



Final Report

# **Mid Size Sustainable Energy Financing Facility (MidSEFF)**

## **Sukenari Hydro Electric Power Plant: Non Technical Summary (NTS)**

October 2011

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**European Bank for Reconstruction and Development**

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The European Bank for Reconstruction and Development (EBRD) launched in January 2011 a financing facility aimed at scaling up Renewable Energy and Energy Efficiency investments in Turkey, to increase the country's energy savings and decrease its carbon emissions. The Turkish Mid Size Sustainable Energy Financing Facility (MidSEFF) launched by the EBRD with support from the European Investment Bank (EIB) and European Commission (source of the Technical Cooperation funds) will provide a total of EUR 900 million in loans through 5 Turkish banks for on-lending to private sector borrowers.

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## Table of Contents

1.	General Plant Description .....	4
2.	Environmental and Social Baseline .....	6
2.1	Soil Use .....	6
2.2	Residential Areas .....	6
2.3	Water Sources .....	6
2.4	Natural Protected Areas and Cultural Heritage .....	6
2.5	Climate .....	6
2.6	Flora and Fauna .....	7
3.	Social and Environmental Impact .....	8
3.1	Use of Agricultural and Forest Areas .....	8
3.2	Man Power .....	8
3.3	Land Taking .....	8
3.4	Water Utilization .....	8
3.5	Water Discharge .....	9
3.6	Solid Wastes .....	9
3.7	Excavations .....	10
3.8	Emissions to atmosphere .....	10
3.9	Noise Emissions and Vibration .....	10
3.10	Impact on Aquatic Biota .....	12
3.11	Workers' Health and Safety .....	12

## 1. General Plant Description

The Project will be realized on the Değirmendere River that is in Black Sea Region in Trabzon Province, Maçka District.

The facilities to be constructed within the scope of the Project are Sukenari Regulator and settling trap, transmission tunnels, conduits and channels, forebay, penstock, power house, and switchyard.

The water being collected by the Sukenari Regulator on the 511 m a.s.l. high ground level of the Değirmendere River shall be transmitted to the forebay by means of the transmission tunnels, conduits and channels before being directed to the powerhouse by means of the 248 m long penstock. The powerhouse is located on a place that is 386 m high a.s.l (tailwater level).

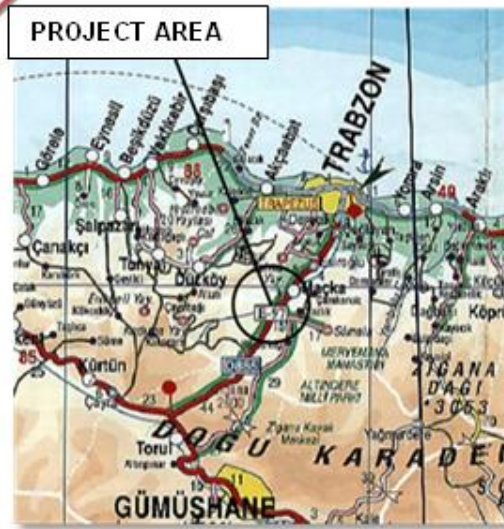
The regulator is used essentially to control the extraction of water at the intake. The intake is the HEPP's door and guides a part of the river flow into the hydro channel. It is located at a thalweg elevation of 511 m. In order to avoid the side effects of the sediments coming from the basin of the "Sukenari Regulator", the construction of a sedimentation pool is necessary. Then the water coming from the regulator will be canalized to the sedimentation pool and, after it, to the transmission channels/tunnels. A forebay is planned to be built between the transmission channels and the penstock pipe. The main purpose of the forebay is to feed the penstock leading the water to the turbines. The penstock connects the forebay, followed by the valve house, and the powerhouse. In order to minimize the head losses the penstock shall be the less rough as possible. The turbines to be installed in the plant are one Francis and one Pelton type water turbines of 6.69 and 2.16 MW respectively.

The HEPP has a power capacity of 8.57 MW and will be equipped with one assembled horizontal axis Francis turbine and one vertical axis Pelton turbine.

The present report is a Non Technical Summary of the relevant technical and socio-environmental information about the project as made available by the sponsor by means of:

- Verification Report;
- Feasibility Study;
- Additional information provided by the sponsor.





**Figure 1-1: Sukenarı Hydro Electric Power Plant – Project Location**

## 2. Environmental and Social Baseline

### 2.1 Soil Use

Most of the lands of Maçka District are hilly and mountainous which is common in the Interior part of Black Sea Region. The scarce cultivated areas are used for hazelnut and corn.

Maçka is one of the less developed district of Trabzon: there are a few industrial plants located far away from the project area.

