneficial
	Operation	During operation of Alpaslan II HEPP limited number of personnel will be employed by the Project.	 Beneficial	Enerjisa will try to employ locally for the operation period, yet qualifications of the local workforce may not correspond to local needs.  Enerjisa will put in a place a program to train local people to take up higher grade employment. Trained/qualified local workforce from construction phase will be transferred to other Enerjisa projects depending on job availabilities.	 Beneficial
Impact on livelihoods	Reservoir area, construction site, camp site	The project will also affect the PAPs in terms of their livelihoods. The PAPs that will be physically displaced will also be affected by economic displacement. Economic displacement depends on the size of land loss, and limited access to natural resources (such as water sources, electricity, pastures etc.). Furthermore, some of the PAPs that do not lose any land to the Project may be economically displaced due to restricted access to communal pastures.	 Significant Adverse	The Project has prepared a RAP in order to minimise adverse impacts of land acquisition and to ensure that all livelihoods are restored. In addition to cash compensation, Enerjisa will provide additional support to PAPs in order to improve agricultural production. Specialised programs catered to each settlement will be devised with the support of advisors/consultants. The aim of the program is to achieve higher agricultural productivity in a limited amount of land so that land loss does not instigate income loss for the PAPs. Capacity building trainings and workshops will also be given to PAPs that prefer employment in sectors other than agriculture depending on PAP's preference.	 Neutral
Land loss	Reservoir area, construction site, camp site Construction and Operation	The Project will acquire 5,751 ha of land in total. Private land constitutes 1,862 ha and comprises approximately one third of the total land required for the Project. Loss of land is significant for all of the PAPs because the economy is rural and land based. Hence, land loss has direct impact on the livelihoods of the PAPs.	 Significant Adverse	There is a RAP devised in order to mitigate adverse impacts from land loss. Even though land acquisition will be completed by expropriation, Enerjisa commits to full capitalization value for land. Enerjisa will also mitigate by livelihood restoration and community development programs to ensure that land based livelihoods are not adversely impacted by the Project.	 Neutral
Home loss	Reservoir area, construction site, camp site Construction and Operation	The Project will inundate 344 homes; 4 villages will be completely inundated and 2 villages will be partially inundated by the Project. The PAPs impacted by resettlement will have to resettle to new settlements, urban or rural depending on their preference.	 Significant Adverse	The RAP illustrates the resettlement strategy for the PAPs that lose their homes. Enerjisa abides by EBRD PR 5 to ensure that no PAPs will be left without adequate housing as a result of the Project and livelihoods are fully restored to pre-Project conditions or improved	 Neutral

Environmental and social issue	Phase/Project Component Causing Impact	Description of Impact	Potential Impact Significance	Mitigation	Residual Significance
Pasture loss	Reservoir area, construction site, camp site Construction and Operation	Within the scope of the Project, 21 villages' pasturelands will be affected. There are 120 parcels (1,604 ha) that will be acquired by the Project. Pastures are significant for the PAPs as livestock management is a critical source of income. Loss of pasture will adversely impact PAPs.	 Significant Adverse	The RAP identifies mitigation strategy for pasture loss. Enerjisa makes necessary payments to the Treasury for pasture acquisition. Enerjisa will cooperate with Provincial pasture committee to develop strategies to mitigate losses to PAPs and this could include measures improve remaining pastures in order to achieve higher yields to compensate for lost hay.	 Neutral
Impact on education	Fully inundated settlements in the reservoir area (4 settlements) Construction phase	Seven schools will be lost due to the inundation of some villages. The resettlement process may interrupt the education at these villages, and impoundment of the reservoir lake may coincide with education year.	 Significant Adverse	The resettlement of the homes will follow school terms to ensure that education of the school children will not be interrupted during resettlement process. In case there is a new resettlement site, Enerjisa will construct a new school to avoid interruptions to education.	 Neutral
Impact on education	2 km surrounding reservoir area, and partially impacted settlements and settlements that lose land only Construction and Operation	Enerjisa supports education by continuous renovations to schools, and distributes school material to primary school students in all settlements affected by the Project.	 Beneficial	The Project's impact on education will be positive. Renovation activities have been undertaken at schools. Better education opportunities have positive impact on the motivation of the students.	 Beneficial
Downstream irrigation	Downstream impacts Construction and Operation	There is Arincik irrigation scheme downstream of the Project, which may be adversely impacted if the Project does not release enough life water for the operation of the Weir.	 Significant Adverse	Enerjisa will ensure that sufficient water will always be released to meet environmental flow and irrigation requirements.	 Neutral
Road impact	Road construction Construction phase	During the construction of roads there will be dust, noise and increased traffic, and possible disruptions to daily traffic flow. Increased traffic in the area and construction pose threats to animal well-being and also the water usage of the animals can be constrained due to the limited access to river due to construction activities.	 Significant Adverse	Enerjisa implements strict health and safety standards to reduce risks to community safety for road related accidents. Enerjisa will compensate for losses to crops or assets caused by road construction through the Resettlement Action Plan.	 Minor Adverse
Road impact	Roads Operation phase	New access roads and bridges will be built during construction and current village roads will be renovated which will ease access for villagers using them and this is a positive effect on quality of life of the PAPs. Road quality will be improved significantly, increasing community health and safety.	 Beneficial	The Project's impact on roads will be positive, since Enerjisa will build new, wider roads that will improve access and mobility in the Project area.	 Beneficial

