

Appendix 7-5
Initial Environmental Examination
(IEE)

Appendix 7-5-1

DRAFT

**INITIAL ENVIRONMENTAL
EXAMINATION (IEE)**

FOR THE

**ALTINKAYA PUMPED STORAGE
POWER PLANT PROJECT**

January, 2011

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1 INTRODUCTION

1.1 Background

The Turkish government has shown a power development scenario in which the power consumption and the maximum power demand will annually increase by 8.4% on average by 2015. Given such a steep increase in the demand and the current generation capacity, construction plan, etc., it is projected that the country would become unable to cope with the peak demand by 2015. In line with such an increase in the power demand, the peak demand will also increase. Therefore, it is urgently required to carefully study an appropriate method for providing sufficient electricity during the peak hours in the future.

For the supply of electricity in the peak hours, pumped-storage power generation is considered as the most appropriate method since it is capable of raising the output in short time and allows the surplus electricity during off-peak hours to be utilized if a certain level of base power source is secured. Pumped-storage power generation requires advanced technologies not only in construction but also operation due to its particularity. However, the Turkish government has no experience in constructing or operating a pumped-storage power plant (PSPP). The Turkish government has a plan to proceed with PSPP development until around 2015, and has requested the Japanese government to provide support for their PSPP development since 2006.

In response to the request, the Japanese government through Japan International Cooperation Agency (JICA) dispatched the JICA Study Team to Turkey in 2010 in order to conduct “The Study on Optimal Power Generation for Peak Demand in Turkey”. The JICA Study Team in cooperation with General Directorate of Electric Power Resources Survey and Development Administration (EIE) identified two candidate sites for PSPP development in Turkey. Altinkaya PSPP Project is one of the candidate sites.

Though there is no obligation to conduct environmental assessment at conceptual design stage according to Turkish regulations, Initial Environment Examination (IEE) for the PSPP Project was carried out to minimize the environmental impacts by the Project from the initial stage as a step of environmental and social considerations.

1.2 Objective of the Study

The objectives of the study are to get initial information of the current situation of the project site, and to initially assess environmental impacts by the Project for effective and smooth implementation of Full-scale Environmental Impact Assessment (EIA) in the next step. This is expected to contribute to minimize environmental and social impacts by the Project.

1.3 Scope of the Study

The following tasks were carried out in this IEE Study:

- Review relevant policies, legislation, regulations and guidelines regarding environmental protection and conservation.
- Collect baseline data and information of the existing physical, biological and social environment around the project area through literature study, preliminary site investigation, and interviews with the villagers and related officers.
- Conduct initial assessment of anticipated environmental and social impacts by the Project.

- Prepare a draft of Terms of Reference (TOR) of Environmental Impact Assessment (EIA), which will be carried out during the feasibility study stage or pre-implementation stage.

It is noted that there will be limitation on accuracy of the potential impacts by the Project since current status of the Project is in pre-feasibility study. In this stage, exact quantity of potential impacts in detailed will not be discussed.

2 PROJECT DESCRIPTION

2.1 Objective and Need for the Project

The Turkish government has been forecasting that the power consumption in Turkey will annually increase by 8.4% on average by 2015. In line with the energy policy of Turkish Government, base-load power sources such as coal-thermal power plants and nuclear power plants will increase. Also, large capacity of renewable energy such as wind power will be developed. In consequence, not only peak-load power sources but also needs of ancillary services for frequency control of the power system will be required.

In order to meet the increase of peak power demand and ancillary service needs, it is expected to take urgent countermeasures.

In terms of power supply in peak hours, pumped-storage power generation is considered as the most appropriate method because it is capable to raise the output in short time and allows the surplus electricity during off-peak hours to be utilized if a certain level of base power source is secured. According to the study on optimal installation capacity of PSPP, 1,800MW of PSPP development by the year of 2030 is recommended to minimize the total generation cost in Turkey.

As for devices for ancillary services, pumped-storage power plant is also considered as the most economical and technically reliable method because of its characteristics.

In consideration of the power development scenario, Altinkaya PSPP Project is expected to be developed as soon as possible as one of the most prospective peak power sources and ancillary services devices.

2.2 Scope of the Project

A PSPP is a power generation facility that utilizes water to generate and store electric power. A PSPP consists of two regulating reservoirs, which are connected by an underground waterway, together with an underground powerhouse located midway along the waterway.

Altinkaya PSPP can generate electric power at the maximum output of 1,800MW for 7 hours with 350 m³/s of designed discharge and 611 m of effective head.

For the PSPP Project, a 79m-high concrete gravity dam will be constructed for the upper reservoir with 0.5 km² of reservoir area; totally 5.18km of an underground waterway will be constructed; and 266,000 m³ of a cavern for the underground powerhouse will be excavated at 473m-deep from the ground surface.

Since the existing Altinkaya reservoir will be used as the lower reservoir, construction of a lower dam is not required.

For the construction of the structures mentioned above and also for the operation of the PSPP, 30km of access and maintenance road will be expanded and newly constructed. The associated transmission line is excluded from this study.

Profiles of the main structures/facilities for the PSPP Project are shown in Table 2.2-1.

As for the operation of the PSPP, the plant pumps up water from the lower reservoir to the upper reservoir during off-peak hours by using electric power generated by other power plants, and then uses the stored water to generate electricity when demand becomes high during peak hours. Therefore, once water has been stored in the reservoirs, it can be utilized repeatedly unlike ordinary hydropower plants, so PSPP can generate electricity every time at its installed capacity regardless rainy or dry seasons.

Table 2.2-1 Profiles of Main Structures of Altunkaya PSPP Project

Description		Unit	Altunkaya PSPP	
General	Installed Capacity	P	MW	1,800
	Designed Discharge	Qd	m ³ /s	350
	Effective Head	Hd	m	611
	Peak Duration Time		hrs	7
Upper Dam and Reservoir	Type			Concrete Gravity Dam
	Height	H	m	79
	Crest Length	L	m	330
	Dam (Bank) Volume	V	m ³	467,000
	Excavation Volume	Ve	m ³	341,000
	Reservoir Area	Ra	km ²	0.5
	Catchment Area	Ca	km ²	60.6
	H.W.L		m	829
	L.W.L		m	802
	Usable Water Depth		m	27
	Effective Reservoir Capacity		mil.m ³	8.9
Lower Dam and Reservoir	H.W.L		m	190
	L.W.L		m	160
	Usable Water Depth		m	30
	Effective Reservoir Capacity		mil.m ³	2,892
Waterway	Intake	L(m) x n	m	Open 60 x 1, Tunnel 99 x 1
	Headrace	L(m) x n	m	2,083 x 1
	Penstock	L(m) x n	m	1,066 x 2 , 110 x 4
	Tailbay	L(m) x n	m	105 x 4 , 112 x 2
	Tailrace	L(m) x n	m	1,694 x 1
	Outlet	L(m) x n	m	Tunnel 37 x 1, Open 45 x 1
	Total Length	Lt	m	5,411
Powerhouse	Type			Egg-shape (Underground)
	Overburden		m	437
	Height		m	56.1
	Width		m	36
	Length		m	213.5
Cavern Volume		m ³	266,000	
Turbine	Type			Single-Stage Francis
	Number		unit	4
	Unit generating capacity		MW	450

2.3 Study Area

The Project site is located in Bafra District, Samsun Province as shown in Figure 2.3-1. The location of the existing Altunkaya Dam/reservoir is on the Kizilirmak River, about 100 km west of Samsun, which will be utilized as the lower reservoir for the Project. The upper dam/reservoir site is located in Baskaya Village, about 20km west of the provincial road along the Kizilirmak River. It is on “Degirmen River”, which is a tributary of the Kizilirmak River through the Ilyasli River.

General layout of the Project is shown in Figure 2.3-2.



Source: picsdigger.com/domain/allexperts.com/

Figure 2.3-1 Location of Project Site

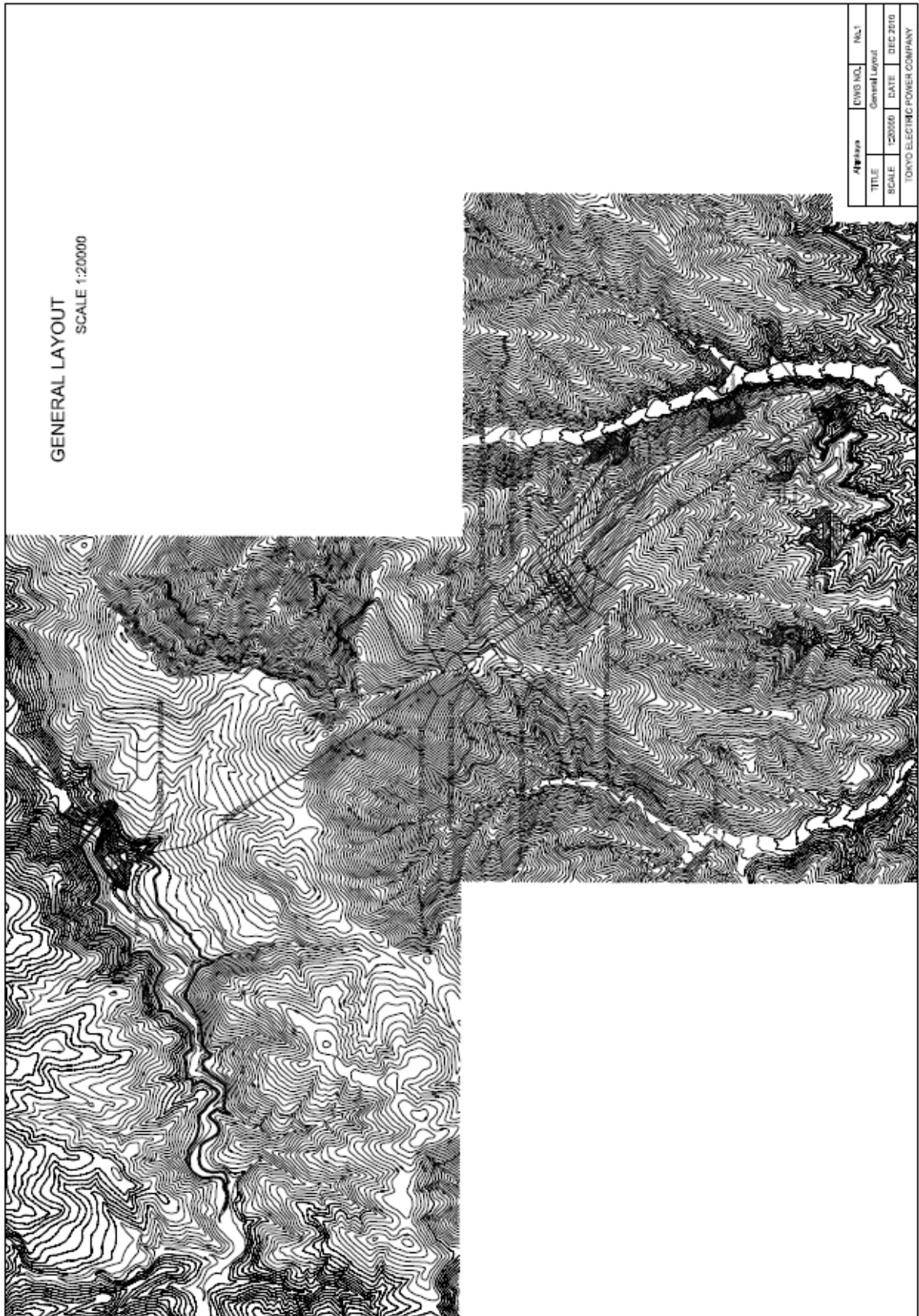


Figure 2.3-2 Layout of Altunkaya PSPP Project

2.4 Project Activities, Timing/Sequence

The assumed implementation schedule is shown in Table 2.4-1. According to the schedule, it will take 13 years from start of Feasibility Study to Commencement of Operation.

Table 2.4-1 Project Implementation Schedule

Years from Start of FS	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Feasibility Study		■	■											
EIA Procedure			■	■										
Fund Arrangement			■	■										
Procurement of Consultant				■										
Detailed Design & Tender Document					■	■								
Tendering						■								
Construction							■	■	■	■	■	■	■	■
Operation														■

The PSPP will be operated for at least 40 to 50 years. If the structures and facilities are well maintained and periodically upgraded, it will be operated more than that.

2.5 Quantity and Quality of Raw Material to be used

Rocks, sand and soils for construction materials are taken within the Project area. Generation equipment and raw materials such as cement, steel and others will be brought from outside of the Project area. Detailed quantity and specification of the materials will be identified during detailed design stage, however, harmful materials to the environment such as Polychlorinated Biphenyl (PCB) must be prohibited.

2.6 Quantity of Waste Products generated by the Project

From previous similar projects, one of wastes generated from the Project would mainly be from clearing vegetation. The local villagers living along the alignment could make use some of these wastes from vegetation e.g. for firewood, raw materials for charcoal production, fencing component as well as using in constructions of farm buildings and animal sheds. As part of the environmental protection procedures, and in order to protect surrounding forests and other natural resources, burning off is not permitted.

Another major waste materials anticipated from the Project is rocks and soils excavated from the Project areas. Some of these rocks and soils will be used for construction materials and/or back fill materials for the foundation; remaining will be left behind. The excavation and disposal materials balance is shown in Table 2.6-1.

The other wastes from the Project should be disposed and/or brought out from the Project site are on contractors' own responsibility.

Table 2.6-1 Excavation and Disposal Materials Balance

Excavation		Utilization		Required Disposal Volume
Rocks	Soils	Aggregates	Disposal	
2,066,852	227,088	596,330	1,697,610	2,285,819

(m³)

2.7 Project Cost

The project cost was approximately estimated as shown in Table 2.7-1.

Table 2.7-1 Project Cost

Cost Items	Amount (million US\$)
Preparatory Works	90,0
Construction Works	398,7
Equipment	409,9
Engineering Services	50,0
Administration Expenses	9,0
Land Compensation and Resettlement	9,0
Contingency	96,7
Price Contingency	96,7
Custom & Duty	41,0
Total Project Cost	1.201
Unit Cost (US\$/kW)	667

3 Policy, Legal, and Administrative Framework

3.1 Organization related to Environment

The main administrative organization for environment in Turkey is the Ministry of Environment and Forestry (MOEF).

In 1991, the Undersecretariat of Environment was merged with the Special Environmental Protection Institution, and thus the Ministry of Environment was established by the Decree in the Force of Law of 443. Further in 2003, the current MOEF was established merging two central bodies: the Ministry of Environment and the Ministry of Forestry. The organic Law of the MOEF (No. 4856) aims to set forth the principles regarding the establishment, organization and responsibilities of the MOEF to expect the followings:

- To protect and improve environment,
- To ensure effective use and protection of lands and natural resources in rural and urban areas,
- To protect flora and fauna, and to develop natural resources of the country,
- To prevent any environmental pollution,
- To harmonize protection and development of forests, and to expand forest area,
- To develop villagers living inside and nearby forests, and to take necessary measures, and
- To meet needs for development of forest products and forest industry.

MOEF has responsibility for International conventions such as Ramsar Convention, and for coordination with other related agencies for environmental conservation. And also, MOEF is responsible for management of all environmental protection areas.

The organizational chart of MOEF is shown in Figure 3.1-1.

The other agencies related to environment are the followings:

- Ministry of Agriculture and Rural Affairs,
- Ministry of Culture and Tourism,
- Ministry of Energy and Natural Resources.

During environmental study and/or Environmental Impact Assessment (EIA) related to land utilization, historical and cultural heritages, and mining resources, coordination with the agencies mentioned above is necessary.

