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ABBREVIATIONS

TC	Republic of Turkey
EU	European Union
USA	United States of America
WEPP	Wind Energy Power Plant
See	See
LTD.ŞTİ.	Limited Liability Company
A.Ş.	Joint Stock Company
CO₂	Carbon dioxide
EMRA	Energy Market Regulatory Authority
EİE	General Directorate of Electrical Power Resources Survey and Development Administration
TEİAŞ	Turkish Electricity Transmission Co. Inc.
GW	GigaWatt
IUCN	International Union for Conservation of Nature
TUBİVES	Turkish Plants Data Service
MAK	Central Hunting Commission
km	Kilometer
m	Meter
mm	millimeter
m²	square meter
m³	cubic meter
sec.	second
TWh	Terawatt/hour
kV	Kilovolt
kW	KiloWatt
MW	MegaWatt
kWh	KiloWatt hour
L	Liter
m/sec.	Meter/Second
%	Percent
°C	Centigrade Degree

DESCRIPTION AND OBJECTIVE OF THE PROJECT**I. Description and Economic Life of the Project**

Dağpazarı Wind Energy Power Plant is planned to be established and operated in Mersin Province, Mut District by Enerjisa Enerji Üretim A.Ş. It is planned that 19 units (of turbines) shall be constructed in total, each having an installed capacity of 2.000 kW within the scope of the project. The Total Installed capacity of the plant is 39 MW. 129.823.200 kWh/year of energy shall be generated in the plant by means of the wind turbines; and it shall be connected to the national network by means of the energy transmission line in planning stage.

The application has been submitted to EMRA for receiving the generation license in relation to the project and the license application assessment procedure has been completed; the Generation License issued by EMRA is presented in **Annex 3**. The pre-construction period of the project is anticipated as 16 months and the construction period is estimated as 12 months; the economic life of the Project has been determined as 49 years corresponding to the license period requested in EMRA license application file.

II. Purpose and Importance of and Requirement for the Investment**II. 1. Turkish Electricity System Energy Demand**

The fuel resources of Turkey required for electricity generation are insufficient and the related quality level is below the global standards. Hydroelectric power provides a usable potential to some degree; but the related investments cannot be readily put into service due to the long investment period.

The gross consumption of electricity in Turkey (Turkish gross generation + import - export) increased by 8.6% and reached to 174.6 Billion kWh in 2006 and it displayed an increase by 8.8% and reached to 190 Billion kWh in 2007. The net consumption in Turkey was recorded as 144.1 Billion kWh in 2006 and 155.1 Billion kWh in 2007.

The development of instantaneous peak demand and energy of Turkish interconnected system by years is given in Table 1. In the year of 2006, the peak demand and the Minimum Load were recorded as 27594 MW and 10545 MW, respectively. As for the year of 2007, the peak demand and the Minimum Load were recorded as 29249 MW and 11100 MW, respectively.

If the electricity demand in Turkey maintains its long-term average increase rate of 7-8%, the installed capacity required will reach to the levels of 46.000 MW in 2010 and 65.000 MW in 2015. For meeting this demand, it will be required to put into service a power plant with an annual average capacity of 3.000 MW in addition to the existing power plants with an approximate installed capacity of 41.000 MW. Thus, an investment at the amount of 4,5-5 billion US Dollars will be needed for providing this capacity and preventing electrical outages.

The petroleum reserves of the World are estimated to have an economic useful life of nearly 40 years; therefore, more resources are required to be allocated in parallel to the price increase in the future years.

Table 1. Turkish Electricity System Peak Power and Energy Demand Figures between the Years of 1998-2007

YEARS	PEAK POWER DEMAND (MW)	INCREASE (%)	ENERGY DEMAND (GWh)	INCREASE (%)
1998	17799	5,2	114023	8,1
1999	18938	6,4	118485	3,9
2000	19390	2,4	128276	8,3
2001	19612	1,1	126871	-1,1
2002	21006	7,1	132553	4,5
2003	21729	3,4	141151	6,5
2004	23485	8,1	150018	6,3
2005	25174	7,2	160794	7,2
2006	27594	9,6	174637	8,6
2007	29249	6,0	190000	8,8

[Source:25]

Turkey has important strategic opportunities that can be put into service in a short period of time offering economy, decreasing imported fuel dependency and minimizing environmental damages and oriented towards clean energy production for meeting the rapidly increasing electricity requirement in the country.

II. 2. Converting the Wind Potential into Investment

The Sun is the source of wind energy. The Sun transmits 100.000.000.000.000 kWh of energy per hour to the World; and only 1-2% of this energy is converted into wind energy.

The global markets that can become leaders in respect of the wind power include Australia, Canada, China, France, India, Italy, Philippines, Poland, Turkey, United Kingdom and the USA. These markets are in the beginning stage; but are constantly developing and the main wind development can be realized in these markets. The technically usable total available global wind resource is more than two folds of the total estimated global electricity demand.

The global wind resource is estimated as 53 TWh/year; and it is anticipated that the global electricity demand will increase by 25,579 TWh/year in 2020.

Due its strategic position in a region of the world under the effect of regular and dominant winds, the potential widespread use of wind energy which is a self-renewing and environmentally-friendly resource of energy in Turkey will create an advantageous environment for our country in respect of both economic and environmental perspectives. The geographical characteristics, shorelines, mountain and valley structures of our country and the wind measurement results obtained by EİE Administration and State Meteorological Services General Directorate show that the wind energy is a resource that should be paid high attention in Turkey.

The wind energy power plants that are already installed and planned to be installed in our country are listed in Table 2.

Table 2. Wind Energy Power Plants (WEPP) that are in Operation in Turkey (04th.02.2009)

Company	Location	Start Date of Production	Installed Capacity (MW)	Turbine Manufacturer	Number and capacity of the turbines
Alize A.Ş.	İzmir-Çeşme	1998	1.50	Enercon	3 units, 500 kW
Güçbirliği A.Ş.	İzmir-Çeşme	1998	7.20	Vestas	12 units, 600 kW
Bores A.Ş.	Çanakkale-Bozcaada	2000	10.20	Enercon	17 units, 600 kW
Sunjüt A.Ş.	İstanbul-Hadımköy	2003	1.20	Enercon	2 units, 600 kW
Ertürk A.Ş.	İstanbul-Silivri	II/2006	0.85	Vestas	1 unit, 850 kW
Mare A.Ş.	İzmir-Çeşme	I/2007	39.20	Enercon	49 units, 800 kW
Deniz A.Ş.	Manisa-Akhisar	I/2007	10.80	Vestas	6 units, 1,800 kW
Anemon A.Ş.	Çanakkale-İntepe	I/2007	30.40	Enercon	38 units, 800 kW
Doğal A.Ş.	Çanakkale-Gelibolu	II/2007	14.90	Enercon	13 units, 800 kW + 5 units, 900 kW
Deniz A.Ş. (*1)	Hatay-Samandağ	I/2008	30.00	Vestas	15 units, 2.000 kW
	Manisa-Sayalar	I/2008	30.60	Enercon	38 units, 800 kW
İnnores A.Ş.	İzmir-Aliağa	I/2008	42.50	Nordex	17 units, 2.500 kW
Lodos A.Ş.	İstanbul-Gaziosmanpaşa	I/2008	24.00	Enercon	12 units, 2.000 kW
Ertürk A.Ş.	İstanbul-Çatalca	I/2008	60.00	Vestas	20 units, 3.000 kW
Dares A.Ş. (*3)	Muğla-Datça	II/2008	10.00	Enercon	27 units, 800 kW + 8 units, 900 kW
TOTAL CAPACITY IN OPERATION			433.35		
Ayen A.Ş.	Aydın-Didim	I/2009	31.50	Suzlon	2.100 kW
Ezse Ltd. Şti.	Hatay-Samandağ	II/2009	35.10	Nordex	900 kW
Ezse Ltd. Şti.	Hatay-Samandağ	II/2009	22.50	Nordex	2.500 kW
Rotor A.Ş.	Osmaniye-Bahçe	II/2009	135.00	GE	54 units, 2,500 kW
Mazi-3 Res Elk. Ü. A.Ş.	İzmir - Çeşme	II/2009	22.50	Nordex	9 units, 2500 kW
Kores A.Ş.	İzmir-Çeşme	II/2009	15.00	Nordex	2,500 kW
Soma A.Ş.	Manisa-Soma	II/2009	140.80	Enercon	176 units, 800 kW

Table 2. Wind Energy Power Plants that are in Operation in Turkey (CONTINUED)

Company	Location	Installed Capacity (MW)	Turbine Manufacturer	Number and capacity of the turbines
TOTAL CAPACITY UNDER CONSTRUCTION		402.40		
Alize A.Ş.	Tekirdağ-Şarköy	28.80	Enercon	14 units, 2000 kW and 1 unit, 800 kW
Alize A.Ş.	Çanakkale-Ezine	20.80	Enercon	10 units, 2000 kW and 1 unit, 800 kW
Belen A.Ş.	Hatay-Belen	30.00	Vestas	10 units, 3000 kW
Alize A.Ş.	Manisa-Kırkağaç	25.60	Enercon	32 units, 800 kW

Boreas A.Ş.	Edirne-Enez	15.00	Nordex	6 units, 2,500 kW
Doruk A.Ş.	İzmir-İzmir	30.00	Enercon	15 units, 2,000 kW
Yapısan İnş. Elk. San.Tic. A.Ş.	İzmir-İzmir	90.00	Nordex	36 units, 2500 kW
Doğal A.Ş.	İzmir-İzmir	30.00	Enercon	15 units, 2000 kW
Doğal A.Ş.	İzmir-Foça	30.00	Enercon	15 units, 2000 kW
Bilgin Elektrik Üretim A.Ş.	Manisa-Soma-Kırkağaç	90.00	Nordex	36 units, 2500 kW
TOTAL OF PROJECTS FOR WHICH TURBINE SUPPLY AGREEMENTS ARE SIGNED		667.60		
GRAND TOTAL		1.503.35 MW		

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[Source:23]

(*) The total installed capacity of the plant is 60 MW; and the related 30 MW extension works are ongoing.

(*) The total installed capacity of the plant is 114 MW; and the related 24 MW extension works are ongoing.

(*) The total installed capacity of the plant is 28.8 MW; and the related approval process for additional capacity of 18.8 MW is ongoing.

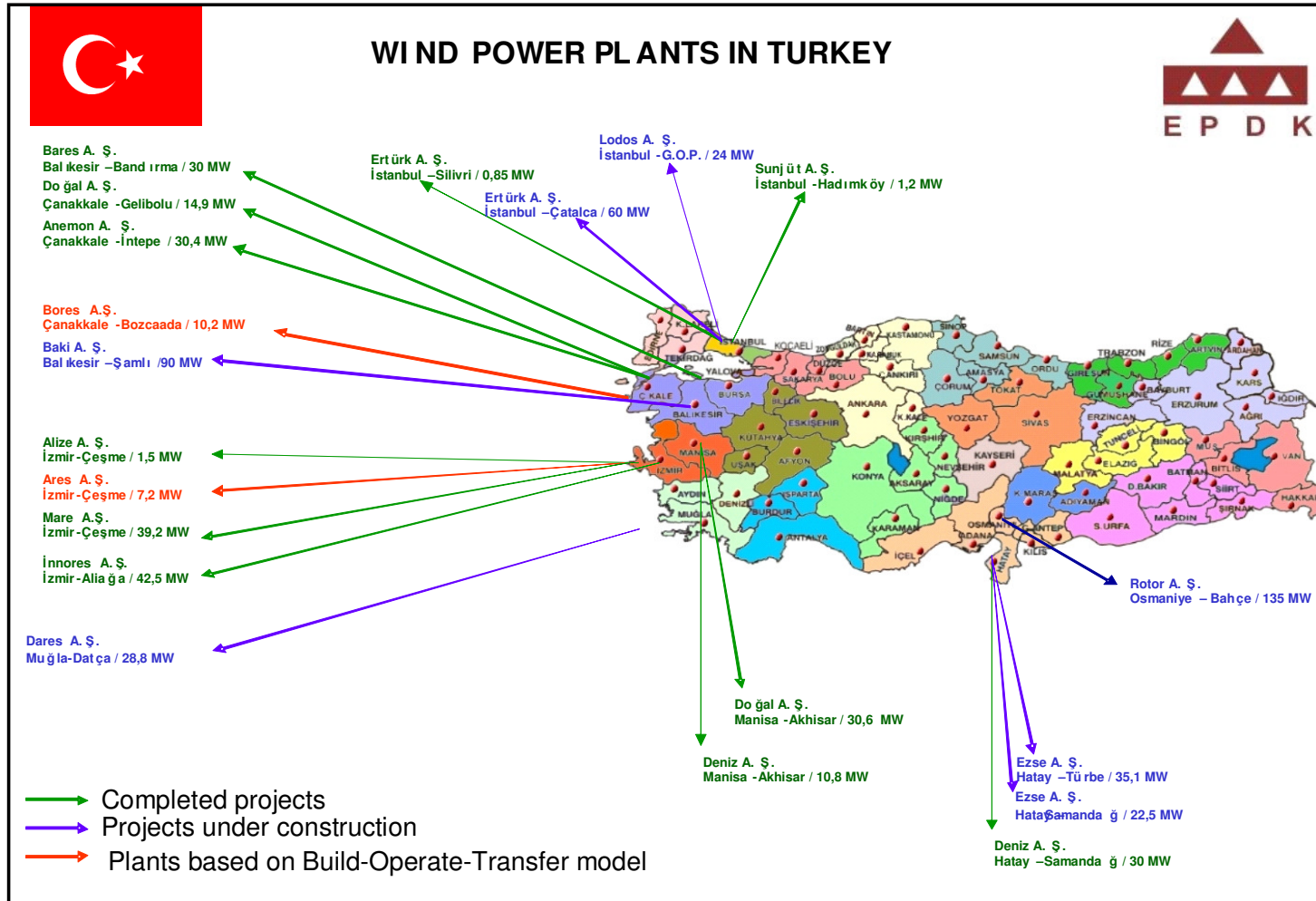


Figure 1. Wind Energy Power Plants in Turkey

Source:[22]

II.3. Renewable and Clean Energy Generation

The global technological development in the field of wind energy is rapidly decreasing the production costs. Today, the power plants under good wind regime are capable of competing with the thermal and nuclear power plants in respect of production costs.

Considering the investments required for prevention of the environmental damages and destruction caused by the conventional and nuclear energy facilities, it is required that a mean "external cost" of 5 cent/kWh should be taken into account. The external cost refers to the technological investment amount required for prevention and remedy of the public health and environmental negative impacts.

II.3.1. Climate Change

Together with the discussions on Global Warming and Kyoto Protocol which have acquired currency, the renewable energy resources, and especially the use of wind energy has gained importance in generation of electricity both in our country and all around the world. Arrangements are being made for promotion of the use of wind energy in energy production in order to decrease the rate of carbon dioxide emissions particularly originating from the use of fossile fuels in energy generation.

In a research conducted in the USA, it was determined that the wind potential of California decreased the emissions of CO₂ and the other pollutants by 1.2 million ton and 15 million tons, respectively; these quantities correspond to a forest with 90 million to 175 million trees for providing the same air quality.

According to the studies and the Industrial reports; 12% of the global electricity requirement is met through the use of wind energy; and 11 billion tons of CO₂ can be reduced by the year of 2020.

Wind energy plays an important role in the future of our energy and in prevention of climate changes. It is still one of the most rapidly growing energy sectors in the world. G8 countries should promote and support wind energy developments in the world for protection from greenhouse gas emissions. The installed wind capacity in Europe avoids more than 50 million tonnes of CO₂ emission per year.

45% of the global carbon emission will be originating from energy sector until the year 2030.

II.3.2. Reduction of Carbon Dioxide (CO₂) Emission

Under the Kyoto Protocol climate change, the EU has committed to reduce its collective greenhouse gas emissions by 8% below 1990 levels until the year 2010. Today, the installed wind capacity of the EU avoids over 50 million tons of CO₂ emission per year. If the current growth is maintained, the wind energy will save 109 million tons of emission per year until the year 2010; this quantity is 30% higher than the quantity specified in the Kyoto Protocol.

If completed, Dağpazarı Wind Energy Power Plant will generate and supply to the national network 129.823.200 kWh of electricity per year. This energy that will be produced from clean, renewable and national resources will replace to some extent the electrical energy required to be generated and supplied to the network by the thermal power plants; and thus, it will contribute in consumption of less fossil fuels. Decreased consumption of such fuels will mean generation of less greenhouse gas emissions in our country; and this will make important contributions in preventing the global warming in addition to the other benefits that it will provide.

The degree of replacement of the fossil fuels by the electricity generated with the project and the amount of greenhouse gas reduction expressed in carbon dioxide equivalents were calculated using the methodologies specially prepared in this field. Our country generates the substantial part of electricity that it produces from the fossil-based fuels; and most of such fuels are imported.

Accordingly, 0,635 tons of carbon dioxide is released to the atmosphere per each MWh of electricity produced in our country. Considering the amount of electricity that will be produced with the project, it can be clearly seen that Dağpazarı Wind Energy Power Plant will contribute in reduction of nearly 82.438 tons of carbon dioxide emission per year.

1. PROJECT CHARACTERISTICS

The following issues should be taken into account in respect of the project characteristics.

a) Work flow diagram, capacity, covered area, and technology of the project, and the number of personnel to be employed

I. Capacity, Location and Covered Area of the Project

I.a. Capacity and Covered Area of the Project

The Wind Energy Power Plant Project is located within the boundaries of Mersin Province, Mut District.

The area for settlement of each turbine within the project site is $10 \times 10 = 100 \text{ m}^2$; and the total land use is $19 \times 100 = 1.900 \text{ m}^2$. A measurement station was positioned in the site for wind measurements within the scope of the project and long-period wind measurements are being recorded. The Project Site Location Map is presented in **Annex:1** and 1/25.000-Scaled Topographic Map showing the location of Turbines is given in **Annex:2**. The locations of the turbines may shift to the left or right to some extent as a result of the detailed wind measurements and the geological surveys to be performed; therefore, the environmental impacts of the project were assessed within the context also including the periphery of the turbines.

It is planned that 19 units (of turbines) shall be constructed in total, each having an installed capacity of 2.000 kW within the scope of the project. The total Installed capacity of the plant is 39 MW in the project. The average annual energy generation by the Wind Energy Power Plant Project is 129,823,200 kWh/year.

The electricity that will be produced at the Wind Energy Power Plant shall be connected to the national network by means of the energy transmission line which is in planning and design stage.

I.II. Location and Covered Area of the Project

Mut District of Mersin Province has been selected as the location of Dağpazarı Wind Energy Power Plant; and the area covered by the project is located in the sections of Silifke - O 30 B3 and Silifke - O 30 C2. The area selected for the project and the 6-degree UTM coordinates for the facilities to be installed within this area and the areas covered by such facilities are given in the tables below.

Table 3. Project Site Coordinates (6-Degree, UTM)

Point No.	Y (Right)	X (Up)
1	537661.226	4070398.471
2	537985.576	4070083.668
3	538171.675	4069711.46
4	538196.725	4069473.534
5	538410.001	4069084.615
6	538512.094	4068795.349
7	538375.186	4068832.034
8	538363.897	4068715
9	538455	4068375
10	538363.897	4068035
11	538115	4067786.103
12	537775	4067695
13	537435	4067786.103
14	537303.301	4067917.801
15	537235	4067936.103
16	537171.602	4067999.5
17	537035	4068036.103
18	536971.602	4068099.5
19	536835	4068136.103
20	536771.602	4068199.5
21	536635	4068236.103
22	536386.103	4068485
23	536349.5	4068621.603
24	536244.15	4068726.952
25	536210	4068736.103
26	536112.452	4068833.651
27	536010	4068861.103
28	535761.103	4069110
29	535670	4069450
30	535761.103	4069790
31	536010	4070038.897
32	536283.205	4070112.102

33	536335	4070163.897
34	536675	4070255
35	537015	4070163.897
36	537112.548	4070066.349
37	537226.961	4070026.936
38	537425	4070080
39	537522.048	4070075.946
40	537586.103	4070315

Table 4. Turbine Coordinates (6-Degree, UTM)

Point No.	Y (Right)	X (Up)
T1	535780	4069781
T2	536048	4069657
T3	536312	4069514
T4	536575	4069348
T5	536814	4069011
T6	537051	4068670
T7	537313	4068508
T8	537580	4068446
T9	537832	4068186
T10	536496	4070039
T11	536758	4069871
T12	536997	4069537
T13	537236	4069200
T14	537505	4069140
T15	537791	4068896
T16	537377	4069936
T17	537708	4070266
T18	537970	4070086
T19	538169	4069599
Total Area = 100 m ² × 19 units of Turbines = 1.900 m ²		

Table 5. Coordinates of the Switchyard Transformer Substation and the Administrative Building (6-Degree, UTM)

ŞTİ-1	537779.657	4069799.917
ŞTİ-2	537727.918	4069799.917
ŞTİ-3	537727.918	4069757.749
ŞTİ-4	537780.92	4069757.749
Total Area = 2.500 m ²		

Table 6. Coordinates of the Topsoil Storage Area [This area may be changed during the implementation stage of the project.] (6-Degree, UTM)

BT-1	537561.961	4069937.151
BT-2	537611.961	4069937.151
BT-3	537611.961	4069887.151
BT-4	537561.961	4069887.151
Total Area = 2.500 m ²		

Table 7. Coordinates of the Excavation Soil Storage Area [This area may be changed during the implementation stage of the project.] (6-Degree, UTM)

HT-1	537613.308	4069937.151
HT-2	537663.308	4069937.151
HT-3	537663.308	4069887.151

HT-4	537613.308	4069887.151
Total Area = 2.500 m ²		

The application has been submitted to EMRA for receiving the generation license in relation to the project and the license application assessment procedure has been completed; the Generation License issued by EMRA is presented in **Annex 3**.

II. Technology and Work Flow Diagram of the Project

Work Flow for the Construction Stage of the Project

In the first stage of the project construction, the Site organisation will be performed and road rehabilitation works will be carried out on the roads within the site for access to the turbines in the power plant site.

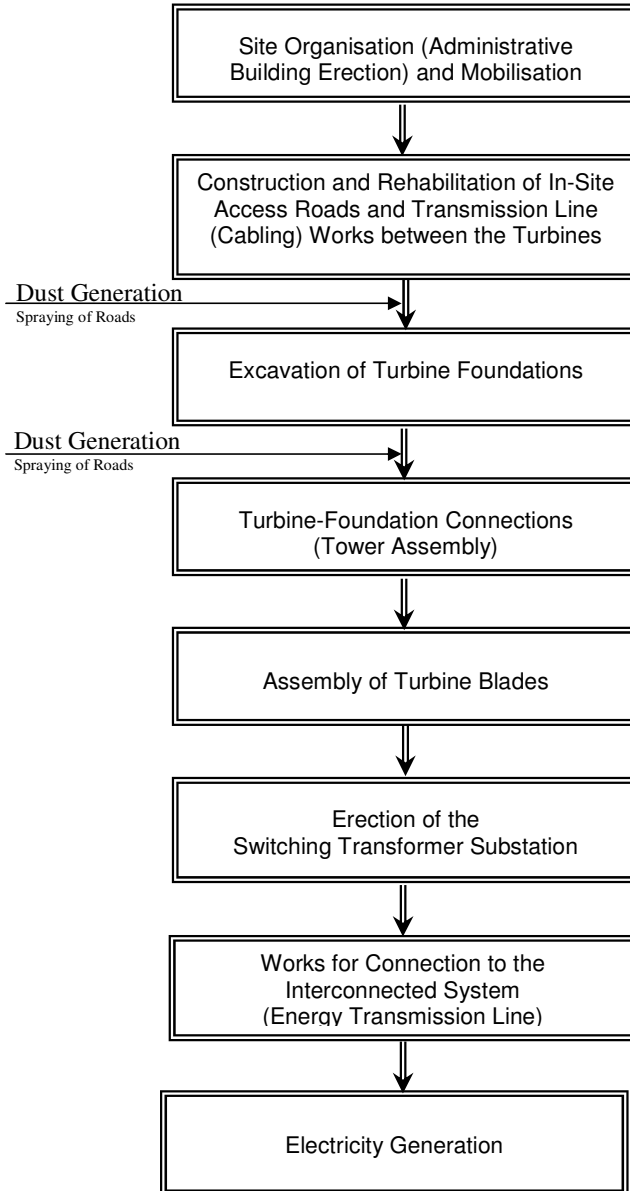
The topsoil layer in an area of 10 x 10 m and at a depth of nearly 1,5 m shall be stripped off in the area where each wind turbine will be installed during the construction stage of the project. A foundation for assembly of the tower will be constructed in this section and a bedplate onto which the tower will be erected will be placed on it and concreted duly. After construction of the foundation for the tower, the tower composed of three parts shall be erected on the bedplate.

After the erection of the tower, the assembly of the turbine and the blades shall be completed and the power plant shall be made ready for production operation. The soil removed during the foundation excavation shall be laid onto the foundation upon concreting process and compressed by means of a roller. The work flow diagram for the construction stage of the plant is given in **Annex: 5**.

The construction stage of the project will take 12 months; and the time schedule for the project is given in Table 8.

Table 8. Time Schedule for the WEPP Construction Works

WORK SCHEDULE	WEPP CONSTRUCTION WORKS											
	MONTHS											
	1	2	3	4	5	6	7	8	9	10	11	12
Site Organisation and Mobilisation												
Construction of In-Site Access Roads												
Excavations for the Turbine Foundations												
Storm Water Drainage System Establishment												
Turbine – Foundation Connection (Tower Erection)												
Transformer, Turbines, Switchyard Electrical Works												
Preparations for Connection to the Interconnected System												

WORK FLOW DIAGRAM

Work Flow for the Operation Stage of the Project

The wind energy originates from different levels of heating of the earth surfaces by solar radiation. Different level of absorption by the earth surfaces leads to different air temperature, humidity and pressure levels; and this different pressure causes the air movements. Wind will exist as long as there as sun beams. Wind is an indirect product of the solar energy. Nearly 2% of the solar energy that reaches to the earth is converted into the wind energy. The earth surface heats and cools irregularly; as a result, atmospheric pressure areas are formed; and the air starts to flow from high-pressure areas to low-pressure areas.

The winds blowing over a tropical island (trade wind) are relatively dependent creating nearly constant wind flow throughout the day and night. Unfortunately, there are not trade winds blowing in every region of the world and the air systems move in every several days. The wind velocity displays huge variations from a still air to a storm. Since the use of electricity is a time-dependent issue, the daily and seasonal changes in wind constitutes an important indicator. [Source:22]

Wind Turbine Operation

Wind turbine is a system converting the kinetic energy inherent in the wind into firstly mechanical energy, and then to electrical energy.

A wind turbine is generally composed of a tower, generator, speed converters (gearbox), electrical-electronic components and a rotor. The kinetic energy of the wind is converted to mechanical energy in the rotor. It is transferred to the generator on the body through acceleration of the cyclic movement of the rotor shaft. The electrical energy received from the generator are stored by means of the batteries or supplied directly to the receivers.

Two important aerodynamic forces should be known well in order to understood how the wind turbines work; these forces are the drag force and the lift force.

Drag force is the force generated on an object in the direction of flow. For example, the maximum drag force that can be generated on a flat plate actually arises when the air flows perpendicularly at 90° on the object; while the minimum drag force arises when the air flows in parallel to the surface of the object.

Lift force is the force generated perpendicular to the direction of flow. It was called as the lift force since this force makes the aircrafts to achieve lift-off.