Environmental and social issue	Phase/Project Component Causing Impact	Description of Impact	Potential Impact Significance	Mitigation	Residual Significance
Quality of life	Construction area	There will be temporary impacts caused by the construction activities of the Alpaslan II Project. During the construction period, there will be use of heavy machinery, blasting, heavy truck movement through affected villages, and other construction related factors, which will have temporary adverse impact on PAPs. These impacts can be categorised as; noise and dust, damage to crops and land, damage to buildings, and landslides. Blasting, road works, stone quarries and construction vehicles cause an ongoing noise that is inharmonious with the rural life. The rural landscape may change from a serene settlement to a noisy construction site. The villagers may be unhappy with the noise and pollution caused by construction.	 Significant Adverse	The Project ESIA describes various measures to ensure that people's quality of life is not affected. These include noise and air quality control mechanisms, awareness raising and the implementation of the Resettlement Action Plan. These measures together with careful regional development planning will avoid or limit potential cumulative impacts on people's quality of life.	 Minor Adverse
Impact on cemeteries	Reservoir area	The cemeteries in settlements that will be fully inundated will be impacted.	 Significant Adverse	Enerjisa will relocate all cemeteries that will be inundated prior to impoundment according to Turkish regulations. RAP provides detailed information on the procedures for relocation of the cemeteries.	 Minor Adverse
Social tensions and community ties / cohesion	Area of Influence Construction and Operation	During construction period there may be social tensions between local communities and migrant workforce due to cultural differences.  Resettlement to host communities in rural and urban resettlement sites may lead to social tensions due to a number of factors including increased demand on local resources. During operation phase, Project will monitor carefully for any potential increase in social tensions. This will be monitored by the Project.  Community ties may be adversely impacted especially for physically resettled populations. The four fully inundated villages have a risk of social disintegration. Moreover, host communities may not welcome displaced households and may lead to further community tensions.	 Significant Adverse	Enerjisa follows strict guidelines to ensure fair employment policy. Any potential tension is mitigated within workers code of conduct policy. Host community issues are mitigated through Enerjisa's resettlement policy in RAP. Enerjisa's RAP policy ensures that PAPs are resettled with their communities depending on their preference in order to keep community ties and social integration.  Continual monitoring and the work of the community liaison officers will inform the Project, should social tensions arise in the future.	 Minor Adverse
Impacts on vulnerable groups	Reservoir area, roads, downstream impacts	Vulnerable groups such as women, children, elderly, disabled, poor, homeless and landless face particular risk due to the resettlement impact of the Project.	 Significant Adverse	The RAP document describes in detail mitigation measures undertaken for the vulnerable groups. Enerjisa assures that vulnerable groups are assisted, and monitored throughout the resettlement process. Enerjisa has public information mechanisms in place for children's health and safety as outlined in the SEAP document.	 Minor Adverse

Environmental and social issue	Phase/Project Component Causing Impact	Description of Impact	Potential Impact Significance	Mitigation	Residual Significance
Community health and safety	Reservoir area, road construction, rock quarries and downstream impacts Construction phase	Community health and safety is critical especially in the construction zone of the Project where heavy machinery and trucks operate constantly. The PAPs in the vicinity of the Project's construction zone may be adversely impacted by the heavy truck load, especially children playing on the streets. Explosions at the rock quarries may disturb the daily life and falling rocks may pose threats to health and safety of those homes nearby rock quarries. Gocmenler quarter, which is very close to construction site, is at risk on community health. Likewise, Kusluk settlement will be adversely impacted by blasting.	 Significant Adverse	Enerjisa abides by national and international health and safety guidelines to minimize any potential adverse impact of the Project. The public is informed prior to blasting and noise levels are monitored daily. Enerjisa puts in place various measures to avoid impacts associated with traffic movements including dust control, maintaining speed limits, driver training, etc. Enerjisa has in place a grievance mechanism through which the public can raise any concerns associated with the Project. Concerns are addressed as quickly as possible.	 Minor Adverse
Community health and safety	Downstream impacts Operation Phase	<p>During operation phase, community health and safety will be critical for downstream settlements of the Project. One of the impacts of the Project will be daily water level fluctuations from minimum levels to maximum levels depending on the peaking of the production. As the change in fluctuation will be abrupt, it may impact the water users downstream by:</p> <ul style="list-style-type: none"> <li>■ Health and safety concerns for children that use the riverbeds during summer months for recreation;</li> <li>■ Safety concerns for those that use the river for navigation,</li> <li>■ Flooding damage to the islands if they are being cultivated by PAPs<sup>5</sup></li> <li>■ Health and safety concern for the PAPs that use Arincik regulator picnic area</li> <li>■ Animal health and safety concern for those PAPs that water their livestock by the river<sup>6</sup></li> </ul> <p>On the positive side, the Project's flood control component will protect the downstream settlements from flooding.</p>	 Significant Adverse	In order to mitigate potential health and safety downstream impacts, Enerjisa will collaborate with DSI to inform people downstream of the Project about the downstream health and safety risks.	 Neutral   Beneficial