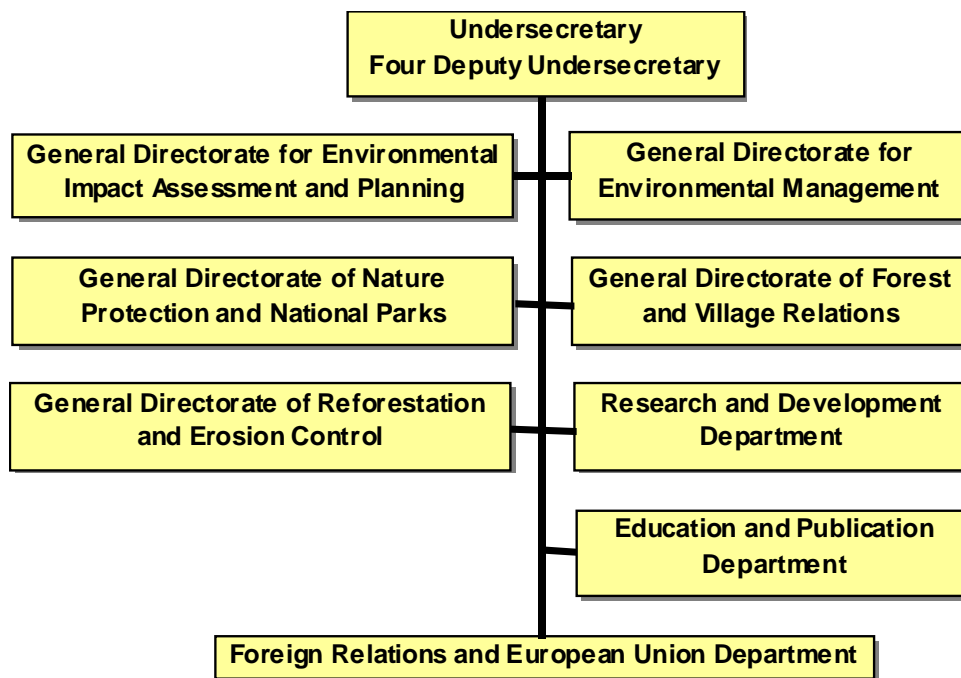


Figure 3.1-1 Organizational Chart of Ministry of Environment and Forestry

3.2 Environmental Legislation

(1) Laws and regulations in Turkey

The law, which governs environmental protection in Turkey, is the Environment Law No. 2872 which was enacted in 1983. The environmental Law shows a fundamental concept on environmental conservation. Since establishment of the Law in 1983, many regulations to support the Law have been established.

Currently effective laws and regulations related to development of pumped storage power plants (PSPP) are as follows:

Laws and Regulations	No.	Establishment
【Laws】		
Environmental Law	2872	Oct. 1983
Fishery Law	1380	Mar. 1971
Amendment of Fishery Law	3288	May. 1986
【Regulations】		
Regulation for Amendments to the Regulation Concerning Implementation of the Convention in International Trade of Endangered Wild Fauna and Flora Species	24623	Dec. 2001
Revised Regulation on Implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (SITES)	25545	Jun. 2004
Forestation Regulation	25515	Jul. 2004
Regulation on Environment and Forestry Council	25622	Oct. 2004
Regulation on Preservation and Development Areas of Wildlife	25637	Nov. 2004
Regulation on Control of Water Pollution	25687	Dec. 2004

Protection of Living Spaces of Game and Wild Animals, Regulation on Harm Struggling Procedure and Fundamental Principles	25976	Oct. 2005
By-law on Environmental Impact Assessment	26939	Jul. 2008

(2) International Convention and Agreement

The government of Turkey has ratified many international agreements. The agreements related to development of PSPP are as follows:

Agreements	Ratification
UN Convention on Biodiversity (CBD)	1997
Convention on International Trade in Endangered Species of Wild Flora and Fauna	1996
International Convention for the Protection of Birds, Paris 1959	1966
Convention on Wetlands of International Importance	1994
Convention for the Protection of the World Cultural and Natural Heritage	1983

(3) Others

In addition to the environmental protection areas designated by Turkish government, Doga Dernegi (DD) has been carrying out designation of Key Biodiversity Areas (KBAs) to protect internationally important places for biodiversity with the support of the “Royal Society for the Protection of Birds.” DD is one of NGOs in Turkey, who is a partner of “Birdlife International”, “International Association for Conservation of Nature (IUCN)”, and also “Alliance of Zero Extinction (AZE)”.

Though MOEF is aware of the KBAs that should be fully considered, the KBAs have not designated as official protection areas so far. Since KBAs are places of international importance for biodiversity at the global level, it should be taken into consideration the possibility that those areas may be officially designated as protection areas in the future.

3.3 Environmental Impact Assessment (EIA) Regulation

(1) Legal Basis

Based on the Environmental Law No. 2872 of 1983, EIA Regulation or Bylaws (No. 21489) came into forth in February 1993. After amendment of the regulation three times, the currently effective By-law on Environmental Impact Assessment (No. 26939) was enacted in July 2008. MOEF has the responsibility for the EIA procedures.

(2) EIA Procedures

The flowchart of EIA Procedures is shown in Figure 3.3-1.

(3) Screening Criteria

Either “Full-scale EIA” or “Initial EIA” is required for project development in Turkey. Project owners are obliged to prepare an EIA report for each project.

Types of EIA depend on types, scale, and location of the projects.

a) Full-scale EIA

Types and scale of projects for which Full-scale EIA is required are defined in ANNEX I of the

bylaws. The criteria related to hydropower development are as follows:

- No. 15: Water storage facilities (dams and lakes with a reservoir volume of 10 million m³ and over).
- No. 16: River type power plants with an installed capacity of 25 MW or more.
- No. 32: Construction of overhead electrical power lines with a voltage of 154 kV or more and a length of more than 15 km (transmission line, transformer center, switch yards).

In addition to those criteria, projects, which are located in the environmentally sensitive areas listed in ANNEX V of the bylaws, are required to conduct Full-scale EIA.

b) Initial EIA

Types and scale of projects for which Initial EIA is required are defined in ANNEX II of the bylaws. The criteria related to hydropower development are as follows:

- No. 27 m): Water storage facilities (dams and lakes with a reservoir capacity of 5 million m³ or more),
- No. 28: River type power plants having 0.5 MW or more installed capacity,
- No. 32: 154 kV or more energy transmission facilities (5 kilometers or more).

(4) Disclosure of Information

Disclosure of EIA Information in Turkey is shown in Figure 5-1-4, and also as follows:

- Announcement to public and request for opinion when application of EIA is submitted,
- Public Participation Meeting for EIA Scope,
- Opening EIA report to public,
- Disclosure of results of EIA evaluation and those reasons.

Though officially required number of public participation meeting is only once, there are some cases that more than tree times of public participation meeting were held for hydropower projects. Therefore, it seems that disclosure of EIA information in Turkey is relatively at sufficient level.

EIA project list and recent EIA reports can be found at the following URLs respectively:

<http://www2.cedgm.gov.tr/dosya/cedsonuckarar/cedsonuc.htm>

<http://www2.cedgm.gov.tr/dosya/cedilkbasvuru/cedbasvurudosyalari.htm>

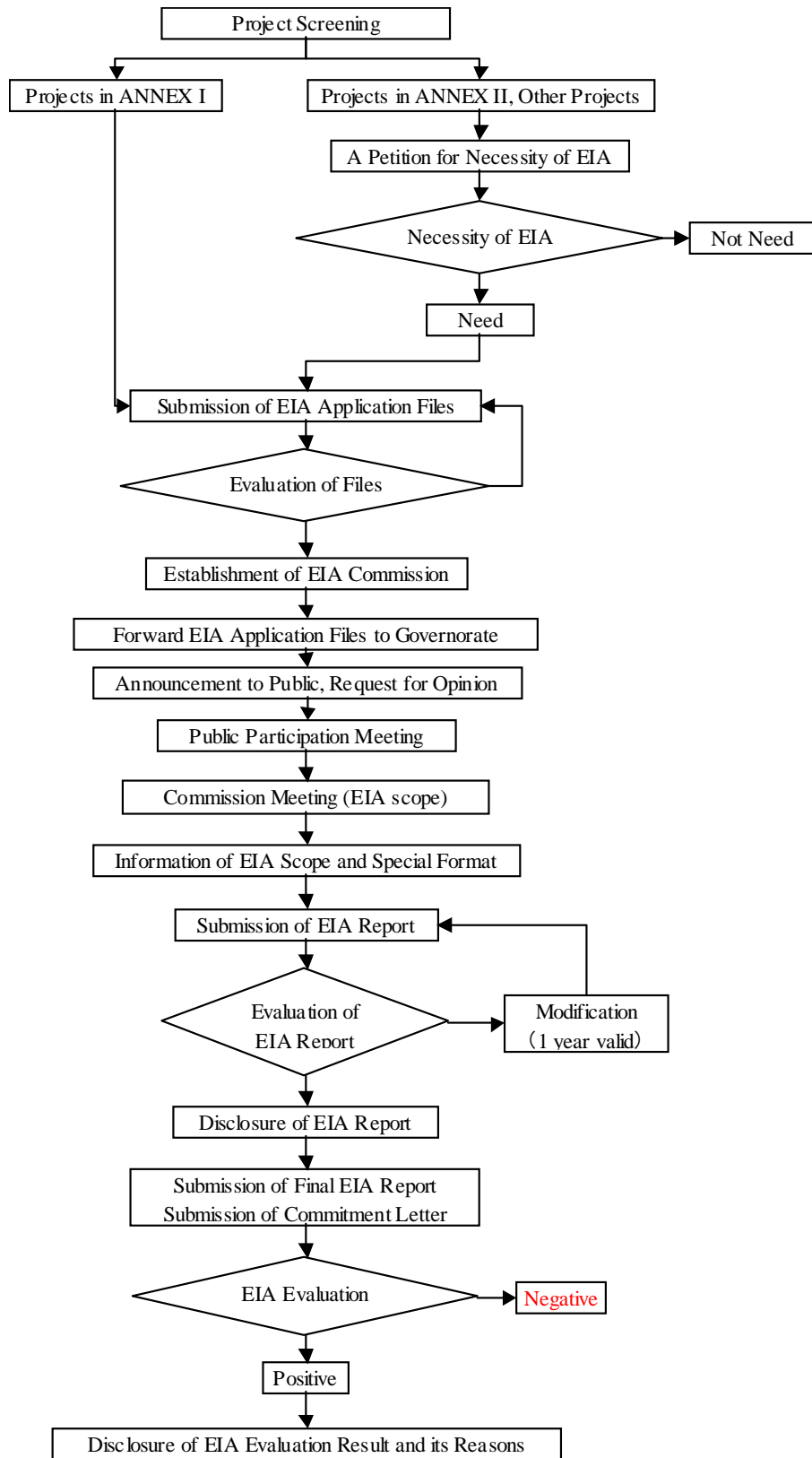


Figure 3.3-1 Flowchart of Environmental Impact Assessment Procedures

4 ENVIRONMENTAL BASELINE OF THE PROJECT AREA

4.1 Physical Resources

(1) Topography

The upper reservoir, lower reservoir, waterways and powerhouse of the Altinkaya PSPP (Site 27-1) are all located in the borders of Kolay County near to Bengü and Baskaya Villages (upper reservoir), Bafra District, Samsun Province. The lower reservoir is the existing Altinkaya Dam reservoir and located on the Kızılırmak River of which length is 1,151 km and rises from Red Mountain in Sivas.

Samsun city is located between the deltas where Yeşilirmak and Kızılırmak rivers run out. The city exists in the middle part of Black Sea's coastal way and has a 9,083 -Km²- area. The city is between 40° 50' and 41° 51' North latitudes and 37° 08' and 34° 25' east longitudes as geographical position.

Samsun City displays three different characteristics in terms of topography. Mountainous part is located in the south; plateaus are between the mountainous part and coastal zone; and coastal savannas exist between the Black Sea and highlands. Bafra and Çarşamba savannas have the highest agricultural production potential, and exist on the delta areas of Kızılırmak and Yeşilirmak rivers.

Bafra is 20 km away from Black Sea, 51 km away from Samsun and average elevation is 20 meters from the sea level. It was established on a savanna which was created by the Kızılırmak River. Bafra Savanna comprises a part of Kızılırmak Delta which opens to Black Sea. And on the south part, it is surrounded by extensions of Canik Mountains. The highest mountain in the region is Nebyan Mountain and its height is 1224 meters. The Kızılırmak River, which is the longest river, passes through these mountains with a deep valley and it reaches to Bafra Savanna. The whole savanna is composed by alluviums which are brought by the Kızılırmak River. Many lakes exist in parts of river which are close to sea.

(2) Soil and Geology

a) Soil Types

Alluvial soils usually exists in Kızılırmak and Yesilirmak deltas, spreading the area of 157.000 hectares. On the other hand, colluvial soils exist in the beds of relatively small creeks in the area of 16 000 hectares. Brown forest soil type is observed in between Alacam and Baspınar, in the north of Vezirkoru District, between Bafra and Taskoy and south of Bafra, in Ladik-Kavak Districts and in the vicinity of Ladik Lake as well as Ayvacık District. Brown forest soil type of which 32 % is available for agricultural production spreads the area of 410 000 hectares in the Province.

In general, alluviums take place in Samsun's young delta savannas whereas old alluviums can be observed in the terraces splitted by steep sides of the mountains. The transition area to mountainous part on the South, is covered by neogen, old and clayey – cretaceous torbids. Coastal mountains are composed of Kretase lavas. Clayey and pebbly torbids hold place in the internal parts of the same mountains. In the inner sections, Kretase and Eosen Fliches; and old and curly rocks belonged to the first and second times on the South of savannas which are covered by Neogen torbids and alluviums in patches can be seen. In large areas, volcanic formations are observed. In Samsun, some formations related to Kretase, Eosen and Neogen periods are frequently seen.

Table 4.1-1 Soil Types in Samsun Province

Soil Characteristics and Distribution in Samsun Province	Area (hectares)	Share (%)
Land suitable for agriculture	455.324	48
Meadow and Pasture	44.826	5
Forest and Bushland	358.107	37
Land not suitable for agriculture	99.643	10
TOTAL	957.900	100.00

As for the soil type of the Project site, the upper reservoir, waterway, access tunnels, outlet structure are located on gray-podsolic soils under forest covered by deciduous trees and pine species. Types of these soils are relatively rich in terms of organic material and humus. Degree of alkaline saturation of this soil type is low, and clay content is not expected to be high. Lower layers may be rich in terms of clay due to washing effect of upper layers. The average slope of the area is around 20-30 %, soil depth is very shallow and 20-50 cm on average, and there are salinity problems encountered. Erosion due to precipitation is medium level. These soils can be classified as Class VI, which are not favorable for agriculture in terms of erosion, soil depth, and salinity problems.

a) Geology

According to the 1/100,000 Aralık quadrangle (2000) , surrounding area of the project site belongs to upper Cretaceous System of Mesozoic Erathem. The upper dam reservoir area is in Yemişliçay formation (ky) and Cankurtaran formation (kc) .The former has a non-volcanic facies contains flysch, and the latter is volcanogenous sedimentary rocks.

Cankurtaran formation (kc) which must be the upper horizon is composed of sandstone, mudstone, and sandy limestone. Yemişliçay formation (ky) is composed of tuff, volcanic breccia, sandstone, calcareous mudstone, and shale.

According to the reconnaissance result, the boundary between them is around El.900m on the right bank of Degirmen River. Sandstone and weathered tuff which covers the former are exposed on the ridge of SE direction from dam site. Onion structures occur in the weathered tuff on the road side near the village. Figure 4.1-1 shows the geologic map rearranged based on our reconnaissance result.

i) The upper reservoir:

We shifted the upper dam site about 500m upstream from the former site by the result of our actual site reconnaissance based on the map of 1/5000. The new dam site is the narrowest in the area.

The new dam site area shows asymmetric landform, where steep left bank and gentle right bank. Generally middle height of the left bank has steep landform and stratification of sedimentary rocks is well exposed (see photo 5-5-3). Bedding strikes WNW, and it dips gently to SW. Joints perpendicular to the bed in sandstone and slaking in mudstone occur at the outcrop of the cutting slope on the right bank.