Parachutes can be given as the best example to the drag force. The speed of the parachute is decelerated by this force. The special objects designed to minimize the effects of the drag force are called as streamlined objects. Ellipse, fish, zeppelin, etc. can be given as examples to such objects.

The lift force acting on a flat plate occurs when the air flows at an angle of 0° on the plate surface. At small angles occurring according to the air flow direction, areas of low pressure are formed with the increase in the flow velocity. These areas are also called as downstream regions. Therefore, a correlation occurs between the air flow velocity and the pressure. In other words, the more the air flow velocity is, the less the pressure become; and the less the air flow velocity is, the more the pressure become. This is called as Bernoulli effect. The lift force also leads to absorption or suction on the object.

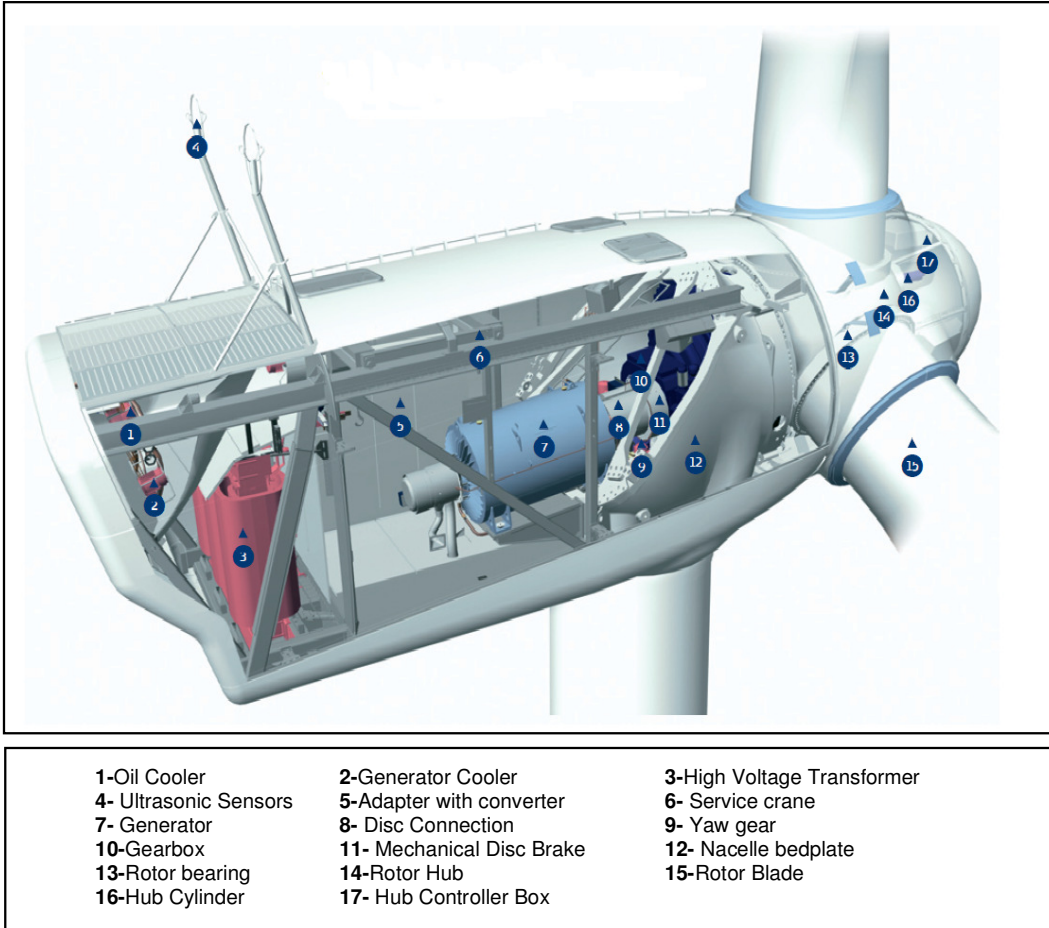


Figure 2. General Technical Specifications of the Turbines Planned to be used within the scope of the Project

Wind Turbine

It is a rotatory mechanism transforming the kinetic energy of the wind into electricity.

Wind turbine is essentially composed of the following parts and components;

- Rotor
 - Blades,
 - Hub,
- Head (machine room); this section is also called as nacelle.
 - Main shaft;
 - Gearbox;
 - Emergency brake system;
 - Yaw engines;
 - Generator;
 - Cooling system;
 - Controllers;
- Tower
 - Stairs or elevator;
 - Electrical cables;
 - Controllers and communication cables;
- Base
 - Endplate;
 - Concrete or steel pad.

Operation of the System

When the wind starts to blow, the direction of the wind turbine is turned toward the wind; the wind crashing onto the blades of the turbine leads to a rotational movement on the blade. This rotational movement also rotates the main shaft connected to the rotor and housed in nacelle.

The gears within the gearbox connected to the main shaft increase the rotational speed and transfer the power to the high-speed shaft. The high-speed shaft transfers this rotational movement and the resultant power to the generator. When the generator rotates, the electricity is generated. The generator producing electricity is cooled by the cooling system. The electricity generated by the generator is transmitted by means of the cables to the controller located at the base of the tower. Here, the electricity is arranged and adapted to the network and transferred to the medium voltage transformer.

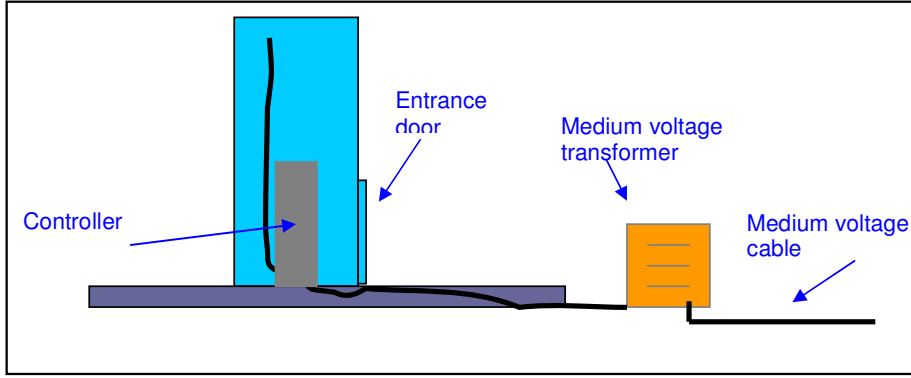


Figure 3. Controller and Transformer

At the medium voltage transformer, the voltage value is increased and the medium voltage is transferred to the energy transmission lines. The medium voltage cable laid underground until the point of energy transmission lines is exposed and connected to the energy transmission line. The energy transmission line within the power plant is then connected to the National Network by means of a bridged circuit. Thus, the electricity generated as such becomes available for use.

III. Number of Personnel to be Employed

The construction period of the project is anticipated as 12 months; and it is planned that 15 personnel will be employed and assigned for the construction works to be carried out during this period. There will be 6 personnel assigned to work in the plant upon completion of the construction stage and commissioning and start of commercial operation of the Wind Energy Power Plant. It is planned that container-type site will be constructed in the construction stage and an administrative building (of nearly 100 m²) will be constructed in the operation stage of the project in order to meet the requirements of the personnel.

Energy Transmission Line between the Turbines

An underground transmission line is planned to be established between the turbines within the scope of Dağpazarı Wind Energy Power Plant Project. The underground transmission line between the turbines shall be established through laying of underground cables under the roads that will be used for access purposes. The area to be used as roads and the underground cables shall be arranged in the same area; and any additional area will not be used. The cabling works between the turbines shall be carried out during the construction of service roads between the turbines. It is planned that nearly, albeit not certain, 6,500 meters of service roads will be constructed within the scope of the project. Accordingly; the transmission line between the turbines is anticipated to be established with a length of nearly 6.500 meters. The dust emission quantities likely to be generated during construction of service roads are separately calculated in **Section 1.c**. Since the cabling

works between the turbines will be commenced concurrently with the construction of the service roads and the same route will be used for both works, the dust emissions that will be generated during establishment of the transmission line between the turbines could not be calculated separately. As a matter of fact, it is considered that the dust emissions that will be generated during laying of the transmission line between the turbines will not lead to an additional load in respect of dust emissions to be generated during construction of the service roads.

Switchyard Transformer Substation and Administrative Building:

Another work that will be carried out within the scope of Dağpazarı Wind Energy Power Plant Project is the works related with the construction of the Switchyard Transformer Substation and the Administrative Building. In the Wind Energy Power Plant Projects, the Switchyard Transformer Substation and the Administrative Building are designed adjacent to each other on the same area for ease and comfort of control during operation.

The Switchyard Transformer Substation and the Administrative Building were designed to be located in the same area within the scope of the related project. 1/25.000-Scaled Topographic Map showing the location of the Switchyard Transformer Substation and the Administrative Building is presented in **Annex:2** and 1/5.000-scaled Layout Plan is presented in **Annex: 7**.

b) Use of Natural Resources (land use, water use, type of energy used, etc.)

I. Land Use

Within the project site, the area for settlement of each turbine (foundation section) is nearly $10 \times 10 = 100 \text{ m}^2$; and the total land use is $19 \times 100 = 1.900 \text{ m}^2$. A measurement station was positioned in the site for wind measurements within the scope of the project and long-period wind measurements are being recorded. The locations of the turbines may shift to the left or right to some extent as a result of the detailed wind measurements and the geological surveys to be performed; therefore, the environmental impacts of the project were assessed within the context also including the periphery of the turbines.

The area where the turbines will be positioned are the forest lands. 1/25.000-scaled Forest Stand Map pertaining to the project site is given in **Annex 4**. Before commencement of the related construction works in the project site, required applications shall be submitted to and the required permits shall be received from the General Directorate of Forestry.

The related application was submitted to TEİAŞ for the energy transmission line, one of the components of the Wind Energy Power Plant; and the related planning process is ongoing. Therefore, it was not taken into consideration within the Project Presentation File; and it will be prepared and submitted within the scope of the EIA Regulation or if required, within a separate EIA/Project Presentation File after finalization of the related details.

II. Water Use

The water use within the scope of the project can be examined under two sections such as construction and operation stages.

Water Use in the Construction Stage of the Project

The water quantity to be used during the construction stage is calculated as follows based on 15 personnel to be employed in the area for the related works to be carried out until commissioning and start of commercial operation of the plant.

Water consumption per person	= 150 l/ personnel-day [Source:26]
Number of personnel employed	= 15 personnel
Water quantity required	= 150 l/ personnel-day x 15 personnel
	= 2.250 l/day = 2,25 m ³ /day

The water quantity consumed daily by the personnel during the construction works is approximately 2,25 m³. Together with the water to be consumed by the personnel working during the construction works in the work area, water will be used during the construction works to be carried out throughout the related activities, during the concreting works and for the primary purposes of prevention of dust. Except for the water consumption by the personnel, it is anticipated that nearly 1.5 m³ of water will be used daily in the construction works and during spraying for the purpose of prevention of dust emission. Accordingly, the water quantity to be consumed during the construction works amounts to nearly 3,75 m³/day.

Water Use in the Operation Stage of the Project

No water shall be used in the process and there will only be water requirement of the personnel to be taken into consideration during the operation stage of the plant. It is planned that nearly 6 personnel will be employed during the operation stage of the plant. Accordingly, the water quantity to be used in the operation stage is calculated as follows;

Water consumption per person	= 150 l/ personnel-day [Source:26]
Number of personnel employed	= 6 personnel
Water quantity required	= 150 l/ personnel-day x 6 personnel
	= 900 l/day= 0.9 m ³ /day

The water quantity consumed daily by the personnel to be employed during the operation stage is approximately 0.9 m³.

Water Supply for the Project

It has been stipulated that the industrial water required during the construction and operation stages of the plant will be provided by the project owner from the resources in the environment and by means of a tanker that will collect the water from a source approved by Mut Municipality. The drinking water required by the personnel is planned to be supplied through the use of commercially available bottled waters.

III. Energy Use

Wind is another natural resource that will be used in the plant. By means of the wind turbine, the kinetic energy of the wind is firstly transformed into mechanical energy, and then to electrical energy and subsequently, it is supplied to the national network. The WEPP Plant is based on a completely renewable operating technology and a clean system; and there will be no impacts on the wind regime and air quality likely to be caused by the activities to be performed. In addition, it will positively contribute in the reduction of CO₂ emission.

The plant is based on an energy generation system; and the energy requirement needed for the work machinery during the construction stage shall be met through the use of diesel oil and the electricity requirement during the operation stage and especially in the administrative building shall be supplied from the 34,5 kV energy transmission line passing through the periphery of the project site.

c) Waste generation quantity (solid, liquid, gas, etc.) and chemical, physical and biological characteristics of the wastes

I. Amount of Liquid Waste

The waste waters that will be generated during the construction and operation stages include the domestic-type wastewaters to be generated by the working personnel. The water quantity to be consumed by the personnel to be employed during the construction stage is 3,75 m³/day as specified in Section: 1.b. Of this quantity, 1,5 m³ of water shall be used for spraying and construction works and not be recovered as wastewaters; and 2,25 m³ of water generated by the personnel shall lead to generation of wastewater.

The water quantity to be consumed during the operation stage of the plant is calculated in details in Section: 1.b. In the calculations made in the said section, it is estimated that 0,9 m³ of water will be consumed daily by the personnel. Based on the assumption that all of the water to be used in the operation stage will turn into wastewaters, the wastewater quantity that will be generated in the operation stage is calculated as 0.9 m³/day.

The domestic-type wastewaters that will be generated during both the construction and operation stage of the plant shall be collected in the watertight septic tank to be

constructed next to the construction site building. The said septic tank shall be constructed in accordance with the "Regulation on Septic Tanks to be Constructed in Places where Sewerage System Pipes cannot be laid" which was enforced upon its publication in the Official Gazette no. 13783 dated 19th.03.1971.

The wastewaters collected in the septic tank shall be drawn by special sewage truck companies operating in the region or by the sewage truck owned by Mut Municipality when it is on the point of filling up and shall be disposed duly through its discharge into the sewerage system of Mut Municipality. The septic tank design is provided in **Annex: 12**.

II. Amount of Solid Waste

II.I. Domestic-Type Solid Wastes

The solid wastes generated during the construction stage include the domestic-type solid wastes generated by the employed personnel and the waste materials used in construction. The amount of the domestic-type solid wastes to be generated by the personnel employed in construction works is calculated as follows.

Amount of Solid waste generated daily per person = 1,34 kg ^[Source:27]

Number of personnel employed = 15

Amount of Solid Waste = 1.34 kg/personnel-day x 15 personnel
= 20.1 kg/day

It is planned that 6 personnel will be employed during the operation stage of the plant. Accordingly, the domestic-type solid wastes that will be generated is calculated as follows.

Solid waste quantity generated daily per person = 1,34 kg ^[Source:27]

Number of personnel employed = 6

Amount of Solid Waste = 1.34 kg/personnel-day x 6 personnel
= 8.04 kg/day

The domestic-type solid wastes that will be generated during the construction and operation of the Wind Power Plant shall be collected in closed containers that will be kept within the facility and disposed duly through their delivery to the solid wastes storage area of Mut Municipality.

II.II. Excavation and Construction Wastes

Considering that a foundation of 10x10 m in size and with a depth of nearly 1,5 m will be excavated for each turbine, the quantity of excavation wastes expected to be generated during excavation of the turbine foundations in the project can be calculated as follows:

Excavation waste quantity to be generated for each turbine: $10 \times 10 \times 1,5 = 150 \text{ m}^3$.

Number of turbines x Excavation Quantity = Total Excavation Quantity

Soil density: $1,6 \text{ ton/m}^3$

$19 \times 150 = 2.850 \text{ m}^3$ (4.560 tons).

Amount of Excavation that will be generated during the Excavation Works to be carried out within the scope of the Switchyard Transformer Substation and Administrative Building Construction:

Amount of topsoil to be stripped off during establishment of the switching transformer substation and the administrative building:

$2.500 \text{ m}^2 \times 0,3 \text{ m} = 750 \text{ m}^3$

Soil density: $1,6 \text{ ton/m}^3$

$750 \text{ m}^3 \times 1,6 \text{ ton/m}^3 = 1.200 \text{ tons}$.

Amount of topsoil excavation to be generated during the foundation excavations to be carried out during the construction of the switching transformer substation and the administrative building that will be established within the scope of the project:

Considering that the foundation depth will be nearly 3 meters;

$2.500 \text{ m}^2 \times 3 \text{ m} = 7.500 \text{ m}^3$

Material Density: $2,4 \text{ ton/m}^3$

$7.500 \text{ m}^3 \times 2,4 \text{ ton/m}^3 = 18.000 \text{ tons}$.

The excavated materials will be temporarily stored in the excavation material storage area shown on the 1/25.000-scaled topographic map for use in future for covering over the turbine foundations and the site levelling and arrangement to be performed in the worksite. At this stage, the earthmoving wastes shall be stowed properly to ensure that the vegetative soil remains on the top in order to allow it to be covered with grass.

Some wastes such as iron parts and packaging materials, etc. will be generated after construction in the projects; and the control and management of the construction-related wastes such as cement bags, sheet and metal parts, packages and boxes, timber, et c. shall be conducted in accordance with the "Regulation on Control of Excavation Soil, Construction and Debris Wastes" enforced upon its publication in the Official Gazette no. 25406 dated

18th.03.2004, the “Regulation on Control of Waste Batteries and Accumulators” enforced upon its publication in the Official Gazette no. 25559 dated 31st.08.2004 and amended on the date of 03rd.03.2005/25744; and the Packaging Wastes Control Regulation enforced upon its publication in the Official Gazette no. 26562 dated 24th.06.2007.

III. Hazardous Wastes

The waste oils that will be generated by both the work machinery during the construction stage of the project and the accessories of the transformer and turbines during the operation stage of the project are considered within the scope of hazardous wastes; and they shall be collected in watertight containers in accordance with the “Hazardous Wastes Control Regulation” and disposed duly through their delivery to the companies licensed by the Ministry of Environment and Forestry. The provisions of the “Hazardous Wastes Control Regulation” enforced upon its publication in the Official Gazette no. 25755 dated 14th.03.2005 shall be followed in the project.

IV. Amount of Gaseous Waste

No gas waste generation will occur during operation stage of the Wind Energy Power Plant planned to be constructed and operated since no burning or combustion works will be carried out in this stage. Exhaust emission will be generated by the machines that will be used in the works to be carried out in the field during the construction stage of the plant.

Exhaust Emissions to be originated by the Machinery and Equipment to be used in the Area

It is planned that TÛPRAŞ-400 Diesel fuel will be used as the fuel in the work machinery to be used during the construction stage.

The use of fuel in relation to the equipment that will be used in the related activities is presented below.

$$\text{Fuel to be Consumed} = \text{HP} \times \text{Working Period} \times 0.18$$

The work machinery that will be used in the excavation works and the amount of fuel used by such machinery per unit of time are given in Table 9.

Table 9. Amount of Fuel used by the Work Machinery per Unit of Time

Machine	Unit	HP	Working Period (hours)	Fuel to be consumed (l/hour)
Loader	1	150	0,75	20,25
Truck	1	125	0,5	11,25
Crane	1	125	0,5	11,25
Roller	1	150	0,5	20,25
Ready-mix concrete Mixer	1	100	0,5	9

In the calculations made assuming the simultaneous operation of all machinery, the fuel quantity to be consumed is found as 72 l. Taking the density of TÜPRAŞ-400 diesel fuel as 0,85 kg/l, the fuel quantity to be used per hour will be calculated as;

$$= 31,5 \text{ l/hour} \times 0,85 \text{ kg/l}$$

$$= 61.2 \text{ kg/hour.}$$

Table 10. Fouling Factors emitted by the Diesel Vehicles

Pollutant	Fouling Factor (kg/t)
Carbon monoxide	9,7
Hydrocarbons	29,0
Nitrogen Oxides	36,0
Sulphur Oxides	6,5
Dust	18,0

(Source: Hava Kirliliğinin ve Kontrolünün Esasları (Principles for Control of Air Pollution), 1991

Accordingly, the estimated pollutant values expected to be generated by the work machinery are given below.

The Pollutant Values expected to be generated by the Work Machinery

$$\text{Fuel quantity per hour to be used in the field} = 61.2 \text{ kg/hour} \times 1 \text{ ton}/1000 \text{ kg}$$

$$= 0,067 \text{ t/hour.}$$

Amount of Mass Emission for Carbon Monoxide;

$$= 9.70 \text{ kg/t} \times 0.061 \text{ t/hour}$$

$$= 0,59 \text{ kg/hour}$$

Amount of Mass Emission for Hydrocarbons;

$$= 29.0 \text{ kg/t} \times 0.061 \text{ t/hour}$$

$$= 1,769 \text{ kg/hour}$$

Amount of Mass Emission for Nitrogen Oxides;

$$= 36.0 \text{ kg/t} \times 0.061 \text{ t/hour}$$

$$= 2,196 \text{ kg/hour}$$

Amount of Mass Emission for Sulphur Oxides;

$$= 6.50 \text{ kg/t} \times 0.061 \text{ t/hour}$$

$$= 0.396 \text{ kg/hour}$$

Amount of Mass Emission for Dust;

$$= 18.00 \text{ kg/t} \times 0.061 \text{ t/hour}$$

$$= 1.098 \text{ kg/hour}$$

Amount of emission to be generated by the fuel to be used during the works and the comparison with the limit values specified in the Air Quality Protection Regulation (HKKY) are tabulated below.

Table 11. Emission Quantities to be generated by the Machinery

Pollutant Parameters	Emission Quantities to be generated by the Machinery (kg/hour)	HKKY Limit Value (kg/hour)
Carbon monoxide	0,59	1000
Hydrocarbons	1.769	-
Nitrogen Oxides	2.196	40
Sulphur dioxide *	0.396	60
Dust	1.098	1,5

* Mass Emission Quantity of Sulphur Oxides

As it can be seen from the Table 11, the emission to be generated by the machinery will remain below the limit values stipulated for such emissions in the Air Quality Protection Regulation.

The machinery to be used during construction stage of the project will be operated for a short period of time; and the emissions will not reach to the levels likely to cause negative impacts on the settlement areas in the neighbourhood.

V. Amount of Dust

There are no activities that may cause dust emission during the operation stage of Dağpazarı Wind Energy Power Plant planned to be constructed. In the construction stage, dust emission will be generated during the arrangement of the roads within the site to be opened for access to the wind turbines, in the area where the wind turbines will be established and during the excavation works to be carried out during the construction of the switchyard transformer substation and the administrative building. Since the in-site roads, turbine construction and the switchyard transformer substation and administrative building constructions are not performed simultaneously within the scope of the project, dust emission estimations were assessed separately.

V. A. Dust Emission to be generated during Construction and Arrangement of the In-Site Access Roads

Access to the project site is easily maintained in winters and summers by means of the side roads deviating from the asphalt road connecting Mut and Karaman and leading to Dağpazarı Village. There will be no need for any rehabilitation works in the said side roads. However, it will be required to construct roads between the turbines for easy movement of the work machinery within the area where the turbines will be positioned, comfort of mobilisation and ease of performance of any maintenance and repair works to be carried out on the turbines and the energy transmission organs during the operation stage. Dust emissions are likely to be generated during the construction and arrangement of such roads. The existing roads providing access to the project site and the roads to be newly constructed within the project site are shown on 1/25.000-scaled Topographic Map and 1/5.000-scaled layout plan given in **Annex: 2**. It is planned that the roads to be opened within the project site will have a width of 5 meters, height of 0,5 meters and a total length of 6.500 meters. Accordingly, the dust emissions likely to be generated during construction of the said roads are calculated as follows.

V. A.1. Amount of Dust to be Generated during the Removal of the Topsoil on the Road Route

The calculation of the topsoil excavation quantity is given below for an area of 5 meters in width and 1 meter in length.

Amount of Excavation = Excavation width x Excavation depth x Excavation length

Amount of Excavation = 5 m x 0,3 m (Topsoil Depth) x 1 m = 1,5 m³

Mean density of the materials excavated = 2,4 ton/m³

Excavated materials = 1,5 m³ x 2,4 ton/m³ = 3,6 tons.

Amount of dust to be generated during stripping of the top soil per a section of 1 m is calculated as follows. The dust emission factor during stripping off is taken as 0,01 kg/ton.

$$3,6 \text{ ton} \times 0,01 \text{ kg/ton} = 0,036 \text{ kg}$$

Caterpillar Bulldozer will cover a distance of 75 meters on average per 1 hour under normal conditions during stripping of the topsoil.

Amount of dust generated during stripping of the Topsoil:

Distance covered per hour by the bulldozer : 75 m/hour x 0,036 kg/m

Dust quantity to be emitted : **2,7 kg/hour** of dust emission is expected.

Amount of Topsoil to be stripped off during construction of the roads within the facility:

Amount of Excavation = Excavation width x Excavation depth x Excavation length

Amount of Excavation = 5 m x 0,3m (Topsoil Depth) x 6,500m = 9,750 m³ = 24.375 tons

24.375 tons of vegetative soil that will be removed during topsoil stripping works shall be laid on the sides of the in-site roads to be newly constructed in such a way that the live part will remain on top and it shall be ensured that the topsoil shall become adapted to the new area and maintain its soil vitality.

V. A.2. Amount of Dust to be Generated During Rehabilitation of the In-Site Roads

Quantity of materials required for the roads = 6.500 m (length) x 5 m (width) x 0,5 m (height) = 16.250 m³ x 2.4 ton/m³ = 39.000 tons

In the in-site roads:

Daily Discharge: 39.000 tons / 90 days = 433 tons/day

Hourly Discharge: 433 tons / 8 hours = 54 tons/hour

Amount of Dust that will be generated under Uncontrolled Conditions:

The dust emission factor during loading is taken as 0,01 kg/ton. [Source:13]

Accordingly, the emission is calculated as; 54 ton/hour x 0,01 kg/ton = **0,54 kg/hour**.

Amount of Dust that will be generated under Controlled Conditions:

The dust emission factor during loading is taken as 0.005 kg/ton. [Source:13]

Accordingly, the emission quantity is calculated as; 54 ton/hour x 0,005 kg/ton = **0,27 kg/hour**.

V. A.2.1 Amount of Excavation to be generated during Transportation of the Materials to be used during Rehabilitation of the In-Site Roads

The materials required during rehabilitation of the access roads shall be loaded onto and transported with trucks. Since 6.500 m of road in total that will be rehabilitated at this stage will be advanced on a step-by-step basis over the road line during the related works, the dust calculation was prepared for the last section of 500 m and added to the total dust emission. It is considered that nearly 17 trips will be sufficient for daily transportation of 433 tons of materials with a truck of 25 tons capacity during the transportation of such materials.