<sup>5</sup> This impact will be assessed during field trip scheduled for April 2014.

<sup>6</sup> This impact will also be assessed during the field trip

Environmental and social issue	Phase/Project Component Causing Impact	Description of Impact	Potential Impact Significance	Mitigation	Residual Significance
<b>Cultural Heritage</b>					
Known archaeology	Construction of Project	Four archaeological sites of 1st degree classification of the Ministry of Culture and Tourism would be affected due to the Alpaslan II reservoir and the construction of the relocation road.	 Significant Adverse	Archaeological excavations (which will be done under the control of the Turkish authorities) will be completed prior to impoundment of the reservoir and construction of the relocation road. Conservation measures will be developed for each site based on the results of the excavations. Mitigation measures are likely to include recording, preservation. One site (Tepekoy Tumulus) will be completely inundated while Kayalidere Castle and Mescitli Village Kiz Castle will be partially inundated. Dogdap Castle will not be affected by the reservoir. The relocation road route is currently being revised to avoid impacts to Dogdap Castle.	 Significant Adverse
Unknown archaeology	Construction of Project	Probability of encountering assets or sites that can be discovered during construction works at the construction sites of dam and HEPP, ETL and relocation roads.	 Significant Adverse  <i>*subject to findings</i>	A chance finds procedure will be implemented in line with the requirements of the Ministry of Culture and Tourism.	 Significant Adverse  <i>*subject to findings</i>
Other cultural heritage assets	Construction and operation of Project	Need to relocate cemeteries and graves in the area to be impounded. Potential effects of ETL (not yet known). Other effects on other tangible and intangible cultural heritage.	 Significant Adverse  <i>*subject to further investigation</i>	<p>Enerjisa will investigate, and assess the impacts to, cultural heritage in the Project area together with the relevant authorities in line with local legislation and with the EBRD's PR 8. This will include the development of a Cultural Heritage Management Plan that includes specific measures to avoid, and where avoidance is not possible, manage impacts to cultural heritage appropriately as well as consultation with local communities. These ongoing investigations will consider the whole Project including the reservoir area, the ETL route and pylon footprints and the relocation road corridor. Both tangible and intangible cultural heritage will be considered.</p> <p>With respect to the cemeteries and graves which are present in the area impounded by the reservoir, Enerjisa will prepare a strategy for the relocation of these sites. Recognising the sensitivity of this issue, all decisions will be made with the close participation of local communities.</p>	 Significant Adverse  <i>*subject to further investigation</i>

## Additional studies to be carried out

As explained in the Preface to this NTS there is a need for a number of targeted studies to improve our understanding of certain effects associated with the Project and refine the proposed mitigation and management measures (as explained in Section 7 below).

All of the additional information requirements and actions are set out in the ESAP together with associate timelines. The results of these studies will be disclosed as per the Stakeholder Engagement Action Plan. In summary, the main additional studies are as follows:

