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Kavsakbendi Dam, HPP and Quarries Project

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

☐ EIA Report

☒ Final EIA Report



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Name of the Project :	Kavsakbendi Dam, HPP and Quarries Project
Location of the Project :	Approximately 8 km downstream of the junction of River Zamanti and Goksu, Kozan and Aladag Districts, Adana Province
Description and Aim of the Project:	Proposed Project of Kavsakbendi Dam, HPP and Quarries on Seyhan River

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	<u>Page</u>
<i>Table of Contents</i>	<i>ii</i>
<i>List of Appendices</i>	<i>vi</i>
<i>List of Tables</i>	<i>viii</i>
<i>List of Figures</i>	<i>xi</i>
<i>Abbreviations</i>	<i>xii</i>
I. DESCRIPTION AND PURPOSE OF THE PROJECT	1
I.1. Description of the Project Activity	1
I.2. Purpose and Importance of the Project	2
II. LOCATION OF THE PROJECT SITE	7
II.1. Project Site (Presentation of the Project Site Approved by Related Governorship or Municipality on Approved Landscaping Plan including Legend and Plan Notes and Settlement Plans, on Present Land Usage Map if these plans are not available)	7
II.2. The location of units within the context of Project (Dam Body and Weir Facilities (Spillway and Sluiceway), Transmission Conduits, Building and Facilities relevant to Hydroelectric Power Plant, Technical Infrastructure Units, Administrative and Social Units, Other Units if any, Size of Closed and Open Space within These Units, Presentation of the Location of These Units Within the Project Site on the General Plan or Sketch, Presentations as Representative Drawings or Scale Model with Other Techniques, Presentation of Temporary and Final Storage Areas within the context of the Project, Construction Site where will be constructed within the Dam Site and Rock, Sand, Gravel and Clay Pits which will be Opened in compliance with Mining Law, on 1/25,000, 1/5,000 and/or 1/1,000 scaled Maps)	10
III. ECONOMICAL AND SOCIAL ASPECTS OF THE PROJECT	12
III.1. Investment Program and Financial Resources Regarding the Realization of the Project	12
III.2. Work Flow Diagram or Time Table regarding the Realization of the Project	12
III.3. Cost-Benefit analysis of Project	15
III.4. Other Economical, Social and Infrastructural Projects which are not in the Scope of the Project but are Proposed by the Project Owner or Other Investors Depending Upon the Realization of the Project	15
III.5. Other Economical, Social and Infrastructural Projects which are not within the Context of the Project but are Requisite for the Realization of the Project or Planned to be Carried Out by the Project Owner or Other Investors	16
III.6. Expropriate and Resettlement	16
III.7. Other Issues	18
IV. IDENTIFICATION OF THE AREA TO BE IMPACTED FROM OF THE REGULATOR, HPP AND QUARRIES WITHIN THE CONTEXT OF PROJECTS AND CLARIFICATION OF ITS ENVIRONMENTAL CHARACTERISTICS	19
IV.1.1. Identification of the Area to be impacted from the project (According to How and what the impact area will be determined is explained and the impact area will be marked on the map)	19
IV.2.1. Characteristics of the Physical and Biological Environment within the Impact Area and Utilization of Natural Resources	21
IV.2.2. Geological Characteristics (Geological structure of project area and quarries are investigated under the topics of tectonic movements, mineral sources, landslide, unique formations, avalanche, flood, rock fall, geological map and legend with 1/100000, 1/25000 and/or 1/5000 scaled, broken lines and faults is marked on map and showed its distance to Project Site, and added Geological and Geotechnical survey report)	36
IV.2.3. Hydrogeological Characteristics of Groundwater and Thermalwater Springs (Level and amount of water, secure withdraw values, flowrates of sources, present and planned usage)	49