The project is not in an agricultural or industrial area, the surrounding is a wild land without any kind of beings other than spruce and pine trees near the river.

The lands used for the projects are at least in part private lands: the sponsor has already started procedures for the purchasing on a bilateral agreement basis whenever possible.

The sponsor obtained the cut permit by Forestry Directorate.

### 2.2 Residential Areas

The closest settlements to project area are:

- a residential estate within the borders of Sukenari Village located about 100 m to the regulator;
- a residential estate within the borders of Sukenari Village located about 75 m to the 2<sup>nd</sup> conveyance channel;
- a residential estate within the borders of Ortakoy Village located about 200 m to the HEPP.

### 2.3 Water Sources

The Degirmendere River will be the source during the Project and electrical energy shall be obtained thereof.

Degirmendere River is the most dominant water source of the district. It starts as Bekciler and Haranoy River at source at 2400 m altitude. These two rivers combine after passing Hamsikoy area and take the name of Hamsikoy River. Combining with two smaller river, Hamsikoy River forms Degirmendere River at east of Kiremitli district.

### 2.4 Natural Protected Areas and Cultural Heritage

By taking the Sensitive Areas list on Annex-V into consideration; wetlands, shores, mountains and forests, cultivated areas, historical, cultural or archaeological areas, areas of potential erosion and forestation, and aquifers that need to be protected in conformity with Law on Underground Water dated 12/16/1960 and numbered 167.

In Turkey, there are 35 natural protected areas and 37 national parks have defined by Ministry of Environmental and Forestry. In the project district, Macka Village, there are neither natural protected areas nor national parks. The nearest national park, Trabzon, Altindere valley, is 10 km away from the project location. No direct interaction is foreseen.

### 2.5 Climate

The Project is in the temperate climate, Black Sea climate. For this reason both during the summers and winters, temperature remain warm and cool, also rainy and wet all seasons.

## 2.6 Flora and Fauna

### 2.6.1 Flora

The project area is inside the Colchis Fauna Sector of the EU-Siberia flora sector. The major flora of the district is forest vegetation. The forestry area of Trabzon province constitutes 2.6% of the total Turkey's forestry areas. As a result of features of climate and soil, the flora is very rich. Major vegetation zones are listed below:

- Lauretum: Mostly maquis shrubland. Up to 600m altitude
- Castanetum: Between 400-600 m altitude
- Fagetum: Up to 1000 m altitude
- Picetum: Between 1000 m and 1500 m
- Alpinetum: Up to 2000 m and above

There are no species around the activity area that are endemic, rare, endangered or that has to be protected under Bern Agreement Annex-1 list.

### 2.6.2 Fauna

A detailed desk and site study has been performed highlighting the potential presence of fauna in the Trabzon Province and the project area. A large table summarizing the species in the Province is presented in the Project Information Report. Major fauna consist of:

*Cervus eleptus, Copeolus capreolus, Rupicapra rupicapra, Sus scrofa, Ursus arctos, Felis silvestiris, Canis lupus, Canis aureus, Vulpes vulpes, Males meles, Martes martes, Martes foina, Lutra lutra, Mustela nivalis, Mustela orientalis, Lepus europeus, Sincap, Citellus citellus, Erinaceus europeus, Elyomis quercinus, Muscardinus avellarianus, Talpa europea, Dryomis nitedula.*

Considering the kind of project, particular attention has been paid to protected areas and fishes. There is a fish passage in the project next to the regulator and the flow is going to be kept at needed level. The sponsor had prepared a special study for fauna, especially for fishes in the area and the river, could be found on Project Information File.

The project will affect the fish habitat in the river but the developer should take precautions such as constructing a fish passage. A general information about the project indicates that there will be minimal loss of fish. The EIA not necessary decision also shows that there are no habitats which should be care in the project site

## 3. Social and Environmental Impact

### 3.1 Use of Agricultural and Forest Areas

The main means of livelihood is agriculture, especially tea, hazelnut and corn. 23% of the total area is suitable for agriculture. The other 39% is forest, 24% is meadow and 14% is infertile areas.

In agricultural areas, 62.4% is for tea and hazelnut; 24.5 % is for corn and bean; 8% is for potato other 5.1% is for other vegetables.

Most the lands belongs to the Treasure and MoEF no resettlement or economic displacement in the project areas. Only few private lands and private houses not continuously used/habited will interested. The agreement with the owners has already been reached.

Project sponsor has already applied for the needed permits to use the public lands, the process will be kept ongoing according to regulation.

### 3.2 Man Power

It's expected that 50 people will be employed for the development and construction phase (already started) and eighth people will be employed during the operation phase.