- **Social Impact Assessment** - the Social Impact Assessment (SIA) carried out so far has been mainly for the area impacted directly by the footprint of the Project (the dam and reservoir area). Investigation of conditions and impacts in the wider area of influence has so far relied on secondary data and on discussions with the village muhtars. A detailed field investigation is planned for April and May 2014 and this will provide comprehensive information on the socio-economic situation in the area of influence and how potential impacts can be mitigated. Enerjisa will then update and refine the SIA and Social Management Plan (SMP).
- **Resettlement Action Plan** – Enerjisa will develop the preliminary RAP into a full Resettlement Action Plan (RAP) covering all aspects of the Project including the impoundment and dam construction area, the ETL and the corridors of the relocation roads. The RAP will provide a detailed entitlement matrix. In the entitlement matrix and elsewhere, the RAP will set out compensation measures which ensure replacement value in line with the EBRD's performance requirements according to the type of impact suffered. Particular attention will to be given to women, many of whom are landowners in their own right.
- In addition, Enerjisa will prepare and implement a **Livelihood (economic) Restoration Framework** (LRF). Livelihood restoration will be a combination of agricultural support, training with direct access to employment where possible, small business development, micro-finance, and other similar measures.
- **Cultural heritage** - For the Project, the authorities, including special committees formed under the General Directorate of Cultural Heritage and Museums, have conducted various studies and have identified four archaeological/cultural heritage assets in the Project area. Investigative work on these assets, and the wider Project footprint, is on-going. In addition, there are cemeteries and graves in the area to be impounded and these will need to be relocated. Enerjisa will continue to investigate, and assess the impacts to, cultural heritage together with the relevant authorities.

This will include the development of a Cultural Heritage Management Plan that will include specific measures to manage impacts to cultural heritage in consultation with local communities.

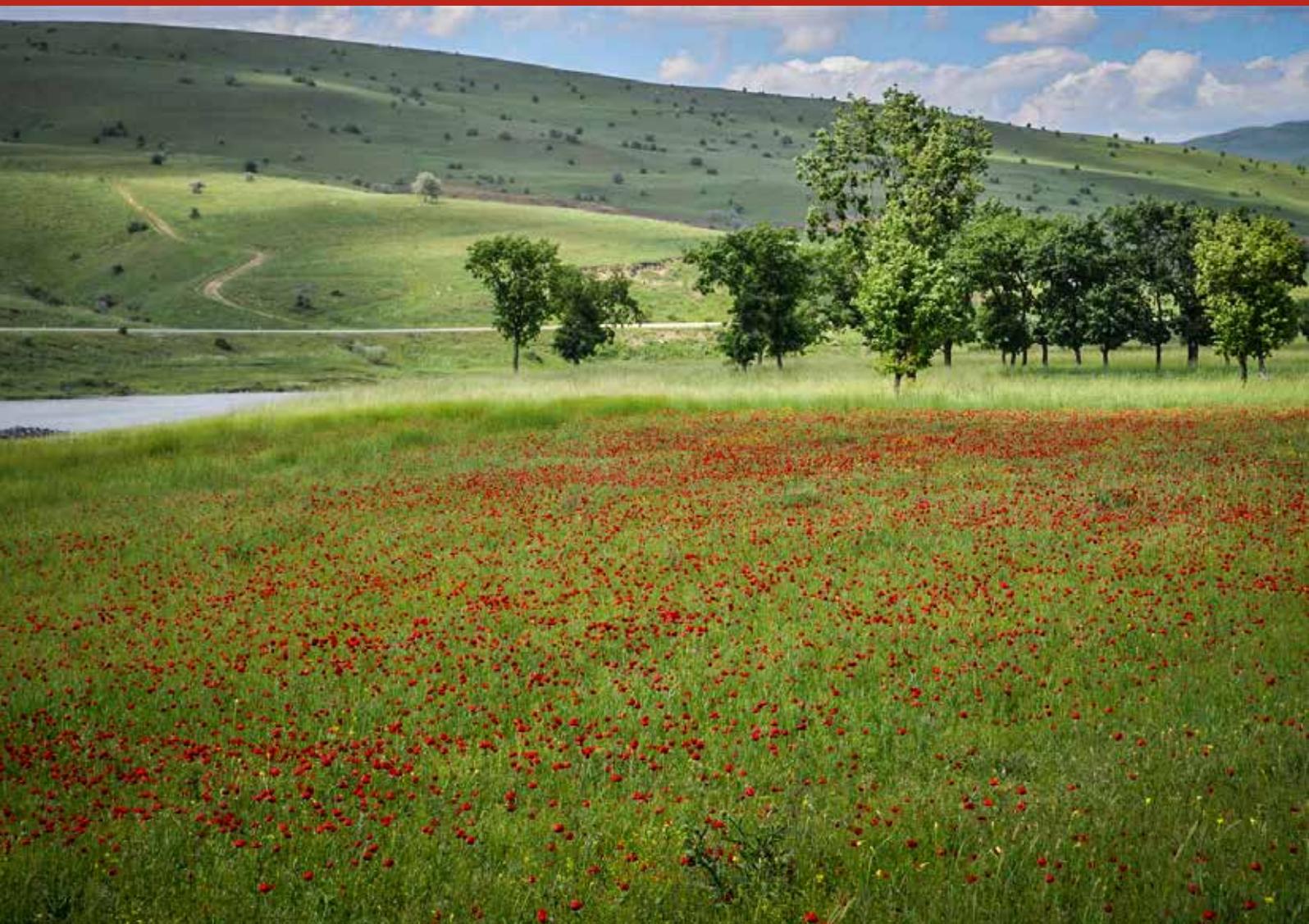
- **Downstream effects** - Enerjisa will develop a detailed hydraulic model of the downstream reach of the Murat River potentially affected by the Project. Enerjisa will use the model to further identify and evaluate downstream environmental, social, health and safety risks from the construction and operation of the Project including dam, and cofferdam, failure. The results will inform updates to the ESMP and other plans (see Section 7 below). Based on the results of the model, a downstream erosion prevention plan will be prepared in consultation with DSI including measures to address any erosion as well as a detailed emergency response plan and public awareness plan
- **Fish** – based on the hydraulic model outputs as described above, Enerjisa will further assess whether the changes to the river will adversely affect fish downstream, in particular during the breeding season. On this basis, Enerjisa will revise the Biodiversity Action Plan to implement a habitat restoration program if fish habitats are affected. Enerjisa will develop a system of 'catch and truck' to reduce impacts on fish movements.
- **Reservoir hillside and bank stability** - Enerjisa will further assess the potential erosion and hillside stability risk areas around the reservoir edge. If risks are identified additional measures will be put in place (e.g. tree planting) and, based on the outcomes of the assessment, they will monitor reservoir bank and hillside stability during impoundment and operation.
- **Environmental Impact Assessment (EIA)** of the ETL – as explained in the Preface to this document, a full EIA of the ETL will be completed by the Turkish Electricity Transmission Company (TEIAS) according to Turkish EIA Regulations.