There is a gently sloped meadow composed of sandy sediments having around 10m thickness along the river between the dam site and a small bridge which over the Degirmen river. The meadow has 30m to 50m in width in both the left and right bank. A little grasses cover the surface of the meadow, however there grows aquatic plants and shrubs in and beside the river.

ii) The lower reservoir:

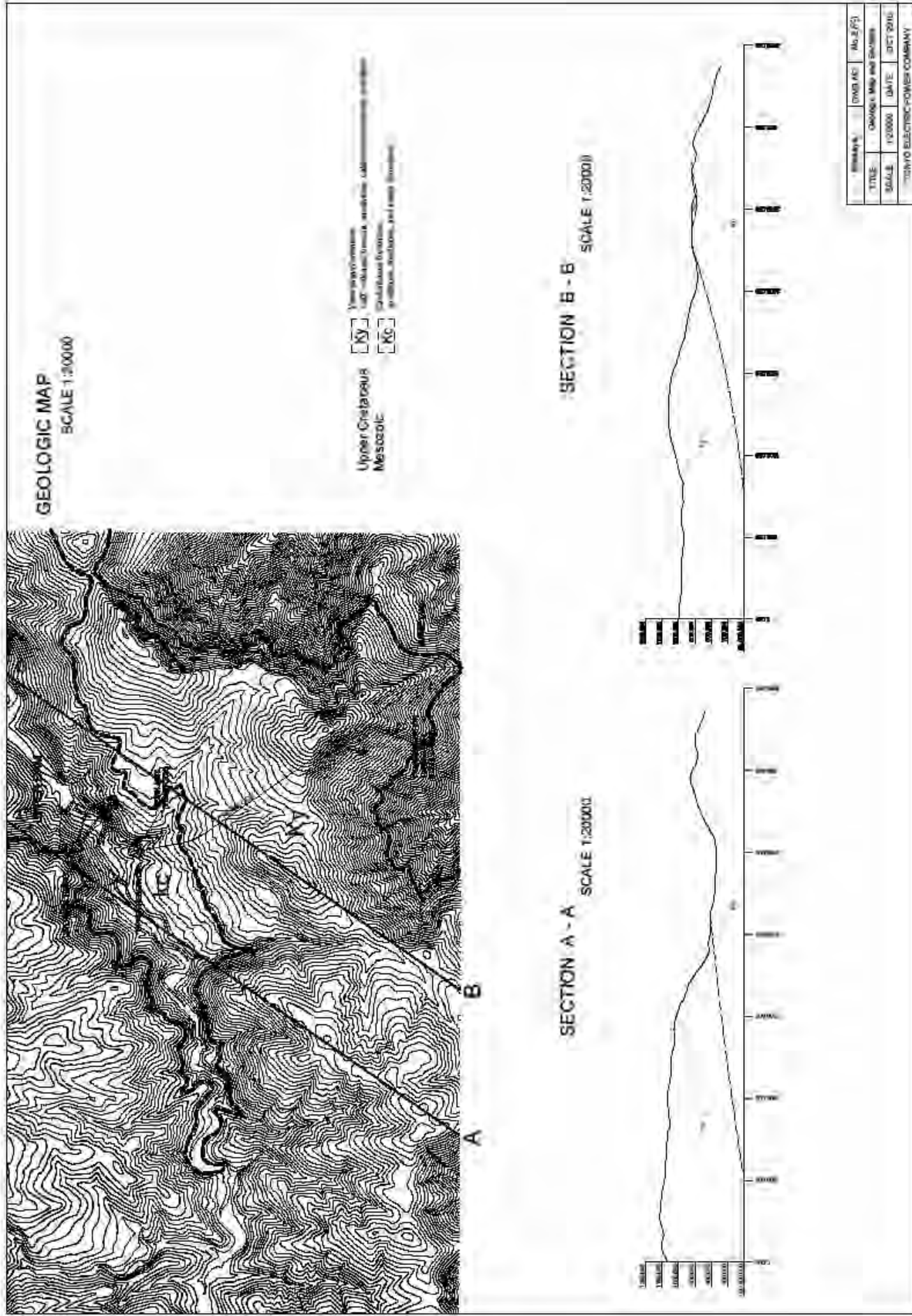
Alternation of sandstone, mudstone (, and rarely conglomerate) is exposed on the left bank of Altunkaya lake. The stratification shows flexure folds.

iii)The waterway and the underground power house(UGPH) :

Stratification of conglomerate, sandstone, and mudstone expose on the ground surface through the waterway route and UGPH. The posture shows open flexure fold.

Slaking for mudstone and dissolution for the pebbles of conglomerate are scattered here and there. Sandstone and conglomerate expose near the outlet site. Some of limestone pebbles of conglomerate had been dissolved on their surfaces.

Figure 4.1-1 Geologic map of Altmkaya PSPP (No.27-1) site



(3) Water Resources

The Kızılırmak River which arises from Kızıl Mountain in Sivas, is the longest river in Turkey. It enters to Black Sea region from Osmaniye county and its length is 1151 km. When it is in the environs of Kargı, it goes to Samsun – Sinop border on the North east. It divides into branches on the west of Bafra and it joins to the sea from the Bafra foreland. Delice, Devrez and Gökırmak are important branches of the Kızılırmak River.

The catchment area of the Kızılırmak River at Inozu village section in Bafra is 75,120 km². Annual mean inflow is 5,808x10⁶ m³ and discharge is 184.2 m³ / s. Minimum discharge is expected in August.

Altinkaya Dam and HPP is located at 35 km South west of Bafra District center and on the Kızılırmak River. Its dam height is 195 meters. There is Derbent Dam at 30 km downstream of Altinkaya Dam and HPP with a height of 33 meters. It is 7 km away from Bafra. Main purpose of the Dam is irrigation for the agricultural lands of Bafra.

Altinkaya Dam reservoir is utilized as the lower reservoir of the PSPP Project. Therefore, water for the generation for the Project is taken only once to pump-up to the upper reservoir. The water will be used repeatedly.

Regarding the Project site from upstream to downstream of the upper reservoir area, Akbaba stream is named as Degirmen stream in downstream before junction with the İlyaslı river. The İlyaslı river then flows to the Kızılırmak river. The upper dam /reservoir is located on the Degirmen stream. Akbaba (Degirmen) stream rises from the forest zone in upstream of Bengü village. Local residents of Bengü village uses Akbaba stream for irrigation of their fields. On the other hand, villagers of neither Uluavlu part nor main part of Baskaya village do not demand on water of Degirmen stream for irrigation or drinking water purposes. However, water of the Degirmen stream will not be taken for generation so that water flow of the stream will be the same even after the dam construction.

(4) Climate

Since meteorological data at the Project site is not available, the one of Samsun is shown in Table 4.1-2.

Samsun has a temperate climate generally. But climate displays two different characteristics in coastal ways and internal parts. In the coastal areas (Center, Terme, Çarşamba, Bafra, Alaçam, 19 Mayıs, Tekkeköy and Yakakent Districts), effects of Black Sea climate are obviously observed and summer season is hot whereas winters are temperate and rainy. Internal parts (Vezirköprü, Havza, Ladik, Kavak, Asarcık and Salıpazarı) are under the effects of Akdağ having height of 2,000 meters and Canik mountains having height of 1,500 meters. Because of the effects of the mountains, it is cold, rainy and snowy in winter, but it is chilly in the inland areas in summer.

The annual average temperature is 15 °C. According to the yearly average data, the hottest months are July (23.1 °C) and August (23.2 °C); the coldest months are January (6,9 °C) and February (6,6 °C). The highest annual average temperature is 18.1°C, and the lowest average temperature is 11.0 °C. There is 10 °C difference between the temperatures measured in coastal ways and internal parts of the city.

The number of snowy days are 2 days in December, 3 days in January, 4 days in February, 2 days in March, and 1 day in April; and 1 snowy day in November in 1993 and 1 snowy day in April in 1995 were observed.

The annual average rain fall is above the country's average of 676.5 mm. On the contrary, the rate of rain fall in the city is different from cities of West Black Sea Region. The maximum monthly rain falls observed were 86.5mm in October, 81.2 mm in November. Amount of rain in South of the city is more than in the west of the city. The average number of rainy days is about 156.

Samsun is always open to North winds. Direction of the most forceful wind is south-south west.

Table 4.1-2 Meteorological Data of Samsun in 2006

Months	01	02	03	04	05	06	07	08	09	10	11	12	Yearly
Average temperature (°C)	4,7	6,0	9,7	11,0	14,6	21,3	23,0	26,5	20,9	17,2	11,5	7,2	14,5
The relative humidity average (%)	72,5	71,0	72,2	82,6	84,5	77,5	72,8	76,5	75,0	77,4	65,5	64,3	74,3
Average of the wind speed (m/sec)	2,3	2,2	2,1	1,4	1,2	1,9	2,3	2,0	1,8	1,4	2,2	2,0	1,9
Total rain falls (kg)	121,3	98,7	94,6	33,7	69,0	36,3	9,0	0,0	66,2	48,7	65,8	71,4	714,7
Temperature of sea water	11,9	8,7	8,2	11,0	13,2	20,3	23,8	25,7	23,5	20,7	17,1	12,7	16,4

Source: Samsun Meteorology District Directorate

4.2 Biological Resources

(1) General

Samsun is regarded as a rich Province in terms of natural resources. Flora and fauna, being indicators of the ecological balance, are destroyed insensibly. Forest areas are destroyed for reasons like undue lumbering, field making and other natural reasons. Majority of the forest products are used for heating. For these reasons, the protection and development of the forests which are one of the most important natural sources is needed. Meadows and feeding grounds occupy a space of 43,000 hectares. However these areas are mostly misused, and destroyed because of over-grazing and other terrain problems.

Agricultural lands are under threat because of increasing settlements and industrial areas that are built over fertile and irrigated first class lands. With the widening urbanization over those areas, the agricultural lands are becoming narrow and the fertility of the available lands is decreasing. Along with this, the usage of especially the soil, in the mining sector like sand, lime, brick, tile production, natural resources are being destroyed by making them impossible to recycle.

Lists of biological resources of Samsun Province is in Annex 1.

(2) Vegetation:

Alaçam, Çarşamba, Kavak, Vezirköprü and Ayvacık forest are the most important vegetation covers in this region. As for forest trees, Vilonia oak, pine tree, hornbeam oak and beech tree take the first places. Apart from these trees, poplar tree, Salix, chestnut tree, locust tree and plane tree are also present in these forests. These vegetation covers which give a unique attribution to Black Sea Region have decreased in great amount due to wrong and illegal logging. Very big marshy areas and reed fields are present near the broad posture areas of the region, especially at Çarşamba, Bafra and Ladik cities.

Distribution of Tree Species in Sumasun Province and Bafra District are shown in Table 4.2-1 and Table 4.2-2 respectively.

Table 4.2-1 Distribution of Tree Species in Forests of Samsun Provincial Forestry Department Borders

Type of Tree	Area Covered (hectares)	Type of Tree	Area Covered(hectares)
Beech	29,125	Salix	4
Chestnut	936	Poplar	1,180
Hornbeam	1,697.5	Fraxinus excelsior	739,5
Oak	11,600	Conifers	827.5
Pine	5,042.5	Mixed leaved trees	68,476
Alnus glutinosa	2,032.5	Mix of Conifers and leaved trees	4,442
Juniper	100.5		

Source: Samsun Provincial Environment and Forestry Department Report based on Forestry Department, 2008

Table 4-2-2 Distribution of Tree Species in Forests of Bafra District Forestry Department Borders

Type of Tree	Area Covered (hectares)	Type of Tree	Area Covered(hectares)
Beech	36,887	Hornbeam	2,031
Abies	5,024	Fraxinus excelsior	748.5
Pinus nigra	7,171	Pine	142
Pinus brutia	13,856	Mixed leaved trees	4,514.5
Pinus sylvestris	1,693		
Oak	27,447.5	Total	99,514.5

Source: Samsun Province Environment and Forestry Department Report based on Forestry Department, 2008

(3) Biological Conditions around Project Site:

a) National Parks and other Environmental Protection Areas

There are no National parks and other environmentally protected areas around the Project site.

b) Vegetation

The Project Site is in the Euro-Siberian Floristic Zone. The lower reservoir site (existing Altinkaya Reservoir) is surrounded by vegetation cover mainly consisting of destroyed forest, shrub zone and meadows. The hills, whose elevation is 700m or higher, are mostly covered by Acer campestre L.), kızılgaç (Alnus glutinosa (L.) Gaertner), kestane (Castanea sativa M.), ıhlamur (Tilia tomentosa Moench), mese (Quercus cerris var. cerris L.), gürgen (Carpinus orientalis Mill.), disbudak (Fraxinus excelsior L.), cınar (Platanus orientalis L.) ve kayın (Fagus orientalis Lipsky). Sogut (Salix alba L.) ve kavak (Populus tremuloides Michx.) are common along stream banks. Areas above 1000 m of elevation are covered by karacam (Pinus nigra subsp. pallasiana L.), sarıçam (Pinus sylvestris L.) ile koknar (Abies nordmanniana subsp. bormulleriana L.). Littoral flora are not developed on the slopes of the Altinkaya reservoir since gradient of the hills can be accepted as medium to high.

The land use map around the Project site is shown in Figure 4.2-1.

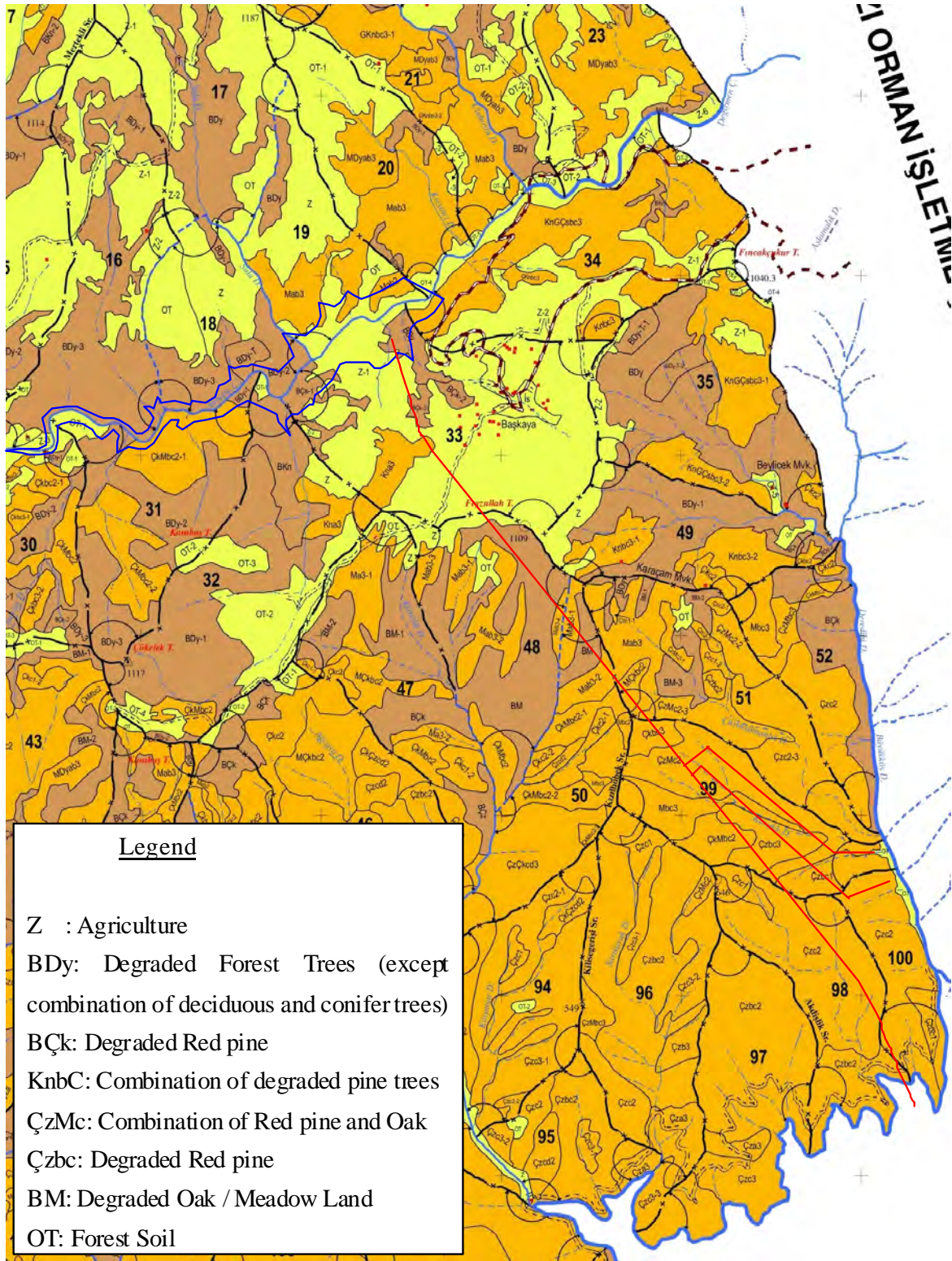


Figure 4.2-1 Land Use Map around the Project Site

c) Wildlife:

Wildlife in the area is mostly rabbits, foxes, Sus Scrofa (wild pig), snakes having length of 1-1.5 m at most, Capra aegagrus (wild goat), falcons. Population of wild goats has been considerably increasing for the recent two years after the government released them to the mountains.

d) Fish Species in Lower Reservoir:

Pikeperch, Sander lucioperca (Linnaeus, 1758), Cyprinus carpio, Silurus glanis are the species living in the Altinkaya reservoir. On the contrary to the Derbent reservoir, there are no fish breeding facilities in the Altinkaya reservoir.

4.3 Socio-Economic Conditions

(1) Socio-Economic Statistics of Samsun Province and Bafra District

a) Population and Demographics

According to the population census made in the year 2000, counties can be lined up in terms of size of their population like the following: Center county, Bafra, Çarşamba, Vezirköprü, Terme, Havza, Tekkeköy, Alaçam, Kavak, 19 Mayıs, Salıpazarı, Ayvacık, Ladik, Asarcık and Yakakent. According to the results of the study done based on the recent address system in 2009, total population of Samsun Province is 1,250,076. Population of Bafra district is 145,393.