IV.2.4. Hydrological and Ecological Characteristics of Surface Water Resources _____	51
IV.2.5. Present and Planned Utilization of Surface Water Resources (Potable, usage, irrigation water, production of aqua products, transportation, tourism, generation of electricity, other usages) _____	52
IV.2.6. Soil Characteristics and Usage Conditions (Physical-Chemical and biological characteristics of soil, land use capability classification, erosion, present usage of land) _____	54
IV.2.7. Agricultural Lands (Agricultural development projects lands, special product plantation areas) Size of Irrigated and Rain-fed Agricultural Lands, Product Pattern and Amount of Their Annual Production _____	57
IV.2.8. Forestry Areas (type and amount of trees, size of forestry areas and their coverage, their present and planned protection and/or usage purposes) _____	60
IV.2.9. Protection Areas (National Parks, Natural Parks, Wet Lands, Natural Monuments Nature Protection Areas, Wildlife Conservation Areas, Biogenetic Reserve Areas, Biosphere Reserves, Natural Site and Monuments, Historical and Cultural Sites, Special Environmental Protection Regions, Special Environmental Protection Areas, Tourism Area and Centers, Areas in the content of Pasture Law) _____	61
IV.2.10. Species Living in Inner Waters (lake, stream) (Natural Characteristics of these Species and species protected by national and international legislation, their feeding, reproduction, sheltering and living zones, protective decisions for these areas) _____	65
IV.2.12. Mines and Fossil Fuel Resources _____	71
IV.2.13. Animal Husbandry (Species, feeding zones, amount of annual production, contribution and value of these products to Turkish economy) _____	72
IV.2.14. Lands Under Control and Responsibility of Authorized Governmental Agencies (Military Forbidden Zone, areas allocated to public institutions and corporations for special purposes, etc.) _____	74
IV.2.15. Determination of Baseline Pollution Load in Terms of Air, Water, Soil, Noise of Project Location and Its Impact Area _____	75
IV.2.16. Other Characteristics _____	77
IV.3.1. Characteristics of Socio-Economic Environment _____	77
IV.3.1. Economical Characteristics (major sectors constituting the economic structure of the region, distribution of local labor force to these sectors, the status and significance of the property and service production in these sectors in the regional and national economy, other information) _____	77
VI.3.2. Population (Urban and rural population in the region, population movements, migrations, population growth rates, average household size, other information) _____	82
IV.3.3. Income (Distribution of income as well as maximum, minimum and average income per capita on sectoral breakdown) _____	87
IV.3.4. Unemployment (Unemployed population in the region and its ratio to economically active population) _____	88
IV.3.5. Social Infrastructure Services in the Region (Education, health, cultural services and utilization from these services) _____	89
IV.3.6. Land usage of Rural and Urban (the distribution of settlement area, present and planned usage areas, in this context, industrial regions, houses, tourism area etc.) _____	93
Present and Planned Usage Areas _____	94
IV.3.7. Other Aspects _____	95
V. PROJECT IMPACTS ON THE AREA WHICH IS DETERMINATION IN SECTION 4 AND TAKING PRECAUTIONS _____	96
V.1. Preparation of area, projects which is on the construction and establishment stage, its impacts on physical and biological environment and taking precautions (Including Regulator, HPP, Quarries) _____	96