# 6

# Other Effects of the Project

Transboundary and Cumulative



## Will there be any effects outside of Turkey?

The Project is located on the Murat River, which forms a sub-basin and is major tributary of the Firat (Euphrates) River Basin (see Figure 1). The Euphrates River flows from Turkey through to Syria and then through Iraq to join the Tigris in the Shatt al-Arab before emptying into the Persian Gulf. Due to the nature of the Project, and its location on a tributary of a transboundary river, there is the potential that the Project could result in adverse effects outside of Turkey. A detailed study was undertaken by the Project to examine potential transboundary effects. The conclusions of the transboundary study were as follows:

- The Project filling period is expected to last around ten months. There will be no adverse impacts on transboundary water availability during this period due to Turkey's application of the 1987 Protocol, agreed between Syria and Turkey, which requires that Turkey guarantees a minimum flow (500 m<sup>3</sup>/s) in the Euphrates River at the border with Syria. Turkey technically has the ability to maintain this flow using the regulation capacity of existing large reservoirs downstream of the Project.
- During operation Project inflows will be turbined or discharged through the spillway and returned to the river downstream of the dam. As such, there will be no water consumption during operation other than evaporation from the reservoir surface. The net loss from the reservoir due to evaporation has been estimated as an annual average of 20.77 hm<sup>3</sup> (million m<sup>3</sup>). This evaporation loss represents 0.066% of the average annual potential of the Euphrates River at the border with Syria. Considering that this amount of losses is negligible, and taking into account the applicability of the '500 m<sup>3</sup>/s' rule at the border with Syria during the operation period, the Project is expected to have no significant adverse transboundary impact on water availability downstream during its life.
- Any impact on river flow characteristics, sediment movement and water quality downstream of Alpaslan II will be localised, and will be absorbed or diluted by the downstream reservoirs, with consequently no adverse transboundary impacts.
- A flood wave resulting from a worst case scenario failure of the Alpaslan II cofferdam during construction can be safely accommodated in the downstream reservoirs, notably Keban Dam, with no adverse transboundary impact.
- The risk of cascade dam failure resulting in a transboundary flooding impact already exists due to the presence of the dams upstream and downstream of Alpaslan II. Construction of Alpaslan II results in a marginal incremental increase in this risk, and will not change the overall status of the cascade of dams in terms of tolerability of risk

## What are the likely cumulative impacts with other projects?

The ESIA prepared for the Project considered the effects of the Project within a defined area of influence. However, there are a number of other major projects in the vicinity of Alpaslan II including other dam and HEPP proposals, as well as major irrigation and transport developments. Therefore, a Cumulative Impact Assessment (CIA) Study was prepared to identify and assess the potential cumulative environmental and social impacts that may result from the Project acting together with other reasonably foreseeable future projects (upstream and downstream of Alpaslan II) in the wider river basin.