In Samsun Province, distribution of urban and rural population is 58% and 42 % respectively. The rate of population increase is 2 % per year, and the population density is 126 persons/km².

According to the results of the population census in 2000, there is a trend of immigration from rural villages to cities. In Bafra District, the population increase rate in rural area was minus 18.42%. Main reasons of the immigration are insufficient agricultural lands, unemployment and seasonal working.

b) General Information of Economic Sector

The primary economic sector in Samsun is agriculture. In company with agriculture, animal husbandry and tourism have an important place in economy. Agricultural products which have a great influence on the economy are wheat, tobacco, corn, sun flower, sugar beet, hazelnut, rice in the husk, and vegetables. Bafra and Çarşamba savannas which are important places for agriculture of the province, have 122,410 hectare of agricultural area in total. Vegetables which are grown in this area (tomatoes, peppers, melons, water melons) firstly, fill the needs of the region; and then, they are marketed through out the country.

Samsun is the biggest city in East Black Sea Region. Its commercial and industrial activities are very dynamic because of its population density. Industrial zones are providing significant contributions. The most important productions which are being produced by the manufacturing industry in Samsun and its neighborhood are cement, fertilizer, copper, artificial jute, car spare part, pumps in different sizes, furnishings and textile products, iron, confection, drugs and medical materials. In addition to big and middle size firms, small size firms are producing furnaces, plastic PVC plants, agricultural machines and materials, copper products, reinforcing irons, plastic bags, different types of confectionery, jam, and industrial type kitchen wares in a labor intensive way.

c) Employment and Unemployment Condition

The comparison of employed and unemployed population between in 1990 and 2000 is shown in Table 4.3-1.

Labour force participation rate on the age of 12 or above, in the Samsun Province, is 59% in 2000. In the period between the years from 1980 to 2000, labour force participation rate was decreased continuously. Looking into differences by gender, its rate for male was 71%, it was higher than 48% for female's rate.

As for unemployment conditions, the unemployment rate in 2000 was 6.6%, and increased from 4.7% of the rate in 1990. The definition of the unemployment population is the number of people who attempted to have a job in the last three months, but do not have working place, do not have any relation to any job. Its rate for male was 7.2%, while the rate for female was 5.9%. Unemployment rate in Districts is higher than the one in Provincial Centres. This rate is 20.5% in the Districts, 17% in Provincial Centres and 0,6% in Villages.

The unemployment rate for female was higher than the one for male population in the districts and Provincial Centres, however; it was opposite in the Villages. In concrete, the unemployment rate in the Provincial Centres for female was 30.8% and 12.8% for male: in the Districts, the rate for female was 36% and 16.9% for male; on the contrary, the rate for female was 0.4% and 0.8% for male in villages. The majority of the unemployed people are young generation. 64% of the unemployed population is under the age of 30.

Housewives and retired people have a big share in the total unemployed people.

Table 4.3-1 Information of Employment and Unemployment Condition

Parameters	1990	2000
Total population	1,161,207	1,209,137
Population which is not included in labor force	265,220	380,081
Labor force	555,64	541,015
Employment	529,584	505,115
Unemployed population	25,980	35,900
Rate of unemployment (%)	4.7	6.6
Rate of participation to labor force	67.7	58.7

Source: Samsun Business Institution Provincial Directorate

d) Agriculture and Animal Husbandry

i) Agriculture

Total land use and agricultural land use situations in Samsun Province are shown in Table 4.3-2 and Table 4.3-3 respectively.

Table 4.3-2 Land Use in Samsun Province (2007)

Type of the Land	Area of field(Ha)	Ratio (%)
Cultivated area	455,324	47.5
Forested area	358,07	37.4
Grassland –posture area	33,721	3.5
Non-agricultural area	110,748	11.6
Total	957,900	100

Source: Directorate of the Ministry of Agriculture

Table 4.3-3 Agricultural Land Use Situation (2007)

Agriculture Type	Area (Ha)	Ratio (%)
Arable field cultivation, Fallowing, Grove	310,115	68.1
Fruit Growing	91,335	20.1
Vegetable production	28,645	6.3
The arable fields which are not cultivated	25,092	5.5
Total	455,324	100

Source: Directorate of the Ministry of Agriculture

The cultivation areas and annual production of the important products in 2006 are summarized in Table 4.3-4. The most important products are wheat, corn, rice and tobacco.

Wheat is produced for own consumption needs and a commercial purpose. Its production is dense mostly at the inner parts of the city. The suitable variety of wheat seeds such as Cumhuriyet 75, Momtchill, Gönen, Bezostia-1, Panda, Orso, Golia are used because of the recommendation of the Directorate of the Ministry of Agriculture. Wheat cultivation area is yearly 137.825 hectares and its annual production is 459.177 tones.

Corn is cultivated rotationally with other cereals. Hybrid seeds such as "Karadeniz Yıldızı" and Arifiye Slajlık, ZP-677,TTM-813 types have high efficiency for production, and those have been used. Total corn cultivation area in our province is yearly 53.496 hectares, and annual corn production is 205.037 tones.

Rice is produced in nine (9) districts in the province, especially in Terme, Bafra, Alaçam, Çarşamba and Tekkeköy districts. In the province, abrupt irrigation method is being applied for rice plant. Rice cultivation is generally authorized or licensed. Rice production area in the province is yearly 10.091 hectares, and its annual production is 80.607 tones.

In Samsun, 11.930 tones of tobacco are produced on an area of 12.400 hectares. The cultivation of tobacco is being made intensively in Province Center, Bafra, Tekkeköy and Alaçam Districts. While the buyers of tobacco are merchants and Tekel on behalf of the government, supportive purchases were ended with the new tobacco law (No.4733) dated on March1, 2002.

Table 4.3-4 Cultivation Areas and Annual Production of Important Products (2006)

Type	Cultivation Area(Hectare)	Cultivation Percentage	Yearly Production (as Tones)	Yearly Production (%)
Wheat	139,825	44.36	459.177	22.70
Corn(bead)	36,521	11.59	205,037	10.14
Rice plant	10,091	3.20	80,607	3.98
Tobacco	12,400	3.93	11,930	0.59
Sugar Beet	11,228	3.56	487,365	24.09
Helianthus	9,045	2.87	24,050	1.19
Dried Beans	15,340	4.87	9,336	0.46
S. Corn	15,945	5.06	387,905	19.18
Grass	31,904	10.12	195,036	9.64
Others	32,873	10.44	162,46	8.03
Total	315,172	100	2,022,889	100

Source: Directorate of the Ministry of Agriculture 2006

ii) Animal Husbandry

Number of animals related to animal husbandry is described from Table 4.3-5 to Table 4.3-9.

Table 4.3-5 Number of Animals for Husbandry (number/year) :

Existence of animals	2002	2003	2004	2005	2006
	A-Small Cattle	264,469	242,740	192,579	198,389
1-Sheeps	192,041	166,760	133,390	139,216	137,199
2-Lambs(till 1 year old)	58,820	62,951	46,584	48,455	46,954
3-Goat	13,608	13,029	12,605	10,718	10,864
B-Great Cattle	311,772	316,352	291,610	298,904	297,144
1-Beef	231,375	298,166	276,707	285,437	284,882
a-Culture	23,285	33,440	27,706	32,797	31,696
b-Half-breed	111,993	144,387	140,310	140,677	141,407
c-Domestic	96,97	120,339	108,691	111,963	111,779
3-Buffalo	17,115	18,186	14,903	13,467	12,262

Resource: Samsun Provincial Agricultural Directorate

Table 4.3-6 Number of Winged Animals by Year (number/year) :

Existence of winged animals	2002	2003	2004	2005	2006
	1-Chicken	4,474,500	1,541,575	1,531,650	1,820,306
2-Turkey	32,600	32,275	29,058	30,766	29,188
3-Duck	75,850	77,580	72,970	69,927	68,078
4-Goose	58,405	38,265	39,022	43,656	44,394
Toplam	4,646,355	1,689,695	1,672,700	1,964,655	2,459,223

Resource: Samsun Provincial Agricultural Directorate

Table 4.3-7 Number of Animals on District basis (2006)

Counties	Beef Buffalo	Sheep Goat	Horse Mule	Donkey	Winged animals	Bees
Merkez	32,170	7,120	370	482	135,000	10,000
Alaçam	17,955	20,675	890	960	757,820	2,975
Asarcık	12,790	2,150	534	1,900	35,350	1,030
Ayvacık	7,810	1,981	133	1,500	5,200	1,090
Bafra	40,000	32,000	1,000	125	145,500	11,000
Çarşamba	35,327	5,865	79	97	341,000	5,100
Havza	23,872	8,704	487	510	136,000	6,105
Kavak	18,519	6,300	235	650	505,000	2,410
Ladik	13,089	13,860	356	875	18,436	1,890
19.May	9,100	1,500	37	7	24,960	3,090
Salıpazarı	5,482	600	162	164	26,577	6,598
Tekkeköy	17,062	11,429	175	38	2,000	3,120
Terme	22,864	4,883	530	82	239,416	23,960
Vezerköprü	35,450	65,750	700	900	35,000	3,500
Yakakent	5,654	11,525	612	570	7,570	1,120
Total	297,144	195,017	6,300	8,860	2,414,829	82,988

Resource: Samsun Provincial Agricultural Directorate

Table 4.3-8 Number of Poultry

Direction of the foundation	Number	
	Active	Inactive
chicks	1	1
Broiler	102	148
egg chickens	14	16
Integrated Plants	1	1
Total	118	155

Resource: Samsun Provincial Agricultural Directorate

Table 4.3-9 Number of Beekeeping by Year

Beekeeping situation	Years				
	2002	2003	2004	2005	2006
Number of hives	82,502	83,224	76,213	78,133	82,988
Production of honey (Kg)	963	1,693	1,349	1,275	1,261
Bee wax(Kg)	116	121	115	158	105

Resource: Samsun Provincial Agricultural Directorate

iii) Aquatic Products:

Amount of water products are shown in Table 4.3-10 to Table 4.3-11.

Table 4.3-10 Amount of Water Products by Year (ton/year)

Water products	Years				
	2002	2003	2004	2005	2006
Sea products	21,305	26,751	28,330	10,415	12,589
Culture fishing	241	126	210	378	766
Fresh water products	149	151	208	165	176
total	21,695	27,028	28,748	10,958	13,531

Resource: Samsun Provincial Agricultural Directorate

Table 4.3-11 Amount of Water Products (2006)

Type of fishing	Fish	Amount (ton)
Sea products	Anchovy	8,497
	Whiting	776
	Bonito	1,038
	Other	2,278
Culture fishing	Trout	766
	Carp	115
	Sea trout	-
Fresh water fishing	Carp	88
	Grey mullet	17
	White fish	23
	Other	8

e) Industry

The most important products manufactured in Samsun are cement, fertilizers, artificial jute, auto replacement parts, pumps in various sizes, furniture and textile and medical equipment.

Along with medium- and large-scales businesses, there are, furthermore, labor-intensive small

facilities, manufacturing heating boilers, plastic PVC facilities, agricultural equipment and machinery, copper products, construction iron, plastic bags, various sweets, jam and industrial-type kitchen appliances and refrigerators within small-scale businesses.

There are 16 small industrial estates in the region, 5 in the city center and 11 in suburbs. The total number of business offices in the city is 5.279.

There are 404 cooperatives in the city. The Chamber of Commerce has 6.145 registered members.

According to the observations of the Directorate of Customs, as of December 2006, an import volume of 125 million \$ has been reached in Charcoal, Scrap Iron, Tobacco, LPG, Timber, Electrode, Blue Flow Project Equipment and Instruments, Phosphate, Diesel Oil, Grubber, Wheat, Bran, Carbamide, Lumber, Fertilizers, Copper Ore, Medical Equipment and Sesame.

Similarly, an export volume of 125 million \$ has been reached in Crystal Sugar, Valve, Citrus Fruits, Nuts, Copper, Wet Yeast and Bread Additives, Wheat Flour, Snail and Snail Shelves, PVC Pipes, Chipboard, Spring Beds, Pipe Connection Pieces, Frozen Anchovy, Frozen Chicken and Silvery Thread.

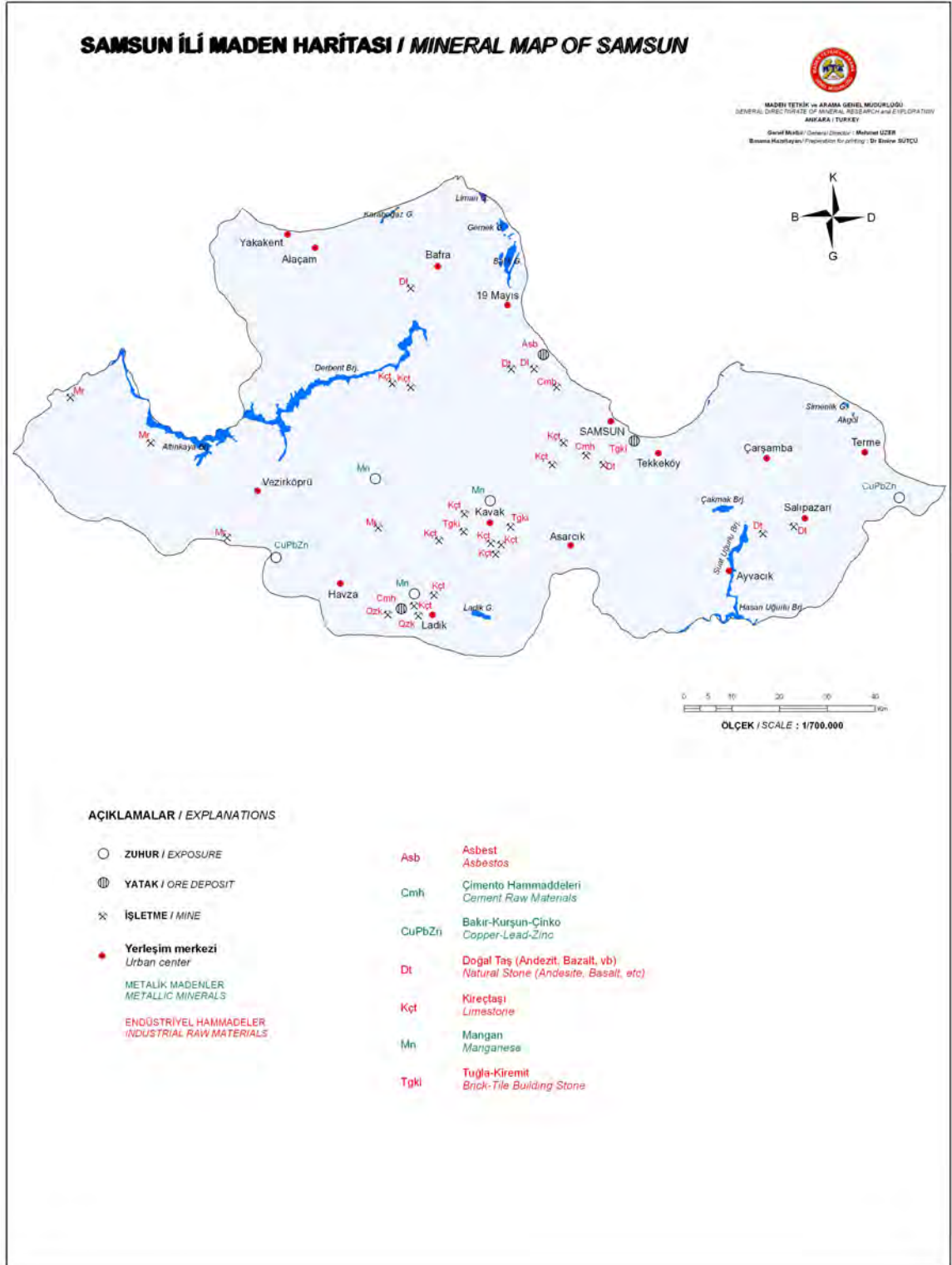
f) Mining:

In Samsun Province, there are no important mineral resources. The table below indicates mineral resources of the province and the main characteristics.

Table 4.3-12 Mineral Resources in Samsun Province

Mineral	Reserve (Tonnes)	Degree (%)	Location
Raw materials of cement	51.951.361	N.A	Ladik
Lead and Zinc	177	4,5	Vezirokopru
Manganese	420	23.8	Kavak
Brick and Tile raw materials	46.000	N.A	Dikbayır
Lignite	4.721.000	N.A	Havza

Source: General Directorate of Mineral, Research and Exprolation



Source: General Directorate of Mineral, Research and Exprolation

g) Health

Samsun Province locates in junction point of Inner Anatolia and Black sea regions, thus it is becoming a prospecting health center of the North.