Amount of Dust that will be generated under Uncontrolled Conditions:

The dust emission factor generated by transportation works is 0.7 kg/km-trip under uncontrolled conditions. ^[Source:13] Accordingly, the dust quantity to be generated during transportation (under uncontrolled conditions) is calculated as;

$$0,7 \text{ kg/km-trip} \times 0.5 \text{ km} \times 17 \text{ trips} / 8 \text{ hours} = \mathbf{0.74 \text{ kg/hour of dust.}}$$

Amount of Dust that will be generated under Controlled Conditions:

The dust emission factor generated by transportation works is 0.35 kg/km-trip under controlled conditions. ^[Source:13] Accordingly, amount of dust to be generated during transportation (under controlled conditions) is calculated as;

$$0,35 \text{ kg/km-trip} \times 0.5 \text{ km} \times 17 \text{ trips} / 8 \text{ hours} = \mathbf{0.37 \text{ kg/hour of dust.}}$$

V. A.2.2 Excavation Quantity to be generated during Unloading of the Materials to be used during Rehabilitation of the In-Site Roads

In the in-site roads:

Daily Discharge: 39.000 tons / 90 days = 433 tons/day

Hourly Discharge: 433 tons / 8 hours = 54 tons/hour

Dust Quantity that will be generated under Uncontrolled Conditions:

The dust emission factor during unloading is taken as 0,01 kg/ton. ^[Source:13]

Accordingly, the emission is calculated as; 54 ton/hour x 0,01 kg/ton = **0,54 kg/hour.**

Amount of Dust that will be generated under Controlled Conditions:

The dust emission factor during unloading is taken as 0,005 kg/ton. ^[Source:13]

Accordingly, the emission is calculated as; 54 ton/hour x 0,005 kg/ton = **0,27 kg/hour.**

Table 12. Dust Emissions to be generated during Road Rehabilitation Stage

Process	Uncontrolled Conditions (kg/hour)	Controlled Conditions (kg/hour)
Loading	0.54	0.27
Transportation	0.74	0.37
Unloading	0.54	0.27
Stripping	2.7	-
Total	4.52	0.91

The total dust emission that will be generated under uncontrolled conditions due to the activities to be carried out during the stage of road rehabilitation between the turbines in the project site is **4.52 kg/hour**; and this value exceeds the limit of **1 kg/hour** as stipulated in the "Regulation on the Control of Air Pollution originating from Industrial Facilities" (SKHKKY) published in the official gazette no. 27277 dated 03rd.07.2009. Therefore, dust dispersion modelling is required to be performed for uncontrolled work conditions as stipulated by the regulation.

The total dust emission that will be generated under controlled conditions due to the activities to be carried out during the stage of road rehabilitation between the turbines in the project site is **0.91 kg/hour**; and this value is below the limit of **1 kg/hour** as stipulated in the "Regulation on the Control of Air Pollution originating from Industrial Facilities" (SKHKKY) published in the official gazette no. 27277 dated 03rd.07.2009. Therefore, dust dispersion modelling is not required for controlled work conditions as required by the regulation.

Distribution of Dust Emissions that will be generated under Uncontrolled Working Conditions during Construction and Rehabilitation of the In-Site Roads:

Calculation of the U_h Value

The formula of $U_h = UR(h/Z_a)^M$ is used.

*For M, the following values are taken.

Dispersion Class	M
A(Very unstable)	0.09
*B(unstable)	0.20
*C/I(Neutral)	0.22
C/II(Neutral)	0.28
D(stable)	0.37
E(very stable)	0.42

* Values used in Calculations

$Z_a = 10$ m value refers to the elevation of the anemometer from the ground; and $h = 10$ m refers to the height to which dust can be dispersed during movement of the vehicles (determined based on the observations).

Table 13. Classification of Wind Data

DIRECTION	DISPERSION	UA(m/sec)	UR(m/sec)	UH(m/sec)
N	B	1.3	1	1.0
NNE	B	1.6	1.5	1.5
NE	B	2	2	2.0
ENE	B	2.1	2	2.0
E	B	2.1	2	2.0
ESE	B	2.4	3	3.0
SE	B	2.2	2	2.0
SSE	B	2.5	3	3.0
S	B	3.3	3	3.0
SSW	C/1	4.1	4.5	4.5
SW	C/1	3.6	3	3.0
WSW	B	2.2	2	2.0
W	B	2.1	2	2.0
WNW	B	1.5	1.5	1.5
NW	B	1.2	1	1.0
NNW	B	1.3	1	1.0

As a result of the calculations, the dispersion class by directions is calculated according to the cloud cover rate of 5/8 for the value B (considering the meteorological data of Mersin).

The Environmental Legislation Formula II was used in dust dispersion modelling.

$$C_i(x, y, z) = \frac{10^6}{3600 \times 2 \times \pi} \times \frac{Q_i}{U_h \times \sigma_y \times \sigma_z} \times \exp\left[-\frac{y^2}{2 \times \sigma_y^2}\right] \times \left[\exp\left[-\frac{(z-h)^2}{2 \times \sigma_z^2}\right] + \exp\left[-\frac{(z+h)^2}{2 \times \sigma_z^2}\right]\right] \times \exp\left[-\sqrt{\frac{2}{\pi}} \times \frac{V_{di}}{U_h} \times \int_0^z \frac{1}{\sigma_z(\xi)} \times \exp\left[\frac{-h^2}{2 \sigma_z^2(\xi)}\right] d\xi\right]$$

Settleable Dust Quantity Calculation

$$d(x, y) = 3600 \sum_{i=1}^4 V_{di} \times C_i(x, y, 0) \text{ (Environmental Legislation Formula III)}$$

80% of the dust generated after operation (based on the experiences) is composed of particles larger than 10 µ. Total dust quantity is 4,52 kg/hour.

For the Quantity of Airborne Particles, C(x,y,z);

The following values are taken:

Q = 0,904 kg/hour (for particles smaller than 10µ)

h = 10 m (based on experiences)

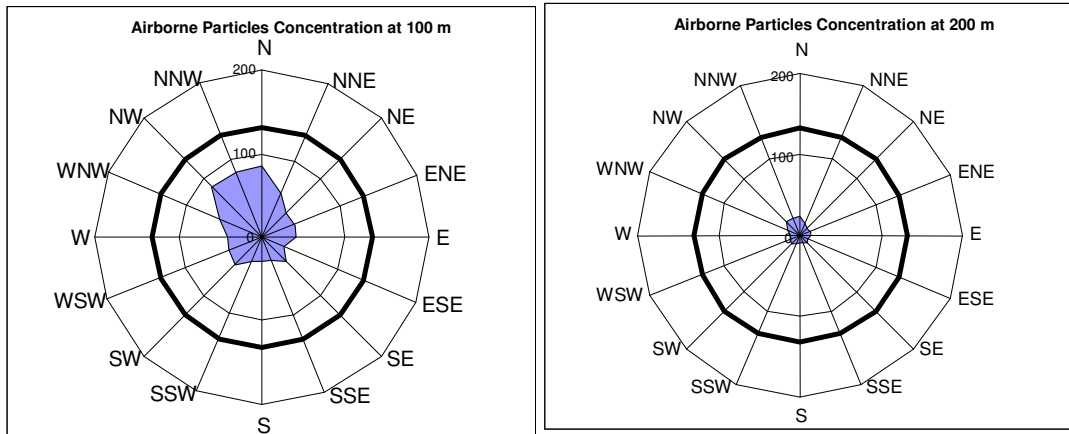
z = 2 m.

V_{di} = 0,01 m/s

Table 14. Dispersion of the Suspended Particulate Matters ($\mu\text{g}/\text{m}^3$)

AIR	UH	DIRECTI ON	C=100 m	C=200 m	C=300 m	C=400 m	C=500 m
B	1.0	N	83.90	24.14	11.20	6.46	4.21
B	1.5	NNE	55.93	16.09	7.47	4.31	2.80
B	2.0	NE	41.95	12.07	5.60	3.23	2.10
B	2.0	ENE	41.95	12.07	5.60	3.23	2.10
B	2.0	E	41.95	12.07	5.60	3.23	2.10
B	3.0	ESE	27.97	8.05	3.73	2.15	1.40
B	2.0	SE	41.95	12.07	5.60	3.23	2.10
B	3.0	SSE	27.97	8.05	3.73	2.15	1.40
B	3.0	S	27.97	8.05	3.73	2.15	1.40
C/1	4.5	SSW	31.84	10.56	5.22	3.14	2.11
C/1	3.0	SW	47.76	15.83	7.83	4.71	3.16
B	2.0	WSW	41.95	12.07	5.60	3.23	2.10
B	2.0	W	41.95	12.07	5.60	3.23	2.10
B	1.5	WNW	55.93	16.09	7.47	4.31	2.80
B	1.0	NW	83.90	24.14	11.20	6.46	4.21
B	1.0	NNW	83.90	24.14	11.20	6.46	4.21

Graph 1. Suspended Particulate Matters Concentration Graph



Concentration Limit 132 $\mu\text{g}/\text{m}^3$ limit

For Settleable Dust Quantity (di);

The following values are taken:

$Q = 3,616 \text{ kg/hour}$ (for particles larger than 10μ)

$h = 10 \text{ m}$

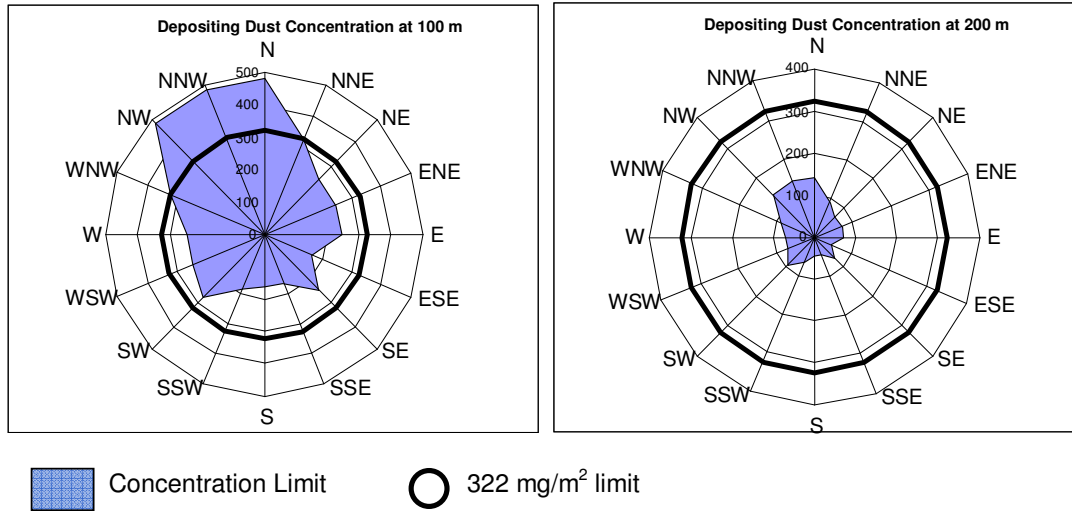
$z = 0.$

$V_{di} = 0,07 \text{ m/s}$

Table 15. Dispersion of Settleable Dusts (mg/m².day)

Uh	AIR	DIRECTIO N	d=100 m	d=200 m	d=300 m	d=400 m	d=500 m
1.00	B	N	484.95	139.15	64.54	37.21	24.23
1.50	B	NNE	323.30	92.77	43.02	24.80	16.15
2.00	B	NE	242.48	69.58	32.27	18.60	12.12
2.00	B	ENE	242.48	69.58	32.27	18.60	12.12
2.00	B	E	242.48	69.58	32.27	18.60	12.12
3.00	B	ESE	161.65	46.38	21.51	12.40	8.08
2.00	B	SE	242.48	69.58	32.27	18.60	12.12
3.00	B	SSE	161.65	46.38	21.51	12.40	8.08
3.00	B	S	161.65	46.38	21.51	12.40	8.08
4.50	C/1	SSW	184.27	60.91	30.11	18.09	12.15
3.00	C/1	SW	276.41	91.36	45.16	27.14	18.23
2.00	B	WSW	242.48	69.58	32.27	18.60	12.12
2.00	B	W	242.48	69.58	32.27	18.60	12.12
1.50	B	WNW	323.30	92.77	43.02	24.80	16.15
1.00	B	NW	484.95	139.15	64.54	37.21	24.23
1.00	B	NNW	484.95	139.15	64.54	37.21	24.23

Graph 2. Settleable Dust Concentration Graph



The dust emission that will be generated during construction and rehabilitation of the in-site roads within the project site and the related dispersions according to the meteorological conditions were estimated using the related formulae given above.

The emission values found as a result of the calculations made as such were assessed as follows according to the UVS (LTLV= Long-Term Limit Value) and KVS (STLV= Short-Term Limit Value) limit values specified in the Regulation on Control of Air Pollution originating from Industrial Facilities.

Table 16. Table of Long-Term and Short-Term Limit Values and Gradual Reduction within the Impact Zone of the Project ^[Source:13]

	STLV	LTLV	2009	
			STLV	LTLV
Suspended Particulate Matters ($\mu\text{g}/\text{m}^3$)	300	150	260	132
SettleableDusts ($\text{mg}/\text{m}^2\cdot\text{day}$)	650	350	598	322

It is located at a distance of nearly 550 meters away from Yayla Evleri, the nearest settlement unit to the project site which is located at the southeast of the Project area. Accordingly; considering the dispersion tables of the dust emission that will be generated during excavation of the vegetative soil to be carried out on the in-site roads to be opened within the project area, it can be observed from the values measured at a distance of 500 meters that the **suspended particulate matter** are observed at the maximum level of $4,21 \mu\text{g}/\text{m}^3$ and the settleable dust emissions are observed at the maximum level of $24,23 \text{ mg}/\text{m}^2\cdot\text{day}$. It can be seen that the values estimated as such are quite below the LTLV and STLV limit values specified in the SKHKKY Regulation. Therefore, the dust emissions that will be generated during excavation of the vegetative soil on the in-site roads to be opened within the project site will not lead to any negative impacts on Yayla Houses, the nearest settlement area to the project site which is located at a distance of nearly 550 meters.

V. B. Dust Emission to be generated during Excavations to be performed for Construction of the Wind Turbines

A foundation of 10×10 m in size and with a depth of nearly 1,5 m shall be excavated for each turbine. Accordingly;

Excavation waste quantity to be generated for each turbine: $10 \times 10 \times 1,5 = 150 \text{ m}^3$.

Number of turbines x Excavation Quantity = Total Excavation Quantity

Soil density: $1.6 \text{ ton}/\text{m}^3$

$19 \times 150 = 2.850 \text{ m}^3$ (4.560 tons).

4.560 tons of excavation will be performed in total within the scope of the project. The total construction period of the project is 12 months; however, the excavation works are anticipated to take nearly 30 days. Accordingly, the excavation quantity to be generated per day; $4.560 \text{ tons} / 30 \text{ days} = 152 \text{ tons/day}$

Considering that the working period will be 8 hours per day;

The excavation quantity to be performed per hour = 152 tons/day and $8 \text{ hours/day} = 19 \text{ tons/hour}$.

The excavated materials shall be stored in the areas shown on the 1/25.000-scaled topographic map given in Annex: 2 and they shall be received from such areas and used when required. Accordingly, 8 trips will be performed per day.

The dust emission factors in the construction stage, the related emission values and the emission discharges calculated accordingly are given in the table below.

Table 17. Emission Factors during Excavation of the Turbine Foundations (Uncontrolled Conditions)

Dust Factors	Emission Values (Uncontrolled)	Emission Discharges (Uncontrolled)
Excavation	0.025 kg/ton	19 ton/hour x 0,025 kg/ton = 0,48 kg/hour
Loading	0.01 kg/ton	19 ton/hour x 0,01 kg/ton = 0,19 kg/hour
Handling	0,7 kg/km-vehicle	(8 trips/8 hours x 0,7 kg/km. trip x 0,1 km) = 0,07 kg/hour
Unloading	0.01 kg/ton	19 ton/hour x 0,01 kg/ton = 0,19 kg/hour
Total Emission		0,93 kg/hour

Table 18. Emission Factors during Excavation of the Turbine Foundations (Controlled Conditions)

Dust Factors	Emission Values (Controlled)	Emission Discharges (Controlled)
Excavation	0.0125 kg/ton	19 ton/hour x 0.0125 kg/ton = 0.2375 kg/hour
Loading	0.005 kg/ton	19 ton/hour x 0.005 kg/ton = 0.095 kg/hour
Handling	0.35 kg/km-vehicle	(8 trips/8 hours x 0.35 kg/km. trip x 0,1 km) = 0.035 kg/hour
Unloading	0.005 kg/ton	19 ton/hour x 0.005 kg/ton = 0.095 kg/hour
Total Emission		0.46 kg/hour

It is observed that the total emission flow that will be generated due to the works to be carried out during the construction of the turbines is 0,93 kg/hour under uncontrolled conditions and 0,46 kg/hour under controlled conditions. These values found as such are below the limit of **1 kg/hour** as specified in the "Regulation on the Control of Air Pollution originating from Industrial Facilities" published in the official gazette no. 27277 dated 03rd.07.2009. Therefore, there was no need to perform the dust dispersion modelling as required by the regulation.

During the construction stage, the loading and unloading operations shall be performed without scattering and the materials transported shall be covered with nylon canvas. The excavation materials shall only be used for covering the top of turbine foundations and for site arrangement. At this stage, the earthmoving wastes shall be stowed properly to ensure that the vegetative soil remains on the top in order to allow it to be covered with grass. The provisions of the "Air Quality Assessment and Management Regulation" enforced upon its publication in the Official Gazette no. 26898 dated 06.06.2008 and the "Regulation on the Control of Air Pollution originating from Industrial Facilities" published in the official gazette no. 26236 dated 22/07/2006 shall apply during the project.

V.C. Excavation Quantities and Dust Emissions to be generated during Construction of the Switchyard Transformer Substation and the Administrative Building

In addition to the turbines, a switchyard transformer substation and administrative building shall also be constructed within the scope of the related project. The area where the switchyard transformer substation and the administrative building will be constructed is shown on the 1/25.000-scaled topographic map. 2.500 m² of land area will be used in total for the switchyard transformer substation and the administrative building. During construction of the switchyard transformer substation and the administrative building, firstly, the topsoil shall be stripped off up to the depth of nearly 0,3 meters in an area of 2.500 m². Accordingly;

The topsoil quantity to be stripped off during establishment of the switchyard transformer substation and the administrative building:

$$2.500 \text{ m}^2 \times 0,3 \text{ m} = 750 \text{ m}^3$$

$$\text{Soil density: } 1,6 \text{ ton/m}^3$$

$$750 \text{ m}^3 \times 1,6 \text{ ton/m}^3 = 1.200 \text{ tons.}$$

The excavation quantity to be generated during the foundation excavations to be carried out during the construction of the switchyard transformer substation and the administrative building that will be established within the scope of the project:

Considering that the foundation depth will be nearly 3 meters;

$$2.500 \text{ m}^2 \times 3 \text{ m} = 7.500 \text{ m}^3$$

$$\text{Material Density: } 2,4 \text{ ton/m}^3$$

$$7.500 \text{ m}^3 \times 2,4 \text{ ton/m}^3 = 18.000 \text{ tons.}$$

Considering that the construction of the switchyard transformer substation and the administrative building will take nearly 60 days;

$$\text{Total excavation quantity: } 18.000 + 1.200 = 19.200 \text{ tons}$$

$$\text{Daily excavation quantity: } 19,200 \text{ tons} / 60 \text{ days} = 320 \text{ tons/day}$$

$$\text{Hourly excavation quantity: } 320 \text{ tons/day} / 1 \text{ day} / 8 \text{ hours} = 40 \text{ tons/hour.}$$

Accordingly, the dust emissions to be generated during construction of the switchyard transformer substation and the administrative building:

Dust Emissions for Uncontrolled Working Conditions:

a) Amount of Dust likely to be generated during Topsoil Stripping and Foundation Excavation:

The dust emission factor during stripping of the topsoil is taken as 0,025 kg/ton.

(Source: Compilation of Air Pollutant Emission Factors (AP-42), EPA Michigan department of environmental quality division-environmental science and services)

Accordingly, $40 \text{ ton/hour} \times 0.025 \text{ kg/ton} = 1 \text{ kg/hour}$.

b) Amount of Dust likely to be generated during loading of the excavated soil:

The emission factor for the dust that will be generated during loading is taken as 0,01 kg/ton. ^[Source:13]

Accordingly; $40 \text{ ton/hour} \times 0.01 \text{ kg/ton} = 0.4 \text{ kg/hour}$.

c) Amount of Dust likely to be generated during transportation of the excavated materials:

The hourly excavated quantity will be around 40 tons and the daily excavated quantity will be around 320 tons. A truck with 25 tons capacity will make 13 trips in total per day for handling and transportation of the soil. Considering that the trucks will use a road of 1.000 m (at maximum round trip) in length within the project site;

$0,7 \text{ kg/km-trip} \times 1 \text{ km (round trip)} \times 13 \text{ trips} / 8 \text{ hours} = 1.14 \text{ kg/hour of dust}$ will be generated.

b) Amount of dust likely to be generated during unloading of the excavated soil:

The emission factor for the dust that will be generated during unloading is taken as 0,01 kg/ton. ^[Source:13]

Accordingly; $40 \text{ ton/hour} \times 0,01 \text{ kg/ton} = 0,4 \text{ kg/hour}$.

Total Amount of Dust likely to be generated during Excavation (Uncontrolled Conditions): **2,94 kg/hour**.

The total emission discharge that will be generated due to the works to be carried out during the construction of the switchyard transformer substation and administrative building in the project site is **2,94 kg/hour**; since this value is above the limit of **1 kg/hour** as specified in the "Regulation on the Control of Air Pollution originating from Industrial Facilities" published in the official gazette no. 27277 dated 03rd.07.2009, dust dispersion modelling was performed as required by the said regulation.

Calculation of the Uh Value

The formula of $U_h = U_R (h/Z_a)^M$ is used.

*For M, the following values are taken.

Dispersion Class	M
A (Very unstable)	0.09
*B (unstable)	0.20
*C/I (Neutral)	0.22
C/II (Neutral)	0.28
D (stable)	0.37
E (very stable)	0.42

* Values used in Calculations

Z_a = 10 m value refers to the elevation of the anemometer from the ground; and h = 10 m refers to the height to which dust can be dispersed during movement of the vehicles (determined based on the observations).

Table 19. Classification of Wind Data

DIRECTION	DISPERSION	U _A (m/sec)	U _R (m/sec)	U _H (m/sec)
N	B	1.3	1	1.0
NNE	B	1.6	1.5	1.5
NE	B	2	2	2.0
ENE	B	2.1	2	2.0
E	B	2.1	2	2.0
ESE	B	2.4	3	3.0
SE	B	2.2	2	2.0
SSE	B	2.5	3	3.0
S	B	3.3	3	3.0
SSW	C/1	4.1	4.5	4.5
SW	C/1	3.6	3	3.0
WSW	B	2.2	2	2.0
W	B	2.1	2	2.0
WNW	B	1.5	1.5	1.5
NW	B	1.2	1	1.0
NNW	B	1.3	1	1.0

As a result of the calculations, the dispersion class by directions is calculated according to the cloud cover rate of 5/8 for the value B (considering the meteorological data of Mersin).

The Environmental Legislation Formula II was used in dust dispersion modelling.

$$C_i(x, y, z) = \frac{10^6}{3600 \times 2 \times \pi} \times \frac{Q_i}{U_h \times \sigma_y \times \sigma_z} \times \exp\left[-\frac{y^2}{2 \times \sigma_y^2}\right] \times \left[\exp\left[-\frac{(z-h)^2}{2 \times \sigma_z^2}\right] + \exp\left[-\frac{(z+h)^2}{2 \times \sigma_z^2}\right]\right] \times \exp\left[-\sqrt{\frac{2}{\pi}} \times \frac{V_{di}}{U_h} \times \int_0^z \frac{1}{\sigma_z(\xi)} \times \exp\left[-\frac{h^2}{2 \sigma_z^2(\xi)}\right] d\xi\right]$$

Settleable Dust Calculation

$$d(x,y) = 3600 \sum_{i=1}^4 V_{di} \times C_i(x,y,0) \text{ (Environmental Legislation Formula III)}$$

80% of the dust generated after operation (based on the experiences) is composed of particles larger than 10 μ .

For the Quantity of Airborne Particles, $C(x,y,z)$;

The following values are taken:

Q = 0.588 kg/hour (for particles smaller than 10 μ)

h = 10 m (based on experiences)

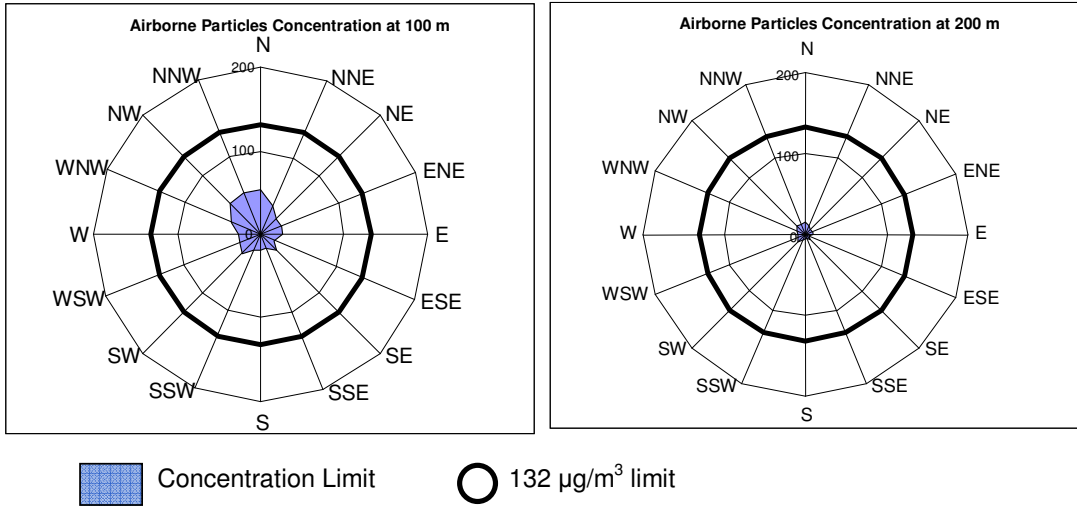
z = 2 m.

V_{di} = 0.01 m/s

Table 20. Dispersion of the Suspended Particulate Matters ($\mu\text{g}/\text{m}^3$)

AIR	UH	DIRECTI ON	C=100 m	C=200 m	C=300 m	C=400 m	C=500 m
B	1.0	N	54.57	15.70	7.28	4.20	2.74
B	1.5	NNE	36.38	10.47	4.86	2.80	1.82
B	2.0	NE	27.28	7.85	3.64	2.10	1.37
B	2.0	ENE	27.28	7.85	3.64	2.10	1.37
B	2.0	E	27.28	7.85	3.64	2.10	1.37
B	3.0	ESE	18.19	5.23	2.43	1.40	0.91
B	2.0	SE	27.28	7.85	3.64	2.10	1.37
B	3.0	SSE	18.19	5.23	2.43	1.40	0.91
B	3.0	S	18.19	5.23	2.43	1.40	0.91
C/1	4.5	SSW	20.71	6.87	3.40	2.04	1.37
C/1	3.0	SW	31.07	10.30	5.10	3.06	2.06
B	2.0	WSW	27.28	7.85	3.64	2.10	1.37
B	2.0	W	27.28	7.85	3.64	2.10	1.37
B	1.5	WNW	36.38	10.47	4.86	2.80	1.82
B	1.0	NW	54.57	15.70	7.28	4.20	2.74
B	1.0	NNW	54.57	15.70	7.28	4.20	2.74

Graph 3. Suspended Particulate Matter Concentration Graph

**For Settleable Dust Quantity (di);**

The following values are taken:

$Q = 2,352$ kg/hour (for particles larger than 10μ)

$h = 10$ m

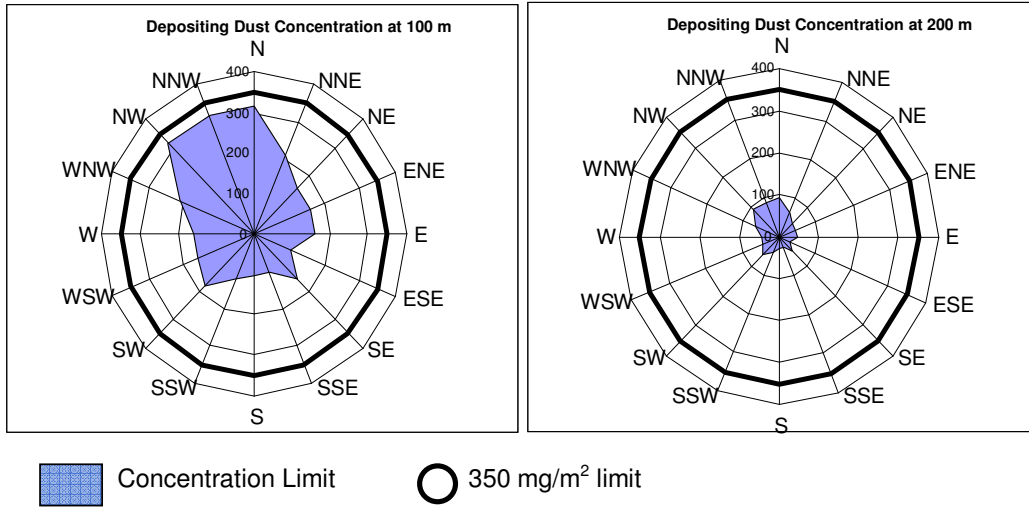
$z = 0$.