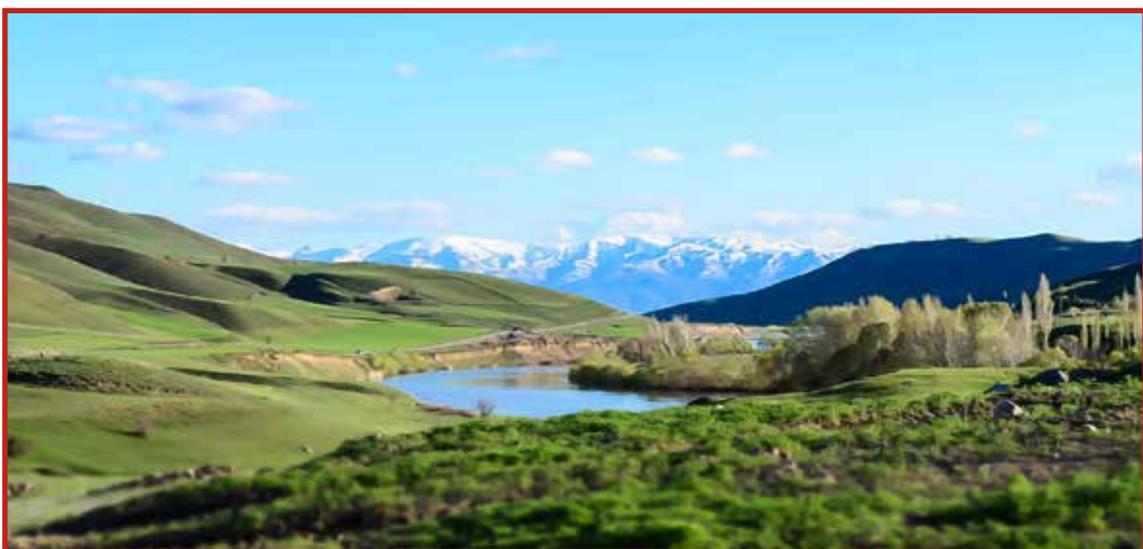
The CIA assessed the potential environmental and social cumulative impacts (i) during the construction phase of Alpaslan II focusing on the impoundment stage, (ii) during operation using a timeframe of 20 years to capture the long term effects on the study area.

All environmental and social issues (such as hydrology, water quality, air emissions, GHG emissions, aquatic and terrestrial flora/fauna, cultural heritage, land and other immovable assets) within the scope of the Project ESIA have been screened against the type of projects (such as upstream/downstream hydropower, upstream/downstream irrigation) within the CIA study area to identify the potential cumulative environmental and social impacts that could occur. As a result of this analysis, the environmental and social key issues where cumulative impacts could occur were identified as:

- **Hydrology.** During construction there is a potential cumulative impacts should Alpaslan II being filled at the same time as the Kalekoy Dam (see Figure 2 above). DSI will have the responsibility to co-ordinate the filling of the two dams to ensure that the minimum agreed environmental flow of water in the river is maintained.
- **Water quality and sediment transport.** The development of irrigation projects upstream and downstream of Alpaslan II could result in a degradation of the quality of water due to residues of fertilizers and pesticides running off from agricultural land and entering the Murat River. Sediment transport along the river will be modified due to the barrier effect of each dam and the regulation of flows.
- **Aquatic flora/fauna.** There are a number of dams proposed which will increase the extent of modified aquatic habitats on the Murat River. These will adversely affect river habitats and species but benefit lake dwelling species. The movement of fish will be further restricted.

- **Terrestrial flora/fauna.** The future projects in the region have the potential to further alter the ecological character of large areas of land. Many of the habitats and species affected by Alpaslan II are common in the locality, however, given the scale of land use changes which would take place if all the projects were realised there is the potential for adverse cumulative effects. There is also the possibility that endangered and vulnerable species may be affected by other projects resulting in adverse cumulative effects at a regional scale.
- **Landscape and visual impacts.** The Project will change the landscape through the presence of a large reservoir, the ETL and the relocated road. This change will further contribute to the changes in the landscape from other proposed developments in the area including hydro projects that would introduce more large water bodies into the valleys together with changes in nearby land use through activities such as irrigation and agriculture.
- **Socio-economics.** The proposed dam and transport projects will result in the permanent loss of land (predominately agricultural) and additional people will need to be resettled in the wider area. This could lead to pressures and tensions on existing communities as well as social facilities. It is something that needs to be managed carefully as successive projects come on board. It is hoped that in the longer term, the large scale irrigation projects will more than compensate for the loss of agricultural land. Equally, the various projects in combination, in particular the transport project will create opportunities for economic growth and diversification of the local economy out of agriculture into other sectors.

The CIA sets out recommendations to relevant stakeholders so that they can better manage cumulative impacts and improve the planning of regional and local development programmes.



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How will  
Enerjisa Mitigate  
and Manage  
Environmental and  
Social Impacts?



## How will impacts be avoided and managed?

One of the key objectives of ESIA is to define mitigation measures to avoid, minimise, offset/compensate or otherwise manage adverse environmental and social impacts associated with the Project. Key mitigation measures and actions developed for the Project are summarised in Table 1.