There are 193 health centers of which 21 is hospitals in Samsun by the year 2007(Source Samsun Province Environment Report, 2008). On the other hand, totally 24 health centers of which only 2 hospital exist in Bafra district which is 51 km away from Samsun city center. Number of doctors in Samsun Province is 1369 and 75 in Bafra district by the year 2007.

In case of epidemics most frequent diseases among population are hepatitis B, mumps and rabies in Bafra district. This distribution is proportional to the on efor Samsun Province fort the year 2008 (Source: Samsun Province Health Directorate Statistics, 2008). Heath Statistics given in Samsun indicates population growth rate has tendency to increase by the year 2006.

Table 4.3-13 Birth Rate , Infant Mortality Rate, Death Rate Fertility Rate, and Natural Population Growth Rate for Samsun Province

Rate	2002	2003	2004	2005	2006
Birth Rate (%)	16	10	10	11	14
Infant Mortality Rate (%)	15	11	9	11	13
Death Rate (%)	2	2	2	2	2
Fertility Rate (%)	57	36	36	40	54
Natural Population Growth Rate (%)	14	8	8	9	12,69

(Source: Samsun Province Health Directorate Statistics, 2008)

h) Education

In terminology of Ministry of National Education formal education includes pre primary, primary, secondary and tertiary educational institutions.

Number of schools in pre primary, primary and secondary levels in total in Samsun province is 1.112, number of teachers is 14.282 and number of students is 263.360 by the education year 2009-2010. In Bafra district, on the other hand, number of schools is 117, number of teachers is 1.696 and number of students is 31.092 respectively.

In case there is not enough students for one class or level in rural area, or not enough number of students at the same time facilities are not sufficient, education of those students continue in the nearest district or in province center in Turkey. Totally 26.995 students from in different levels of education in Samsun province have to move to schools in districts or province centers in order to continue to their education and stay in dormitories.

(Source: Samsun Province National Education Diectorate
http://samsun.meb.gov.tr/birim/istatistik/2009_2010_meis/bafra.htm)

(2) Social Conditions of Baskaya Village and Surrounding Area

(Upper Reservoir)

i) Population and Demography

Baskaya Village is mainly divided into two communities; Main Village on the right bank and Uluavlü on the left bank. Each of the communities has 20 households (HH). So, the number of houses of the village is 40HH in total. The population of the village is 135 (Male: 65, Female:70).

Many of houses in the main village are used as summer houses in which retired people from Samsun and/or Bafra live. Since young people go out of the village to look for jobs, most of the residents in the village are old.

ii) Socio-economic Conditions

Main income source of the residents is animal breeding. The residents used to breed sheep, however, they shifted to cow breeding. The reasons are as follows:

- No one can drive sheep because the number of young people decreased,
- Sheep meat is not popular in the local market of the region.

Income from cow breeding is about 1,000TL/month/HH (700US\$/month/HH). Recently, the residents started producing Tobacco as an income source. However, it is not successful for the moment. Therefore, Tobacco planting is still a limited income source. The residents also harvest vegetables, but only for their own use.

The residents are allowed to get fire woods from dead trees in the surrounding forest.

iii) Education

There are five elementary school students, three-four high school students and four university students. Since there is no school in the village, they have to attend the schools staying in dormitories in Bafra City and/or Samsun City.

iv) Public Facilities, Cultural Heritages, Tourist Resources

There are two mosks and a guest house in the village. Since there is no clinic, a doctor comes to the village from Bafra City once a month to check up the villagers. There is no school as mentioned above.

Cultural Heritages, Tourist Resources do not exist in the village so that no impact by the Project is anticipated.

v) Water Use

The residents do not use the water of Degirmen River. Drinking water for the residents is taken from springs. People of Bengi village, which is located upper stream of the dam site, use small amount of water from the river for their gardening.

River water at the downstream of Degirmen River is not utilized until the meeting point of Degirmen River and Ilyasli River. Water of the Ilyasli River until the junction with Kizilirmak River, which is the main stream of the basin, is taken for Tobacco field, but its amount is very limited and its period is also limited only in May and June.

vi) Development Plan and Needs

The village submitted a request for an additional water supply project to the district office because their current water supply facilities are insufficient, especially during summer time. However, there is no answer from the district office at this moment.

Meanwhile, Bafra district office has a plan to create leisure facilities at highland in the village in order to enhance the village's economy inviting people for summer houses and paragliding.

(Lower Reservoir)

The lower dam/reservoir is planed to utilize the existing Altunkaya Dam, which has 5.76 billion m³ of total storage capacity. There is no social activities around the outlet site, and no salmon breeding unlike other reservoirs. And also, there is no mining activity around the outlet and the lower reservoir.

4.4 Directly Affected Land and Expropriation Cost

According to the expropriation survey, which was carried out in October 2010, directly affected land is approximately 76 hectare, of which Class 2 and 3 agricultural lands are 16 hectare and forest is 59 hectare.

Based on the survey result, expropriation cost was estimated as shown in Table 4.4-1. The total expropriation cost or land acquisition cost estimated is 6.9 million US\$ in consideration of 20% increase for uncertainty. In consideration of expropriation cost for access roads, total environmental cost is estimated as 9.00 million US\$.

Table 4.4-1 Expropriation Cost and Monitoring Cost

Items	Area (ha)	Cost (million US\$)
Irrigable 2 nd Class Agricultural Land ST2	5.00	0.89
Irrigable 3 rd Class Agricultural Land ST3	11.28	
Forest	59.34	
Other	(20% increased)	
Forest Compensation Cost (0.5% of Project Cost)	-	6.01
Sub-total		6.90
Expropriation Cost for Access Road and others	-	2.10
Total		9.00

5 ENVIRONMENTAL IMPACTS

At this moment, the development plan of the Project is in conceptual design stage so that specific design has not been developed. Also, the study team had a limited time during the site survey for this study. Nevertheless, the potential impacts on physical, biological and social aspects, which are related to design and construction, were identified using the checklist as shown in Table 5.1-1 based on the limited information and experience in similar PSPP projects in the past.

5.1 Environmental Impacts related to Design and Construction

Even if there are land losses by the PSPP Project, it is expected that anticipated environmental and social impacts are limited because of the following facts:

- The land loss for the upper reservoir is relatively small in comparison with ordinary large scale hydropower projects,
- Most of the waterway structures and the powerhouse are located underground,
- Construction of the lower reservoir is not required because the existing Altinkaya Reservoir can be utilized for the lower reservoir,
- The Project site is accessible using the existing roads. New development of access roads for the Project will be limited,
- There is no resettlement of local residents are anticipated,
- There is no information about existence of important species surrounding the Project site.

Even though environmental impacts are limited, there are still some concerns. Main concerns are related to disturbance of river flow by the upper dam. Because of the upper dam, migration of aquatic species will be disturbed. After completion of the upper dam, the same amount of inflow water will be released from the dam. But, water temperature and turbidity may be different from the ones of inflow. Installation of fish path at the dam is not practical, another countermeasure such as installation of an elevation-selectable outlet, manual release of species etc. should be considered, if required.

As for the impacts during construction, all the items concerned should be carefully considered and technical specifications must be given to contractors to conduct all necessary mitigation measures.

Expansion of the approach road should be carefully planned in order to avoid villages and agricultural areas as much as possible and to prevent soil erosion and landslides as much as possible.

Workers' camp is expected to be big and its social impacts are to be carefully assessed and fully mitigated.

Careful consideration should be paid to select disposal area to prevent secondary impacts. It is ideal to site the disposal area within the reservoir areas.

Poaching and introduction of alien species must be well controlled to prevent disturbance to the local ecosystem and biodiversity (even if they are already degraded). Especially at the upper dam / reservoir site, the biodiversity of the surrounding forests should be protected.

5.2 Environmental Impacts related to Operation and Maintenance

All the items in the check list should be carefully considered and necessary mitigation measures must be undertaken by operational organization to reduce impacts as much as possible.

Insect vector / waterborne diseases are at the moment not prevailing in the areas. The water levels of reservoirs of PSPP change everyday, which may not make insects (e.g. mosquito) actively breed. It is therefore likely that the diseases will not prevail. However, such insect vector / waterborne diseases should be monitored, and take necessary countermeasures in case.

Impacts on the natural environment should be carefully assessed and necessary countermeasures

should be undertaken.

5.3 Environmental Impacts related to Project Closure

The operational lifetime of the Altunkaya PSPP Project will be 40 to 50 years. If the structures and facilities are well maintained and periodically upgraded, it will be operated more than that. According to the experience of the existing hydropower plants, the power plant might be operated more than 100 years. Since it is difficult to forecast an appropriate de-commissioning process so far, the social and environmental consequences of closing and de-commissioning the Project in the far future cannot be described.

Therefore, it is recommended to set aside small amount from the Project' s revenue to bear the costs for mitigation measures and/or compensation on social and environmental issues during the project closure period. Issues and mitigation measures will be identified during 40 to 50 years' operation period and sufficient amount will be saved by the time.

Table 5.1-1 Checklist of Environmental Parameters: Altunkaya (No.27-1)

	Anticipated negative impacts			Evaluation
	Major	Unknown or can be mitigated	No significant impact	
A. Environmental Problems Due to Project Location				
A-1. Social Environment				
1. Effects on ethnic minorities			X	There are no minorities in the Project area.
2. Resettlement			X	There is no people and no houses to be resettled in the upper dam and reservoir area. There are the existing roads from provincial road to the site, and one of the road will be expanded for the construction. In addition, there are two units of water mills at the upstream of the dam site, which might be affected by the upper reservoir. The existing Altunkaya reservoir will be used as the lower reservoir for the Project. Therefore, there is no resettlement for the lower reservoir.
3. Loss of land (e.g. agricultural land)		X		A part of the upper reservoir area is used for wheat field or meadow for animal breeding. Other area is a forest Rice field and grazing land will be lost. The waterway is an underground structure. So, limited land for adits, disposal yards and access road to the adits will be lost. Since the existing Altunkaya reservoir will be used as the lower reservoir for the Project, land will not be lost for the lower reservoir.
4. Encroachment into watershed			X	The watershed is expected not to be affected.
5. Encroachment on historical and cultural values			X	There is no historical and cultural site in the Project site.
6. Impairment of navigation			X	There is no shipping traffic along Degirmen River. As for Altunkaya reservoir, construction of outlet and operation of

					the PSPP will not disturb shipping traffic because of the wide reservoir area.
7. Inundation of mineral resources				X	There is no mineral resource in the Project site.
8. Decline of fisheries				X	Fishery is not practised in Degirmen River. Large-scale of fishery such as salmon breeding is not observed in Altunkaya reservoir. Only small-scale fishery for people's own consumption may be practised in the area.
9. Downstream impacts			X		Discharge of Degirmen River will not be affected by the upper reservoir because the same volume of water will be released. Sediment transportation will be cut by the upper dam. However, since Degirmen River joins with Ilyasli River in about 17 kilo-meter from the upper dam site, impact of reduction of sediments will be limited. Installation of a bypass channel is a mitigation measure to reduce the impact as much as possible. Its necessity should be discussed during EIA process. As for the lower reservoir, since Altunkaya reservoir is utilized, there is no impact to the down stream.
A-2. Natural Environment					
1. Encroachment into precious ecosystem			X		The terrestrial ecosystem at upper dam / reservoir has already been degraded due to human activities. Secondary forests are left, and they need to be maintained as much as possible. The aquatic ecosystem of both areas is not fully understood. However, the impacts can be limited because the upper reservoir and the lower reservoir are in the same river basin.
2. Encroachment into existing protected areas				X	The Project site is not in any protected areas.
3. Migrating fish species			X		According to Fishery Law, a fish path or a fish ladder is required to structures, which are crossing rivers. However, since the dam height of the upper reservoir is 79m, it is not practical to construct a fish path. The river discharge is very small so that fish species are not abundant. Therefore, its impact is expected to be limited. Mitigation measures for fish migration should be coordinated with the related authorities.

					As for the lower reservoir, there is no impact because of utilization of the existing Altinkaya reservoir.
4. Effects on scenic value				X	Impact on scenic value is limited because the upper dam site is located in the valley, and other open structures are very limited.
5. Downstream impacts				X	Impacts on the terrestrial ecosystems surrounding the Project site are limited and are expected small. The aquatic ecosystem of both areas is not fully understood. However, the impacts can be limited because the upper reservoir and the lower reservoir are in the same river basin.
A-3. Physical Environment					
1. Watershed erosion / silt runoff			X		There are no activities related to the Project in the watershed. Therefore, there is no risk of increase of watershed erosion and silt runoff by the Project. As for possibility of land slide caused by drawdown of reservoir water level, necessary protection is required if there are geologically weak slopes.
2. Effects on groundwater hydrology				X	Pumping up of groundwater is not necessary for operation of the PSPP. Impact on groundwater hydrology by the construction of waterway is not fully understood, but it is expected to be limited and small.
3. Downstream water flow variations				X	Once the reservoirs are filled with water, the water flows from the dams are regulated to the same amount as before. It means that there will be no change in water flow variations.
4. Change of sedimentation transportation balance			X		Sediment transportation will be cut by the upper dam. However, since Degirmen River joins with Ilyasli River in about 17 kilo-meter from the upper dam site, impact of reduction of sediments will be limited.
B. Environmental Problems Associated with Construction Stage					
			X		All the items in this section should be carefully considered and technical specifications must be given to contractors to conduct all

B-1. Construction Monitoring				necessary mitigation measures.
1. Construction monitoring				Expansion of the approach road should be carefully planned in order to avoid villages and agricultural areas as much as possible and to prevent soil erosion and landslides as much as possible.
B-2. Construction				
1. Soil erosion / silt runoff				Workers' camp is expected to be big and its social impacts are to be carefully assessed and fully mitigated.
2. Toxic wastes from equipment and cement factory				Careful consideration should be paid to select disposal area to prevent secondary impacts. It is ideal to site the disposal area within the reservoir areas.
3. Environmental degradation at quarry site				Poaching and introduction of alien species must be well controlled to prevent disturbance to the local ecosystem and biodiversity (even if they are already degraded). Especially at the upper dam / reservoir site, the biodiversity of the surrounding forests should be protected.
B-3. Workers				
1. Safety of workers				
2. Sanitation at workers' camp				
3. Dust/ odors / fumes / noise / vibrations				
4. Quarrying hazards				
B-4. Social Environment				
1. Negative perception of local people				
2. Traffic accidents				
3. Traffic congestion and damage to road and bridge				
4. Environmental aesthetics				
B-5. Natural Environment				
1. Poaching by workers				
2. Firewood collection				
3. Introduction of alien species				
C. Environmental Problems Related to Project Operations			×	All the items in this section should be carefully considered and necessary mitigation measures must be undertaken by operation organisation to reduce impacts as much as possible.
C-1. Operation Monitoring				Insect vector / waterborne diseases are at the moment not prevailing in the areas. The water levels of reservoirs of PSPP change everyday, which may not make insects (e.g. mosquito) actively breed. It is therefore likely that the diseases will not prevail. However, such insect vector / waterborne diseases should be monitored, and take necessary countermeasures in case.
1. Operation monitoring				
C-2. Operation				
1. Warning system				
2. Downstream erosion				
3. Eutrophication of the reservoir				
4. Downstream water quality				

5. Reservoir bank stability							Impacts on the natural environment should be carefully assessed and necessary countermeasures should be undertaken.
C-3. Social Environment							
1. Insect vector / waterborne diseases hazards							
2. Estuarine and marine fisheries impacts							
C-4. Natural Environment							
1. Poaching due to new access methods							
2. Illegal logging due to new access methods							
3. Encroachment due to new access methods							
D. Additional Consideration for Hydropower Projects							
D-1. Transmission Lines							
1. Encroachment on precious ecosystem							All the items in this section should be carefully considered and necessary mitigation measures must be undertaken. At the moment, it is unlikely that avian hazards from transmission lines and towers occur. This is because such avian hazards related to the transmission line from the existing Altmkaya Hydropower Plant have not reported. At the moment, it is unlikely that aircraft hazards from transmission lines and towers occur. This is because there is not an airfield in the region.
2. Impairment of wildlife movement							
3. Avian hazards from transmission lines and towers							
4. Impairment of environmental aesthetics							
5. Soil erosion from construction and areas left exposed							
6. Inviting new encroachment							
7. Aircraft hazards from transmission lines and towers							
8. Induced effects from electromagnetic fields							

NOTE: The remarks are made based on the current plan. The assessments are based on the information obtained during the survey and should be reviewed and corrected, if necessary, at the next stage.