-
- V.1.1. Within the context of works for preparation of land, where and how much excavations will be done, amount of excavation, where excavation remnants like soil, stone, soil etc. Will be transported, where they will be stored or for which purposes they will be used, the materials to be used during excavation. _____ 96
- V.1.2. The material which is flammable, explosive, dangerous, toxic and chemical of the material which will be used during the Preparation of Land and moreover on construction of units are conveyed, stored and used, the equipment and machines which will be used for these works. _____ 99
- V.1.3. Prevention of flood and Drainage Process _____ 100
- V.1.4. Amount of stone, soil, gravel will be taken out by reason of digging, deep survey etc. process that will be realized for any purpose in water environments within the Project Site and where they will be transferred or what purposes for they will be utilized. 101
- V.1.5. The number of quarries like stone quarry, soil quarry, clay quarry etc., area size of quarries, size of operating area and its coordinates, amounts of planning production depending on years, production techniques that will be applied, step height, its largeness, angle of repose, number of step, marking the beginning and final situations of quarries on production map. _____ 101
- V.1.6. It is explained that how explosive process will be made in quarries, it is figured of explosive pattern, amount of explosive material for one usage, its carried, its stored and usage, air shock and stone jump, and it is evaluated of its effects. _ 105
- V.1.7. Working time (Day-Month- Year) in quarries, transportation routes, transportation infrastructure plan, process regarding construction of infrastructure, machine equipments that will be used. _____ 111
- V.1.8. The dust spreader process like crush, grind, transport, storage, cumulative values. 111
- V.1.9. The process that should be do for ground security and prevention of leak _____ 136
- V.1.10. For the purpose of land preparation and obtained necessary area for construction type and number of trees that will be cut, effects of trees that will be cut on forest ecosystem in environment, types of natural plant that will be annihilate and how many area the process will be carried out, possible effect on fauna. _____ 137
- V.1.11. Size of agricultural lands where will be disposed with a view to obtaining necessary field for construction site and land preparation, capability of them and agricultural production types. _____ 138
- V.1.12. Starting from land preparation to opening of unit to activity types of fuels that will be used for works, its aspects, its emission _____ 138
- V.1.13. Amount of water that will be obtained from the sources that will provide water for used within the context of project, water supply system and amount of water according to purpose of usage, type and amount of waste water, environments that will be discharged to. _____ 140
- V.1.14. Amount of solid waste starting from land preparation to opening units, how it will be annihilated _____ 142
- V.1.15. The preparation of the report according to the regulation for the evaluation and management of the environmental noise for the vibration, sources and the level of noise, cumulative values and for the material quarries that will take place as a result of the jobs that will be conducted starting from the preparation of the area and ending when the units will start to function. _____ 142
- V.1.16. The accommodation of and other social infrastructure needs of the personnel that will work starting from the land preparation to the opening of the units their families. How and where these needs will be handled. _____ 143
- V.1.17. Starting from the land preparation to the opening of the units, the jobs that pose risks and dangers for the human health and environment _____ 144
- V.1.18. In the project field, creating landscape figures and making the field arrangements for the other reasons (forestation and green field arrangements), How they will be made, how much land is required for that and what kind of plants and trees are needed for that. _____ 145
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V.1.19.	The evaluation of the possible effects of the project on the underground and belowground entities(traditional urban infrastructure, archeological heritage and other natural entities that should be protected)	145
V.1.20.	Other Activities	146
V.2.	The projects in the execution phase of the project: Their effects on the physical and biological environment and the precautions that will be taken	146
V.2.1.	The characteristics of all the units within the scope of the project, which activity will be executed in which unit, the goods and services that will be produced in these units and the production amounts of the secondary and final goods	146
V.2.2.	Possible effects of the water blockage on the water quality and on the living organisms in the water, the amount of water released on the stream headstock and how it is calculated.	152
V.2.3.	The effects on the areas that should be protected by the national and international legislations	154
V.2.4.	The possible changes in the downstream that will take place as a result of the utilization of the resources to obtain water (Erosion, River Hydrology, Sediment Arrival, etc.)	154
V.2.5.	Other usage patterns belonging to the resources and their effects if there are any	159
V.2.6.	The effects on the below ground and surface water resources	159
V.2.7.	How and where will the accommodation and other social, technical infrastructure needs of the personnel and of the parties related to them be met	159
	The duties and number of the people that will work on maintenance, security, control and on other areas during the management of the project are shown on Table V.22. In the functioning period of the project, 40 people are planned to be employed. The personnel will be chosen out of the people living in the district and the accommodation facilities for the personnel will be built in the nearest district. For this reason, an administrative building will be constructed and a housing arrangement will also be made for the families of the personnel. Also, a service bus will be provided for the school, doctor and shopping needs of the personnel. The personnel that will work in shifts will be obtained from the nearest districts and in the shift changes they be released to their houses by buses.	159
V.2.8.	The characteristics of the treatment facility for the waste water that emerges after the utilization of the water for drinking and usage purposes in the administrative and social unities, The detailing of the process and where, how will the treated water be given and on what amounts	160
V.2.9.	The amount and characteristics of solid water that will be emerges from house, social and administrative facilities, where and how these waste will be carried or for which purposes and how they will be evaluated.	161
V.2.10.	The sources of the noise that will appear during the operation of the project units and the measures that will be taken for the control of it	161
V.2.11.	Possible Effects on Forests and the definition of the measures that will be taken against these effects	161
V.2.12.	Other Charactersitics	162
V.3.	THE EFFECTS OF THE PROJECT ON THE SOCIO-ECONOMIC ENVIRONMENT	162
V.3.1.	The expected increases in the income levels; Employment Oppoportunities created, population movements, migrations, education, health, culture, other social and technical, infrastructure services and changes in these services, etc.	162
V.3.2.	Environmental Cost-Benefit Analysis	163
VI.	THE EFFECTS THAT WILL EMERGE AND CONTINUE AFTER THE END OF THE PROJECT AND THE MEASURES THAT WILL BE TAKEN AGAINST THEM	165
VI.1.	Land Adjustment	165
VI.2.	The Land Adjustment that will be made in the Dam, HPP and in material quarries and the promotional studies	165

VI.3.	Effects on the Water Resources _____	166
VII.	THE ALTERNATIVES OF THE PROJECT _____	167
	Alternative Technologies for Electricity Production _____	167
VIII.	FOLLOW UP PROGRAM _____	169
VIII.1.	The follow up program proposed for the construction of the facility, operation of the facility and for the stages after the operation, Emergency action plan _____	169
VIII.2.	On the condition that EIA Positive Document is given, The program for realizing the points in the second paragraph of the “The Obligations of the Directorships that have received a Competency Document” Regulation _____	171
X.	RESULTS _____	173

LIST OF APPENDICES

Appendix-A The EIA Report Format

Appendix -B General Layout

Appendix -C Official Letters

Appendix -D Septic Type Projects

Appendix -E Long-Term Meteorological Data of Kozan Meteorological Station

Appendix -F Geological Sections of Kavsakbendi Dam, HPP Units, Quarries and Storage Sites