Project mitigation measures and actions are described in a series of management plans including:

- Environmental and Social Management Plan (ESMP) – including some standalone addendum EMP and SMPs.
- Various topic specific management plans such as plans for erosion prevention, biodiversity, etc.
- Resettlement Action Plan
- Stakeholder Engagement Action Plan

These documents all draw on the outcomes of the Project ESIA and are aligned with Enerjisa's own environmental and social management requirements. Further, these are 'living' documents which will be updated as required to ensure that they are effective.

Enerjisa, and its contractors, will implement the measures and actions described in these documents and monitor their success through the different Project phases. The measures will be adapted or changed if required. Contractors will also be required to develop their own task specific management plans that are aligned with the Project management plans. Enerjisa will monitor their implementation during the construction of the Project.

The ESMP, and its addendums, defines measures for the whole Project including the dam, HEPP, ETL, roads and supporting facilities. It also extends beyond these directly impacted areas to consider the area downstream of the Project. The ESMP is supplemented with topic specific plans that focus on particular issues such as the need to prevent erosion and rehabilitate construction areas. The RAP on the other hand defines specific measures and processes that will be followed for the settlements affected by the reservoir area including the process of land acquisition and compensation. The SEAP sets out the programme for engaging with and providing information to stakeholders and public, including awareness raising to avoid safety risks, and further defines a means with which the public can raise concerns about the Project.

In addition to these various plans, Enerjisa has agreed in principle with the EBRD on an Environmental and Social Action (ESAP). The ESAP sets out a number of key actions that need to be implemented by Enerjisa to meet the EBRD's Performance Requirements during the life of the Project. Some of these actions require further studies that need to be undertaken during the disclosure period prior to consideration of the Project by the EBRD's Board of Directors while others need to be implemented prior to the filling of the reservoir and during construction and operation. Where additional studies and assessments are conducted, the outcomes thereof, together with relevant Project updates, will be disclosed as per the Stakeholder Engagement Action Plan. Each action in the ESAP has an associated timeframe.

## How will Enerjisa and its Lenders ensure that commitments are met?

Monitoring is an important part of environmental and social management. Careful monitoring of the Project and its effects will allow Enerjisa to determine whether the impacts have been correctly predicted through the ESIA process, the effectiveness of the developed mitigation measures and the need to develop new measures if required or indeed change how certain elements of the Project are implemented or operated. Monitoring also allows the Project to report on its environmental and social performance and on its commitments to the authorities, its Lenders and other stakeholders.

Enerjisa has defined monitoring requirements that it will implement during the life of the Project. Monitoring activities will focus on specific issues, such as the closure and reinstatement of quarries for example. Monitoring activities will be conducted by Enerjisa as well as third party specialist companies. These companies will be required to report to Enerjisa on a regular basis.

Enerjisa will in turn be required, during construction, to submit quarterly updates to the EBRD and Garanti Bank on progress made against the ESAP and its general environmental and social performance. During operation this will reduce to annually.

The Lenders will conduct monitoring of the Project including visits to the Project site. This will involve the use of independent monitoring consultants that will focus on environmental and social as well as the technical aspects of the Project.





What are the proposals for resettlement and restoring livelihoods?



The Project will cause physical and economic resettlement of people and settlement due to the formation of the Project reservoir or artificial lake as well as the construction of the ETL and road. Physical resettlement refers to the physical displacement of people by a project while economic resettlement refers to a loss of income or livelihood through an interruption or elimination of a person's access to their employment or to productive assets such as land. In order to avoid, minimise and mitigate potential adverse impacts associated with resettlement, Enerjisa has prepared a preliminary Resettlement Action Plan (RAP) in line with the international guidelines and the EBRD PR 5 and which sets out specific requirements for resettlement. At this stage the RAP which is more than a framework is still to be regarded as preliminary. This RAP will be developed into a full RAP, including supporting documents and plans, prior to land acquisition and resettlement. Separate RAPs would be developed for the ETL and relocation road or included in the main RAP.

## What is a Resettlement Action Plan?

The Resettlement Action Plan (RAP) presents the framework and procedures required for land acquisition and/or land use, and involuntary resettlement.

The RAP is prepared with the aims of:

- Eliminating and/or minimising the adverse impacts of land acquisition and the resettlement process,
- Identifying opportunities for development,
- Establishing a new zoning budget and programme, and determining the rights possessed by affected people of different statuses (including homeowner communities).
- Presenting the legal and corporate framework which is planned to be implemented by Enerjisa.
- Defining the grievance mechanism and creating a monitoring and evaluation framework in order to monitor the RAP.
- Budgeting the costs of each budgeted item for RAP activities.