6 MITIGATION MEASURES AND ALTERNATIVES

6.1 Examination of Alternatives

(1) No construction of the PSPP Project

In case that the PSPP Project is not constructed, Gas-Turbine Power Plants (GT) are installed as an alternative power source for peak load.

PSPP has technical advantages in comparison with GT such as faster responsibility to the fluctuation of power demand etc.

Aside from the technical advantages, initial unit construction cost per kW of PSPP is lower than the one of GT. Though operation unit cost is higher than the one of GT, PSPP is more economical than GT as a peak load power source.

As for environmental aspects, the result of simulation shows that about 70,000 ton-CO₂/year of CO₂ emission can be reduced by installation of the PSPP because consumption of gas can be reduced.

Thus, implementation of the Project is recommended from viewpoint of technical, economical and environmental aspects.

(2) Alternative PSPP Project Sites

During the Master Plan Study, at first 58 potential sites were identified in the country. Ten out of 58 sites were selected as priority sites for preliminary site survey by the desk study from viewpoints of economic, geological and environmental aspects as shown in Figure 6.1-1. Based on the results of the preliminary site survey, Altunkaya PSPP Site (No. 27-1) was selected one of the most economical and environmentally friendly sites.



Figure 6.1-2 Selected Site for Preliminary Site Survey

Table 6.1-1 Evaluation Result of PSPP Potential Sites

Project Site No.	11-1	11-2	19	21-1	24	26	27-1	31	32-2	37-1
Economic Value (US\$/kW)	744	780	734	778	767	758	727	—	732	729
Scores of Environmental Evaluation	1.00	1.19	1.19	1.19	1.19	1.00	1.00	1.19	1.19	2.00
Priority Rank	A	B	AA	B	B	A	AA	C	AA	B

Priority Rank

AA : It is economically **superior** and there is **no significant** natural / social environmental impacts **nor** technical problem

A : It is economical, and there are **no significant** natural / social environmental impacts **nor** technical problems expected

B : It is economically feasible and there are natural / social environmental impacts or technical problems expected

C : It is **uneconomical** or there are **significant** natural / social environmental impacts or technical problems expected.

6.2 Mitigation Measures

Mitigation measures against anticipated impacts should be determined based on results of sufficient evaluation of environmental and social impacts. Therefore, those will be proposed during full-scale EIA process.

For reference, typical environmental mitigation measures applied to the previous PSPP projects are shown in Annex 2.

7 DRAFT TOR FOR ENVIRONMENTAL IMPACT ASSESSMENT

According to the currently effective By-law on Environmental Impact Assessment (No. 26939) was enacted in July 2008, types and scale of projects for which Full-scale EIA is required are defined in its ANNEX I. The criteria related to hydropower development are shown as follows:

- No. 15: Water storage facilities (dams and lakes with a reservoir volume of 10 million m³ and over).
- No. 16: River type power plants with an installed capacity of 25 MW or more.
- No. 32: Construction of overhead electrical power lines with a voltage of 154 kV or more and a length of more than 15 km (transmission line, transformer center, switch areas).

According to the screening criteria of JICA and World Bank, PSPP projects are generally categorized as “Category A”, for which careful EIA procedures are required.

During full-scale EIA procedures, sufficient site investigation should be carried out to fully know the current environmental situation, and consultation with Project Affected People (PAPs) and other related persons should be done to reflect PAPs’ opinion to the Resettlement Action Plan (RAP) and Environmental Management Plan (EMP)..

In order to implement EIA procedures, environmental consultants or experts who are familiar with PSPP development will be hired. The draft of Terms of Reference (TOR) for consultant procurement is prepared as shown in Annex 3.

8 DESCRIPTION OF PUBLIC INVOLVEMENT

8.1 Activities for Public Involvement

Basically, disclosure process and consultation with local stakeholders at the stage of Master Plan Study are not required according to Turkish regulations. Actually, it is difficult to disclose information of the Project and make consultation with local stakeholders at the stage of Master Plan Study because the project profile and even project owner is still uncertain. There is a possibility for local stake holders to have too much expectation and/or misunderstandings with such uncertain information.

In the course of the study on environmental and social considerations for the Project, however, the following process was taken to have common understanding on the Study in consideration of the concerns mentioned above:

a) The 1st Workshop

During the 1st workshop on May 13, 14, 17, 2010 in Ankara, the concept and characteristics of PSPP was explained to the participants including officials from MoEF, EIE and other Turkish stakeholders. And also, methodology of the Study for environmental and social considerations was explained to them, and asked for their comments.

b) Brief Explanation about the Project during preliminary site survey

During the first visit to the project site for the preliminary site survey on June 3-4, 2010, the survey team contacted local residents of Baskaya Village and explained purpose of the visit and possibility of a PSPP project in the area. There was no objection against the Project.

c) The 2nd Workshop

During the 2nd workshop on August 26, 2010 in Ankara, results of the preliminary site survey and the next step for environmental and social considerations including methodology of the IEE Survey to the participants from related agencies.

d) Consultation with Baskaya Village and Bafra District Office during IEE survey

During the IEE level site survey on August 31, 2010, explanation of outline of a PSPP and consultation was made with the head of Baskaya Village and other villager. The survey team together with Village head and other villager visited the Project site to confirm the range of area to be affected conducted as shown in Annex 4.

8.2 Willingness to accept the Project

Most of villagers in Baskaya Village are old people. Young people go to urban areas because there is no job in the village.

In this connection, villagers represented by the village head are expecting to realize the PSPP Project to have job opportunities during and after the construction of the Project. And also, they are expecting expansion of water supply facilities under the social responsibility project related to the Project.

9 CONCLUSION AND RECOMMENDATIONS

During the site survey, crucial environmental and social issues on the Altunkaya PSPP Project were not found as mentioned above. In addition, the followings are relatively friendly to the environment.

- 1) There in no national parks and other environmental protected areas around the Project sites, and there is no information of endangered species in the Project sites,
- 2) New construction of the lower dams is not required because the existing reservoirs can be utilized as lower reservoirs,
- 3) The scale of the upper reservoirs is relatively small in comparison with dams for ordinary large-scale hydropower projects,
- 4) Most of the waterways and the powerhouse are underground structures,
- 5) There are existing roads which can be used for access roads to most of the construction sites. Only expansion of the existing roads are needed,
- 6) Once the upper reservoirs are impounded, it is not necessary to take additional water for those operations.

Therefore, it is expected at this moment that environmental and social impacts by the PSPP Project will be limited. Further, the villagers are expecting to have job opportunities during the construction, and also to realize an additional water supply project and expansion of surrounding roads under one of Corporate Social Responsibility (CSR) activities related to the Project. Therefore, the villagers are expecting realization of the Project.

Even if anticipated environmental and social impacts by the Project are limited at this moment, however, careful and detailed EIA procedures should be carried out through sufficient site investigation and consultation with Project Affected People (PAPs) and other related persons.

ANNEXES

- 1. List of Biological Resources in Samsun Province**
- 2. Typical Environmental Mitigation Measures for PSPP Projects**
- 3. Draft of Terms of Reference (TOR) for Environmental Impact Assessment (EIA)**
- 4. Pictures during Site Survey**

ANNEX - 1

List of Biological Resources in Samsun Province

Flora list of the Samsun Province.

SCIENTIFIC NAME	TURKISH NAME	ENDEMISM	PROTECTED BY BERN CONVENTION
BİLİMSEL İSMİ	TÜRKÇE İSMİ	ENDEMİZM	BERN SÖZLEŞMESİ
Divisio: Spermatophyta	Tohumlu Bitkiler		
Familya: Pinacea	Çamgiller		
<i>Pinus nigra ssp.</i>	Kara çamı	-	-
Subdivisio: Angiospermae	Kapalı Tohumlular		
Sınıf: Dicotyledones	Çift Çenekliler		
Familya: Fagaceae			
<i>Quercus cerris</i>	Türk Meşesi	-	-
<i>Q.vulcanica</i>	Kasnak Meşesi	-	-
Familya: Papaveraceae	Gelincikgiller		
<i>Papaver rhoeas</i>	Gelincik	-	-
Familya: Brassicaceae (Cruciferae)	Hardalgiller		
<i>Capsella bursa-pastaris</i>	Çoban Çantası	-	-
<i>Sinapis arvensis</i>	Acırğa	-	-
Familya: Polygonaceae	Çobandeğneğigiller		
<i>Rumex scutatus</i>	Kuzukulağı	-	-
<i>R.crispus</i>	Kuzu kulağı	-	-
Familya: Geraniaceae	Turnagagasıgiller		
<i>Erodium acaule</i>	İğnelik	-	-
<i>Geranium dissectum</i>	Turnagagası	-	-
Familya: Fabaceae (Leguminosea)	Baklagiller		
<i>Medicago lupulina</i>	Yabani Yonca	-	-
<i>Trifolium caampetre</i>	Üçgül	-	-
<i>T.tomentosum</i>	Üçgül	-	-
<i>Vicia peregrina</i>	Fiğ	-	-
<i>Trigonella crasipes</i>	Çayırtrfılı	-	-
<i>Melilotus alba</i>	Kokulu yonca	-	-
Familya: Rosaceae	Gülgiller		
<i>Rosa pulverulenta</i>	-	-	-
<i>Potentilla recta</i>	Beşparmak otu	-	-
<i>P.reptans</i>	Acı ayıt	-	-
<i>Rosa canina L.</i>	Kuşburnu	-	-
<i>Sanguisorba minor</i>	Amel otu	-	-
<i>Rubus idaeus</i>	Böğürtlen	-	-
Familya: Compositae (Asteraceae)	Papatyagiller		
<i>Centaurea virgata</i>	Peygamber çiçeği	-	-
<i>C.triumfetti</i>	Peygamber çiçeği	-	-
<i>Cichorium pumilum</i>	Ak kanak	-	-
<i>Antemis cretica</i>	Papatya	-	-
<i>A.coelopoda</i>	Papatya	-	-
<i>A.chia</i>	Beyaz papatya	-	-
<i>Teucrium chamaedrys</i>	-	-	-
<i>Sonchus oleraceus</i>	Eşek marulu	-	-
<i>Taraxacum megalorhizan</i>	Gelin göbeği	-	-
<i>Circium ciliatum</i>	Kuşkonmaz	-	-
Familya: Boraginaceae	Hodangiller		
<i>Myosotis arvensis</i>	Unutma neni	-	-

<i>Myosotis refracta</i>	Unutma beni	-	-
<i>Onosma heterophyllum</i>	Emzik otu	-	-
<i>Anchusa leptophylla</i>	Sığır dili	-	-
<i>Heliotropium lasiocarpium</i>	Siğil otu	-	-
<i>Cynoglossum creticum</i>	Köpek dili	-	-
Familya: Scrophulariaceae			
<i>Linaria corifolia</i>	Nevruz otu	-	-
<i>Scrophularia trichopoda</i>	-	-	-
<i>Veronica orientalis</i>	Mine çiçeği	-	-
<i>V.multifade</i>	Mine çiçeği	-	-
<i>V.multifade</i>	Mine çiçeği	-	-
<i>Verbascum asperuloides</i>	Yalangı otu	-	-
Familya: Caryophyllaceae			
<i>Cerastium dichotomum</i>	-	-	-
<i>Dianthus orientalis</i>	Yabani karanfil	-	-
<i>Minuartia juniperina</i>	-	-	-
<i>Silene vulgaris</i>	Gıvışkan otu	-	-
Familya: Labiatae			
<i>Teucrium polium</i>	Acı yavşan	-	-
<i>Thymus hirsutus</i>	-	-	-
<i>Salvia virgata</i>	Yılcıkcık	-	-
<i>S.nemorasa</i>	Kara ot	-	-
Familya: Umbelliferae			
<i>Torilis leptophylla</i>	-	-	-
<i>Eryngium creticum</i>	Devedikeni	-	-
<i>E.falcatum</i>	Devedikeni	-	-
<i>Turgenia kutifolia</i>	Pıtrak	-	-
Familya: Campanulaceae			
<i>Campanula stricta</i>	-	-	-
Familya: Convolvulaceae			
	sarmaşıkgiller		
<i>Convulus holosericeus</i>	Yabani sarmaşık		
Familya: Urticaceae			
	Isırganiller		
<i>Urtica dioica</i>	Isırgan otu	-	-
Familya: Dipsacaceae			
<i>Scabiosa micrantha</i>	Uyuzotu	-	-
<i>S. rotata</i>	Uyuzotu	-	-
Familya: Euphorbiaceae			
	Sütleğengiller		
<i>Euphorbia helioscopia</i>	Sütleğen	-	-
<i>E. aleppica</i>	Sütleğen	-	-
<i>E. stricta</i>	Sütleğen	-	-

Familya: Malvaceae	Ebegümeçigiller		
<i>Alcea aptenocarpa</i>	-	-	-
<i>Malva neglecta</i>	Ebegümeçi	-	-
<i>M. sylvestris</i>	Ebegümeçi	-	-
Familya: Violaceae			
<i>Viola pervula</i>	Yabani menekşe	-	-
Sınıf: Monocotyledons	Tek çenekliler		
Familya: Graminae (Poaceae)	Buğdaygiller		
<i>Bromus tectorum</i>	-	-	-
<i>B.tomentellus</i>	-	-	-
<i>Agropyron repens stionim: Elymus repens</i>	ayrık otu	-	-
<i>Alopecurus textilis myasoroïdes var.tansus</i>	Tilki kuyruğu	-	-
<i>Festuca ovina</i>	-	-	-
<i>Stipa lagascae</i>	-	-	-
<i>S.barbata</i>	-	-	-
<i>Phleum exoatum</i>	-	-	-
<i>Agropyrum intermedium</i>	-	-	-
<i>Cynodon dactylon</i>	Domuz ayrığı	-	-
<i>Poa pratensis</i>	-	-	-
<i>Lolium temulentum</i>	Erez	-	-
<i>Hordeum murinum</i>	Pisipisi otu	-	-

Source: Samsun Provincial Environment and Forestry Department Report based on Forestry Department, 2008

Fauna list of the Samsun Province.

LATIN NAME	TURKISH NAME	PROTECTED BY BERN CONVENTION
LATİNCE İSMİ	TÜRKÇE İSMİ	BERN SÖZLEŞMESİ
Filum: Cordata		
Grup II: Craniata		
Subfilum: Gnathostomata	Çeneliler	
Üst sınıf: Tetrapoda	Dört üyeliler	
Sınıf: Amphibia	İki yaşamlılar	
Altsınıf 1: Anuromorpha		
Takım : Anura	Kuyruksuz kurbağalar	
Alttakım: Procoela		
Familya: Bufonidae		
<i>Bufo viridis</i>	Gece kurbağası	II
<i>Bufo bufo</i>	Siğilli kurbağa	III
Familya: Hylidae		
<i>Hyla arborea</i>	Ağaç kurbağası	II
Alttakım: Diplaciocoela		
Familya: Ranidae	Gerçek su kurbağaları	
<i>Rana ridibunda</i>	Ova kurbağası	III
Altsınıf 2: Urodelomorpha		
Takım: Urodela		
Alttakım: Salamondroidae		
Familya: Salamandridae		
<i>Triturus vittatus</i>	Şeritli semender	III
<i>Triturus cristatus</i>	Pürtüklü semender	II
Filum: Cordata		
Grup II: Craniata		
Subfilum: Gnathostomata	Çeneliler	

Üst sınıf: Tetrapoda	Dört üyeliler	
Sınıf: Reptilia	Sürtingenler	
Takım 1: Testudinata	Kaplumbağalar	
Familya: Testudinidae	Tosbağagiller	
<i>Testudo graeca</i>	Adi tosağa	II
Takım 2: Squamata		
Alt takım 1: Lacertilia	Kertenkeleler	
Familya 1: Gekkonidae	Ev kelerleri	
<i>Hemidactylus turcicus</i>	Geniş parmaklı keler	III
Familya 2: Lacertidae	Gerçek kertenkeleler	
<i>Lacerta viridis</i>	Yeşil kertenkele	II
<i>L. saxicola</i>	Kaya kertenkelesi	III
<i>L. muralis</i>	-	III
Familya 3: Scincidae	Parlak kertenkeleler	
<i>Ablepharus kitaibelii</i>	İnce belli kertenkele	II
Familya 4: Amphisbaenidae	Kör kertenkeleler	
<i>Blanus strauchi</i>	Kör kertenkele	III
Familya 5: Anguidae	Yılan kertenkeleleri	
<i>Ophisaurus apodus</i>	Oluklu kertenkele	II
<i>Anguis fragilis</i>	Yılanımsı kertenkele	III
Alt takım 2: Ophidia	Yılanlar	
Familya 1: Typhlopidae		
<i>Typhlops vermicularis</i>	Kör yılan	III
Familya 3: Colubridae		
<i>Coluber caspius</i>	Hazer yılan	III
<i>Eirenis modestus</i>	Uysal yılan	III
<i>Elaphe quatuorlineata</i>	Sarı yılan	II
<i>Telescopus fallax</i>	Kedi gözlü yılan	II