Appendix -G Forestry Map

Appendix -H Fauna

Appendix -I Flora

Appendix -J Acoustic Report

Appendix -K Quarries

The EIA Project Team

LIST OF TABLES

Table I.1 Per capita Income and Per Capita Electric Consumption	2
Table I.2 Distribution of Sources in energy production in Turkey (January 1 st – December 31 st 2005).....	3
Table I.3 Development of Turkey's Hydroelectric Energy Potential as of beginning of 2006....	3
Table I.4 Turkey Long-Term Electrical Energy Demand Estimation	5
Table II.1 Footprint sizes of Kavsakbendi Dam, HPP and Quarries Project Units	11
Table III.1 Cumulative Cost and annual expenses of the Kavsakbendi Dam, HPP and Quarries Project.....	13
Table IV.1 Kozan Meteorological Station	21
Table IV.2 Blowing Frequencies of Winds (monthly and annual).....	22
Table IV.3 Blowing frequencies of winds in winter	23
Table IV.4 Blowing Frequencies of Winds in Spring	24
Table IV.5 Blowing Frequencies of Winds in Summer	25
Table IV.6 Blowing Frequencies of Winds in Autumn	26
Table IV.7 Kozan Meteorological Station Average Annual Wind Velocity Distribution According to Directions (1975-2005)	27
Table IV.8 Long-term Temperature Data of Kozan Meteorological Station.....	29
Table IV.9 Numbers of Days According to Different Temperatures	30
Table IV.10 Precipitation Data from Kozan Meteorological Station.....	31
Table IV.11 Relative Humidity Data from Kozan Meteorological Station	31
Table IV.12 Evaporation Values.....	32
Table IV.13 Values of Average Number of Days in the Region	34
Table IV.14 Average Number of Days in the Region	34
Table IV.15 Adana Province Underground Water Sources.....	50
Table IV.16 Land Use Capability Classes and Suitability for Cultivation.....	57
Table IV.17 Adana Province Total Land asset with its districts.....	58
Table IV.18 Amounts of Citrus Fruits Production in Adana Province	58
Table IV.19 Amounts of Agricultural Production in Adana Province	59
Table IV.20 Agricultural Production and Land asset of Kozan District	59
Table IV.21 Mammals	70
Table IV.22 Birds.....	71
Table IV.23 Mining Activities in Kozan District	72
Table IV.24 Small Cattle Property of Adana Province and Districts.....	73
Table IV.25 Cattle Property of Adana Province and Districts.....	73
Table IV.26 Numbers of Beehives and Amounts of Production of Adana Province and Districts.....	74
Table IV.27 Poultry Property of Adana Province and Districts	74
Table IV.28 Sectoral Distribution of Economically Active Population (%)	82
Table IV.29 Distribution of 2000 Population Census results according to Districts	82
Table IV.30 Annual Population Growth Rate according to Districts of Adana Province (‰).....	83
Table IV.31 Number of Households in Adana Province and Aladag and Kozan Districts.....	85
Table IV.32 Indicators Regarding Fertility Rate.....	87
Table IV.33 Schooling Ratio in Adana Province.....	90
Table IV.34 Population by literacy and last school completed	92
Table IV.35 Land Usage Patterns of Aladag and Kozan Districts	95
Table V.1 Quarries and Amounts of Planned Productions.....	102
Table V.2 Annual Usage Plans of Storage Sites.....	104
Table V.3 (T1) Material site – Stone Sample Laboratory Experiment Results.	104
Table V.4 (T-2) Material site – Stone Sample Laboratory Experiment Results.....	104
Table V.5 Effects of vibration speeds on buildings on surface exploded.	109
Table V.6 Quarries that will be used.	111
Table V.7 The emission factors that will be used for dust amounts	113
Table V.8 The information which is used in modeling study	120

Table V.9 PM ₁₀ Concentrations calculated in settlement area.	123
Table V.10 Compared results of modeling to regarding limit values	125
Table V.11 Compared sediment dust values to regarding limit values	127
Table V.12 Sediment dust concentration in settlement area.	128
Table V.13 Air quality values calculated for T ₁ Quarry.	133
Table V.14 Air quality values calculated for T ₂ Quarry.	134
Table V.15 Amount of sedimented dust that will be grown out form explodes (For T ₁ Stone Quarry).....	135
Table V.16 Amount of sedimented dust that will be grown out form explodes (For T ₂ Stone Quarry).....	136
Table V.17 Chemical Aspects of Diesel	139
Table V.18 Emission guesses that will be grown out from construction equipments.	139
Table V.19 The number of the personnel that will work during the construction period and their duties	143
Table V.20 The characteristics of Kavsakbendi Dam, HPP ve Materials Quarries Project..	146
Table V.21 Kavsakbendi Dam, HPP ve Malzeme Quarries Data.....	148
Table V.17 AGI Stations on Seyhan River	157
Table V.22 The number and duties of the personnel that will work during the functioning phase.....	160