$V_{di} = 0,07$ m/s

Table 21. Dispersion of Settleable Dusts (mg/m².day)

Uh	AIR	DIRECTIO N	d=100 m	d=200 m	d=300 m	d=400 m	d=500 m
1.00	B	N	315.43	90.51	41.98	24.20	15.76
1.50	B	NNE	210.29	60.34	27.98	16.13	10.51
2.00	B	NE	157.72	45.25	20.99	12.10	7.88
2.00	B	ENE	157.72	45.25	20.99	12.10	7.88
2.00	B	E	157.72	45.25	20.99	12.10	7.88
3.00	B	ESE	105.14	30.17	13.99	8.07	5.25
2.00	B	SE	157.72	45.25	20.99	12.10	7.88
3.00	B	SSE	105.14	30.17	13.99	8.07	5.25
3.00	B	S	105.14	30.17	13.99	8.07	5.25
4.50	C/1	SSW	119.86	39.62	19.58	11.77	7.90
3.00	C/1	SW	179.79	59.42	29.38	17.65	11.86
2.00	B	WSW	157.72	45.25	20.99	12.10	7.88
2.00	B	W	157.72	45.25	20.99	12.10	7.88
1.50	B	WNW	210.29	60.34	27.98	16.13	10.51
1.00	B	NW	315.43	90.51	41.98	24.20	15.76
1.00	B	NNW	315.43	90.51	41.98	24.20	15.76

Graph 4. Settleable Dust Concentration Graph



The dust emission quantities that will be generated during topsoil stripping and foundation excavation works to be performed during construction of the switchyardtransformer substation and administrative building within the project site and the related dispersions according to the meteorological conditions were estimated using the related formulae given above.

The comparison of the emission values found as a result of such calculations with the limit values specified in the Regulation on Control of Air Pollution originating from the Industrial Facilities is given below.

The emission values found as a result of the calculations made as such were assessed as follows according to the UVS (LTLV= Long-Term Limit Value) and KVS (STLV= Short-Term Limit Value) limit values specified in the Regulation on Control of Air Pollution originating from Industrial Facilities.

Table 22. Table of Long-Term and Short-Term Limit Values and Gradual Reduction within the Impact Zone of the Project [Source:13]

	STLV	LTLV	2009	
			STLV	LTLV
Suspended Particulate Matter (µg/m³)	300	150	260	132
Settleable Dust (mg/m².day)	650	350	598	322

It is located at a distance of nearly 550 meters away from Yayla Evleri, the nearest settlement unit to the project site which is located at the southeast of the Project area. Accordingly; considering the dispersion tables of the dust emission that will be generated

during construction of the switchyard transformer substation and administrative building in the project area, it can be observed from the values measured at a distance of 500 meters that the **suspended particulate matter** are observed at maximum level of $2.74 \mu\text{g}/\text{m}^3$ and the settleable dust emissions are observed at the maximum level of $15.76 \text{ mg}/\text{m}^2\cdot\text{day}$. It can be seen that the values estimated as such are quite below the LTLV and STLV limit values specified in the SKHKKY Regulation. Therefore, the dust emissions that will be generated during construction of the switchyard transformer substation and administrative building to be carried out in the project site will not lead to any negative impacts on Yayla Houses, the nearest settlement area to the project site which is located at a distance of nearly 550 meters.

Dust Emissions for Controlled Working Conditions:

a) Amount of Dust likely to be generated during Topsoil Stripping and Foundation Excavation:

The dust emission factor during stripping of the topsoil is taken as $0.025 \text{ kg}/\text{ton}$.

(Source: Compilation of Air Pollutant Emission Factors (AP-42), EPA Michigan department of environmental quality division-environmental science and services)

Accordingly, $40 \text{ ton}/\text{hour} \times 0.025 \text{ kg}/\text{ton} = 1 \text{ kg}/\text{hour}$.

b) Amount of Dust likely to be generated during loading of the excavated soil:

The emission factor for the dust that will be generated during loading is taken as $0.005 \text{ kg}/\text{ton}$. ^[Source:13]

Accordingly; $40 \text{ ton}/\text{hour} \times 0.005 \text{ kg}/\text{ton} = 0.2 \text{ kg}/\text{hour}$.

c) Amount of Dust likely to be generated during transportation of the excavated materials:

The hourly excavated quantity will be around 40 tons and the daily excavated quantity will be around 320 tons. A truck with 25 tons capacity will make 13 trips in total per day for handling and transportation of the soil. Considering that the trucks will use a road of 1.000 m (at maximum round trip) in length within the project site;

$0.35 \text{ kg}/\text{km}\cdot\text{trip} \times 1 \text{ km (round trip)} \times 13 \text{ trips} / 8 \text{ hours} = 0.57 \text{ kg}/\text{hour of dust}$ will be generated.

b) Amount of Dust likely to be generated during unloading of the excavated soil:

The emission factor for the dust that will be generated during unloading is taken as 0.005 kg/ton. ^[Source:13]

Accordingly; 40 ton/hour x 0,005 kg/ton = **0,2 kg/hour**.

Amount of Total Dust likely to be generated during Excavation (Controlled Conditions): **1.97 kg/hour**.

The total emission discharge (under controlled conditions) that will be generated due to the works to be carried out during the construction of the switchyard transformer substation and administrative building in the project site is **1,97 kg/hour**; since this value is above the limit of **1 kg/hour** as specified in the "Regulation on the Control of Air Pollution originating from Industrial Facilities" published in the official gazette no. 27277 dated 03rd.07.2009, dust dispersion modelling was performed as required by the said regulation.

Calculation of the Uh Value

The formula of $U_h = U_R(h/Z_a)^M$ is used.

*For M, the following values are taken.

Dispersion Class	M
A(Very unstable)	0.09
*B(unstable)	0.20
*C/I(Neutral)	0.22
C/II(Neutral)	0.28
D(stable)	0.37
E(very stable)	0.42

* Values used in Calculations

Z_a = 10 m value refers to the elevation of the anemometer from the ground; and h = 10 m refers to the height to which dust can be dispersed during movement of the vehicles (determined based on the observations).

Table 23. Classification of Wind Data

DIRECTION	DISPERSION	U_A(m/sec)	U_R(m/sec)	U_H(m/sec)
N	B	1.3	1	1.0
NNE	B	1.6	1.5	1.5
NE	B	2	2	2.0
ENE	B	2.1	2	2.0
E	B	2.1	2	2.0
ESE	B	2.4	3	3.0
SE	B	2.2	2	2.0
SSE	B	2.5	3	3.0
S	B	3.3	3	3.0
SSW	C/1	4.1	4.5	4.5
SW	C/1	3.6	3	3.0
WSW	B	2.2	2	2.0
W	B	2.1	2	2.0

WNW	B	1.5	1.5	1.5
NW	B	1.2	1	1.0
NNW	B	1.3	1	1.0

As a result of the calculations, the dispersion class by directions is calculated according to the cloud cover rate of 5/8 for the value B (considering the meteorological data of Mersin).

The Environmental Legislation Formula II was used in dust dispersion modelling.

$$C_i(x, y, z) = \frac{10^6}{3600 \times 2 \times \pi} \times \frac{Q_i}{U_h \times \sigma_y \times \sigma_z} \times \exp\left[-\frac{y^2}{2 \times \sigma_y^2}\right] \times \left[\exp\left[-\frac{(z-h)^2}{2 \times \sigma_z^2}\right] + \exp\left[-\frac{(z+h)^2}{2 \times \sigma_z^2}\right]\right] \times \exp\left[-\sqrt{\frac{2}{\pi}} \times \frac{V_{di}}{U_h} \times \int_0^z \frac{1}{\sigma_z(\xi)} \times \exp\left[-\frac{h^2}{2 \sigma_z^2(\xi)}\right] d\xi\right]$$

Settleable Dust Quantity Calculation

$$d(x,y) = 3600 \sum_{i=1}^4 V_{di} \times C_i(x,y,0) \text{ (Environmental Legislation Formula III)}$$

80% of the dust generated after operation (based on the experiences) is composed of particles larger than 10 µ.

For the Quantity of Airborne Particles, C(x,y,z);

The following values are taken:

Q = 0.394 kg/hour (for particles smaller than 10µ)

h = 10 m (based on experiences)

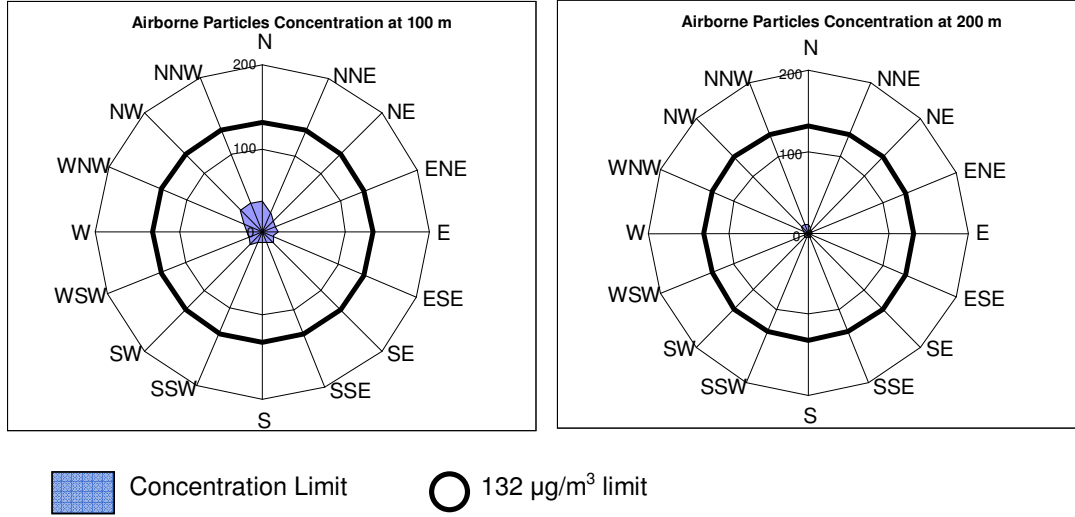
z = 2 m.

V_{di} = 0.01 m/s

Table 24. Dispersion of the Suspended Particulate Matter (µg/m³)

AIR	UH	DIRECTI ON	C=100 m	C=200 m	C=300 m	C=400 m	C=500 m
B	1.0	N	36.57	10.52	4.88	2.81	1.83
B	1.5	NNE	24.38	7.01	3.25	1.88	1.22
B	2.0	NE	18.28	5.26	2.44	1.41	0.92
B	2.0	ENE	18.28	5.26	2.44	1.41	0.92
B	2.0	E	18.28	5.26	2.44	1.41	0.92
B	3.0	ESE	12.19	3.51	1.63	0.94	0.61
B	2.0	SE	18.28	5.26	2.44	1.41	0.92
B	3.0	SSE	12.19	3.51	1.63	0.94	0.61
B	3.0	S	12.19	3.51	1.63	0.94	0.61
C/1	4.5	SSW	13.88	4.60	2.28	1.37	0.92
C/1	3.0	SW	20.82	6.90	3.41	2.05	1.38
B	2.0	WSW	18.28	5.26	2.44	1.41	0.92
B	2.0	W	18.28	5.26	2.44	1.41	0.92
B	1.5	WNW	24.38	7.01	3.25	1.88	1.22
B	1.0	NW	36.57	10.52	4.88	2.81	1.83
B	1.0	NNW	36.57	10.52	4.88	2.81	1.83

Graph 5. Suspended Particulate Matter Concentration Graph

**For Settleable Dust Quantity (di);**

$Q = 1,576 \text{ kg/hour}$ (for particles larger than 10μ)

$h = 10 \text{ m}$

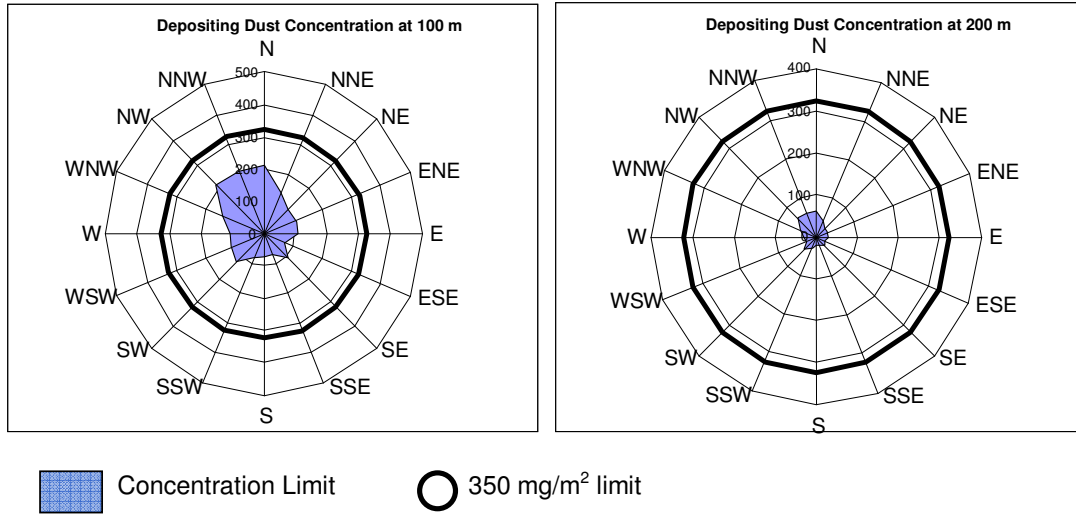
$z = 0.$

$V_{di} = 0,07 \text{ m/s}$

Table 25. Dispersion of Settleable Dusts ($\text{mg}/\text{m}^2.\text{day}$)

Uh	AIR	DIRECTIO N	d=100 m	d=200 m	d=300 m	d=400 m	d=500 m
1.00	B	N	211.36	60.65	28.13	16.22	10.56
1.50	B	NNE	140.91	40.43	18.75	10.81	7.04
2.00	B	NE	105.68	30.32	14.06	8.11	5.28
2.00	B	ENE	105.68	30.32	14.06	8.11	5.28
2.00	B	E	105.68	30.32	14.06	8.11	5.28
3.00	B	ESE	70.45	20.22	9.38	5.41	3.52
2.00	B	SE	105.68	30.32	14.06	8.11	5.28
3.00	B	SSE	70.45	20.22	9.38	5.41	3.52
3.00	B	S	70.45	20.22	9.38	5.41	3.52
4.50	C/1	SSW	80.31	26.55	13.12	7.88	5.30
3.00	C/1	SW	120.47	39.82	19.68	11.83	7.94
2.00	B	WSW	105.68	30.32	14.06	8.11	5.28
2.00	B	W	105.68	30.32	14.06	8.11	5.28
1.50	B	WNW	140.91	40.43	18.75	10.81	7.04
1.00	B	NW	211.36	60.65	28.13	16.22	10.56
1.00	B	NNW	211.36	60.65	28.13	16.22	10.56

Graph 6. Settleable Dust Concentration Graph



The dust emission quantities that will be generated during topsoil stripping and foundation excavation works to be performed during construction of the switchyard transformer substation and administrative building within the project site and the related dispersions according to the meteorological conditions were estimated using the related formulae given above.

The comparison of the emission values found as a result of such calculations with the limit values specified in the Regulation on Control of Air Pollution originating from the Industrial Facilities is given below.

The emission values found as a result of the calculations made as such were assessed as follows according to the LTLV and STLV limit values specified in the Regulation on Control of Air Pollution originating from Industrial Facilities.

Table 26. Table of Long-Term and Short-Term Limit Values and Gradual Reduction within the Impact Zone of the Project ^[Source:13]

	STLV	LTLV	2009	
			STLV	LTLV
Suspended Particulate Matter ($\mu\text{g}/\text{m}^3$)	300	150	260	132
Settleable Dust($\text{mg}/\text{m}^2\cdot\text{day}$)	650	350	598	322

It is located at a distance of nearly 550 meters away from Yayla Evleri, the nearest settlement unit to the project site which is located at the southeast of the Project area. Accordingly; considering the dispersion tables of the dust emission that will be generated during construction of the switchyard transformer substation and administrative building in the project area, it can be observed from the values measured at a distance of 500 meters

that the **suspended particulate matter** are observed at maximum level of $1,83 \mu\text{g}/\text{m}^3$ and the settleable dust emissions are observed at the maximum level of $10,56 \text{ mg}/\text{m}^2\text{-day}$. It can be seen that the values estimated as such are quite below the LTLV and STLV limit values specified in the SKHKKY Regulation. Therefore, the dust emissions that will be generated during construction of the switchyard transformer substation and administrative building to be carried out in the project site will not lead to any negative impacts on Yayla Houses, the nearest settlement area to the project site which is located at a distance of nearly 550 meters.

V.C. Energy Transmission Line

In relation to the energy transmission line to be constructed at the stage of connection of the project to the interconnected system, the design route and the number of poles are not yet finalized; after presentation of the detailed plans in relation thereof, a separate process shall be conducted for the energy transmission line as required by the EIA Regulation; and if required, EIA/Project Presentation File shall be prepared duly. Therefore, the environmental impacts of the energy transmission line are not assessed in this report.

VI. Noise Pollution

VI. A. Information about the Noise Levels for the Construction Stage (Emission and Immission)

V.A.1. Number and Sound Power Levels of the Machinery and Equipment to be Used in the Construction Stage (as per the Article 23 of the ÇGDY Regulation), the Reference taken for Such Data and Calculation of the Total Noise Level according to TS 9315 (ISO 1996-1) Standard under the Working Conditions depending on the Construction Work Period (Calculation of Ldaytime value according to the Working Conditions throughout the Day; and if it is a Project requiring Public Benefit, Provision of the related Reasons and Working Conditions and Calculation of the Noise Level for the Other Time Frames)

Noise will be generated by the machines to be used in the construction stage of Dağpazari Wind Energy Power Plant located within the boundaries of Mersin Province, Mut District.

The sound power levels of the machines to be used in the construction of the Wind Energy Power Plant are tabulated below.

Table 27. Sound Power Levels

Machine	Quantity (Unit)	Noise Level (dB)
Crane	1	105
Loader	1	115
Roller	1	110
Truck	1	85
Ready-Mix Concrete Mixer	1	115
Concrete Pump	1	115

*Source: Regulation on Noise Emission in the Environment by the Equipment for use Outdoors enforced upon its publication in the Official Gazette no. 26392 dated 30th.12.2006

$$L_{wT} = 10 \log \sum 10^{(L_{wi}/10)} \dots\dots \text{Formula-3 (Total Sound Power Level)}$$

$$L_{wT} = 10 \log \sum [(10^{105/10}) + (10^{115/10}) + (10^{110/10}) + (10^{85/10}) + (10^{115/10}) + (10^{115/10})]$$

$$L_{wT} = 120,34 \text{ dB}$$

The amount of reduction by distance in the sound power level originated by each source is calculated with the formula given below.

$$L_{pT} = L_{wT} + 10 \log (Q/A) \dots\dots \text{Formula-4 (Total Sound Pressure Level)}$$

$$A = 4 \pi r^2$$

Q= directivity factor (Q = 1 by the field type)

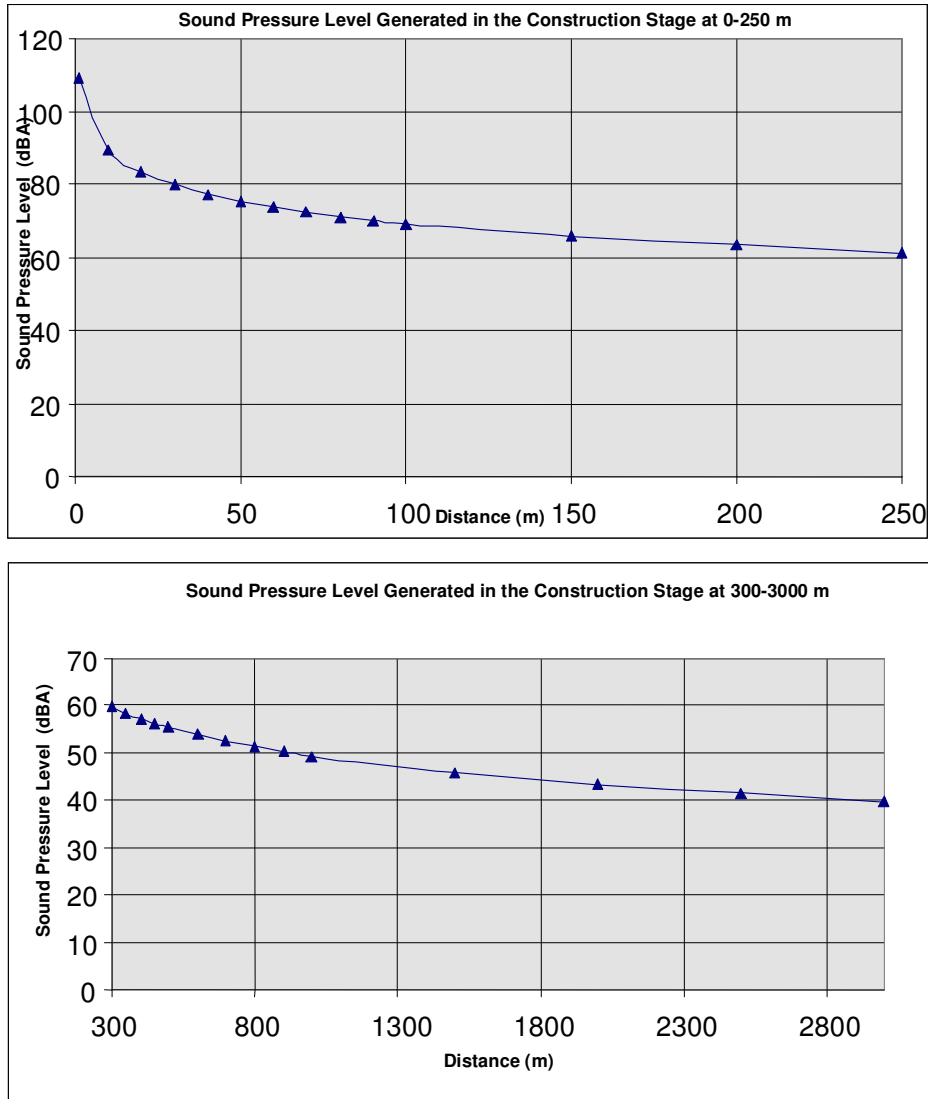
$$L_{pT} = L_{wT} + 10 \log (Q/A)$$

The graph of sound pressure level by distance determined as a result of the calculations given above is given below.

Since the operating frequency range of the equipment to be used in the construction stage of the plant is 500-4.000 Hz, the sound pressure level of each point will be equal to the approximate noise level. Accordingly, it is considered that $L_{pT} = L_{daytime}$.

Table 28. Noise Distribution by Distances

Distance	1	10	20	30	40	50	60	70	80	90	100	150	200	250
LpT	109	89	83	80	77	75	74	72	71	70	69	66	63	61
Distance	300	350	400	450	500	600	700	800	900	1000	1500	2000	2500	3000
LPT	60	58	57	56	55	54	52	51	50	49	46	43	41	40



Graph 7. Graph showing Variation by Distance of the Noise Level generated during Construction

V.A.2. Comparison of the Values determined as a result of Calculations with the Article 23 of the ÇGDY Regulation

As required by the Article 23 of the “**Regulation on Environmental Noise Assessment and Management**”; the environmental noise levels in the construction site cannot exceed the limit values given in Table 5 expressed in $L_{daytime}$ values.

Table 29. Environmental Noise Limit Values for the Construction Site

Type of Activity (construction, demolition and repair)	$L_{daytime}$ (dBA)
Building	70

Road	75
Other Sources	70

The related facility area was considered within the scope of the “Other Sources” in the table above.

Table 30. L_{daytime} Values by the Nearest Settlements

Settlement Unit	Nearest Turbine No.	Distance to the Nearest Turbine (m)	Location by the Nearest Turbine	$L_{\text{pT}} = L_{\text{daytime}}$ dBA Values
MERSİN PROVINCE, MUT DISTRICT				
Burunköy	T 6	1550	Southwest	≈ 45 dBA
Yayla Evleri	T 9	550	Southeast	≈ 54 dBA
Yayla Evleri	T 1 – T 10	650	North	≈ 53 dBA
Yayla Evleri	T 6	970	West	≈ 49 dBA

The noise level likely to be generated should not exceed 70 dBA. The settlement units in the region are located quite far away; and as it can also be seen from the Table 16, the noise levels do not exceed the limit values in the nearest settlement. All calculations made provided the maximum noise estimation reached assuming the simultaneous operation of all machines. But in fact, the work machinery shall be used separately in different stages like excavation, assembly, erection and concreting, etc.; and they will not be used simultaneously. Therefore, it is expected that the noise level that will be actually generated will be much less than the estimations during the construction stage. In addition, this impact is a temporary impact that will be generated only during the construction stage of the Wind Energy Power Plant; and it will be eliminated during the operation stage.

VI.B. Information about the Noise/Vibration Level likely to be generated during the Operation Stage

VI.B.1. Locations, Characteristics and Sound Data and Sound Character and the related Sound Power Levels of the Noise Sources within the Plant/Facility

The noise sources anticipated during the operation stage include the blades rotating within the air, the gearbox, generator and the auxiliary engines. In addition, the noise pollution asserted for the wind power plants is not at high levels. The noise level of the environment housing the turbines is 80 dB within the power plant.

V.B.2. Estimation of the Potential Environmental Noise Level likely to be generated under Full Capacity Operation of the Plant using ISO 9613-2 Calculation Method (Provision of the Related Data by this Calculation Method in accordance with ISO 8297 or TS EN ISO 3744 and TS EN ISO 3746 Standards);

According to the measurements conducted in a wind power plant in operable condition, the noise levels generated by different sources are given below.