The staff to be employed during the preliminary and construction phases of the project will be using construction site to be built for their daily necessities whereas administrative building to be built based on project scope shall be used during administrative phase of the project.

Whenever possible, local people and local services will be used.

### 3.3 Land Taking

Most the lands belongs to the Treasure and MoEF no resettlement or economic displacement in the project areas. Only few private lands and private houses not continuously used/habited will interested. The agreement with the owners has already been reached.

### 3.4 Water Utilization

#### 3.4.1 Construction Phase

During construction phase the water consumption is related to:

- soil wetting to prevent dusting: not quantified considering it varies according to weather conditions;
- drinking and utilities: 7.5 m<sup>3</sup>/day considering 50 people working depending on the season.

The staff will receive drinking water in bottles (not estimated) and other water requirements will be met by means of the tanks arriving at the project area.

#### 3.4.2 Operation Phase

During operation, the only water consumption is related to civil use: 1.5 m<sup>3</sup>/day considering 10 working people.

Potable and utility water to be used in the project will be supplied by bottles or tanks arriving in the project area.



## 3.5 Water Discharge

### 3.5.1 Construction Phase

Considering that soil wetting will not originate waste water, the only waste water will be related to civil uses: 7.5 m<sup>3</sup>/day, with typical pollutant concentrations for residential type waste water.

Residential type waste water will be collected in a sealed sewage system in compliance with "Regulation on the Excavation Studies on Areas where one cannot install a Sewage System". Sewage shall be removed in return for some costs according to Regulation on Water Pollution Control.

### 3.5.2 Operation Phase

In the operation process, the total waste water for 10 people will be 1.5 m<sup>3</sup>/day. This waste will be collected in the septic tank and discharged by Maçka Municipality.

## 3.6 Solid Wastes

### 3.6.1 General Issues

The residential type solid waste produced by staff to be employed during field preparation/construction phases of the project and operation will be collected and kept in covered trash bins located at several locations within the field to be used as construction site. Solid waste collected as such will be disposed by being sent to Maçka municipality waste disposal site on regular basis.

The average amount for the package waste is been evaluated 25% of residential solid waste. The Recyclable package wastes as paper, glass, plastic and metal will be separated and collected into covered trash bins and will be recycled to be reused or handed to licensed recycling companies according with "Directive on Controlling Packaging Materials" .

The hazardous waste emerging during the field preparation and construction phases as oily yarns, filters or lubricant substances in general, will be gathered separately from household waste and solid waste to be destroyed by licensed waste management facility.

Furthermore, in compliance with "Directive on Controlling Waste Batteries and Vehicle Batteries", it is foreseen not to have waste emerging in project area since maintenance of the vehicles to be employed at the project will be executed at nearby service stations but in case of such incident action will be taken in accordance to the aforementioned directive.

Employees will be warned about the prohibition on dumping all solid wastes (like waste food etc) to emerge during the field preparation, construction and operation phases of the project into seas, lakes, streets and similar recipient environment as mentioned in "Directive on Controlling Solid Wastes".

### 3.6.2 Solid Waste Production during Construction Phase

Considering the presence of 50 working people and a specific waste production of 1.15 kg/day/person, a daily overall waste production of 57.5 kg/day is expected.

### 3.6.3 Solid Waste Production during Operation Phase

Considering the presence of 10 working people and a specific waste production of 1.15 kg/day/person, a daily overall waste production of 11.5 kg/day is expected.

### 3.7 Excavations

The excavation operations will be performed in the construction stage of the project in the scope of field preparation. The remaining materials from the excavation will be used in backfill works of the units that will be constructed. If there is still remaining material it will be destroyed in accordance with the rules of “the control of excavation soil, constructions wastes regulation”.

All such excavation works will be in compliance with sanctions in “Directive on Controlling Excavated Soil, Wastes of Construction and Demolished Areas”.

The total amount of excavated material is assessed to be abt. 232,561 m<sup>3</sup>.

### 3.8 Emissions to atmosphere

Dust is likely to spread because of screening, filling, excavation, stripping and the spilled materials from vehicles. It will be following moisture retention method and close the top of the vehicles to be reduced spreading of dust.

To be work with the related Air Quality Protection Regulation Dated 02/11/1986 and numbered 19269 and Industrial Air Pollution Control Regulations dated 04/10/2004 and numbered 25606

#### 3.8.1 Construction Phase

During construction phase emissions to atmosphere have been assessed referring to dusting caused by construction activities.

Acceptable levels and the sponsor are obliged to work with the related Turkish regulation (Evaluation and Management of Air Quality).

A detailed study for dust emission presented in the EIA Report in Section V.1.8 (page 118-125). According to provided data/information the maximum dust emission expected during construction is not over the limit of one kg/h. Site visit at one construction yards during activities shows that no relevant environmental issues due to emission to air are present.