LIST OF FIGURES

Figure I-1 Turkey Electricity Production (GWh)	2
Figure II.1 Location of the Project Site in Turkey	8
Figure II.2 Satellite photo of the Project Site and its surroundings	9
Figure II.3 View from the Project Site-I	9
Figure II.4 View from the Project Site-II	10
Figure III.1 Execution Program of the Kavsakbendi Dam, HPP and Quarries Project.....	14
Figure IV.1 Project's Land Registry Survey	20
Figure IV.2 Annual weather vane according to blow counts	22
Figure IV.3 Weather vane according to blow counts in winter	23
Figure IV.4 Weather vane according to blow counts in spring	24
Figure IV.5 Weather vane in summer	25
Figure IV.6 Weather vane according to blow counts in autumn.....	26
Figure IV.7 Average Wind Velocity (1975-2005).....	27
Figure IV.8 Annual Average Weather Vane According to Wind Velocity	28
Figure IV.9 Monthly weather vanes according to blowing numbers.....	29
Figure IV.10 Kozan Meteorological Station monthly temperature values (1975-2005).....	29
Figure IV.11 Kozan Meteorological Station Average Monthly Temperature Values (1975-2005)	30
Figure IV.12 Kozan Meteorological Station Monthly Precipitation Values (1975-2005).....	31
Figure IV.13 Kozan Meteorology Station Monthly Relative Humidity Distribution (1975-2005)	32
Figure IV.14 Monthly Evaporation Values recorded by Kozan Meteorology Station (1975-2005)	33
Figure IV.16 Average Number of Days with Hail recorded by Kozan Meteorological Station (1975-2005)	35
Figure IV.17 Average Number of Days with Thunderstorm recorded by Kozan Meteorological Station (1975-2005).....	35
Figure IV.18 Kavsakbendi Dam ve HPP Project Generalized Stratigraphy Cross Section.....	38
Figure IV.19 Map of Turkey Earthquake Zones	47
Figure IV.20 Earthquake map of Adana Province.....	48
Figure IV.21 Active Fault Map Adana province and its environment	48
Figure IV.22 Land Property of the Project Site, Agricultural Suitability of Lands and the Distribution of Major Soil Groups.....	56
Figure IV.23 Adana Province Land asset	58
Figure IV.24 Forest asset of Adana Province	60
Figure IV.25 Protected Areas in Adana Province	64
Figure IV.26 A view of the flora structure from the Project Site	65
Figure IV.27 Mine Map of Adana Province	72
Figure IV.28 Seyhan Basin Present Water Quality.....	76
Figure IV.29 Distribution of Age Groups in Adana Province	85
Figure IV.30 Distribution of Age Groups in Aladag District	86
Figure IV.31 Distribution of Age Groups in Kozan District	86
Figure IV.32 Sectoral Distribution of Gross Domestic Products in Adana Province in 2001.....	88
Figure IV.33 Unemployment Ratios with Respect to Sex in Adana	89
Figure IV.34 Literacy Rates in Adana Province	90
Figure IV.35 Population Rates according to education levels in Adana province.....	91
Figure IV.36 Population Rates according to education levels in Aladag district.	91
Figure IV.37 Population Rates according to education levels in Kozan district	92
Figure IV.38 Adana Province Land Asset.....	93
Figure IV.39 Distribution of Adana Province Agricultural Lands	94
Figure V.1 Stone Quarries Step Cross section.....	108
Figure V.2 Exploded Pattern.....	108
Figure V.3 Variation of Vibration speed according to distance	110

Figure V.4 Showed of Distribution area with 2 dimensioned topographic map.....	121
Figure V.5 Kozan Meteorology Station Long term wind rose (1975-2005)	122
Figure V.6 Kozan Meteorology Station 2005 Year Wind Rose (1975-200)	123
Figure V.7 Annual PM ₁₀ Concretions Distributions (Uncontrolled Condition)	125
Figure V.8 Daily PM ₁₀ Concretions Distributions (Uncontrolled Condition).....	126
Figure V.9 Annual PM ₁₀ Concretions Distributions (Controlled Condition)	126
Figure V.10 Daily PM ₁₀ Concretions Distributions (Controlled Condition)	127
Figure V.11 Annual Sedimented Dust Concretions Distributions (Uncontrolled Condition).....	128
Figure V.12 Daily Sedimented Dust Concretions Distributions (Uncontrolled Condition).....	129
Figure V.13 Annual Sedimented Dust Concretions Distributions (Controlled Condition).....	129
Figure V.14 Daily Sedimented Dust Concretions Distributions (Controlled Condition) ...	130
Figure V.15 Adana Province, Amount of per daily wastewater and solid waste (litre-day/day)	141
Figure V.16 The dams on Seyhan River.....	153
Figure IX.1 The Newspaper Advertisements Given to Inform the Public About the Meetings	172
Figure IX.2 Scenes from the Meeting	172