Table 31. Sound Power Levels

20 dB	Sound created by the Trees
30 dB	Whispering
80 dB	Noise Level of the Environment housing the Turbines
50 dB	Talking at Moderate Noise Level
60 dB	Office Noise
80 dB	Traffic Noise
140 dB	Aircraft Noise (at 25 meters)

$$L_{wT} = 10 \log \sum 10^{(L_{wi}/10)} \dots\dots \text{Formula-3 (Total Sound Power Level)}$$

$$L_{wT} = 10 \log \sum [(10^{80/10})]$$

$$L_{wT} = 80 \text{ dB}$$

The amount of reduction by distance in the sound power level originated by each source is calculated with the formula given below.

$$L_{pT} = L_{wT} + 10 \log (Q/A) \dots\dots\dots \text{Formula-4 (Total Sound Pressure Level)}$$

$$A = 4 \pi r^2$$

Q= directivity factor (Q = 1 by the field type)

$$L_{pT} = L_{wT} + 10 \log (Q/A)$$

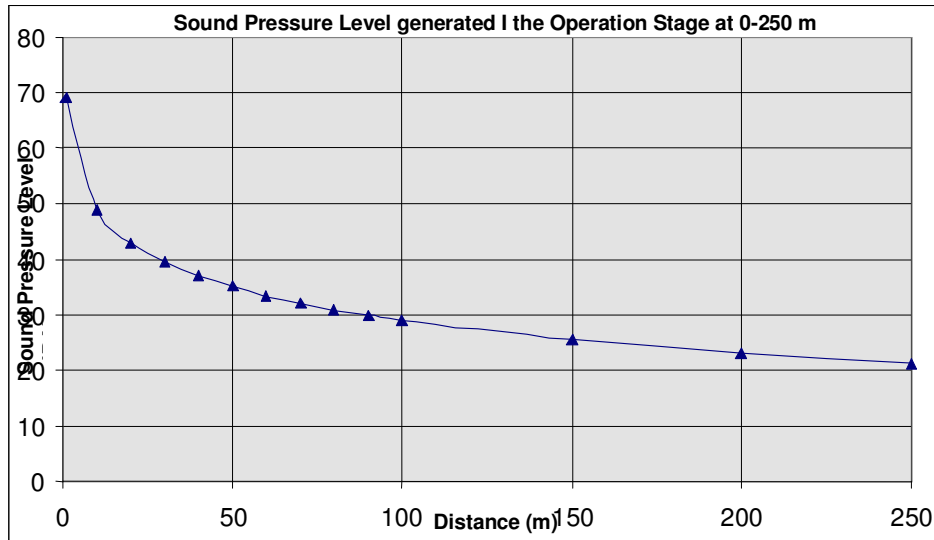
The graph of sound pressure level by distance determined as a result of the calculations given above is given below.

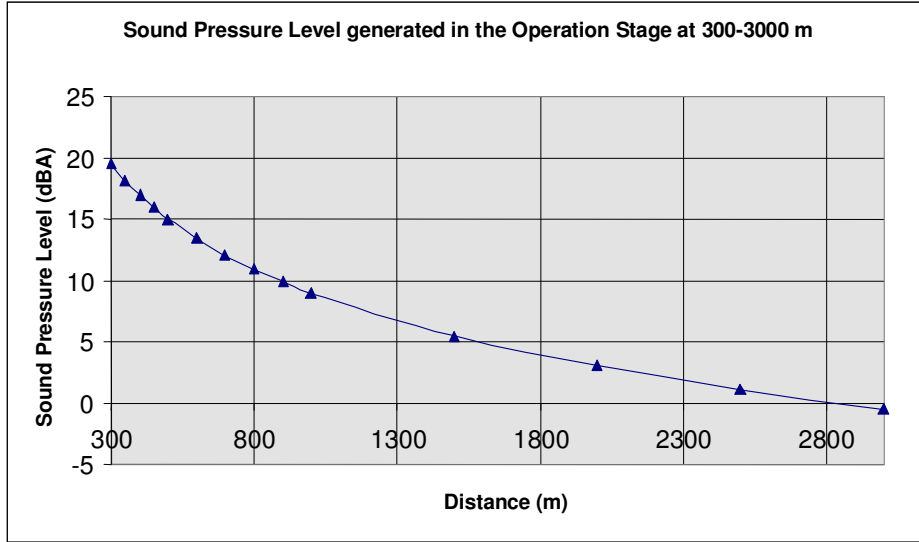
Since the operating frequency range of the equipment to be used during operation of the WEPP is 500-4.000 Hz, the sound pressure level of each point will be equal to the approximate noise level. Accordingly, it is considered that $L_{pT} = L_{\text{daytime}}$.

Table 32. Noise Distribution by Distances

Distance	1	10	20	30	40	50	60	70	80	90	100	150	200	250
LpT	69	49	43	39	37	35	33	32	31	30	29	25	23	21
Distance	300	350	400	450	500	600	700	800	900	1000	1500	2000	2500	3000
LPT	19	18	17	16	15	13	12	11	10	9	5	3	1	-1

Graph 8. Graph showing Variation by Distance of the Noise Level generated during Operation





V.B.3. Assessment of the Results obtained in accordance with the Article 22 of the ÇGDY Regulation:

As required by the Article 22 of the “**Regulation on Environmental Noise Assessment and Management**”; the **environmental noise limit values for Industrial Facilities** cannot exceed the limit values given in the table below which are expressed in Ldaytime, Levening and Lnighttime values.

Table 33. Table of Environmental Noise Limit Values for Industrial Facilities

Areas	L _{daytime} (dBA)	L _{evening} (dBA)	L _{nighttime} (dBA)
Of noise-sensitive usages, the areas highly occupied by education, cultural and health facilities and summer resorts and camping areas	60	55	50
Of the areas including commercial buildings and noise-sensitive usages, the areas highly occupied by houses and residential units	65	60	55
Of the areas including commercial buildings and noise-sensitive usages, the areas highly occupied by workplaces and offices	68	63	58
For each facility within an Organized Industrial Zone or Specialized Industrial Zone	70	65	60

If the environmental noise limit values given in the table above are exceeded; effective and applicable environmental control measures shall be taken together with the measures required for meeting the principles stipulated by the related legislation as issued by the responsible authorities or institutions on the basis of each machine or equipment and on the basis of the workers exposed to noise.

The nearest settlement unit to the power plant is Yayla Evleri located at a distance of 550 meters; and the noise level likely to be generated at this distance during the operation stage will be nearly 14 dBA. This value is quite below the Environmental noise limit values for the Industrial Facilities as specified in the "Regulation on Environmental Noise Assessment and Management". Therefore, there will be no negative impact likely to be caused by the noise that can be generated during the operation stage of the project.

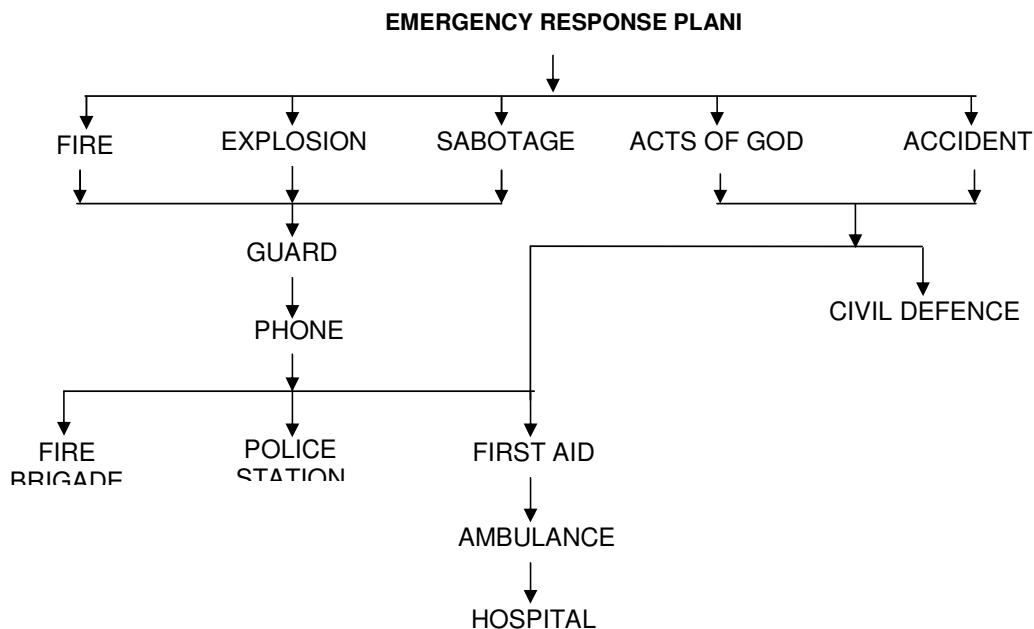
d) Risk of accidents likely to be caused by the technology and materials used

The risks of accident likely to be caused by the technologies and materials to be used during the construction stage of the project include the accidents that can be caused by the negligence of the personnel to be employed and the potential accidents likely to be caused by the failure in performing the required maintenance and repair of the machinery and equipment.

For the measures to be taken against any potential accidents that can occur in the work area during construction of the plant, the provisions of the "Occupational Health and Safety Regulation for Construction Works" shall be followed. As specified within the scope of the said regulation;

- The construction works shall be performed during daylight hours; and if any work is necessary or compulsory to be performed in dark or at night, the work area shall be illuminated as required.
- The materials used in the construction works shall be of satisfactory quality and robustness; and protection helmets shall be distributed to the workers that will be employed in such works.
- The periphery of the construction site shall be surrounded by suitable and easily visible warning signs.
- The required first aid materials shall be kept ready and available in the construction site building against any potential accidents despite the measures taken during the construction works; and there will be at least one unit of vehicle continuously kept ready for operation in the work area within the working hours for transportation of the victims of the accident to the nearest health institution.

- Since communication via telephones will be made available in the facility, help and assistance of the nearest health institution can be requested in case of an emergency resulting from an accident. There shall be a first aid cabinet within the facility for first aid responses. A security officer shall be assigned that will guard the workplace throughout the day and night; and the related officer shall also be trained properly about getting into contact with the related authorities via the phone in case of an incident such as potential sabotage, explosion, Acts of God, accident, fire, etc., the first aid responses required to be made in case of a potential incident, civil defence measures and intervention functions, etc.
- Repair and maintenance works shall be performed after taking the required measures against a potential fault or breakdown that can occur in the facility. The maintenance works shall be performed for efficient operation of all units within the facility and for ensuring safety and security. The provisions of the Occupational Health and Safety Regulation shall be followed during construction of the facility.



The risk of accidents that may occur during the operation stage of the project include the rollover and overturning of the wind turbines when the wind velocity is too high. However, the turbines planned to be used in the Facility have proportionate power and various steel and concrete cast tower versions; and they are designed to guarantee top level energy generation and they are suitable for areas exposed to high wind velocities.

The Wind Energy Power Plants are considered within the scope of the Class 2 Non-Sanitary Enterprises in accordance with the provisions of the Regulation on Licenses to Start and Operate a Business; and an application shall be submitted to the related administration for receiving a License to start and Operate a Business accordingly; and the required safety measures shall be applied through following the Health Protection Strip distances stipulated by the related administration.

Safety measures to be taken in the project;

- Required Warning Signs shall be placed;
- Emergency Response Plan shall be arranged and the personnel to be employed shall be trained duly

In addition, the connection between the turbines shall be made via the underground cables in the system to be established and transmitted to the transformer; and there will be no systems like cabling, etc. that may pose a danger over the ground. Transmission to the main shaft shall be provided via the overhead cables. The technology used in the project is a system equipped with conventional system which offers sensitive automation and self-closing capability in case of surging voltage, act of God, etc. and which can be monitored from the administrative building. The required equipment shall be provided for the personnel in respect of the maintenance and repair works to be carried out within the scope of the project and the safety of the personnel to be employed; and the provisions of TEİAŞ Occupational Safety Regulation shall be followed.

e) Measures to be taken against the potential environmental impacts of the project

In the engineering studies performed for selection of the location and technology for Dağpazarı Wind Energy Power Plant, detailed wind measurements are taken and the project is being modelled by means of special programs; thus, the most effective system and location plan is being prepared. During such activities, economic and environmental factors play an important role in such modelling works as well as the factors such as the detailed wind measurements and field topography, geological structure, etc. Within this context, the environmental factors are always taken into consideration in implementing a sustainable energy policy and assuring the continued maintenance of the project.

The Wind Energy Projects are the projects identified as clean energy; and generally, their environmental impacts are composed of less important or minor components and mostly, the temporary impacts occurring during the construction stage are considered.

The structure of the existing environment was illuminated with the literature compilations made in the lighting of the site surveys carried out in relation to Dağpazarı WEPP project; and the Environmental Risk Matrix was created upon assessment of the environmental impacts expected to occur during the construction and operation activities

taking into consideration the technical characteristics and layout of the project. (See Annex 11)

The Environmental Impacts of the Project the Measures required to be taken can be listed as follows;

I. Area to be used for the Project

It is quite difficult to determine at this stage the land areas that will be disposed within the scope of the wind energy power plant project. The related planning works shall be initiated upon completion of the EIA process. The 1/25.000-scaled environmental landscape plan, 1/5.000-scaled regulatory development plan and 1/1.000-scaled implementation development plan shall be prepared and presented for approval upon attachment of the related opinions of the public authorities and institutions. If the turbine areas, roads and the other facilities are to be located within forest areas, firstly, the forestry preliminary consent shall be received and then, the areas to be allocated shall be determined according to the approved 1/1.000-scaled outline implementation development plan and the related application shall be submitted for final approval to Mersin Provincial Directorate of Forestry.

Nevertheless, the approaches for estimated land use are also given within the report.

19 units of turbines will be constructed within the scope of the project, and an area of $10 \times 10 = 100 \text{ m}^2$ in size will be needed as the settlement area of each turbine. Accordingly, 1.900 m^2 of land area will be required for total area use for the construction of turbines. Although the in-site roads that will provide access to the turbines are not yet finalized, an approach was developed taking into consideration the turbine layouts and the distances of turbines to each other; and assuming that nearly 6.5 km long and 5 m wide road stabilization will be performed within the scope of the project, it has been anticipated that 32.500 m^2 of land area will be used in total and 2.500 m^2 of land area will be used for the administrative building and the switchyard transformer substation planned to be constructed within the scope of the project. The application was submitted to TEİAŞ for connection to the interconnected system; and the related planning process is ongoing. Therefore, the Energy Transmission Line was planned within the scope of a separate project and not assessed within the Project Presentation File; and after finalization of the related details, it will be assessed according to the EIA Regulation and a separate EIA/Project Presentation File will be prepared and submitted duly.

Impacts on Forest Assets and Applicable Measures:

In the areas where rehabilitation of in-site roads, construction of turbines, and the construction of the switchyard transformer substation and the administrative building will be carried out during the construction stage works to be performed within the scope of the project, wood chopping works may only be performed after receiving the required permits from the Regional Directorate of Forestry and payment of the related plantation fees. During such works, since the forest texture found in these areas displays an area not bearing the

character of a natural forest due to the previous plantation works performed on such area, there will be no permanent damages caused on the forest assets and the tree types in such areas. Wood chopping will not be performed in the entire area; and it will be targeted to use the spaces without trees as much as possible or to complete the construction with minimum wood chopping at the turbine locations and during the construction of the other structures.

Firstly, the personnel to be employed in the facility shall be trained about forest fires in order to prevent any potential forest fires that can break out during the works carried out in the project site. Any kind of materials that can cause a fire during the works and the natural materials found in the area (dry wood parts, etc.) shall be stored in a protected area or removed from the area.

The tools like pick, shovel, bucket, etc. and water tanks shall be kept available in the work area and in its close periphery considering any fire potential; and in case of a fire breaking out, the required training and work distribution shall be provided for emergency response; and the nearest fire brigade unit and the related institutions shall be informed immediately. The required measures against occupational accidents shall be taken in the worksite and the required trainings shall be provided for the personnel. The required first aid materials and equipment shall be kept available.

In addition to the measures mentioned above, the required activities shall be performed against any potential forest fires during the operation stage taking into consideration the opinions of the Regional Directorate of Forestry.

II. Use of Natural Resources

II.1. Land Use

Nearly, 1.900 m² of land shall be used for positioning of turbines and nearly 32.500 m² of land shall be used for construction of the road within the site. Due to the technical characteristics of the project, the turbines should be placed at a certain distance between each other.

The soil structure and characteristics may vary in the sections where the turbines will be positioned in the project; and there are no changes on the soil structure and the land character such as the agricultural activities, forestry, grazing crop, etc. in the area between the turbines.

The locations where the Turbines will be positioned are the forest lands as specified in the project. There are occasional agricultural activities carried out in the open fields within the forest around the turbine locations.

II.2.1. Water Use

The water use in the project was examined in details in section 1 b. Accordingly, 3.75 m³ of water shall be used during the construction works of the project and 0.9 m³ of water shall be used during the operation stage. The water required in the facility shall be supplied by the related activity owner or provided from the resources in the periphery or brought by means of a tanker from a source to be designated by Mut Municipality. The drinking water required for the personnel shall be provided in plastic bottles commercially available in the market.

II.2.2. Energy Use

The facility is an energy-generating facility; the energy requirement of the work machinery during the construction stage shall be met through the use of diesel oil and the electricity requirement to be used during the operation stage shall be supplied from the network.

The WEPP Plant is based on a completely renewable operating technology and a clean system; and there will be no impacts on the wind regime and air quality likely to be caused by the activities to be performed. In addition, it will positively contribute in the reduction of CO₂ emission.

III. Amount of Pollutants and their Impacts on the Current Environmental Quality

III.1. Wastewater

The waste waters that will be generated during the construction and operation stages of the Project also include the domestic-type wastewaters to be generated by the working personnel; and there is no process-related wastewaters. In the lighting of the estimations made in Section 1.c, it is expected that 2,25 m³/day of wastewater will be generated during the construction stage and 0,9 m³/day of wastewater will be generated during the operation stage of the project. The domestic-type wastewaters that will be generated during both the construction and operation stage of the plant shall be collected in the watertight septic tank to be constructed next to the construction site building. The said septic tank shall be constructed in accordance with the “Regulation on Septic Tanks to be Constructed in Places where Sewerage System Pipes cannot be laid” which was enforced upon its publication in the Official Gazette no. 13783 dated 19th.03.1971. The wastewaters collected in the septic tank shall be drawn by special sewage truck companies operating in the region or by the sewage truck owned by Mut Municipality when it is on the point of filling up and shall be disposed duly through its discharge into the sewerage system of Mut Municipality. The septic tank design is provided in **Annex: 12**.

Throughout the works to be carried out during both construction and operation stages within the scope of the project, the provisions of the “Water Pollution Control Regulation” no. 25687 dated 31st.12.2004 and the provisions of the “Regulation Amending the Water Pollution Control Regulation” no. 26786 dated February 13, 2008 shall be followed.

III.2. Solid Wastes

III.2.1. Domestic-Type Solid Wastes

According to the calculations made in Section 1.c, it is expected that 20.1 kg/ day and 8.04 kg/day of domestic-type solid wastes will be generated during the construction stage and operation stage of the project, respectively. The domestic-type solid wastes that will be generated during the construction and operation stages of the plant shall be collected in closed containers that will be kept within the facility and disposed duly by the owner of the works through their delivery to the Solid Wastes Storage area of Mut Municipality.

The domestic-type solid wastes to be generated by the personnel (glass, paper, plastic, etc.) shall be disposed duly as required by the “Solid Wastes Control Regulation” enforced upon its publication in the Official Gazette no. 20814 dated March 14, 1991.

III.2.1. Excavation and Construction Wastes

In the project, the excavation quantity expected to be generated during the excavation of the foundations of the turbines is determined as 4.560 tons and the topsoil excavation quantity expected to be generated during construction of the in-site roads is determined as 39.000 tons. The earthmoving wastes expected to be generated in the project shall firstly be utilized in the project site; and the excavation materials shall be used for covering over the turbine foundations and the site levelling and arrangement to be performed in the worksite. At this stage, the earthmoving wastes shall be stowed properly to ensure that the topsoil section remains on top in order to allow it to be covered with grass.

Some wastes such as iron parts and packaging materials, etc. will be generated after construction in the project; and the control and management of the construction-related wastes such as cement bags, sheet and metal parts, packages and boxes, timber, etc. shall be conducted in accordance with the “Regulation on Control of Excavation Soil, Construction and Debris Wastes” enforced upon its publication in the Official Gazette no. 25406 dated 18th.03.2004, the “Regulation on Control of Waste Batteries and Accumulators” enforced upon its publication in the Official Gazette no. 25559 dated 31st.08.2004 and amended on the date of 03rd.03.2005/2005; and the Packaging Wastes Control Regulation enforced upon its publication in the Official Gazette no. 26562 dated 24th.06.2007.

III.3. Hazardous Wastes

The waste oils that will be generated by both the work machinery during the construction stage of the project and the accessories of the transformer and turbines during the operation stage of the project are considered within the scope of hazardous wastes; and they shall be collected in watertight containers in accordance with the "Hazardous Wastes Control Regulation" and disposed duly through their delivery to the companies licensed by the Ministry of Environment and Forestry. The provisions of the "Hazardous Wastes Control Regulation" enforced upon its publication in the Official Gazette no. 25755 dated 14th.03.2005 shall be followed in the project.

Since there will not be any infirmary unit within the scope of the project, generation of any medical wastes is not expected.

III.4. Gas and Dust Emissions

Exhaust emission will be generated by the machines that will be used in the works to be carried out in the worksite during the construction stage of the plant. The machinery to be used during construction of the plant will be operated for a short period of time; and the emissions will not reach to the levels likely to cause significant environmental impacts. No gas waste generation will occur during operation stage of the plant since no burning or combustion works will be carried out in this stage.

Considering the dispersion tables of the dust emission that will be generated during excavation of the topsoil (under uncontrolled conditions) to be carried out on the in-site roads to be opened within the project area, it can be observed from the values measured at a distance of 500 meters that the suspended particulate matters are observed at the maximum level of 4,21 $\mu\text{g}/\text{m}^3$ and the settleable dust emissions are observed at the maximum level of 24,23 $\text{mg}/\text{m}^2\text{-day}$. It can be seen that the values estimated as such are quite below the LTLV and STLV limit values specified in the SKHKY Regulation. Therefore, the dust emissions that will be generated during excavation of the vegetative soil on the in-site roads to be opened within the project site will not lead to any negative impacts on Yayla Houses, the nearest settlement area to the project site which is located at a distance of nearly 550 meters.

It is observed that the total emission flow that will be generated due to the works to be carried out during the construction of the turbines is 0,93 kg/hour under uncontrolled conditions and 0,46 kg/hour under controlled conditions. These values found as such are below the limit of **1 kg/hour** as specified in the "Regulation on the Control of Air Pollution originating from Industrial Facilities" published in the official gazette no. 27277 dated 03rd.07.2009. Therefore, there was no need to perform the dust dispersion modelling as required by the regulation.

Considering the dispersion tables of the dust emission that will be generated during construction of the switchyard transformer substation and administrative building in the project area (under uncontrolled conditions), it can be observed from the values measured at a distance of 500 meters that the airborne particles are observed at maximum level of $2,74 \mu\text{g}/\text{m}^3$ and the settleable dust emissions are observed at the maximum level of $15,76 \text{ mg}/\text{m}^2\cdot\text{day}$. It can be seen that the values estimated as such are quite below the LTLV and STLV limit values specified in the SKHKKY Regulation. Therefore, the dust emissions that will be generated during construction of the switching transformer substation and administrative building to be carried out in the project site will not lead to any negative impacts on Yayla Houses, the nearest settlement area to the project site which is located at a distance of nearly 550 meters.

Considering the dispersion tables of the dust emission that will be generated during construction of the switchyard transformer substation and administrative building in the project area (under controlled conditions), it can be observed from the values measured at a distance of 500 meters that the **suspended particulate matter** are observed at maximum level of $1,83 \mu\text{g}/\text{m}^3$ and the settleable dust emissions are observed at the maximum level of $10,56 \text{ mg}/\text{m}^2\cdot\text{day}$. It can be seen that the values estimated as such are quite below the LTLV and STLV limit values specified in the SKHKKY Regulation. Therefore, the dust emissions that will be generated during construction of the switchyard transformer substation and administrative building to be carried out in the project site will not lead to any negative impacts on Yayla Houses, the nearest settlement area to the project site which is located at a distance of nearly 550 meters.

The provisions of the “Air Quality Assessment and Management Regulation” enforced upon its publication in the Official Gazette no. 26898 dated 06th.06.2008 and the “Regulation on the Control of Air Pollution originating from Industrial Facilities” published in the official gazette no. 27277 dated 03rd/07/2006 shall apply during the project.

III.5. Noise Pollution

The noise level that can be generated during the construction works to be carried out in the project site should not exceed 70 dBA. The noise level expected to occur at Yayla Houses, the nearest settlement to the project area which is located at a distance of 550 meters will be around 54 dBA. This value is quite below the Environmental noise limit values for the Industrial Facilities as specified in the “Regulation on Environmental Noise Assessment and Management”. Therefore, there will be no negative impact likely to be caused by the noise that can be generated during the operation stage of the project. In addition, this impact is a temporary impact that will be generated only during the construction stage of the Wind Energy Power Plant; and it will be eliminated during the operation stage.

The noise level originating during the operation stage should not exceed 65 dBA, the Ldaytime limit value for the areas with high concentration of housing among the areas with

commercial buildings and noise-sensitive uses. Based on the estimations and modelling of the noise level that will be generated during the operation stage of the project, the noise level expected to occur at Yayla Houses, the nearest settlement area to the power plant which is located at a distance of nearly 550 meters will be around 14 dBA. This value is quite below the Environmental noise limit values for the Industrial Facilities as specified in the “Regulation on Environmental Noise Assessment and Management”. Therefore, there will be no negative impact likely to be caused by the noise that can be generated during the operation stage of the project.

IV. Ecological and Other Impacts

The construction and operation of wind power leads to discussions about the visual effects and its impacts on local wildlife generally in open rural regions.

IV.1. Visual effect:

The wind turbines are high structures and they can be easily noticed from relatively wide areas. Although some people express their concerns about the impacts of the wind turbines on panorama, some others find them stylish and elegant and consider as a symbol of a less polluted future.

Shadow flicker and glare are the other impacts caused by the visual effect. The rotating blades of the wind turbines may lead to shadow movement and shadow flicker during sunrise and sunset.

Similarly, the sunlight coming onto the varnished blades may be reflected to the environment creating the glare effect. These problems may be minimized through painting the blades and the turbine with light matte grey colour suitable for the colour conditions at any time of the day. As another measure that can be applied to prevent visual pollution, the tubular towers should be used instead of pylon-type lattice towers. The said visual effect of the wind turbines requires sacrificing from the aesthetic pleasure considering the clean, environmentally-friendly and cost-effective energy generation.

IV.2. Ecological Impacts

Another environmental effect of the use of Wind Energy can be considered as the death of birds as a result of collision with turbine blades. The issues such as the loss of habitat, destruction of the breeding areas or deaths or injuries as a result of the rotation of the turbine blades, etc. may occur due to the wind energy development. Nevertheless, the studies carried out in Europe and the United States have concluded that the average number of collisions was not more than two birds per year per turbine. These figures cannot be compared with millions killed with pesticides and the vehicles on traffic.

In order to prevent the death of birds as a result of collision with blades, the companies producing wind turbines changed their rotor designs, made them visible by the birds or increased the rotor length and decreased the speed of rotation. Today, thanks to this simple measure, the waste of birds is substantially prevented.

The energy generation method will, of course, have less or more impacts. When compared to the other methods, the most harmless energy type is the wind energy with a substantial advantage.