Source: Samsun Provincial Environment and Forestry Department Report based on Forestry Department, 2008

Bird list

LATIN NAME	TURKISH NAME	PROTECTED BY BERN CONVENTION	RED LIST
LATİNCE İSMİ	TÜRKÇE İSMİ	BERN SÖZLEŞMESİ	KIRMIZI LİSTE
Filum: Chordata			
Grup II: Craniata			
Subfilum: Gnathostomata	Çeneliler		
Üstsinif: Tetrapoda	Dört üyeliler		
Sınıf: Aves	Kuşlar		
Takım 1: Ciconiformes			
<i>Ciconia nigra</i>	Kara leylek	II	A.2
TakımI: Falconiformes			
Familya1: Accipitridae			
<i>Accipiter nisus</i>	Atmaca	II	A.4
<i>Buteo buteo</i>	Şahin	II	A.3
<i>B.b.vulpinus</i>	Bozkır şahini	II	A.3
Familya 2: Falconidae			
<i>Falco peregrinus</i>	Gökdoğan	II	A.2
<i>F.subbbuteo</i>	Delice doğan	II	A.3
<i>F.naumanni</i>	Küçük kerkenez	II	A.3
Takım 3: Galliformes			
Familya: Phasianidae			
<i>Coturnix coturnix</i>	Bıldırcın	III	A.4
<i>Perdix perdix</i>	Keklik	III	A.4
Takım 4: Columbiformes			
Familya: Columbidae			
<i>Columba livia</i>	Kaya güvercini	III	-
<i>Columba palambus</i>	Tahtalı	-	A.4
Takım 5: Strigiformes			
Familya: Strigidae			
<i>Athene noctua</i>	Kukumav	II	A.3

LATİNCE İSMİ	TÜRKÇE İSMİ	BERN SÖZLEŞMESİ	KIRMIZI LİSTE
Filum: Chordata			
Grup II: Craniata			
Subfilum: Gnathostomata	Çeneliler		
Üst sınıf: Tetrapoda	Dört üyeliler		
Sınıf: Aves	Kuşlar		
Takım 1: Ciconiformes			
<i>Ciconia nigra</i>	Kara leylek	II	A.2
Takım I: Falconiformes			
Familyal: Accipitridae			
<i>Accipiter nisus</i>	Atmaca	II	A.4
<i>Buteo buteo</i>	Şahin	II	A.3
<i>B.b.vulptinus</i>	Bozkır şahini	II	A.3
Familya 2: Falconidae			
<i>Falco peregrinus</i>	Gökdoğan	II	A.2
<i>F.subbuteo</i>	Delice doğan	II	A.3
<i>F.naumanni</i>	Küçük kerkenez	II	A.3
Takım 3: Galliformes			
Familya: Phasianidae			
<i>Coturnix coturnix</i>	Bıldırcın	III	A.4
<i>Perdix perdix</i>	Keklik	III	A.4
Takım 4: Columbiformes			
Familya: Columbidae			
<i>Columba livia</i>	Kaya güvercini	III	-
<i>Columba palambus</i>	Tahtalı	-	A.4
Takım 5: Strigiformes			
Familya: Strigidae			
<i>Athene noctua</i>	Kukumav	II	A.3

Takım 6: Apodiformes			
Familya: Apodidae			
<i>Apus apus</i>	Ebabil	III	A.3
<i>A.melba</i>	Akkanlı sağan	II	A.4
Takım 7: Coraciformes			
Familya: Alcedidae			
<i>Alcedo atthis</i>	Yalıçapkını	II	A.1.2
Familya: Meropidae			
<i>Merops apiaster</i>	Arı kuşu	II	A.4
Takım 8: Passeriformes			
Familya 1: Alaudidae			
<i>Alauda arvensis</i>	Tarla kuşu	III	-
<i>Galerida cristata</i>	Tepeli toygar	III	-
Familya 2: Turdidae			
<i>Erithacus rubecula</i>	Kızıl gerdan	II	-
<i>Saxicola torquata</i>	Taşkuşu	II	-
<i>Saxicola rubetra</i>	Çayır taşkuşu	II	-
<i>Phoenicurus ochruros</i>	Kara kızılkuşuk	II	-
<i>Turdus merula</i>	Karatavuk	III	-
Familya 3: Hirundinidae			
<i>Delichon urbica</i>	Ev kırlangıcı	II	A.4
<i>Hirundo rustica</i>	Kır kırlangıcı	II	-
Familya 4: Motacillidae			
<i>Motacilla alba</i>	Ak kuyruksallayan	II	A.4
Familya 5: Sylviidae			
<i>Sylvia atricapilla</i>	Karabaşlı ötleğen	II	A.3
<i>Sylvia melanocephala</i>	Maskeli ötleğen	II	A.3
<i>Regulus regulus</i>	Çalikuşu	II	-
<i>R.ignicapillus</i>	Sürmeli çalikuşu	II	-
Familya 6: Paridae			
<i>Parus major</i>	Büyük baştankara	III	A.4
<i>Parus caeruleus</i>	Mavi baştankara	III	A.4
Familya 7: Troglodytidae			
<i>Troglodytes troglodytes</i>	Çitkuşu	II	A.3
Familya 8: Laniidae			

<i>Lanius collurio</i>	Kızıl sırtlı örümcekkuşu	II	-
<i>L.minor</i>	Karaalınlı örümcek kuşu	II	-
Familya 9: Corvidae			
<i>Garrulus glandarius</i>	Alakarga	-	-
<i>Corvus frugileus</i>	Ekin kargası	-	-
<i>Corvus corone cornix</i>	Leş kargası	-	-
Familya 10: Sturnidae			
<i>Sturnus vulgaris</i>	Sığırcık	-	-
Familya 11: Passeridae			
<i>Passer domesticus</i>	Serçe	-	-
Familya 12: Emberizidae			
<i>Miliaria calandra</i>	Tarla kirazkuşu	III	-
<i>Emberiza cirrus</i>	Bahçe kirazkuşu	II	-
<i>Emberiza hortulana</i>	Kirazkuşu	III	-
Familya 14: Fringillidae			
<i>Fringilla coeleps</i>	İspinoz	III	-
<i>Carduelis carduelis</i>	Saka	II	
<i>C.chloris</i>	Florya	II	A.4

Source: Samsun Provincial Environment and Forestry Department Report based on Forestry Department, 2008

Mammal species List

LATIN NAME	TURKISH NAME	PROTECTED BY BERN CONVENTION
LATİNCE İSMİ	TÜRKÇE İSMİ	BERN SÖZLEŞMESİ
Filum: Chordata		
Grup II: Craniata		
Subfilum: Gnathostomata	Çeneliler	
Üstsmf: Tetrapoda	Dört üyeliler	
Sınıf: Mammalia	Memeliler	
Takım: Insectivora	Böcek yiyen ilkel memeliler	
Familya 1: Erinaceidae		
<i>Erinaceus europaeus</i>	Kirpi	III
Familya 2: Soricidae		
<i>Sorex minutus</i>	Cüce fare	III
<i>S.ananeus</i>	Orman sivri faresi	III
<i>Crocidura leucodon</i>	Sivri burunlu tarla faresi	III

Familya 3 :Talpidae		
<i>Talpa europaea</i>	Adi köstebek	III
Takım: Chiroptera		
Familya: Rhinolophidae		
<i>Rhinolopus hipposideros</i>	Küçük nal burunlu yarasa	II
Familya: Vespertilionidae		
<i>Pipistrellus pipistrellus</i>	Cüce yarasa	
<i>P.nathusii</i>	Pürtüklü derili yarasa	II
Takım: Lagomorpha		
Familya: Leporidae		
<i>Lepus europaeus</i>	Adi tavşan	III
Takım: Rodentia		
Familya 1: Cricetidae		
<i>Cricetulus migratorius</i>	Cüce avurtlak	-
<i>M. nivalis</i>	Kar faresi	III
Familya 2: Muridae		
<i>Rattus rattus</i>	Ev sıçanı	-
<i>Mus musculus</i>	Ev faresi	-
<i>Apodemus sylvaticus</i>	Büyük dişli orman faresi	-
<i>A.mystacinus</i>	Kayalık faresi	-
Familya 3: Gliridae		
<i>Dryomys nitedula</i>	Orman faresi	III
<i>Glis glis</i>	Yeduiyur	III
<i>Muscardinus avellanarius</i>	Fındık faresi	III
Takım: Carnivora		
Familya: Canidae		
<i>Canis lupus</i>	Kurt	II
<i>C.familiaris</i>	Evcil köpek	-
<i>C.aureus</i>	Çakal	-
<i>Vulpes vulpes</i>	Kızıl tilki	-
Familya: Mustelidae		
<i>Mustela nivalis</i>	Gelincik	III
Takım: Artiodactyla		
Familya: Suidae		
Alttür: <i>Sus scrofa scrofa</i>	Yabani domuz	-

Source: Samsun Provincial Environment and Forestry Department Report based on Forestry Department, 2008

Fish species List

SPECIES	FAMILIA
Tür	Familya
<i>Squalus acanthias</i> (LINNAEUS.1758)	Squalidae
<i>Raja davata</i> (LINNAEUS.1758)	Rajidae
<i>Dasyatis pastinaca</i> (LINNAEUS.1758)	Dasyatidae
<i>Acipenser stellatus</i> (PALLAS.1771)	Acipenseridae
4c;pencernud; Ventos(LOVETZKY,1828)	Acipenseridae
<i>Acipenser sturio</i> (LINNAEUS.1758)	Acipenseridae
<i>Acipenser guldenstaedti</i> (BRANDT.1833)	Acipenseridae
<i>Huso huso</i> (LINNAEUS.1758)	Acipenseridae
<i>Alosa caspia bulgarica</i> (DRESNSKY,1934)	Clupeidae
<i>Sprattus sprattus phaiencus</i> (RISSO.1826)	Clupeidae
<i>Sprattus sprattus sprattus</i> (LINNAEUS.1758)	Clupeidae
<i>Engraulis encrasicolus ponticus</i> (LINNAEUS.1758)	Engraulidae
<i>Salmotrutia labrax</i> (PALLAS,1811)	Salmonidae
<i>Anguilla anguilla</i> (LINNAEUS.1758)	Anguillidae
<i>Belone belone</i> (GUNTHER,1866)	Seloniidae
<i>Aphanius fasciatus</i> (CUVIER ET VALENCIENNES.1821)	Cyprinodontidae
<i>Syngnathus acus</i> (LINNAEUS.1758)	Syngnathidae
<i>Hippocampus hippocampus</i> (LINNAEUS.1758)	Syngnathidae
<i>Gasterosteus aculeatus</i> (LINNAEUS.1758)	Gasterosteidae
<i>Merlangius merlangus euxinus</i> (NORDMANN,1840)	Gadidae
<i>Gaidropsarus mediterraneus</i> (LINNAEUS.1758)	Gadidae
<i>Serranus scriba</i> (LINNAEUS.1758)	Serranidae
<i>Dicentrarchus labrax</i> (LINNAEUS.1758)	Serranidae
<i>Pomatomus saltator</i> (LINNAEUS.1766)	Pomatomidae
<i>Trachurus trachurus</i> (LINNAEUS.1758)	Carangidae
<i>Trachurus mediterraneus</i> (STEINDACHNER,1868)	Carangidae
<i>Sciaenops ocellatus</i> (LINNAP(S.1758)	Sciaenidae
<i>Umbrina cirrosa</i> (LINNAEUS.1758)	Sciaenidae
<i>Mullus barbatus ponticus</i> (ESS1POV,1927)	Mullidae
<i>Mullus surmuletus</i> (LINNAEUS.1758)	Mullidae

<i>Diplodus annularis</i> (LINNAEUS.1758)	Sparidae
<i>Diplodus sargus</i> (LINNAEUS.1758)	Sparidae
<i>Spicara maena</i> (LINNAEUS.1758)	Centracanthidae
<i>Spicara smaris</i> (LINNAEUS.1758)	Centracanthidae
<i>Chromis chromis</i> (LINNAEUS.1758)	Pomacentridae
<i>Labrus bimaculatus</i> (LINNAEUS.1758)	Labridae
<i>Symphodus cinereus</i> (BONNATERRE.1788)	Labridae
<i>Trachinus araneus</i> (CUVIER.1829)	Trachinidae
<i>Trachinus draco</i> (LINNAEUS.1758)	Trachinidae
<i>Uranoscopus scaber</i> (LINNAEUS.1758)	Uranoscopidae
<i>Sarda sarda</i> (BLOCH,1793)	Scomberomoridae
<i>Gobius niger</i> (LINNAEUS.1758)	Gobiidae
<i>Gobius cobitis</i> (PALLAS.1811)	Gobiidae
<i>Mesogobius batrachocephalus</i> (PALLAS.1811)	Gobiidae
<i>Blennius ocellaris</i> (LINNAEUS.1758)	Blenniidae
<i>Callionymus festivus</i> (VALENCIENNES.1837)	Callionymidae
<i>Mugil cephalus</i> (LINNAEUS.1758)	Mugilidae
<i>Mugil soui</i>	Mugilidae
<i>Uza aurata</i> (RISSO.1810)	Mugilidae
<i>Atherina boyeri</i> (RISSO.1810)	Atherinidae
<i>Atherina hepsetus</i> (LINNAEUS.1758)	Atherinidae
<i>Scorpaena scrofa</i> (LINNAEUS.1758)	Scorpaenidae
<i>Trigla lucerna</i> (LINNAEUS.1758)	Triglidae
<i>Psetta maxima maeoticus</i> (PALLAS.1811)	Bothidae
<i>Platichthys flesus luscus</i> (PALLAS.1811)	Pleuronectidae
<i>Solea vulgaris</i> (QUENSEL.1806)	Soleidae

Kaynak: İl Çevre ve Orman Müdürlüğü, 2005

Source: Samsun Provincial Environment and Forestry Department Report based on Forestry

ANNEX - 2

Typical Environmental Mitigation Measures for PSPP Projects

Typical Environmental Mitigation Measures for PSPP Projects

Items		Factors	Mitigation Measures		
			Avoidance	Reduction	Compensation
Air Pollution	Dust	Operation of Heavy Equipment	No operation of heavy equipment simultaneously and at high load	X	
			No operation when wind is strong	X	
			Distribution of access route to the construction site	X	
			Water sprinkling		X
			Installation of temporary enclosure fence		X
			Isolation of equipment from objects to be protected		X
			Temporary pavement		X
			Washing construction vehicles		X
			Distribution of approach routes		X
			Installation of sound insulation walls		X
Noise	Noise	Transportation of construction materials	Improvement of construction method and working time		X
			Avoidance of transportation during night time		X
			Employment of low-noise construction equipment		X
			Improvement of construction method with low-noise		X
			Isolation of equipment from objects to be protected		X
			Improvement of construction method and working time		X
			Driving speed control and restriction of overload transportation		X
			Distribution of access route to the construction site		X
			Improvement of construction method and working time		X
			Vibration	Vibration	Transportation of construction materials
Improvement of construction method and working time		X			
Avoidance of transportation during night time		X			
Employment of low-vibration construction equipment		X			
Improvement of construction method with low-vibration		X			
Isolation of equipment from objects to be protected		X			
Improvement of construction method and working time		X			
Driving speed control and restriction of overload transportation		X			
Distribution of access route to the construction site		X			
Improvement of construction method and working time		X			
Water Pollution	Water Quality	Existence of Reservoir	Avoidance of transportation during night time	X	
			Employment of low-vibration construction equipment		X
			Improvement of construction method with low-vibration		X
			Isolation of equipment from objects to be protected		X
			Improvement of construction method and working time		X
			Driving speed control and restriction of overload transportation		X
Water Pollution	Turbidity	Temporary	Employment of Selectable Outlet Facility		X
			Installation of bypass channel		X
			Installation of aerator		X
			Installation of drainage canals		X

ANNEXES

		Construction	Installation of settling basin			
Topography Geology	Important topography and Geology	Construction	Installation of turbid water treatment facility		X	
		Transformation of land	Change of location	X	X	
		Existence of Reservoir	Existence of Structures and Plant Operation	Restriction of scale of structures and change to underground structures	X	X
			Change of location	Minimization of transformation of land	X	X
Fauna	Important & Species Habitat	Existence of Structures and Plant Operation	Change of location	X		
			Restriction of lighting in night time	X		
			Prohibition of entering to outside of construction areas	X		
			Prohibition of capture of animals and intimidation	X		
			Minimization of scale of structures and change to underground structures	X	X	
			Change of road design to tunnels and bridges	X	X	
			Minimization of transformation of land		X	
			Appropriate disposal of garbage		X	
			Creation slopes, which small animals can climb		X	
			Restoration of vegetation of construction areas		X	
			Creation of swamp and marshy place		X	
			Transplantations of precious species		X	
			Flora	Important Species and community	Existence of Structures and Plant Operation	Change of location
Prohibition of entering to outside of construction areas	X					
Erosion measures during rain	X					
Prohibition of extraction of plants	X					
Protection of precious species	X					
Prohibition of entering into swamp and marshy place	X					
Minimization of scale of structures and change to underground structures	X	X				
Change of road design to tunnels and bridges	X	X				
Minimization of transformation of land		X				
Creation of swamp and marshy place		X				
Transplantations of precious species		X				
Seeding or reforestation of transformed land		X				
The same as the measures for fauna and flora		X				
Ecosystem	Typical Ecosystem	Existence of Structures and		X	X	

ANNEXES

		Plant Operation Existence of Structures and Plant Operation Temporary Construction			
Scenery	Important scenery resources	Change of location Minimization of scale of structures and change to underground structures Minimization of transformation of land	X		
			X	X	X
					X
Waste	Waste	Recycling			X

ANNEX - 3

Draft of Terms of Reference (TOR) for Environmental Impact Assessment (EIA)

Draft Terms of Reference of Environmental Impact Assessment
for _____ (*Name of Project*) _____ Pumped Storage Power Plant Project

1 Introduction

(General information of the Project shall be briefly explained)

2 Background Information

(Background of the Project and this Study shall be briefly described.)