ABBREVIATIONS

BERN	Bern Convention (Wild Life and Ecosystem Protection Agreement of Europe)
C	Celcius
CITES	Agreement about Trade of Species in Danger of Extinction
cm	Centimeter
dBA	A-Weighted decibel
DMI	State Meteorological Service
DOKAY-CED	DOKAY-CED Environmental Engineering Ltd.
DPT	State Planning Organization
DSI	State Hydraulic Works
E	East
EAP	Emergency Action Plan
EIA	Environmental Impact Assessment
EIEI	Electrical Power Resources Survey and Development Administration
FMS	Flow Monitoring Station
g	Gram
H₂S	Hydrogen sulfide
ha	Hectar
HPP	Hydroelectric Power Plant
HKKY	Protection of Air Quality Regulation
Inc.	Incorporated
kg	Kilogram
km	Kilometer
KVS	Short-Term Standard
kW	Kilowatt
l	Liter
L_{eq}	Equivalent Noise Level
L_p	Noise Intensity Level
m	Meter
mg	Miligram
mm	Milimeter
MTA	Mineral Research and Exploration Institute
MW	Megawatt
N	North
no.	Number
°	Degree
RDB	Red Data Book
s	Second
S	South
sp.	species
ssp.	subspecies
TUIK	Turkish Statistical Institute

UVS	Long-Term Standard
W	West

I. DESCRIPTION AND PURPOSE OF THE PROJECT

(Project subject, description of the project activity, lifetime of project, service objectives, market or service areas and its significance and requirements within this area on national, regional and/or provincial scale in point of economical and social issues)

I.1. Description of the Project Activity

Kavsakbendi Dam, Hydroelectric Power Plant (HPP) and Quarries Project is a power generation purposed project located on lower Seyhan basin, approximately 8 km downstream from the junction of Rivers Zamanti and Goksu which are two main tributaries of Seyhan River. With the purpose of determination of possible environmental, social and economic impacts that may occur during the construction and operation phases of the Project and taking respective preventive and mitigation measures, an “Environmental Impact Assessment Report (EIA)” Format has been prepared in accordance with the articles of the EIA Regulation (Official Gazette dated 16 December 2003 and numbered.25318) which is presented in Appendix A.

Kavsakbendi Dam, HPP and Quarries Project, which was proposed in “Lower Seyhan Basin Master Plan Report” published by General Directorate of State Hydraulic Works (DSI) in 1980, has a transmission tunnel with a length of 8,600 m, installed capacity of 120 MW and is expected to generate a total of 563,8 GWh energy. However, since it was envisaged that the construction of the proposed long energy tunnel was impossible due to geological circumstances, too risky and would be too costly, a project formulation suggesting a shorter, geologically much more feasible and low cost tunnel route was adopted. In this context, by taking the Kavsakbendi axle given in Master Plan to approximately 7.5 km downstream, the HPP was located on talveg elevation of 249.00 m., proposed as dam type concrete load and designed as a dam body with 74 m height from talveg and at crest elevation of 323.00 m. In this way, the planning integrity of Seyhan River would not be deteriorated. By keeping the location of the power plant and tailwater elevation given in Master Plan same, the length of the energy tunnel was decreased to 1,950 m.

The installed capacity of Kavsakbendi Dam, HPP and Quarries Project is 145.40 MW, annual power generation is 650.78 GWh in full development condition and its rentability is 2.28 and internal rate of return is 20.45%.

While economical lifetime of the Project has been anticipated as 50 years, it is possible to extend the lifetime of the Project to 100 years provided that the electro-mechanical equipments are renewed and necessary rehabilitation activities in hydraulic structures are carried out per 35 years.

I.2. Purpose and Importance of the Project

Energy demand depending on industrial development is increasing day by day in our country as is in the world. Our electricity energy production is also increasing in parallel with this demand (See.Fig. I.1).