The bird migration routes coming from the North extend toward the south along Göksu River in the region. Göksu river is located at a distance of nearly 7.500 m from the project site. The Migratory Birds fly at a height of 1000-2000 m during migration; and it is impossible for these migrating birds to bump into the turbines of nearly 100 m in height. Their flying height is decreased when they pause for feeding/resting purposes in the wetland areas during migration.

The birds frequently collide with the high voltage lines, poles and windows of the buildings. They are killed by the vehicles in traffic. The birds are rarely damaged by the wind turbines. It is determined that for a 2MW turbine with a diameter of 60 m, the birds have changed their daytime and night flight routes through passing from a safe distance of 100-200 m away from the turbine. Actually, the researches conducted have shown that the high voltage lines are more dangerous for the birds than the place of wind energy power plant. Some bird species can get used to the wind turbines much quicker than the other species.

IV.3. Electromagnetic Interference Effect

Electromagnetic interference is another issue. In the researches conducted, it has been shown that the electromagnetic interference negatively affected the TV and radio broadcasts and the aviation and maritime communications.

The reason of interference is the fact that the blades and the body of the wind turbine acts like a mirror. The signals received from the receiver are reflected and the signals reflected may affect the direct signals sent to the receiver. The worst conditions occur at high frequencies. It is originated by a wind turbine with large metal blades distributing the weak signals between a low-quality receiver and transceiver. The electromagnetic interference effect can be eliminated by not positioning the wind turbines on microwave routes and by using local amplifiers or cable connections. The electromagnetic interference effect of the wind turbines may also vary in relation to the blade size and material. In the turbines in which metallic materials are used, there is a high rate of noise and electromagnetic interference. This problem can be resolved by production of the blades of the wind turbines from wooden, fibreglass or composite-based materials.

There are not transmitters like large radars, etc. that can cause electromagnetic interference around the project site; and the required measures shall be taken in case of any potential interference.

2. PROJECT LOCATION

The following issues should be taken into consideration in assessment of the sensitivity of the area likely to be affected by the project.

a) Current land use and quality (agricultural area, forest area, planned area, water surface, etc.)

I. Geographical Position and Project Location

Dağpazari Wind Energy Power Plant is located at nearly 105 km West northwest of Mersin Province and at nearly 11 km north of Mut District.

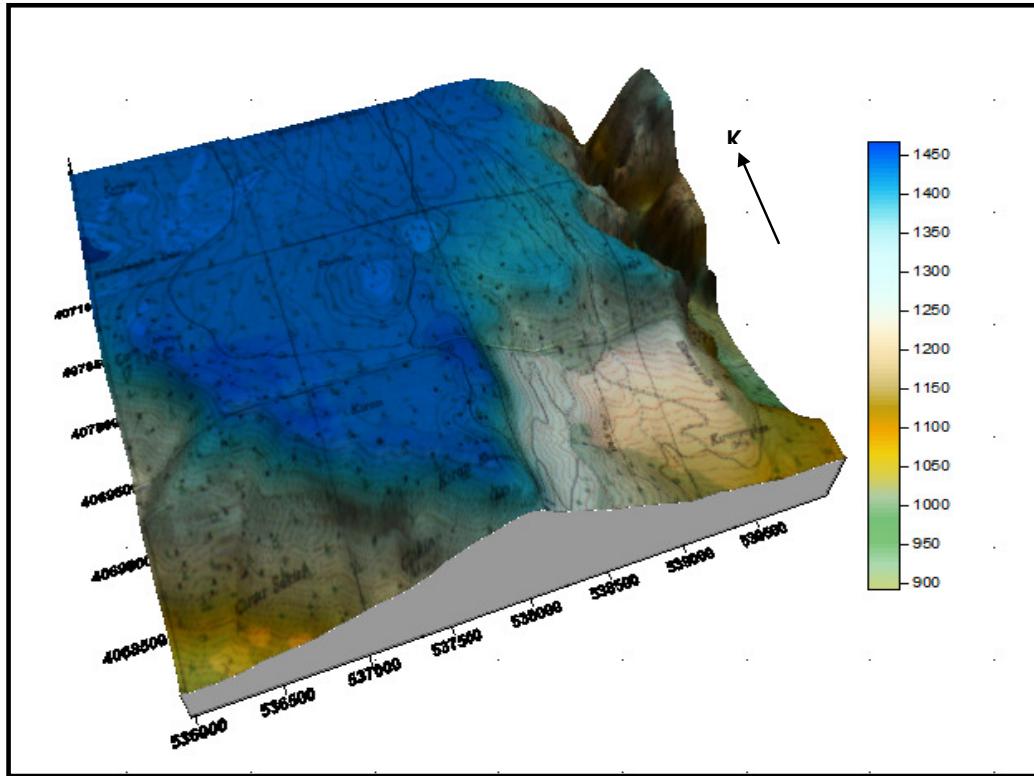


Figure 4. Three-Dimensional Topographic Image of the Project Site

The area for settlement of each turbine within the project site is $10 \times 10 = 100 \text{ m}^2$; and the total land use is $19 \times 100 = 1.900 \text{ m}^2$. A measurement station was positioned in the site for wind measurements within the scope of the project and long-period wind measurements are being recorded. 1/25.000-Scaled Topographic Map showing the positioning of the turbines is given in **Annex:2**. The locations of the turbines may shift to the left or right to some extent as a result of the detailed wind measurements and the geological surveys to be performed;

therefore, the environmental impacts of the project were assessed within the context also including the periphery of the turbines.

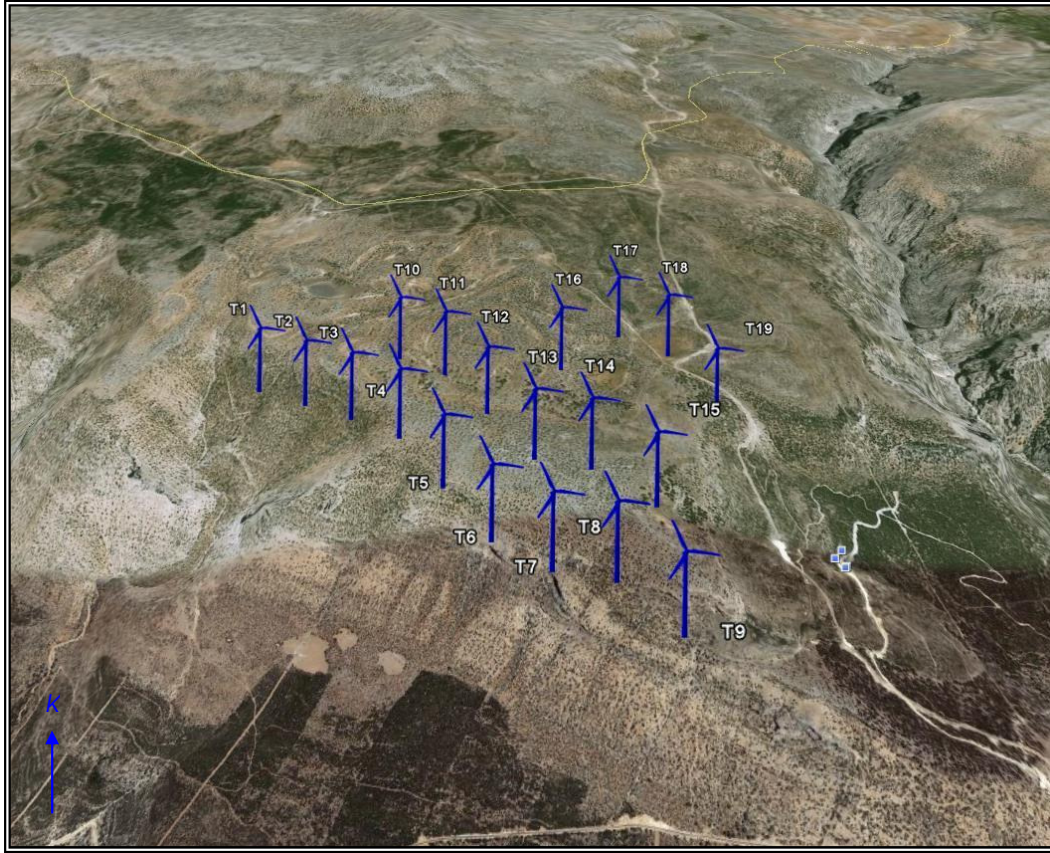


Figure 5. Representative Turbine Locations shown on the Satellite Image of the Project Site

In determining of the distances between the turbines and positioning of the turbines, the positions of the turbines are determined through calculation of the production values found as a result of the engineering studies taking into account the values determined as a result of the long-term wind velocity measurements made by EnerjiSA. It is quite important that there should be no wind turbulence effect likely to result from roughness of the land or likely to affect negatively the operation of the other turbines when the turbine is put into operation.

Within this context, the distances between the turbines are determined as a result of a fully complicated engineering study taking into consideration the production values, the blade diameter, and the tower height of each turbine and the related turbulence effects.

The area where the turbines will be positioned are the forest lands. (See Annex 4) There are agricultural activities carried out in the open fields within the forest in the project site.

There may be shifts in the turbine locations within the Project Site as will be determined as a result of the ongoing detailed measurement and engineering studies within the scope of the project. In such cases, the related applications shall be submitted to the related authorities and institutions for receiving the required permits for the areas in which the turbines will be positioned.

Mut District where the project will be established is surrounded by Silifke at the east, Ermenek at the west, Gülnar at the south and Karaman Province at the north. Mut is located at the northwest of the city at a distance of 165 km to Mersin and situated over Mersin-Konya highway connecting the Central Anatolia to the Mediterranean Region. The surface area of Mut is 2554 square kilometres. Its elevation from the sea is 300 m. The western section of the fields of the district with an elevation from sea level varying between 200-2000 m are disintegrated by the rivers and creeks that constitute the branches of Göksu River. In addition to these rough topographical characteristics, the Central Taurides forming the Karaman boundary at the north of the district rise up. At this point, there is Sartavul (Sertavul) pass providing passage to the Central Anatolia with an elevation from sea level of 1610 m. The mountains connected to the Central Taurides at the north of the district are rough structures.

The city resembles to the middle of a dish located between the mountains rising up to the heights of 700-800 m toward the south and 1500-2000 m toward the north and west. The main heights include the following; Yerlikaya, Mahvaç (1390), Yaylacık, Kızıldağ (2260), Akoluk, Avlağıdağı (1889), Karga and Adras, (1421) Kestel (1813) and the more steep and rough Meleşiren mountain located in its south and shown on the maps as named Sivridağ (1665), Kozlar located at its east surrounded by Karıcıklar mountain pass and covered by wide pine, turpentine and fir forests in the north, mostly juniper areas in the south, displaying good grassing with summer ranges and including the tableland of Mut district located on its skirts (1450), Large Eğre Mountain displaying occasional rigid shapes (2025), and the Small Eğre Mountain at the same situation located on its east and away from Gez Mountain Pass (1926). The valleys between these wide ridges extending from the Taurides toward Göksu and the neighbouring skirts are interesting in respect of both agriculture and settlement. There are two valleys occupied by population groups here. Dağpazarı village is located upstream of Piring streak. They unite before entering into the very steep Kestel canyon at this point which is not yet very rough with occasional flat bases constituting a collector for waters. Each of them has been named by a village through which they pass: The main ones are called as Kavaközü, Navdalıözü, İmrenözü, Çiviözü. They are high and located at a height of nearly 1250 and 1500 meters. The other group constitutes a kind of collection basin at the starting point of Kurt Stream at the east of Mut. These are called as Sarkavak village or merely as Dere (Creek) villages. This section is rougher and less high compared to Dağpazarı villages (1000-1250). The rough parts are occasionally covered with forest lands.

The population of the district is 74.373 in total according to the results of the general census for 2000. Of this population, 36.482 people live in the center of the district while 37.891 people live in villages.

II. Land Use Capability

In respect of settlement, Mut District has mountainous and partially plain areas. Irrigating farming is developed on the sides of Göksu River passing through the district boundaries and the creeks composed of spring waters originating from the Taurides Mountains and on plain areas. Significant part of the lands is composed of barren lands. There are abundant vegetable and fruit types in our district due to the Mediterranean and continental climate prevailing in the district.

Distribution by land use;

There are 51,135 Ha. of agricultural lands, 2,500 Ha. of grass and grazing crops, 55,025 Ha. of non-agricultural lands, and 164,000 decares of irrigated lands; and of this, 41,450 decares are composed of the land areas irrigated by own means of the citizens while the rest of them are irrigated by the rivers. The distribution by the purpose of use is as follows; 37,500, Ha. 2,590 Ha. of vegetable, 8,555 Ha of fruit and 2,940 Ha. of vineyards.

The fruits produced can be listed by their order of abundance as Apricot, Plum, Apple, Fig, Olive, Pomegranate, Grapes, Peach, Cherry and Japanese Plum.

The vegetables cultivated can be listed by their abundance as Tomato, Pepper, Eggplant, Cucumber, Leek, Spinach, Lettuce, Cabbage, Potato, Beans, Lady's-Finger, Onion, and Garlic.

The Cereals and oil seeds that are cultivated can be listed as Wheat, Barley, Chickpea, Peanut, Sesame, and Lentil. ^[Source:28]

b) Considering the List of Environmentally Sensitive Areas given in Annex-V; the wetlands, coastal sections, mountainous and forest lands, agricultural lands, national parks, special protection areas, densely populated areas, historical, cultural, archaeological sites and any similar areas of importance, erosion areas, landslide areas, wooded areas, potential erosion and plantation areas and the aquifers required to be protected as per the Law No. 167 on Groundwater Resources dated 16th/12/1960

The Taurides Coniferous Mountain Forest, Juniper Forest behind the Taurides and the Mediterranean Calabrian Pine vegetations are observed in the region covering the Project Site. Plantation works were performed on Juniper Bushes and Shrubs displaying degraded distribution that are found widespread in the region; and the Black Pine, Calabrian Pine and Cedar trees were planted in such plantation works.

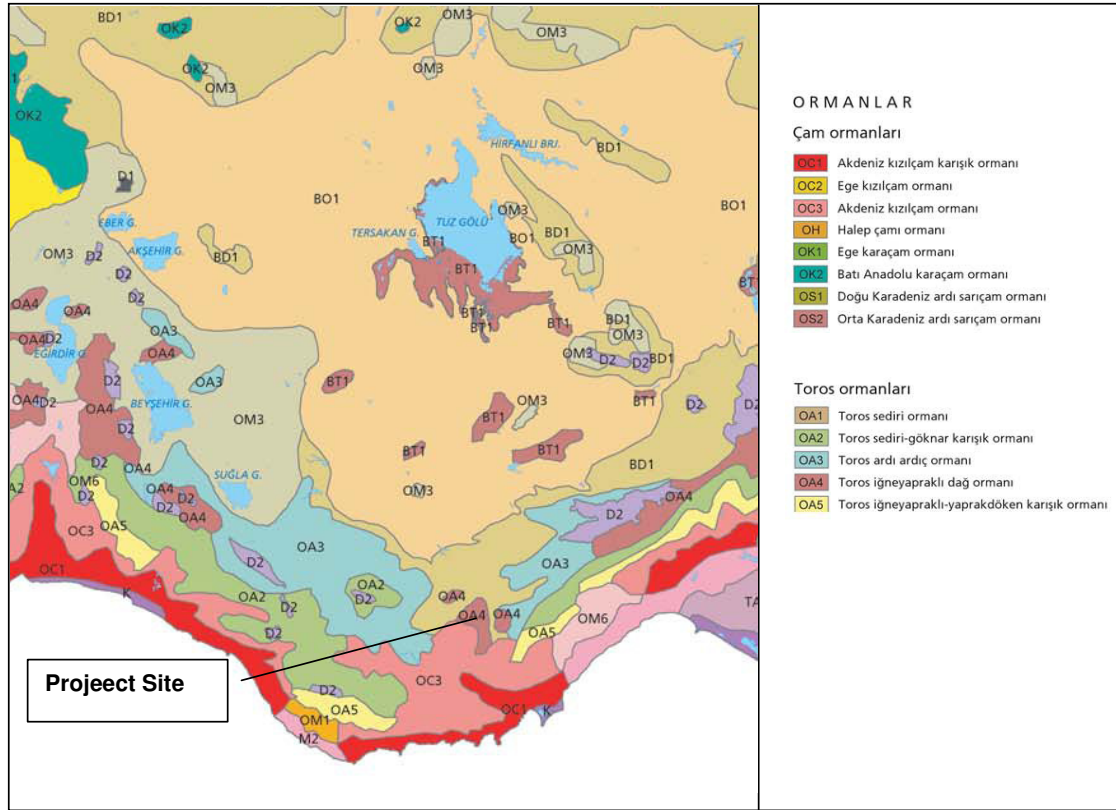


Figure 6. Dominant Vegetation Structure in the Region

The Project Site is considered within the Mediterranean Phytogeographical Region; and it is located in the square C5 according to Davis' Grid System. (See Figure 7.)

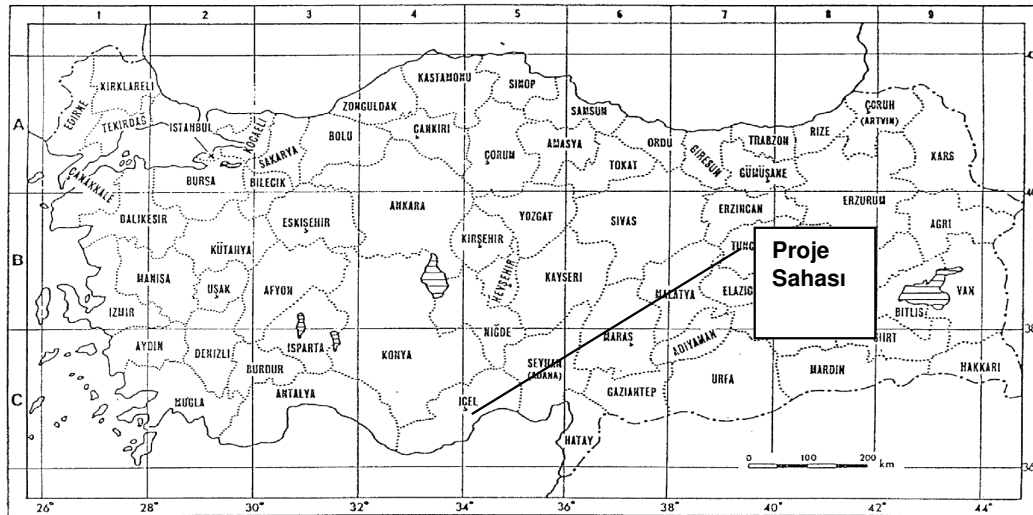


Figure 7. Davis' Grid System

The forest stand types of the turbine locations are as follows; mostly Bar (degraded Juniper), SÇka (Cedar and Black Pine plantation), Çza (Calabrian Pine plantation), OT (non-wood wasteland), and Çk (black pine).

The floristic list was created as a result of the assessment of the plants collected during determination of the flora of the project site and screening of TÜBİTAK's TUBİVES Database (Turkish Plants Database).

Table 34. Flora in the Work Area and its Impact Zone

SPECIES	HABITAT	END.	PHYTOGEOGRAPHICAL REGION
ASPLENIACEAE			
<i>Asplenium reuteri</i> Milde	Between Rocks	-	E. Mediterranean
PINACEAE			
<i>Pinus nigra</i> Arn. ssp. <i>pallasiana</i> (Lamb.) Holmboe	Forest	-	?
<i>Pinus brutia</i> Ten.	Plantation	-	E. Mediterranean
<i>Cedrus libani</i> A. Rich	Plantation	-	Mediterranean (Mountain)
TAXACEAE			
<i>Taxus baccata</i> L.	Slope	-	?
CUPRESSACEAE			
<i>Cupressus sempervirens</i> L.	Slope, Limestone Reef	-	Mediterranean
<i>Juniperus drupacea</i> Lab.	Slope, Bushes, Reefs, Forest	-	?
<i>Juniperus oxycedrus</i> L. ssp. <i>oxycedrus</i>	Pinewood, Oak Bushes, Maquis	-	?
RANUNCULACEAE			
<i>Eranthis hyemalis</i> (L.) Salisb.	Open (Bare) Area	-	?
<i>Delphinium peregrinum</i> L.	Calcareous Slope, Cultivated Land, Vineyard	-	?
<i>Anemone blanda</i> Schott et Kotschy	Rocky Slope, Bushes	-	?
<i>Thalictrum orientale</i> Boiss.	Rocky Slope, Cracks	-	E. Mediterranean
PAPAVERACEAE			
<i>Glaucium corniculatum</i> (L.) Rud. ssp. <i>corniculatum</i>	Hill Slope	-	?
<i>Papaver persicum</i> Lindl. ssp. <i>persicum</i>	Debris, Rocky Slope	-	?
<i>Fumaria cilicica</i> Hausskn.	Empty Area, Roadside	-	?
BRASSICACEAE			
<i>Sinapis arvensis</i> L.	Roadside, Empty Area	-	?
<i>Iberis taurica</i> Dc.	Rocky Slope, Debris	-	?

<i>Fibigia eriocarpa</i> (Dc.) Boiss.	Slope, Bushes, Forest	-	?
<i>Alyssum strigosum</i> Banks et Sol. ssp. <i>strigosum</i> *	Degraded Area	-	?
<i>Alyssum strigosum</i> Banks et Sol. ssp. <i>cedrorum</i> (Schott et Kotschy) Dudley	Rocky Area	-	?
<i>Alyssum repens</i> Baumg. ssp. <i>trichostachyum</i> (Rupr.) Hayek var. <i>trichostachyum</i> (Rupr.) Hayek	Bushes, Slope, Forest	-	?
<i>Alyssum mouradicum</i> Boiss. et Bal.	Rocky Slope, Open Forest	-	?
<i>Arabis caucasica</i> Willd. ssp. <i>brevifolia</i> (Dc.) Cullen	Reef, Debris	-	E. Mediterranean (Mountain)
<i>Arabis nova</i> Vill.	Stony Area	-	?
<i>Malcolmia chia</i> (L.) Dc.	Rocky Slope, away from the Sea	-	E. Mediterranean
<i>Erysimum repandum</i> L.	Slope, Empty Area	-	?
CISTACEAE			
<i>Helianthemum nummularium</i> (L.) Miller ssp. <i>tomentosum</i> (Scop.) Schinz et Thellung	Slope, Meadow, Rocky Area	-	?
VIOLACEAE			
<i>Viola modesta</i> Fenzl.	Stony Area, Slope	-	?
<i>Viola heldreichiana</i> Boiss.	Rock Cracks, Debris, Slope	-	E. Mediterranean
POLYGALACEAE			
<i>Polygala anatolica</i> Boiss. et Heldr.	Slope	-	?
CARYOPHYLLACEAE			
<i>Minuartia juniperina</i> (L.) Marie et Petitm.	Rocky Areas	-	?
<i>Minuartia multinervis</i> (Boiss) Bornm.	Coppice Forests and Open Grounds	-	?
<i>Telephium imperati</i> L. ssp. <i>orientale</i> (Boiss.) Nyman	Dry Stony Slopes, Rocky Water Springs, Pinewoods, Oak Bushes	-	?
<i>Velezia rigida</i> L.	Stony Areas, Open Fields	-	?
<i>Silene italica</i> (L.) Pers.	Open Fields, mostly <i>Pinus Nigra</i> Open Fields	-	?
<i>Silene macrodanta</i> Boiss.	Open Fields	-	?
ILLECEBRACEAE			
<i>Herniaria incana</i> Lam.	Dry and Stony Areas	-	?
POLYGONACEAE			
<i>Rumex tuberosus</i> L. ssp. <i>tuberosus</i> *	Hillsides, Fields, Forests	-	?
GUTTIFERAE			

Hypericum lydium Boiss.	Rocky Slopes and Pinus Coppice Forests	-	?
MALVACEAE			
Althaea hirsuta L.	Open Fields	-	?
GERANIACEAE			
Geranium macrostylum Boiss.	Oak, Juniper and Cedar Forests, Mountain Slopes	-	E. Mediterranean
Geranium asphodeloides Burm. Fil. ssp. asphodeloides *	Forests, Bushes	-	Euro-Siberian
FABACEAE			
Genista albida Willd.	Rocky, Generally Calcareous Slopes, Pinus brutia greenwoods	-	?
Astragalus suberosus Banks et Sol. ssp. suberosus *	Coppice forests, Fields, Slopes	-	?
Cicer pinnatifidum Jaub. et Spach	Pinus brutia Forest, Volcanic or limestone Reefs, Active Reefs	-	?
Vicia villosa Roth ssp. eriocarpa (Hausskn.) P. W. Ball	Pinewood	-	?
Lathyrus laxiflorus (Desf.) O. Kuntze ssp. laxiflorus	Forest, Bushes, Shady Coasts	-	?
Lathyrus cassius Boiss.	Pinus brutia greenwoods	-	E. Mediterranean
Ononis pubescens L.	Pine coppice forests	-	Mediterranean
Trifolium caucasicum Tausch	Grassy Areas and Shady Areas on the Mountains	-	?
Trifolium leucanthum Bieb.	Grassy Areas, Mountainous Slopes, Open Forest Fields	-	?
Trigonella brachycarpa (Fisch.) Morris	Pine Coppice Forests	-	Iran-Turan
Medicago rigidula (L.) All. var. rigidula *	Pine Coppice Forests	-	?
Dorycnium pentaphyllum Scop. ssp. anatolicum (Boiss.) Gams	Pinus brutia, Pinus Nigra Forest	-	?
Onobrychis oxyodonta Boiss.	Roadsides, Cedrus-Pinus Coppice Forests	-	?
ROSACEAE			
Prunus x domestica L.	Hills, Mountain Slopes, Roadsides	-	?
Cerasus prostrata (Lab.) Ser. var. prostrata *	Rocky Areas	-	Mediterranean
Rubus canescens Dc. var. canescens *	Loose Forests, Bushes	-	Euro-Siberian

<i>Potentilla micrantha</i> Ramond ex Dc.	Forests	-	?
<i>Orthurus heterocarpus</i> (Boiss) Juz.	Shady Limestone Rocky Forests, Sub-Juniperus	-	?
<i>Crataegus orientalis</i> Pallas ex Bieb. var. <i>orientalis</i> *	Rocky Areas, Forests	-	?
<i>Crataegus monogyna</i> Jacq. ssp. <i>monogyna</i> *	Hillsides, Roadsides	-	?
<i>Sorbus persica</i> Hedl.	Juniperus Forest, Rocky Open Slopes, Bushes, Forests, Individual	-	Iran-Turan
APIACEAE			
<i>Scandix iberica</i> Bieb.	Juniper Bushes	-	?
<i>Scandix pecten-veneris</i> L.	Pinus Plantations	-	?
<i>Ferula elaeochytris</i> Korovin	Rocky Slopes	-	E. Mediterranean
ASTERACEAE			
<i>Inula oculus-christi</i> L.	Slope, Forest Open Fields	-	Euro-Siberian
<i>Filago eriocephala</i> Guss.	Forest Open Fields, Roadsides	-	E. Mediterranean
<i>Senecio vernalis</i> Waldst. et Kit.	Empty Areas, Slope	-	?
<i>Anthemis cretica</i> L. ssp. <i>cassia</i> (Boiss.) Grierson	Limestone Spring Areas, between Juniperus or Cedrus	-	?
<i>Achillea falcata</i> L.	Rocky Slope, Pinus Forest	-	Iran-Turan
<i>Tanacetum cadmeum</i> (Boiss) Heywood ssp. <i>cadmeum</i>	Juniperus-Cedrus Forest, Grassland Calcareous Slope, Field Sides	LR(lc)	?
<i>Serratula cerinthifolia</i> (Sm.) Boiss.	Pinus brutia Forest, Bushes	-	?
<i>Centaurea triumphettii</i> All.	Pinus Forest	-	?
<i>Crupina crupinastrum</i> (Moris) Vis.	Pinus brutia Forest Open Fields	-	?
<i>Xeranthemum inapertum</i> (L.) Miller	Pinus Forest Open Fields	-	?
<i>Lapsana communis</i> L. ssp. <i>pisidica</i> (Boiss. et Heldr.) Rech. Fil.	Forest Open Fields	-	?
<i>Lapsana communis</i> L. ssp. <i>intermedia</i> (Bieb.) Hayek	Pinus Forest Open Fields	-	?
<i>Crepis reuterana</i> Boiss. ssp. <i>reuterana</i> *	Quercus Forest, Pinus Forest, Slope	-	E. Mediterranean
CAMPANULACEAE			
<i>Campanula rapunculus</i> L. var. <i>rapunculus</i> *	Forests, Bushes	-	?
<i>Asyneuma rigidum</i> (Willd.) Grossh. ssp. <i>rigidum</i> *	Forests	-	Iran-Turan