3 Objectives

The objectives of the study are:

- Conduct surveys and analysis of current environmental baseline of the Project site and surrounding areas,
- Identify social and environmental impacts owing to the Project,
- Propose impact mitigation measures, monitoring plan and resettlement plan,
- Prepare Environmental Impact Assessment (EIA) Report supported by all social and environmental reports required for development of the _____ (*Name of Project*) Pumped Storage Power Plant Project, such as, Environmental Management Plan (EMP), Resettlement Action Plan (RAP), and others.

4 Environmental Assessment Requirements

Measures for assessment, management and monitoring of social and natural environmental impacts have been developed based on Turkish legislation, regulations, decrees, standards and guidelines.

(In case that a funding source is an international donor agency, EIA procedures should be compliance with the Operational directives, standards and guidelines of the agency. Its requirement should be described here.)

5 Study Area

The study area in this study covers all areas affected by the Project whose components are a dam, reservoir, waterway, powerhouse, tailrace, transmission line and surrounding areas. It also includes access roads from main provincial roads to the site, and construction yards such as base camps, stockyards and other temporary construction yards.

6 Scope of Work

6.1 Task 1 Description of Project Information

The Consultant shall provide the following information:

- Scope of the Project
 - Location of all project-related development sites and Right of Ways (ROWs) such as dam area and surroundings, including appurtenant structures as powerhouse, waterways, switchyards, reservoir area, area upstream of the impounding reservoir, downstream area, resettlement area, transmission line, access roads, area for compensatory and mitigation measures, quarry and disposal site, workers camps construction and installation sites etc. using topographic maps and land use maps with appropriate scales..
 - General layout of facilities at project-related development sites
 - Design basis and profile of the structures
- Project Activities
 - Pre-construction and construction activities
 - Operation and maintenance activities
 - Schedule of the project

- Quality and quantity of raw materials
- Quality and quantity of construction equipment
- Quality and quantity of waste products generated by the Project
- Project cost

6.2 Task 2 Study on Legislative and Regulatory Considerations

The Consultant shall provide the pertinent regulations and standards governing environmental quality, health and safety, protection of sensitive areas, protection of endangered species, siting, land use control, etc., at international, national, regional and local levels. The Consultant shall also provide the relevant administrative requirements and set-up.

6.3 Task 3 Study on Baseline on Environment of Project Area

Based on base on site investigation, consultation with stakeholders and literature study, the Consultant shall assemble, evaluate and present baseline data on the environmental characteristics of the study area. It will include information on any changes anticipated before the project commences. As for data which seasonal changes are anticipated, site investigation shall be carried out seasonally.

The following items shall be described:

- a) Methodology of data collection, analysis and evaluation
- b) Physical Resources
Topography, Geology and Soils, Climate, Natural Disaster Situation, Hydrology, Water Quality, Air (Atmospheric Conditions), Landscape Characteristics
- c) Biological resources
Flora (Vegetation), Fauna (Wildlife, Aquatic Animals), National Parks, Natural Parks, Provincial and District Protected Areas, and other Environmental protected Areas, Sensitivity Level (in line with the Sensitive Locations List in Annex V of Gazette No. 26939 “By-Law On Environmental Impact Assessment (EIA)”) of the environment which may become polluted due to proposed project activities
- d) Socio-economical Condition
Population and Demographics, Agricultural Production and Livelihood Systems, Commercial and Industrial Activities, Archeological and Architectural Heritage, Health and Educational Conditions, Infrastructure and Facilities, Energy Consumption, Ethnic Conditions, Land-usage and Ownership Status, and so on.

6.4 Task 4 Analysis of Potential Impacts by the Project

The Consultant shall identify all significant potential impacts, which the project would incur, in consideration of characteristics of pumped storage power plants. These would include, but not be limited to, changes in Physical Resources, Biological Resources, Socio-economical Conditions as described above under Task 3, including impacts due to accidental events, impacts which are unavoidable or irreversible.

In this analysis, the Consultant shall distinguish between significant positive and negative impacts, direct and indirect impacts, and immediate and long-term impacts. The Consultant shall also try to describe impacts quantitatively in terms of environmental costs and benefits when feasible.

6.5 Task 5 Analysis of Alternatives

The environmental assessment should include an analysis of reasonable alternatives to meet the ultimate project objective. This analysis may suggest designs that are more sound from an environmental, socio-cultural or economic point of view than the originally proposed project. The “no action” alternative – not constructing the Project- in order to demonstrate environmental considerations without it will be included. Alternatives should include the

following: the “no action” alternative; alternative means of meeting the energy requirements; the alternative of upgrading existing facilities; alternative routes and sites; alternative design; and alternative methods of construction, including costs and reliability.

6.6 Task 6 Proposal of Mitigation Measures

For the proposed project, the Consultant shall recommend feasible and cost-effective measures to prevent or reduce significant negative impacts to acceptable levels, which will include measures to address emergency response requirements for accidental events. When selecting mitigation measures, the Consultant shall refer mitigation measures which were applied to similar projects in the past not only in Turkey but also in other countries.

The Consultant shall also estimate the impacts and costs of those measures, and of institutional requirements to implement them, in consideration of compensation to affected parties for impacts which cannot be mitigated.

6.7 Task 8 Development of Environmental Management Plan

The Consultant shall also prepare an environmental management plan (EMP) to manage the proposed mitigation measures and to monitor those implementation and impacts during construction and operation.

In concrete, the EMP should consist of the set of mitigation measures, monitoring, and institutional measures to be taken to eliminate adverse environmental and social impacts. It should include proposed work programs, estimates of capital and operating costs, implementation schedules, staffing, and capacity development and training programs, and other necessary support services to implement the mitigating measures.

6.8 Task 8 Development of Resettlement Action Plan

The Consultant shall prepare a policy and framework and also an action plan for resettlement to ensure that resettlement would be taken place without any conflicts and that sufficient compensation would be provided to affected people. The Resettlement Action Plan (RAP) shall include the following: Analysis of alternatives and assessment of resettlement sites, Details of land requirements, Census data and socio-economic assessment, Entitlement framework, Public Involvement process and Grievance procedures, Implementation Mechanisms, Livelihood and income restoration Programs, Institutional and organizational framework, capacity and responsibilities, Resettlement budget, Environmental protection and management, Implementation plan, Implementation schedule, Monitoring and evaluation etc.

6.9 Task 9 Assistance in Procedures of Public Participation and Disclosure of Information

The Consultant shall assist (Name of Project Owner) in coordination with related governmental agencies for all EIA process, in conducting public participation meetings and disclosure process to obtain views of local NGO's and affected groups, and also in keeping records of meetings and other activities, communications, and comments and their disposition during public participation meetings and commission meetings.

7 Report

The Consultant shall provide an EIA report in the general format, which is prescribed in ANNEX III of Gazette No. 26939 “By-Law On Environmental Impact Assessment (EIA)” as shown in Attachment 1.

Aside from the general format for submission to Ministry of Environment and Forestry (MoEF), the Consultant shall also provide another version of an EIA report in consideration of submission to international agencies for funding. It should be concise and limited to significant environmental issues. The EIA report shall consists of the following items:

- a) Executive summary
- b) Policy, legal, and administrative framework

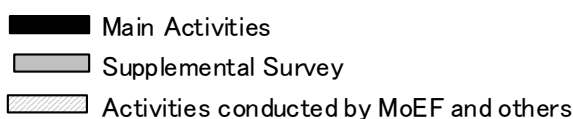
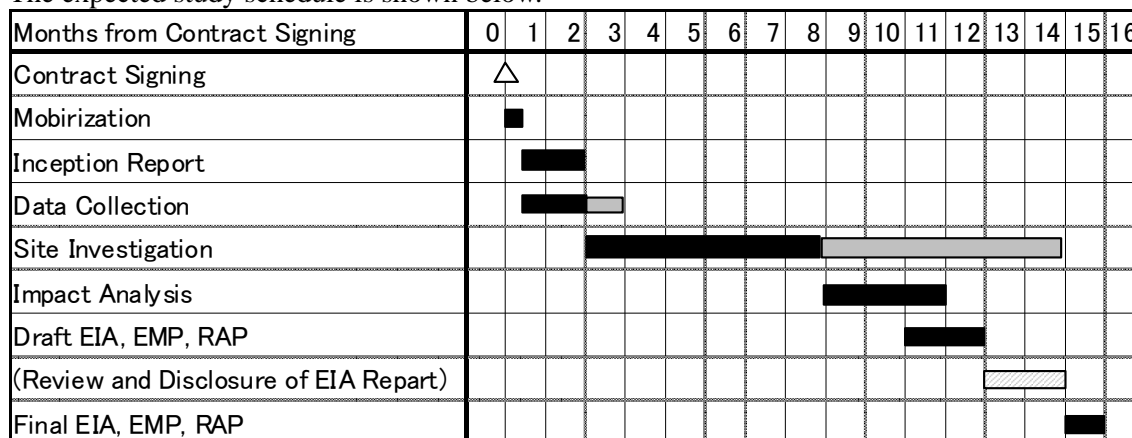
- c) Project description
- d) Environmental Baseline data
- e) Environmental impacts
- f) Analysis of alternatives
- g) Environmental management plan
- h) Appendices
 - (i) List of EA report preparers--individuals and organizations.
 - (ii) References--written materials both published and unpublished, used in study preparation.
 - (iii) Record of public participation meetings and commission meetings, including consultations for obtaining the informed views of the affected people and local nongovernmental organizations (NGOs). The record specifies any means other than consultations (e.g., surveys) that were used to obtain the views of affected groups and local NGOs.
 - (iv) Tables presenting the relevant data referred to or summarized in the main text.
 - (v) List of associated reports:
 - Environmental Management Plan
 - Resettlement Action Plan, and
 - Other reports, if required

8 Consulting Team

The general skills required of an environmental assessment team are: environmental management planning, socio-economics, ecology, hydrology/hydrogeology analysis. The project team will consist of an environmental specialist, a socio-economist, a terrestrial biologist, an aquatic biologist, a hydrologist, and a geologist internationally and locally. Apart from the specialists, a field coordinator and data collectors will be required.

9 Schedule

It may take 15 months to complete the EIA study from the date of signing the contract. The expected study schedule is shown below.



ENVIRONMENTAL IMPACT ASSESSMENT GENERAL FORMAT ¹

Title Page:

Name, address, phone and fax number of project owner:

Name of Project:

Name and Location of the Place of Project:

Name, address, telephone and fax numbers of the working group / institution which prepared the report:

Preparation date of report:

Table of Contents:

Part I: Definition and Objective of the Project

Definition, life period, service purposes, importance, and necessity of project investment:

Physical characteristics of the project, amount and characteristics of land to be used in the construction and operation phases:

General explanation of major environmental impacts which the proposed project may cause (water, air, soil pollution, noise, vibration, light, temperature, radiation, etc)

Summary of the main alternatives examined by the investor and reasons for choosing the selected area:

Part II: Location of Project Area

Location, coordinates, and information about project area and alternative locations.

Part III: Existing environmental characteristics of project and impact area

Explanation of the demographics, fauna, flora, geological and hydro-geological characteristics, natural disaster situation, soil, water, air (atmospheric conditions), climatic conditions, ownership status, archeological and architectural heritage, landscape characteristics, land-usage status, sensitivity level (in line with the Sensitive Locations List in Annex V) of the environment which may become polluted due to proposed project activities, and interaction between above mentioned factors.

Part IV: Important environmental impacts of project and measures to be taken

1- Presentation of the likely impacts of project which may potentially cause the following issues: (This definition should include short, medium, and long-term, permanent and temporary, negative and positive impacts.)

a) The area to be used for the project,

b) Use of natural resources,

c) The quantity of polluters, (atmospheric conditions and interaction between polluters) explanation of possible problems which may disturb the environment, and minimization of wastes.

2- General presentation of estimation methods to be used in the assessment of likely impacts of investment on environment.

3- Presentation of the measures envisaged to be taken in order to minimize the negative effects on the environment.

Part V: Public participation

1- Methods proposed for determining the public likely to be affected by the project

• ¹ Annex III of Gazette No. 26939 “By-Law On Environmental Impact Assessment (EIA)”

- and reflecting the public opinions in the environmental impact assessment study,
- 2- Other parties whose opinions are envisaged to be sought,
 - 3- Other relevant information and documents regarding this subject which are available.

Part VI: A non-technical summary of the information obtained in accordance with the above topics

Appendices: The information and documents below which are obtained from various institutions and organizations and used in the preparation of environmental impact assessment application file and techniques which are not submitted in the text of the report:

- 1- As per the project area and alternatives, if available, landscaping, master plan, application zoning plan, general layout or amendment proposals on these plans,
- 2- Permits, approvals, licenses, and all other documents etc. which the investor has previously obtained for the project from relevant organizations..
- 3- Land usage status of the area selected for the project.

Notes and Sources

Introduction of the working group which prepared the environmental impact assessment application file within the scope of Circular Letter on Certificate of Competency:
Name and surname, profession, curriculum vitae, references, and signature indicating that s/he is responsible for the report.

ANNEX – 4

Pictures during Site Survey

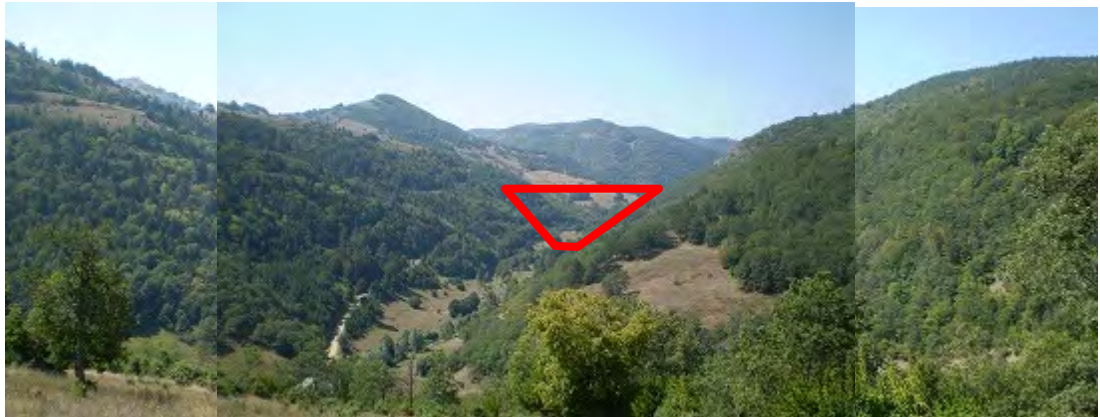


Photo 1 Upper Dam Site, view from downstream.



Photo 2 Baskaya Village (Main)



Photo 3 Baskaya Village (Uluavlu)



Photo 4 Altinkaya Dam (As the lower dam)



Photo 5 Outlet Site and Altinkaya Reservoir



Photo 6 Interview with Head of Village



Photo 7 Site confirmation with Head of Village.



Photo 6 Discussion with Forestry Dept. of Bafra



Photo 7 Discussion with DSI Bafra