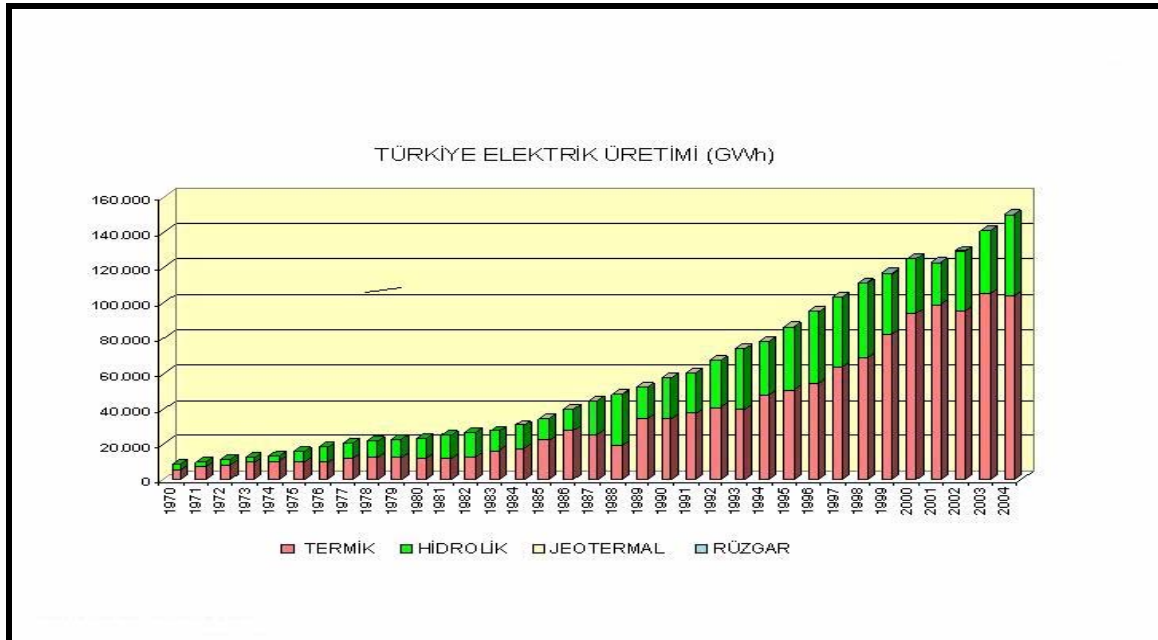


Figure I-1 Turkey Electricity Production (GWh)

At present, energy consumption is considered as an important parameter in determination of a society's development and civilization level. In parallel with increasing of energy consumption, improvements and developments have been observed in every respect. Norway, one of the European countries, has the highest electricity consumption per annum with a consumption amount of 26,000 kWh per capita. This value is much lower in Turkey and is only 1,840 kWh. Figures showing national income and electricity consumption in Turkey and in some European countries are presented in Table I.1.

Table I.1 Per capita Income and Per Capita Electric Consumption

COUNTRIES	National Income per Capita (\$/capita)	Electricity Consumption per Capita (kWh/capita)
Turkey	4,000	1,840
Germany	29,000	6,000
France	30,000	7,000
Switzerland	40,000	8,200
Norway	39,800	26,000

Source: EUAS Office of RPC Statistics and Research Department

Developed countries have primarily evaluated all of the available hydroelectric possibilities from technical and economical aspects and in order to meet the rest of their energy needs, they have headed towards their thermal, nuclear and natural sources as secondary sources. In our country this process has evolved in reverse order. As

presented in Table I.2; in our country, the portion of hydroelectric energy sources among the entire electricity generating sources is about 25%.

Table I.2 Distribution of Sources in energy production in Turkey (January 1st – December 31st 2005)

Sources	Production (MWh)	Contribution (%)
Thermal	121,876,842	75.46
Hydraulic	39,572,014	24.50
Wind	56,031	0.03
Total	161,504,888	100.00

Source: EUAS Office of RPC Statistics and Research Department

It is essential that our energy demand should be met in an uninterrupted, quality, reliable, economical and environmental friendly way. In order to obtain sustainable development, it is an obligation to use renewable energy sources which are clean and environment friendly. Hydroelectricity holds the top place in renewable sources in Turkey. As of the end of February 2005, hydroelectric potential of Turkey sums up to 129.4 billion kWh/year. 35% percent of this potential is in operation, 8% is in construction and rest of the 57% is still in planning stage and waiting to be utilised (See Table I.3).

Table I.3 Development of Turkey's Hydroelectric Energy Potential as of beginning of 2006

PHASE	NUMBER OF PROJECTS	INSTALLED CAPACITY (MW)	AVERAGE ANNUAL POWER GENERATION (GWh)	PERCENT OF TOTAL POTENTIAL (%)
Operation	137	12.846	46.191	35
Construction	39	3.004	9.770	8
Subtotal	176	15.850	55.961	43
Pre-construction	540	20.847	73.972	57
Total Economic Potential	716	36.697	129.933	100

Source: World Energy Council, Turkish National Committee, Electronic Bulletin, No.9, March 2006

As seen from Table 1.3, it is benefited from just 35% of the hydroelectric potential of our country. This ratio is 75% in Europe and 70% in the USA.

HPP's have advantage over other types of energy production systems from a variety of aspects as they are renewable, use domestic natural sources, have low operation and maintenance costs, long physical lifetimes, produce less environmental effects and make economical and social contribution to rural areas. During construction and operation of HPP's, 80% of investment cost consists of domestic expenditures. Compared with the natural gas and coal-fired power plants, HPP's have lesser international dependency and foreign currency expenditure. While inertia of thermal power plants is quite high, that of HPP's is very low. For this reason HPP's have functions like balancing load and frequency arrangement on interconnected power system. Besides, while thermal power plants contribute to greenhouse gases emissions stated in the Kyoto Protocol with CO₂, SO₂, coal slag and ash problems, HPP's have no gas emissions. Behaving diligently in location selection of the plants considering the environment and examining the possible negative impacts in feasibility and design phases will decrease the pressure of the HPP's on the environment .

The actualization of of hydroenergy projects with controlled environmental impacts, will enable to rely less upon the plants utilising technologies that can create environmental problems at regional and even global scale.