The RAP follows EBRD PR 5, with an objective to "improve or at a minimum, restore the livelihoods and standards of living of displaced persons to pre-project levels"<sup>7</sup>. In order to achieve this, Enerjisa is devising a livelihood restoration strategy that entails a community development program. Enerjisa will give special attention to vulnerable groups within the PAPs.

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EBRD PR 5, para 6 p. 35 [http://www.ebrd.com/downloads/about/sustainability/ESP\\_PR05\\_Eng.pdf](http://www.ebrd.com/downloads/about/sustainability/ESP_PR05_Eng.pdf)

## How was the RAP undertaken?

The RAP uses both quantitative and qualitative methods to understand the socio-economic baseline of Project Affected Peoples (PAPs). A team of consultants visited the Project area on three separate occasions to conduct household census surveys, socio-economic baseline surveys and private sector and pasture use assessments. In addition to the



surveys, focus group meetings and in-depth interviews were carried out with PAPs that supported the findings of the quantitative data with observations, and opinions of the PAPs. Consultation with NGOs, public and private sector stakeholders were held in order to devise a RAP that not only reflects the priorities of the PAPs but devises mitigation mechanisms to alleviate potential adverse impacts. Existing published information on the Project area was also used to support the field findings.

## What is Enerjisa's resettlement strategy?

The RAP describes the land acquisition process in detail and sets out Enerjisa's strategy based on:

- Income restoration based on present value of income for land and full replacement value for homes.
- Continuous consultation with PAPs.
- An active stakeholder engagement strategy.

## How does the land acquisition take place?

The land acquisition process for the Project is conducted in two stages. First stage land acquisition covers parcels affected by the dam body and construction area (the dam site). These parcels were acquired by willing buyer seller negotiations. The second stage covers 19 villages, which will be incrementally affected during the impounding phase. The land acquisition of these parcels will be conducted according to Article 27 of Turkish law on expropriation. The reasons for expropriation are:

- The parcels have multiple land owners and there is difficulty in reaching all these owners. Registers of lands are outdated and land title transfer procedures are taking a long time.
- The limited capacity of the land registry cadastre in the center of Muş Province and the limited number of employees in the land registry cadastre to realize the purchase and sale procedures for 15 villages would delay the construction period and adversely affect the Project.

## What is Enerjisa’s compensation policy?

The Project Affected People will be compensated based on replacement values. Different options on the actual compensation package will be presented as outlined in the RAP. In addition to the compensation, be it cash or in-kind, Enerjisa will devise an income/livelihood restoration strategy to ensure sustainable restoration of livelihoods. Support will also be given to assure safe physical resettlement. Some of the in-kind resettlement options that will be offered by Enerjisa include:

- PAPs that are physically resettled:
  - Moving allowance
  - Moving assistance
  - Housing assistance for the homeless and vulnerable
  - Training programs on construction (such as welding),
  - Women’s capacity building,
  - Youth technical training
  - Transferrable skills for PAPs that prefer urban resettlement
- For PAPs that are economically resettled:
  - Community development program for rural development is under preparation
  - Pasture improvements
  - Trainings and courses for youth, women for capacity building

9 If we have a complaint, how can we let the Project know?



## What can I do if I have a grievance or comment on the Project?

Should additional information be required or should you have a concern or comment, Enerjisa can be contacted in the following ways:

### **Alpaslan II Project Office at the Dam site:**

Address: Mus- Varto Karayolu 40 km Dumlusu Koyu Mevkii

Tel: +90 436 711 33 77

### **Enerjisa Community Relations Officer:**

Mr. Murat Yağcı

Mobile: +90 530 016 48 12

E-mail: [murat.yagci@enerjisa.com](mailto:murat.yagci@enerjisa.com) / [alpaslan@enerjisa.com](mailto:alpaslan@enerjisa.com)

The complaint mechanism designed and used by Enerjisa to receive, review, respond to and monitor grievances, complaints and enquiries is as follows:

- Grievances are collected by the Enerjisa community relations officer through monthly/bi-monthly visits to Project affected villages and the PAP's visits to the Project office. The community relations officer records the grievances raised, and the minutes of any discussions, during these visits and send them to the Project Manager, Site Manager and the Social Specialist at Enerjisa's head office. Grievances are also received by telephone and via email and recorded
- Specific grievance forms can also be obtained from the village mukhtars. Verbal complaints are received at the one-to-one meetings and/or by the petition.
- Attempts are made to close all open grievances within one month. If this is not going possible, the PAP making the complaint is informed within that month that the period should be extended.
- Once a grievance has been address and responded to, the person who submitted the grievance is asked to sign a completion form.
- All complaints are recorded in an Excel database, together the actions followed and the outcomes.



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