OLEACEAE			
Phillyrea latifolia L.	Pinus brutia Forest	-	Mediterranean
BORAGINACEAE			
Rochelia disperma (L. Fil.) C. Koch var. disperma *	Juniperus Bushes	-	?
Cynoglossum montanum L.	Juniperus Bushes	-	Euro-Siberian
Onosma tauricum Pallas ex Willd. var. tauricum *	Limestone Active Reefs, Pinus and Cedrus Forests	-	?
SCROPHULARIACEAE			
Scrophularia catariifolia Boiss. et Heldr.	Pinus Nigra greenwoods	-	Iran-Turan
Scrophularia libanotica Boiss. ssp. libanotica * var. libanotica *	Rocky Slopes and Riffs	-	E. Mediterranean
Linaria simplex (Willd.) Dc.	Stony Areas, Fallow Fields	-	Mediterranean
Veronica triphylos L.	Pinus forests	-	?
LAMIACEAE			
Ajuga orientalis L.	Bushes	-	0
Ajuga chamaepitys (L.) Schreber ssp. chia (Schreber) Arcangeli var. chia *	Stony Slopes	-	0
Scutellaria diffusa Benth	Pinus Forests	-	E. Mediterranean
Phlomis samia L.	Pinus and Cedar greenwoods	-	E. Mediterranean
Phlomis pungens Willd. var. pungens *	Roadsides, Dry Stony Slopes, Pinus greenwoods	-	?
Phlomis monocephala P. H. Davis	Cedar, Rocky Calcareous Woods	LR(lc)	E. Mediterranean
Sideritis montana L. ssp. remota (D'urv.) P. W. Ball ex Heywood	Pinus greenwoods	-	Mediterranean
Stachys woronowii (Schischkin ex Grossh.) R. Mill	Juniperus Bushes	-	Iran-Turan
Calamintha nepeta (L.) Savi ssp. nepeta *	Open Regions	-	Mediterranean
Thymus cilicicus Boiss. et Bal.	Open Rocky and Gravelly Areas	-	E. Mediterranean
Salvia frigida Boiss.	Pinus Nigra, Juniperus	-	Iran-Turan
EUPHORBIACEAE			
Euphorbia kotschyana Fenzl	Cedrus Or Juniperus Excelsa Forest Open Fields	-	E. Mediterranean (Mountain)
RUBIACEAE			
Sherardia arvensis L.	Forest Open Fields	-	Mediterranean
Asperula stricta Boiss. ssp. stricta *	Slopes	-	E. Mediterranean
Galium verum L. ssp. glabrescens Ehrend.	Rocky Slopes, Bushes, Cultivated Fields	-	Iran-Turan
ARACEAE			
Arum detuncatum C. A. Meyer virescens (Stapf) K. Alpinar et R. Mill	Juniperus Bushes	-	Iran-Turan

LILIACEAE			
Asparagus acutifolius L.	Pine Coppice Forests, Degraded Fields, Roadsides	-	Mediterranean
Allium cupani Rafin. ssp. hirtovaginatum (Kunth) Stearn	Pinus Nigra Forests	-	Mediterranean
Allium flavum L. ssp. tauricum (Besser ex Reichb.) Stearn tauricum *	Pinus brutia, Juniperus, Cedrus greenwoods	-	Mediterranean
Muscari tenuiflorum Tausch	Pinus Nigra and P.Brutia Forests, Juniper Bushes	-	?
IRIDACEAE			
Crocus biflorus Miller ssp. tauri (Maw) Mathew	Rocky Slopes, Bushes, Dispersed Coniferous Coppice Forests	-	Iran-Turan
CYPERACEAE			
Carex otrubae Podp.	within the Forest	-	Euro-Siberian
Carex divulsa Stokes ssp. divulsa *	Forests, Shady and Open Fields	-	Euro-Siberian
POACEAE			
Brachypodium pinnatum (L.) P. Beauv.	Non-Shady Habitats	-	Euro-Siberian
Elymus hispidus (Opiz) Melderis ssp. barbulatus (Schur) Melderis	Black Pine Forest	-	?
Milium pedicellare (Bornm.) Roshev. ex Melderis Apud Rech. Fil.	Mountain Slopes, with Juniperus	-	Iran-Turan
Stipa bromoides (L.) Dörfler	Bush Open Fields, Stony Areas, on Limestone	-	Mediterranean

HABITAT CLASSIFICATION:

The habitats of the species were specified within the list of plants. The vegetation type that is mostly observed in the region is the Degraded Forest Vegetation.

ENDEMISM:

Turkey is very rich in respect of endemic plants due to the fact that it is a country located in the intercontinental transition zone. 2382 endemic species in total identified in our country account for nearly 30% of the total plant species. Endemism is classified according to the hazard categories in the tables giving the floristic list.

Endemics by the hazard categories were determined and assessed in accordance with the work of art titled as "Türkiye'nin Tehlike Altındaki Nadir ve Endemik Bitkileri" (List of Rare, Threatened and Endemic Plants of Turkey) authored by Ekim et al. and prepared jointly by Turkish Association for Conservation of Nature and Van Yüzüncü Yıl University and according to "Flora of Turkey 1-10". The risk categories of endemic taxa are given below:

EX (Extinct)	A taxon is categorized as EX when there is no reasonable doubt that the last individual has died.
EW (Extinct in the Wild)	A taxon is categorized in this group when exhaustive surveys conducted in known habitat and at different times throughout the year have failed to record an individual and when it is known only to survive in cultivation, in captivity or as a naturalized population well outside the past range.
CR (Critically Endangered)	A taxon is categorized in this group when the best available evidence indicates that it is facing an extremely high risk of extinction in the wild.
EN (Endangered)	A taxon is categorized in the group EN only when it is considered to be facing a very high risk of extinction in the near future, but not classified within the CR group.
VU (Vulnerable)	The taxa are categorized in this group when they are not classified in CR and EN groups, but considered to be facing a medium-term high risk of extinction in the wild.
LR (Lower Risk)	The plants are categorized in these groups when they cannot be classified in any of the groups listed above and when they have better populations. There are 3 Subcategories.
LR-cd (Conservation dependent)	The taxa that can qualify for one of the categories above within a period of 5 years.
LR-nt (Near Threatened)	The candidates not categorized in the previous group, but are close to qualifying for the category VU.
LR- lc (Least Concern)	Those not that are threatened and not requiring any conservation.
DD (Data Deficient)	The taxon is classified in this group when there is inadequate information about its distribution and population status.
NE (Not Evaluated)	Those that cannot be evaluated in any of the groups above.

Accordingly, during the investigations conducted in the work site, 2 units of endemic species categorized as LR(lc) were identified; i.e. *Tanacetum cadmeum* (Boiss) Heywood ssp. *cadmeum* and *Phlomis monocephala* P. H. Davis. These endemics are in the least concern taxa group, and considered among the endemics that are not threatened and not requiring any conservation.

FAUNA

The determination of the wild animal species in and around the work site was assessed on a comprehensive basis and the fauna lists were created through evaluation of the potential species likely to exist in the region in the lighting of the literature studies and the information received from the local people.

Table 35. Amphibians in the Work Area and its Impact Zone (Amphibia)

LATIN NAME	TURKISH NAME	HABITAT	END.	RED DAT.	BERN CON.	IUCN	CITES		
							List I	List II	List III
UFONIDAE									
Bufo viridis	Gece kurbaçası	Under the stones in the open fields	-	nt	II	-	-	-	-
HYLIDAE									
Hyla savignyi	Yeşil kurbağa	On the trees and woody plants and in still waters	-	nt	III	-	-	-	-

Table 36. Reptiles in the Work Area and its Impact Zone (Reptilia)

LATIN NAME	TURKISH NAME	HABITAT	END.	RED DAT.	MAK	BERN CON.	IUCN	CITES		
								List I	List II	List III
AGAMIDAE										
Agama stellio	Dikenli keler	Reefs, stony areas and stone walls	-	nt	1	II	-	-	-	-
LACERTIDAE										
Lacerta danfordi	Toros kertenkelesi	Creek banks, forest and bushes, reefs and stony areas	E.	nt	1	III	-	-	-	-
Lacerta laevis	Hatay kertenkelesi	Loose or dense grassy stony areas and reefs	-	nt	1	III	-	-	-	-
SCINCIDAE										
Ablepharus kitaibeli	İnce kertenkele	short planted open fields, loose greenwoods	-	nt	1	II	-	-	-	-
Mabuya aurata	Tıkız kertenkele	stony parts of open fields with little plants	-	nt	1	III	-	-	-	-
Mabuya vittata	Şeritli kertenkele	Bushes and stony areas in open and forest lands	-	nt	1	III	-	-	-	-
AMPHISBAENIDAE										
Blanus strauchi	Kör kertenkele	Stony parts in forest and open fields	-	nt	1	III	-	-	-	-
COLUBRIDAE										
Coluber najadum	İnce yılan	Stony areas, bushes, dry places	-	nt	1	II	-	-	-	-
Eirenis aurolineatus	-	Loose greenwoods and stony parts	-	-	1	III	-	-	-	-
Elaphe quatuorlineata	Sarı yılan	Loose forest and bushes, stony parts, between the gardens	-	nt	1	II	-	-	-	-

Table 37. Birds in the Work Area and its Impact Zone (Aves)

LATIN NAME	TURKISH NAME	ENGLISH NAME	HABITAT	END.	RED DATA	MAK	BERN CON.	IUCN	STATUS	CITES		
										List I	List II	List III
ACCIPITRIDAE												
Accipiter gentilis	Çakırkuşu	Goshawk	Deciduous and coniferous forests	-	A.3	1	II	-	Y,KZ	-	-	-
Accipiter nisus	Atmaca	Sparrowhawk	Loose greenwoods, agricultural lands with trees	-	A.4	1	II	-	Y,KZ	-	-	-
FALCONIDAE												
Falco tinnunculus	Kerkenez	Kestrel	Reefs, buildings	-	A.4	1	II	-	Y	-	B	-
COLUMBIDAE												
Columba palumbus	Tahtalı	Woodpigeon	Forests	-	A.4	3	-	-	Y	-	-	-
CUCULIDAE												
Cuculus canorus	Guguk	Cuckoo	Forests, open fields with trees and fences	-	-	1	III	-	G	-	-	-
STRIGIDAE												
Bubo bubo	Puhu	Eagle Owl	Widespread reefs and rifts, and sometimes in forests	-	A.1.2	1	II	-	Y	-	B	-
PICIDAE												
Picus viridis	Yeşil Ağaçkakan	Green Woodpecker	Pinewoods	-	A.2	1	II	-	Y	-	-	-
Dendrocopos major	Orman Alaca Ağaçkakanı	Great Spotted Woodpecker	Pinewoods	-	A.3	1	II	-	Y	-	-	-
TURDIDAE												
Phoenicurus ochruros	Kara Kızılkuyruk	Black Redstart	High mountains, reefs, rifts, and infrequently in settlement areas	-	-	1	II	-	G	-	-	-
Turdus philomelos	Öter Ardiç	Song Thrush	Forests, large parks	-	-	2	III	-	KZ,Y	-	-	-
Turdus viscivorus	Ökse Ardicı	Mistle Thrush	Pinewoods	-	-	2	III	-	Y	-	-	-
SYLVIDAE												
Regulus regulus	Çalikuşu	Goldcrest	Pine and fir forests	-	-	1	II	-	Y,KZ	-	-	-
AEGITHALIDAE												
Aegithalos caudatus	Uzun Kuyruklu Baştankara	Long-Tailed Tit	Coniferous and deciduous forests, bushes, gardens, etc.	-	A.2	1	III	-	Y	-	-	-

LATIN NAME	TURKISH NAME	ENGLISH NAME	HABITAT	END.	RED DATA	MAK	BERN CON.	IUCN	STATUS	CITES		
										List I	List II	List III
PARIDAE												
Parus ater	Çam Baştankarası	Coal Tit	Pinewoods	-	-	1	II	-	Y	-	-	-
Parus major	Büyük Baştankara	Great Tit	Forests, parks, gardens, bushes, etc.	-	-	1	II	-	Y	-	-	-
SITTIDAE												
Sitta krueperi	Küçük Sıvacıkuşu	Krüper's Nuthatch	Pinewoods	-	-	1	II	-	Y	-	-	-
CORVIDAE												
Garrulus glandarius	Alakarga	Jay	Any kind of forests, large gardens, plantations	-	-	3	-	-	Y	-	-	-
STURNIDAE												
Sturnus vulgaris	Siğircık	Starling	Any kind of greenwoods, parks, gardens, agricultural fields	-	-	2	-	-	Y	-	-	-
FRINGILLIDAE												
Fringilla coelebs	Ispinoz	Chaffinch	Any kind of greenwoods and forests, gardens, parks, etc.	-	-	2	III	-	Y	-	-	-

Table 38. Mammalians in the Work Area and its Impact Zone (Mammalia)

LATIN NAME	TURKISH NAME	HABITAT	END.	RED DAT.	MAK	BERN CON.	IUCN	CITES		
								LIST I	LIST II	LIST III
SORICIDAE										
Crocidura leucodon	Sivri burunlu tarla faresi	Open fields, forest boundaries, bushy areas	-	nt	-	III	-	-	-	-
LEPORIDAE										
Lepus europaeus	Kır tavşanı, Yabani tavşan	Any habitats	-	nt	3	III	-	-	-	-
SPALACIDAE										
Apodemus mystacinus	Kaya faresi	In the forests and on the rocks in the open fields	-	nt	-	-	-	-	-	-
CANIDAE										
Canis lupus	Kurt	Forest, steppes, tablelands	-	R	1	II	-	B	B	-
Canis aureus	Çakal	Dense forest, maquis and brushwood	-	nt	3	-	-	-	-	B
Vulpes vulpes	Tilki	Any habitats	-	nt	3	-	-	-	-	-
MUSTELIDAE										
Mustela nivalis	Gelincik	Various habitats, forest, vineyard, garden, ruins, residential areas	-	nt	2	III	-	-	-	-
SUIDAE										
Sus scrofa	Yaban Domuzu	Forest	-	nt	3	III	-	-	-	-
BOVIDAE										
Capra aegagrus (¥)	Yaban (Dağ) keçisi	Steep reefs above the forest limits	-	nt/E	1-2	II	VU	-	-	-

(¥) The Project Site is located outside the boundaries of the Wildlife Development Area; but located within the boundaries of Special Hunting Zone.

The species forming the fauna of the work site were examined according to IUCN, decision of the Central Hunting Commission for 2009-2010 and the Bern Convention; and for the Birds (=Aves), the RED DATA BOOK categories and the present statuses in Turkey were determined as well.

According to the Central Hunting Season decision for 2009-2010 enforced upon its publication in the official gazette no. 27245 dated 01st.06.2009 as issued by the Ministry of Environment and Forestry, the categories shown in the table below were classified.

1	Wild Animals under Protection by the Ministry of Environment and Forestry
2	Wild Animals under protection by the Central Hunting Commission
3	Wild Animals permitted for Hunting in Specific Periods

The fauna species that are protected by the Bern Convention are grouped under two categories.

II	Strictly protected species
III	Protected species

II- Strictly Protected Species

The following activities are strictly prohibited:

- Any kind of deliberate capturing and keeping and deliberate and illegal methods of killing of such species;
- Deliberately damaging and destruction of the related breeding or sheltering areas;
- Deliberately disturbing the wild fauna especially during their breeding, development and winter sleep seasons in a manner contrary to the intended purpose of this convention;
- Collecting eggs from the wild environment or deliberately destructing such eggs or keeping such eggs even if they are empty;
- Being in possession of or domestic trading of the fauna species either alive or dead.

III- Protected Fauna Species

- Temporary or regional prohibition under appropriate conditions in order to ensure that the related wild fauna reach to the satisfactory population levels. Closed hunting seasons and the other national principles (decisions of the Central Hunting Commission).

The related works and activities will not certainly lead to any negative impacts on the species specified in the fauna lists above and protected duly by the Bern Convention and the other wildlife species such as hunting of such species, deliberate killing or keeping of such species, or damaging or destruction of their eggs, etc. During the related works and activities, the decisions taken by the Ministry of Forestry, Central Hunting Commission for the season 2009-2010 and the decisions of the Central Hunting Commission to be declared in future years and the provisions of the Bern Convention shall be strictly followed.

Some bird species identified in and around the project site based on the book titled "Türkiye'nin Kuşları" (Birds of Turkey) (KİZİROĞLU, 1989), which are under protection by National and International Legislation were classified as follows according to the categories specified in "Red Data Book" (ERZ, 1977; HEINWALD et al., 1981; BAYERISCHE STAATSMINISTERIUM 1982 a and b; GEEP 1984):

A.1	Threatened with extinction
A.2	Severely endangered
A.3	Endangered
A.4	Potentially endangered
B Categories	Temporal-Transit species

According to the same book, the statuses of these bird species in Turkey are classified as follows;

G	Migratory species
Y	Native species
T	Transit migratory species
KZ	Winter visitor species

The fauna species under protection by **IUCN** are classified as follows:

EX (EXTINCT)	The taxon that has become extinct.
CR (CRITICALLY ENDANGERED)	Severely endangered taxon. The population of the species in this category are facing high risk of extinction appearing nearly imminent.
EN (ENDANGERED)	Endangered taxon. The populations of the species in this category are not critically endangered; but are facing a risk of extinction in near future.
VU (VULNERABLE)	Vulnerable.
LR/nt (LOWER RISK/Near Threatened)	Lower risk taxon, the populations of which are not endangered.
LR/lc (LOWER RISK/Least Concern)	Lower risk taxon, the populations of which are not endangered even in future.

According to this classification, there are not any kind of critically endangered (CR), endangered (EN) or vulnerable (VU) species in and around the worksite. The existence of the Wild Goats which are classified in (VU) Vulnerable category is well known in the region although they were not observed in the project site. Within this context, if any Wild Goats are observed in the worksite during construction works, due care and attention shall be paid; and the construction works shall be proceeded only after taking the required measures before the initiation of the related construction works.

IMPACTS OF THE WORKS ON FLORA AND FAUNA SPECIES AND APPLICABLE MEASURES

Within the scope of the related works, it is anticipated that topsoil shall be stripped of in 36.900 m² of area in total including 10x10=100 m² of area for placement of each turbine and 1.900 m² of area for 19 units of turbines in total during positioning of the turbines in the construction stage, 2.500 m² of area during construction of the administrative building and

the switching transformer substation, and nearly 32.500 m² of area during construction of the in-site roads. There will be a biomass loss to be incurred by the plant species in the regions where stripping works will be performed; but the works will not affect their populations. It is expected that the wild animals will move to calmer and more comfortable environments in the region due to the noise and mobility throughout the construction process. However, the related activities will not lead to any negative biological and physical pressure on the populations of the species classified in IUCN risk categories and the other wildlife species (hunting or deliberate killing, etc.). The project does not have any impact on the vegetative cover and wildlife during the operation stage. However, the collision of birds with the turbines leading to death can be considered as an issue in the sections where turbines are positioned.

In the studies conducted in the USA in relation to this issue, it was determined that this rate was too low at the levels of 0,01-0,02%, that every year, 60-80 million birds were killed on the highways, 100 million birds were killed by the high buildings and towers, 67 million birds were killed by the agricultural pesticides and 39 million birds were killed by domestic cats; and that nearly 38 birds per year were killed by the wind energy power plants.
[Source:24]

The scientific report assessing the potential impacts on the Wildlife and the applicable measures arranged in relation to the project upon in-situ investigation of the site by Prof. Dr. Levent TURAN is presented in **Annex: 14**. The measures required to be taken against the risks specified in the said Scientific Report shall be strictly applied.

III. ENVIRONMENTALLY SENSITIVE AREAS

The Work Area is not located within the boundaries of National Parks, Natural Parks, Natural Monuments, and Nature Reserve Areas, the Wildlife Protection Areas determined by the Ministry of Forestry as per the Land Hunting Law No. 4915, "Site Areas" and "Protection Areas", Fishery Products Reproduction and Breeding Areas, "Pollution-Sensitive Areas", "Special Environmental Protection Areas", the areas under protection according to the Bosphorus Law, and the areas specified in the Law no. 3573 concerning Improvement of Olive Groves and Vaccination of the Wild Types.

It is not considered within the scope of any areas under protection as per the BERN Convention including the Protection Zones I and II specified under the title of "Important Sea Turtle Breeding Areas", "Mediterranean Monk Seal Breeding and Feeding Areas", areas under protection as per the "Convention for Protection of the Mediterranean Sea against Pollution" (Barcelona Convention), the areas determined as "Special Protected Areas" in our country as per the "Protocol concerning the Mediterranean Specially Protected Areas", areas included within the list of "100 Coastal Historic Sites of Common Mediterranean Interest", the coastal areas constituting the breeding and feeding environments of the "Endangered Mediterranean Marine Species", the cultural, historical and natural areas bearing the "Cultural Heritage" and "Natural Heritage" status, and the areas under protection as per the

“Convention on Wetlands of International Importance, especially as Waterfowl Habitat” (RAMSAR Convention).

The worksite is not located within the boundaries of any areas determined as the landscape protection areas subject to prohibition of construction as specified in the Approved Environmental Landscape Plans (areas of protection with its natural character, biogenetic reserve areas, geothermal areas, etc.).

Agricultural Areas: It is not within the scope of any agricultural development areas, irrigated areas, irrigable areas, the areas with land use capability classes of I, II, III, and IV, and the irrigated agricultural lands classified as class I and II used in rain-fed agriculture.

Wetlands: The work area is not considered within the scope of all natural or artificial, permanent or temporary wetlands of importance as the habitats of the living organisms, especially the waterfowls with still or flowing, fresh, brackish or salt water covering depths of up to 6 meters during the ebb stage of ebb and flow movement of the seas; marsh areas, reed fields and turf beds, and any areas that remain as ecological wetlands starting from the shore edge line of such areas toward the land; Lakes, groundwater management areas; The habitats of the species of importance for scientific studies, and/or the endangered species or the species that may become endangered and the species that are endemic for our country; biosphere reserve, biotopes, biogenetic reserve areas; and the areas including geological and geomorphologic formations of unique characteristics.

IV. PROTECTED AREAS AND ARCHEOLOGICAL HERITAGES

-Mersin Mut Kestel Wildlife Development Area:

The Project Site is located outside the boundaries of the Wildlife Development Area as announced by the Ministry of Environment and Forestry for protecting the habitat of the Wild Goats; the nearest turbine, the turbine T19 is located at a distance of nearly 50 m and the turbines T17 and T18 are located at a distance of nearly 100-150 meters.

-Mut Dandi Special Hunting Zone: It is surrounded by: the ridge connecting Mut-Dağpazarı village road to Boncuk Tepe Hill, Boncuk Tepe Hill and the ridge of Boncuk in the North; Cevizliin site following Boncuk ridge, following Karainkapızı creek and Karanlık creek, the forest road connecting Ayvacık quarter to Ömerağa forest log depot in the West; starting from Ömerağa forest log depot and following the ancient Burunköy settlement site, Yarıkkaya, Öküzini ridge and the forest road heading to Kıztaşı site in the South; and Kıztaşı site, Arnavuttaşı ridge and the forest road connected to Mut-Dağpazarı village road and Mut-Dağpazarı village road in the East. The project site and the facilities to be constructed within the scope of the project are located within the boundaries of Dandi Wild Boar Special Hunting Zone. It is warranted that all issues specified in the survey report in relation to Dandi Wild Boar **Special Hunting Area** issued by the Republic of Turkey, Mersin Governor's Office, Provincial Directorate of Environment and Forestry, Administration of Nature

Conservation and Natural Parks will be complied with. The scientific expert report showing how and to what extent the project will impact the ecosystem and especially the Wildlife during the application stage is provided in **Annex: 14**. The said scientific report shall be submitted to the Republic of Turkey, Ministry of Environment and Forestry, General Directorate of Nature Conservation and Natural Parks and upon its approval, the project shall be put into implementation and the related construction works shall be commenced after receiving the required permits from the Republic of Turkey, Ministry of Environment and Forestry, General Directorate of Nature Conservation and Natural Parks.

-Dağpazarı (Corapissus) Ruins

It is located at 35 km northwest of Mut. The location of the city anciently called as Coropissus on an ancient road connecting Karaman to Silifke shows that special importance was attached to the city in the past. There is an interesting Byzantine church and a floor tile of 15x5.50 m. The church was constructed in the middle and at the highest point of the village. The apse and some walls of the church dating back to the Byzantine period have survived.

There are animal figures and geometric motives in the mosaics within the village. There are reservoirs that are used as cold storage depots by the villagers. The project site is located at a distance of nearly 20 km to the antique settlement site.

The Map of Hunting-Allowed and Hunting-Prohibited Areas showing the current status of the work area in relation to the Hunting Prohibited Areas and the Protected Areas is given in **Annex:8**.

3. ALTERNATIVES OF THE PROJECT AND LOCATION (reasons of selection of the project technology and the project site)

I. Energy Generation Alternatives

The project is based on generation of the required energy in a clean and economic way from the wind potential constituting one of the renewable energy resources. The technology planned to be used in the plant is a technology aiming to generate energy even at low wind velocities like the technologies used in similar plants. Therefore, there is no alternative to the technology to be used in the plant.

Our country is an unlucky country in respect of energy resources like gas, coal, etc. 68% of the energy consumed in our country in 2000 was imported. It should be expected that this rate will gradually increase with the increased energy consumption. It seems reasonable that alternative resources should be assessed at the highest level and put into implementation as soon as possible in order to decrease this foreign-source dependency.

The limited nature of the fossil fuels that are mostly used in electricity generation and the negative impacts on environmental pollution resulting from the use of such fuels, i.e. climate changes have led to the inclination toward alternative energy resources. In our country, the electricity is mostly generated from fossil fuels and by the hydroelectric power plants. It is obvious that the increased utilization of these resources which are limited in nature in our territories will bring them on the point of exhausting and foreign-source dependent energy consumption will arise if additional energy resources are not sought.

Especially in the periods without adequate water quantity, alternative energy resources that will support the hydroelectric power plants in which the electricity generation is based on existence of water will become of higher importance.