In order to minimize impacts on air quality by the project, the following precautions will be taken:

- the roads will be watered by water tenders;
- a water pulverization system will be established in the mouths of conveyor bands during the transmitting of materials from conveyor bands to silos and harvest places;
- the loading and downloading operations will be performed without scattering;
- the top of the vehicles will be covered by canvas and 10% of the material will be kept in humidity.

Additionally the exhaust emission tests of the heavy construction equipments and vehicles will be performed regularly.

#### 3.8.2 Operation Phase

No emissions to atmosphere are expected during operation phase.

### 3.9 Noise Emissions and Vibration

Noise emissions will be generated during construction due to equipment/machinery and blasting. A study in the EIA Report shows that the construction activity will have no negative effects on settlement closest to the different facilities.

A study in the EIA Report also shows the effect of the vibration formed by blasting over the buildings. The result is no negative effect over the buildings in the region. All the environmental precautions will

be taken during the blasting, warning signs will be set all around the project field and a warning will be done by siren before the performance of blasting.

### 3.9.1 Construction Phase

The total noise emissions for construction phase has been assessed considering the yard's equipment, obtaining noise level against distance from the yard's area (see Table 3-1).

**Table 3-1: Noise emissions during construction phase**

Machine	Number of units	Noise Level (dBA)
Transmixer	1	104
Scrapers and Bulldozers	2	107
Rock Drill	1	107
Truck	5	105
Excavator	1	104
Diesel Engine vibrating cylinder	1	104
Crane	1	108
Loader	2	104
Pumper	1	103

Table 3-2 shows the environmental noise limit levels for construction sites mentioned in Directive on Environmental Noise Evaluation and Management (DENEM) (2002/49/EC) Annex-VIII Table 5 enacted as issued in Official Gazette No. 26809 dated 07.03.2008.

**Table 3-2: Environmental noise limits**

Type of activity (building, demolition and reconstruction)	L <sub>day</sub> (dBA)
Building	70
Road	75
Other sources	70

The Project Information Report includes a deep study for noise levels. Table 3-3 shows the noise levels calculated from different distances, for the construction phase.

**Table 3-3: Noise level at increasing distance from construction sites**

Distances(m)	L <sub>day</sub> (dBA)	L <sub>day</sub> (dBA)	L <sub>day</sub> (dBA)
	Regulator	Channel	Power House
10	86.68	82.22	89.42
50	72.43	68.13	75.38
100	66.08	61.99	69.18
250	57.30	53.67	60.78
500	50.29	47.08	54.23
1000	43.01	40.05	47.52

According to the relevant estimations, the level of noise on the 50<sup>th</sup> meter (as an example) during the construction process shall be max 75.38 dBA. According to Regulation on Noise, the maximum noise level shall not exceed the level of 85 dBA.

The noise levels in the nearest settlements to the facilities were calculated as acceptable according to the Regulation. As seen in Table 3-3, the measured values are under the acceptable levels.

In case of too close working to the noise sources during the construction, the staff members should use protective headsets, glasses, helmets and over trousers in accordance with the Regulation on Health and Job Safety. Furthermore, according with the regulation, the staff shall not be exposed to continuous noise. Additionally, the machines shall be maintained regularly in order to reduce the volume of noise.

### 3.9.2 Operation Phase

Main noise sources during operation could be assumed as follows:

- noise due to water movement and hits against the regulator structures;
- mechanical noise due to regulator operation (not continuous);
- noise due to water movement and hits against the power house structures;
- noise due to water movement at water tail channel.

Considering the natural noise absorption/abatement by trees and hilly grounds, it is not expected to have any significant negative impact on above mentioned settlements due to noise.

## 3.10 Impact on Aquatic Biota

As the derivation structure will be a regulator with no appreciable storage volume, anaerobic conditions are not expected to be encountered.

### 3.10.1 Construction Phase

During construction phase, potential impacts on aquatic biota could rise due to:

- turbidity increase due to soil movement;
- water pollution/contamination due to incidental spill or uncontrolled waste discharge.

Turbidity increase will be only temporary and water pollution/contamination can be easily faced by means of an adequate yard management.

### 3.10.2 Operation Phase

During operation phase, potential impacts on aquatic biota could mainly due to:

- water utilization and water availability in the river;
- fish direct impact.

The plant will ensure a minimum vital flow as per 10% of the 10 years average flowrate. The project includes specific devices to allow safe fish movement along the river.

## 3.11 Workers' Health and Safety

The documents provided by the Sponsor stated that all the regulations of Worker Health and Job Safety will be preserved during the constructions.

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