Within this context, since recently, the wind energy is a supplementary element supporting both the fossil energy resources and the hydroelectrical energy generation, it decreases foreign-source dependency in respect of energy resources in proportion with the rate of its utilization and it creates new industrial segments and offers employment opportunities, the people and environment are protected against negative loads and burdens with each kilowatt per hour of electricity generated from wind energy.^[Source:29]

If the electricity demand in Turkey maintains its long-term average increase rate of 7-8%, the installed capacity required will reach to the levels of 46.000 MW in 2010 and 65.000 MW in 2015. For meeting this demand, it will be required to put into service a power plant with an annual average capacity of 3.000 MW in addition to the existing power plants with an approximate installed capacity of 41.000 MW. Thus, an investment at the amount of 4,5-5 billion US Dollars will be needed for providing this capacity and preventing electrical outages.

The petroleum reserves of the World are estimated to have an economic useful life of nearly 40 years; therefore, more resources are required to be allocated in parallel to the price increase in the future years.

Turkey has important strategic opportunities that can be put into service in a short period of time offering economy, decreasing imported fuel dependency and minimizing environmental damages and oriented towards clean energy production for meeting the rapidly increasing electricity requirement in the country.

Considering the wind energy power plant established in Bozcaada under the current conditions of Turkey:

-Bozcaada wind energy power plant supplies all the electricity amount required by the district with a population of 10 thousand people.

- The remaining energy produced at the power plant meets 5% energy requirement of Çanakkale.

- The wind energy power plant generated 38 million kilowatt of electricity per 1 year with its 17 units of Wind turbines.
- The turbines lead to only the cost of 80 kg of grease provided in 4 cans throughout the year (the electricity of a district is generated with 4 cans of grease oil).
- While meeting the electricity requirement of 30 thousand of people, the wind energy power plant also offers oxygen saving equivalent to 82 thousand of trees per turbine when compared to a coal-fired power plant generating the same quantity of energy. (in other words; Bozcaada Wind energy power plant creates a forest area of 1 million and 400 thousand trees).

		
NO TRANSPORT	NO FUEL	NO PRESSURE OF INCREASING DEMAND

- No fuel costs
- prevents the interstate disputes for national resources.
- develops the electricity network in rural areas
- offers employment and regional development
- prevents the confusion caused by the price variability of the fossil fuels
- Modular and easy to erect
- No import dependency
- No fuel price risk
- No carbon emission
- No resource exhaustion – the global wind source is much larger than the global energy demand
- Land-friendly – agricultural/industrial activities can be performed in or around the wind power plant
- Application flexibility – applicability of large-scale commercial power plants or domestic-type applications
- National benefit – Contrary to the conventional fuels, it is a native and permanently available resource eliminating the fuel costs and the long*term fuel price risks in respect of energy security and the dependency to the other countries in respect of economic, politic and supply risks.

[Source 22]

Figure 8. Important Advantages of the Wind Energy

The global technological development in the field of wind energy is rapidly decreasing the production costs. Today, the power plants under good wind regime are capable of competing with the thermal and nuclear power plants in respect of production costs.

Considering the investments required for prevention of the environmental damages and destruction caused by the conventional and nuclear energy facilities, it is required that a mean “external cost” of 5 cent/kWh should be taken into account. The external cost refers to the technological investment amount required for prevention and remedy of the public health and environmental negative impacts.

If completed, Dağpazarı Wind Energy Power Plant will generate and supply to the national network 129.823.200 kWh of electricity per year. This energy that will be produced from clean, renewable and national resources will replace to some extent the electrical energy required to be generated and supplied to the network by the thermal power plants; and thus, it will contribute in consumption of less fossil fuels. Decreased consumption of such fuels will mean generation of less greenhouse gas emissions in our country; and this will make important contributions in preventing the global warming in addition to the other benefits that it will provide.

Compared to alternative electricity generation methods, the most important environmental benefit of the wind energy is that it does not lead to any kind of pollution in respect of air pollution. The wind energy will decrease CO₂ emissions caused by the fossil fuels. The wind energy is one of the important weapons used in the fight started against the global warming with Kyoto Protocol.

Table 39. CO₂, SO₂, and NO_x emissions leading to global warming and acid rains during electricity generation [Source 9]

Resource of Energy	CO ₂ (kg/1000 kWh)	SO ₂ (kg/1000 kWh)	NO _x (kg/1000 kWh)
Coal	963	0.62	3.6
Natural Gas	608	0.0032	2.1
Petroleum	890	5.58	1.6
Wind	-	-	-

Wind turbines are extremely important in reduction of CO₂ emission. A 500-600 kW turbine which is widely used today generates 1,1 million kWh of energy on average per year. Nearly 0,7 kg of CO₂ is emitted by the fossil-based fuels for generating 1 kW of energy. Therefore, while the turbine specified above generates 1,1 million kW of energy per year, 1,1 Million x 0,7 kg., i.e. nearly 750 tons of CO₂ emission will be avoided. On the other hand, 1 acre (0,404 Decare) of forest clears nearly 5 tons of CO₂ from the atmosphere per year per (plant). So, with the energy to be generated by a 500 kW turbine, a work equivalent to the clearance of CO₂ (750 tons / 5 = 150 tons) by a forest of 150 acres (composed of 57 000 trees) will be performed.

II. Technology Alternatives

Although displaying diversity in respect of size and type, the wind turbines which are in use are generally classified according to their rotation axis. The wind turbines are categorized under two classes by their axis of rotation such as "Horizontal-Axis Wind Turbines" (HAWT) and "Vertical-Axis Wind Turbines" (VAWT).

In the Horizontal-Axis Wind Turbines, the axis of rotation is in parallel to the wind direction. The blades are perpendicular to the wind direction. The commercial turbines are generally horizontal-axis turbines. Rotor is placed on a rotary table to receive the wind in the best manner.

In the Vertical-Axis Wind Turbines, the Turbine shaft is arranged vertically and is perpendicular to the incoming wind direction. There are some subtypes such as Savonius type, Darrieus type, etc. They are mostly produced for experimental purposes. Their commercial use is quite low.

In the power plant planned to be established, the Horizontal-Axis Turbine Model which is commercially more effective has been selected; and the following characteristics were taken into account in selection of the Turbine Model and capacity.

- Wind characteristics
- Turbine characteristics and performance
- Economic life and warranties of the turbines
- The turbines which are tried and in operable conditions and their performances
- The capabilities for connection to the interconnected system
- Price and financing
- Minimisation of Noise and Interference Effect
- Minimum Environmental Impact
- Ease of Service and Maintenance
- Technology

Within this context, considering the technological, environmental and visual effects, the tubular tower design constructed from light materials like fibreglass, etc. was preferred to steel tower design.

III. Project Location Alternatives

The fact that the area is positioned properly with adequate winter velocity has been one of the determinant factors in selection of the related area as the project location.

As a result of the preliminary analyses performed, it is planned that 129.823.200 kWh of electricity per year will be produced on average by Dağpazarı Wind Energy Electricity Generation Plant with 39 MW installed capacity planned to be constructed and operated. The project uses wind energy which is a renewable energy resource; and the wind energy power plants avoids atmospheric release of CO₂ originating from the fossil fuels. Thus, both electricity is generated and the emission of gases leading to greenhouse effect on the environment is prevented.

CONCLUSIONS

All descriptions given herein shall be summarized and a general assessment listing the important environmental impacts of the project and comparing the alternatives shall be provided.

General Assessment of the Project:

Dağpazarı Wind Energy Power Plant is planned to be established and operated in Mersin Province, Mut District by Enerjisa Enerji Üretim A.Ş. It is planned that 19 units (of turbines) shall be constructed in total, each having an installed capacity of 2.000 kW within the scope of the project. The Total Installed capacity of the plant is 39 MW. 129.823.200 kWh/year of energy shall be generated in the plant by means of the wind turbines; and it shall be connected to the national network by means of the energy transmission line in planning stage.

The application has been submitted to EMRA for receiving the generation license in relation to the project and the license application assessment procedure has been completed; the Generation License issued by EMRA is presented in **Annex 3**. The pre-construction period of the project is anticipated as 16 months and the construction period is estimated as 12 months; the economic life of the Project has been determined as 49 years corresponding to the license period requested in EMRA license application file.

The area for settlement of each turbine within the project site is $10 \times 10 = 100 \text{ m}^2$; and the total land use is $19 \times 100 = 1.900 \text{ m}^2$. A measurement station was positioned in the site for wind measurements within the scope of the project and long-period wind measurements are being recorded. The Project Site Location Map is presented in **Annex:1** and 1/25.000-Scaled Topographic Map showing the location of Turbines is given in **Annex:2**. The locations of the turbines may shift to the left or right to some extent as a result of the detailed wind measurements and the geological surveys to be performed; therefore, the environmental impacts of the project were assessed within the context also including the periphery of the turbines.

It is planned that 19 units (of turbines) shall be constructed in total, each having an installed capacity of 2.000 kW within the scope of the project. The total Installed capacity of the plant is 39 MW in the project. The estimated capacity factor of the project was determined as 39%. The average annual energy generation by the Wind Energy Power Plant Project is 169.768.800 kWh/year.

The Switchyard Transformer Substation and the Administrative Building were designed to be located in the same area within the scope of the related project. 1/25.000-Scaled Topographic Map showing the location of the Switching Transformer Substation and the Administrative Building is presented in **Annex:2** and 1/5.000-scaled Layout Plan is presented in **Annex: 7**.

The turbines shall be positioned in the forest lands; and it was observed agricultural activities were carried out in the open fields within the forest around the project site.

There may be shifts in the turbine locations within the Project Site as will be determined as a result of the ongoing detailed measurement and engineering studies within the scope of the project. In such cases, the related applications shall be submitted to the related authorities and institutions for receiving the required permits for the areas in which the turbines will be positioned.

In the engineering studies performed for selection of the location and technology for Dağpazarı Wind Energy Power Plant, detailed wind measurements are taken and the project is being modelled by means of special programs; thus, the most effective system and location plan is being prepared. During such activities, economic and environmental factors play an important role in such modelling works as well as the factors such as the detailed wind measurements and field topography, geological structure, etc. Within this context, the environmental factors are always taken into consideration in implementing a sustainable energy policy and assuring the continued maintenance of the project.

The Wind Energy Projects are the projects identified as clean energy; and generally, their environmental impacts are composed of less important or minor components and mostly, the temporary impacts occurring during the construction stage are considered.

If completed, Dağpazarı Wind Energy Power Plant will generate and supply to the national network 129.823.200 kWh of electricity per year. This energy that will be produced from clean, renewable and national resources will replace to some extent the electrical energy required to be generated and supplied to the network by the thermal power plants; and thus, it will contribute in consumption of less fossil fuels. Decreased consumption of such fuels will mean generation of less greenhouse gas emissions in our country; and this will make important contributions in preventing the global warming in addition to the other benefits that it will provide.

Compared to alternative electricity generation methods, the most important environmental benefit of the wind energy is that it does not lead to any kind of pollution in respect of air pollution. The wind energy will decrease CO₂ emissions caused by the fossil fuels. The wind energy is one of the important weapons used in the fight started against the global warming with Kyoto Protocol.

Liquid Wastes:

The waste waters that will be generated during the construction and operation stages of the Project also include the domestic-type wastewaters to be generated by the working personnel; and there is no process-related wastewaters. In the lighting of the estimations made in Section 1.c, it is expected that 2,25 m³/day of wastewater will be generated during

the construction stage and 0,9 m³/day of wastewater will be generated during the operation stage of the project. The domestic-type wastewaters that will be generated during both the construction and operation stage of the plant shall be collected in the watertight septic tank to be constructed next to the construction site building. The said septic tank shall be constructed in accordance with the “Regulation on Septic Tanks to be Constructed in Places where Sewerage System Pipes cannot be laid” which was enforced upon its publication in the Official Gazette no. 13783 dated 19th.03.1971. The wastewaters collected in the septic tank shall be drawn by special sewage truck companies operating in the region or by the sewage truck owned by Mut Municipality when it is on the point of filling up and shall be disposed duly through its discharge into the sewerage system of Mut Municipality. The septic tank design is provided in **Annex: 12**.

Domestic-Type Solid Wastes, Earthmoving Wastes and Hazardous Wastes :

It is expected that 20.1 kg/ day and 8.04 kg/day of domestic-type solid wastes will be generated during the construction stage and operation stage of the project, respectively. The domestic-type solid wastes that will be generated during the construction and operation of the Wind Power Plant shall be collected in closed containers that will be kept within the facility and disposed duly through their delivery to the solid wastes storage area of Mut Municipality.

Foundation excavation works shall be performed during the construction of turbines, the switchyard transformer substation and the administrative building within the scope of the project. During such works, 4,560 tonnes and 18.000 tonnes of excavation shall be performed respectively during the foundation excavation of the turbine and the foundation excavations of the switchyard transformer substation and the administrative building.

The earthmoving wastes expected to be generated in the project shall firstly be utilized in the project site; and the excavation materials shall be used for covering over the turbine foundations and the site levelling and arrangement to be performed in the worksite. The remaining vegetative soil and the earthmoving wastes generated during the excavation works shall be stored in the areas shown in 1/25.000-scaled topographic map (**See Annex:2**). At this stage, the earthmoving wastes shall be stowed properly to ensure that the vegetative soil remains on the top in order to allow it to be covered with grass.

The waste oils that will be generated by both the work machinery during the construction stage of the project and the accessories of the transformer and turbines during the operation stage of the project are considered within the scope of hazardous wastes; and they shall be collected in watertight containers in accordance with the “Hazardous Wastes Control Regulation” and disposed duly through their delivery to the companies licensed by the Ministry of Environment and Forestry.

Gas and Dust Emissions;

Exhaust emission will be generated by the machines that will be used in the works to be carried out in the worksite during the construction stage of the plant. The machinery to be used during construction of the plant will be operated for a short period of time; and the emissions will not reach to the levels likely to cause significant environmental impacts. No gas waste generation will occur during operation stage of the plant since no burning or combustion works will be carried out in this stage.

The machinery to be used during construction stage of the project will be operated for a short period of time; and the emissions will not reach to the levels likely to cause negative impacts on the settlement areas in the neighbourhood.

There are no activities that may cause dust emission during the operation stage of Dağpazarı Wind Energy Power Plant planned to be constructed. In the construction stage, dust emission will be generated during the arrangement of the roads within the site to be opened for access to the wind turbines, in the area where the wind turbines will be established and during the excavation works to be carried out during the construction of the switchyard transformer substation and the administrative building. Since the in-site roads, turbine construction and the switchyard transformer substation and administrative building constructions are not performed simultaneously within the scope of the project, dust emission estimations were assessed separately.

The total dust emission quantity that will be generated under uncontrolled conditions due to the activities to be carried out during the stage of road rehabilitation between the turbines in the project site is **4.52 kg/hour**; and this value exceeds the limit of **1 kg/hour** as stipulated in the “Regulation on the Control of Air Pollution originating from Industrial Facilities” (SKHKKY) published in the official gazette no. 27277 dated 03rd.07.2009. Therefore, dust dispersion modelling was performed for uncontrolled work conditions as required by the regulation. Accordingly; considering the dispersion tables of the dust emission that will be generated during excavation of the vegetative soil to be carried out on the in-site roads to be opened within the project area, it can be observed from the values measured at a distance of 500 meters that the suspended particulate matters are observed at the maximum level of 4,21 $\mu\text{g}/\text{m}^3$ and the settleable dust emissions are observed at the maximum level of 24,23 $\text{mg}/\text{m}^2\cdot\text{day}$. It can be seen that the values estimated as such are quite below the LTLV and STLV limit values specified in the SKHKKY Regulation. Therefore, the dust emissions that will be generated during excavation of the vegetative soil on the in-site roads to be opened within the project site will not lead to any negative impacts on Yayla Houses, the nearest settlement area to the project site which is located at a distance of nearly 550 meters.

It is observed that the total emission flow that will be generated due to the works to be carried out during the construction of the turbines is 0,93 kg/hour under uncontrolled conditions and 0,46 kg/hour under controlled conditions. These values found as such are

below the limit of **1 kg/hour** as specified in the “Regulation on the Control of Air Pollution originating from Industrial Facilities” published in the official gazette no. 27277 dated 03rd.07.2009. Therefore, there was no need to perform the dust dispersion modelling as required by the regulation.

The total emission flow (under uncontrolled conditions) that will be generated due to the works to be carried out during the construction of the switchyard transformer substation and administrative building in the project site is **2,94 kg/hour**; since this value is above the limit of **1 kg/hour** as specified in the “Regulation on the Control of Air Pollution originating from Industrial Facilities” published in the official gazette no. 27277 dated 03rd.07.2009, dust dispersion modelling was performed as required by the said regulation. Accordingly; considering the dispersion tables of the dust emission that will be generated during construction of the switchyard transformer substation and administrative building in the project area, it can be observed from the values measured at a distance of 500 meters that the airborne particles are observed at maximum level of $2.74 \mu\text{g}/\text{m}^3$ and the settleable dust emissions are observed at the maximum level of $15.76 \text{ mg}/\text{m}^2\cdot\text{day}$. It can be seen that the values estimated as such are quite below the LTLV and STLV limit values specified in the SKHKKY Regulation. Therefore, the dust emissions that will be generated during construction of the switchyard transformer substation and administrative building to be carried out in the project site will not lead to any negative impacts on Yayla Houses, the nearest settlement area to the project site which is located at a distance of nearly 550 meters.

The total emission discharge (under controlled conditions) that will be generated due to the works to be carried out during the construction of the switchyard transformer substation and administrative building in the project site is **1,97 kg/hour**; since this value is above the limit of **1 kg/hour** as specified in the “Regulation on the Control of Air Pollution originating from Industrial Facilities” published in the official gazette no. 27277 dated 03rd.07.2009, dust dispersion modelling was performed as required by the said regulation. Accordingly; considering the dispersion tables of the dust emission that will be generated during construction of the switchyard transformer substation and administrative building in the project area, it can be observed from the values measured at a distance of 500 meters that the suspended particulate matters are observed at maximum level of $1.83 \mu\text{g}/\text{m}^3$ and the settleable dust emissions are observed at the maximum level of $10.56 \text{ mg}/\text{m}^2\cdot\text{day}$. It can be seen that the values estimated as such are quite below the LTLV and STLV limit values specified in the SKHKKY Regulation. Therefore, the dust emissions that will be generated during construction of the switchyard transformer substation and administrative building to be carried out in the project site will not lead to any negative impacts on Yayla Houses, the nearest settlement area to the project site which is located at a distance of nearly 550 meters.

During the construction stage, the loading and unloading operations shall be performed without scattering and the materials transported shall be covered with nylon canvas. The excavation materials shall only be used for covering the top of turbine

foundations and for site arrangement. At this stage, the earthmoving wastes shall be stowed properly to ensure that the vegetative soil remains on the top in order to allow it to be covered with grass. The provisions of the “Air Quality Assessment and management Regulation” enforced upon its publication in the Official Gazette no. 26898 dated 06th.06.2008 and the “Regulation on the Control of Air Pollution originating from Industrial Facilities” published in the official gazette no. 27277 dated 03rd.07.2009 shall apply during the project.

Noise:

The noise level that can be generated during the construction works to be carried out in the project site should not exceed 70 dBA. The noise level expected to occur at Yayla Houses, the nearest settlement to the project area which is located at a distance of 550 meters will be around 54 dBA. This value is quite below the Environmental noise limit values for the Industrial Facilities as specified in the “Regulation on Environmental Noise Assessment and Management”. Therefore, there will be no negative impact likely to be caused by the noise that can be generated during the operation stage of the project. In addition, this impact is a temporary impact that will be generated only during the construction stage of the Wind Energy Power Plant; and it will be eliminated during the operation stage.

The noise level originating during the operation stage should not exceed 65 dBA, the Ldaytime limit value for the areas with high concentration of housing among the areas with commercial buildings and noise-sensitive uses. Based on the estimations and modelling of the noise level that will be generated during the operation stage of the project, the noise level expected to occur at Yayla Houses, the nearest settlement area to the power plant which is located at a distance of nearly 550 meters will be around 14 dBA. This value is quite below the Environmental noise limit values for the Industrial Facilities as specified in the “Regulation on Environmental Noise Assessment and Management”. Therefore, there will be no negative impact likely to be caused by the noise that can be generated during the operation stage of the project.

Impacts on Wildlife:

The bird migration routes coming from the North extend toward the south along Göksu River in the region. Göksu river is located at a distance of nearly 7.500 m from the project site. The Migratory Birds fly at a height of 1000-2000 m during migration; and it is impossible for them to bump into the turbines of nearly 100 m in height. Their flying elevation is decreased when they pause for feeding/resting purposes in the wetland areas during migration.

-Mersin Mut Kestel Wildlife Development Area:

The Project Site is located outside the boundaries of the Wildlife Development Area as announced by the Ministry of Environment and Forestry for protecting the habitat of the

Wild Goats; the nearest turbine, the turbine T19 is located at a distance of nearly 50 m and the turbines T17 and T18 are located at a distance of nearly 100-150 meters.

-Mut Dandi Special Hunting Area: It is surrounded by: the ridge connecting Mut-Dağpazarı village road to Boncuk Tepe Hill, Boncuk Tepe Hill and the ridge of Boncuk in the North; Cevizliin site following Boncuk ridge, following Karainkapızı creek and Karanlık creek, the forest road connecting Ayvacık quarter to Ömerağa forest log depot in the West; starting from Ömerağa forest log depot and following the ancient Burunköy settlement site, Yarikkaya, Öküzini ridge and the forest road heading to Kıztaşı site in the South; and Kıztaşı site, Arnavuttaşı ridge and the forest road connected to Mut-Dağpazarı village road and Mut-Dağpazarı village road in the East. The project site and the facilities to be constructed within the scope of the project are located within the boundaries of Dandi Wild Boar Special Hunting Zone. It is warranted that all issues specified in the survey report in relation to Dandi Wild Boar **Special Hunting Area** issued by the Republic of Turkey, Mersin Governor's Office, Provincial Directorate of Environment and Forestry, Administration of Nature Conservation and Natural Parks will be complied with. The scientific expert report showing how and to what extent the project will impact the ecosystem and especially the Wildlife during the application stage is provided in **Annex: 14**. The said scientific report shall be submitted to the Republic of Turkey, Ministry of Environment and Forestry, General Directorate of Nature Conservation and Natural Parks and upon its approval, the project shall be put into implementation and the related construction works shall be commenced after receiving the required permits from the Republic of Turkey, Ministry of Environment and Forestry, General Directorate of Nature Conservation and Natural Parks.

The issues such as the loss of habitat, destruction of the breeding areas or deaths or injuries as a result of the rotation of the turbine blades, etc. may occur due to the wind energy development. Nevertheless, the studies carried out in Europe and the United States have concluded that the average number of collisions was not more than two birds per year per turbine. These figures cannot be compared with millions killed with pesticides and the vehicles on traffic.

There are not transmitters like large radars, etc. that can cause electromagnetic interference around the project site; and the required measures shall be taken in case of any potential interference.

The provisions of the Environmental Law No. 2872 and all legislation issued with reference to this law shall be followed during the works and activities to be carried out on site.

In addition to the measures specified within the report; the provisions of the applicable legislation as listed below shall be strictly complied with:

- "Environmental Impact Assessment Regulation" enforced upon its publication in the Official Gazette no. 26939 dated 17th.07.2008;

- “Air Quality Assessment and Management Regulation” enforced upon its publication in the Official Gazette no. 26898 dated 06th.06.2008;
- “Regulation on the Control of Air Pollution originating from Industrial Facilities” enforced upon its publication in the Official Gazette no. 27277 dated 03rd.07.2008;
- “Environmental Noise Assessment and Management Regulation” enforced upon its publication in the Official Gazette no. 26809 dated 07th.03.2008;
- “Water Pollution Control Regulation” enforced upon its publication in the Official Gazette no. 25687 dated 31st.12.2004;
- “Solid Wastes Control Regulation” enforced upon its publication in the Official Gazette no. 20814 dated 14th.03.1991;
- “Hazardous Wastes Control Regulation” enforced upon its publication in the Official Gazette no. 25755 dated 14th.03.2005;
- “Medical Wastes Control Regulation” enforced upon its publication in the Official Gazette no. 25883 dated 22nd.07.2005;
- “Waste Oils Control Regulation” enforced upon its publication in the Official Gazette no. 26952 dated 30th.07.2008;
- “Regulation on Control of Excavation Soil, Construction and Debris Wastes” enforced upon its publication in the Official Gazette no. 25406 dated 18th.03.2004;
- “Occupational Health and Safety Regulation” enforced upon its publication in the Official Gazette no. 14765 dated 11th.01.1974;
- “Regulation on Buildings Constructed in Disaster Areas” enforced upon its publication in the Official Gazette no. 23098 dated 02nd.09.1997;
- “Regulation on Conservation of Wetlands” enforced upon its publication in the Official Gazette no. 25818 dated 17th.05.2005;
- Article 65 of the Highway Traffic Law No. 2918;
- Forestry Law No. 6831;
- National Parks Law No. 2873;
- Animal Protection Law No. 5199;
- Labour Law No. 4857;
- Land Hunting Law No. 4915; and
- Convention on Biological Diversity.

ANNEXES

If any, the environmental landscape plan, the regulatory and implementation development plans, the layout plan or plan modification proposals in relation to the location selected for the project

The project site is located within the boundaries of 1/100.000-Scaled Mersin-Karaman Planning Region Environmental Landscape Plan. (**See Annex: 6**) The areas where turbines are located according to the Environmental Landscape Plan are shown in the table below.

Table 40. Characteristics of the Area where Turbines are located according to Mersin – Karaman Planning Region Environment Landscape Plan

Turbine No.	Characteristics of the Area where Turbines are located according to the Environmental Landscape Plan
T 1	Forest Area
T 2	Forest Area
T 3	Forest Area
T 4	Forest Area
T 5	Forest Area
T 6	Forest Area
T 7	Forest Area
T 8	Forest Area
T 9	Forest Area
T 10	Forest Area
T 11	Forest Area
T 12	Forest Area
T 13	Forest Area
T 14	Forest Area
T 15	Forest Area
T 16	Forest Area
T 17	Forest Area
T 18	Forest Area
T 19	Forest Area

The mapping / measurement processes related with the project are ongoing; and the required permits will be received from public authorities and institutions in relation to the project-specific development plan works. 1/25.000-scaled Topographic Map pertaining to the project site is given in **Annex 2**.

For assessment of the current land use in the project area and its close periphery; recording of any information related to the settlement areas, transportation networks, energy transmission lines, existing facilities and the other areas specified in the List of Environmentally Sensitive Areas as included within the list in Annex:V of the related regulation (if there are any such areas in the project site and its close periphery) on the existing 1/25.000-scaled map (if any, the environmental landscape map, or if not, topographic map) and provision of a short description

The Project site is located at a distance of nearly 150 km to Mersin Province and 11 km to Mut District. The project site is within the scope of forest lands. The settlement areas surrounding the worksite can be listed as follows:

Table 41. Settlement Units near the Project Site

Settlement Unit	Nearest Turbine No.	Distance to the Nearest Turbine (m)	Location by the Nearest Turbine
MERSİN PROVINCE, MUT DISTRICT			
Burunköy	T 6	1550	Southwest
Yayla Evleri	T 9	550	Southeast
Yayla Evleri	T 1 – T 10	650	North
Yayla Evleri	T 6	970	West

The work area is accessed by the road connection diverted from Mersin – Karaman Highway; and the access road to the project site is a compacted and stabilized road. 1/25.000-scaled Topographic Map pertaining to the work area and its close periphery is given in **Annex: 2**.

Scaled geological map of the project site and illustration of groundwater and above ground waters on the said map and description of the seismicity of the area.

The Geological Information and the related Map of the work area are provided in **Annex: 8** and the Earthquake Map is given in **Annex: 9**.

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