In order to evaluate the hydroenergy potential of streams in our country, 566 HPP projects have been prepared. 130 of them are being operated, 31 are being constructed and 405 of them are in various project levels. It is estimated that the cumulative installed capacity of these plants is 35,540 MW, and the energy potential is 126,109 GWh/year. 35% of this figure (44,388 GWh) is from currently operated plants, 9% (10,845 GWh) is from the ones under construction and 56% (70,767 GWh) belongs to several project (baseline, preliminary survey, planning and final project) stages. It is seen that with 126,109 GWh/year energy capacity, Turkey has an hydroelectric potential amounting to almost 15% of Europe's economic potential.

Since the amount of generated secondary energy which is the energy other than reliable energy depends on precipitation conditions, though with a changing proportion every year, hydroenergy contributes 30-40% of the electricity production considering long-term average.

"Medium and Long-Term Production Investment Planning", which is an analysis of the development of Turkish electrical systems, is under the responsibility of TEIAS and the information on HPP needed for the planning studies is provided by DSI and EIEI while the information regarding thermal power plants is provided by TEIAS. Turkey medium and long-term electricity production projections are prepared according to WASP Model. Electricity demand estimations, used for medium and long-term planning studies, are prepared by the Ministry of Energy and Natural Sources according to MAED model. Year 2020 is the target for long term estimations. In the produced scenario, it is envisaged that the HPP's which are renewable and domestic energy sources are to be of primary importance. If the HPP constructions are completed within the set period of planning, Turkey's installed hydroelectrical capacity will rise to 24,935 MW in 2010, and to 29,984 MW in 2020. As far as the distribution of installed capacity is examined according to fuel types, it is estimated that hydrolic and other renewable sources will have the largest share with 38% of total production in 2010.

Table I.4 Turkey Long-Term Electrical Energy Demand Estimation

Year	Peak Time Demand (mw)	Energy Demand (GWh)	Increase Rate (%)
2001	20,020	127,889	-
2002	22,870	143,500	12.2
2003	25,315	159,080	10.9
2004	28,020	176,340	10.8
2005	31,010	195,470	10.8
2006	33,466	211,000	7.9
2007	36,115	227,793	8.0
2008	38,973	245,911	8.0
2009	42,058	265,471	8.0
2010	45,387	286,586	8.0
2011	48,515	306,796	7.1
2012	51,860	328,432	7.1
2013	55,435	351,594	7.1
2014	59,256	376,389	7.1
2015	63,341	402,932	7.1
2016	67,707	431,348	7.1
2017	72,374	461,767	7.1
2018	77,364	494,331	7.1
2019	82,697	529,192	7.1
2020	88,397	566,512	7.1
2021	93,612	600,623	6.0
2022	99,134	636,788	6.0
2023	104,982	675,130	6.0
2024	111,175	715,781	6.0
2025	117,733	758,880	6.0
2026	124,022	800,375	5.5
2027	130,646	844,139	5.5
2028	137,625	890,297	5.5
2029	144,976	938,978	5.5
2030	152,720	990,321	5.5

Source: Electrical Energy, Production-Consumption Balance (2002-2006), TEAS, 2001

In addition to its contribution to Turkish economy and energy market, operation of Kavsakbendi Dam, HPP and Quarries Project will create new energy opportunities in the region which always has a high potential of development due to its geographical location, closeness to transportation roads and big harbors and will provide many important benefits to national economy and employment during construction and operation phases. The Project will also contribute to the amount of “green energy” produced by Turkey, and to energy export possibilities to European countries which are obliged to consume at least 22% of their total energy as “green energy” according to the Kyoto Protocol. Furthermore, construction and operation of the HPP by domestic capital will provide more effective usage of national sources, will decrease the need for foreign energy sources and make contribution to the utilisation of potential renewable energy sources.

Due to the reasons mentioned above, actualization of Kavsakbendi Dam, HPP and Quarries Project will provide considerable benefits both for the region and the country. The energy which will be produced with the purposed project on the Seyhan River will enable the utilisation of hydroelectric potential of Lower Seyhan Basin and also serve whole Turkey by its inclusion in the interconnected system.

II. LOCATION OF THE PROJECT SITE

II.1. Project Site (Presentation of the Project Site Approved by Related Governorship or Municipality on Approved Landscaping Plan including Legend and Plan Notes and Settlement Plans, on Present Land Usage Map if these plans are not available)

Kavsakbendi Dam, HPP and Quarries Project is located on Lower Seyhan basin, approximately 8 km downstream from the junction of Rivers Zamanti and Goksu which are two main tributaries of Seyhan River.

Project Site lies in the borders of Kozan and Aladag Districts of Adana Province. The Project Site is 7 km away from Aladag District center and 27 km away from Kozan District center. Kavsakbendi Dam axis coordinates are 4 160 250 N and 7 23 350 E.

General view of the Project Site is presented in Figures II.1 and II.2 and the photos of the Project Site captured by Dokay-CED during land survey in December 2006 are presented in Figures II.3 and II.4.

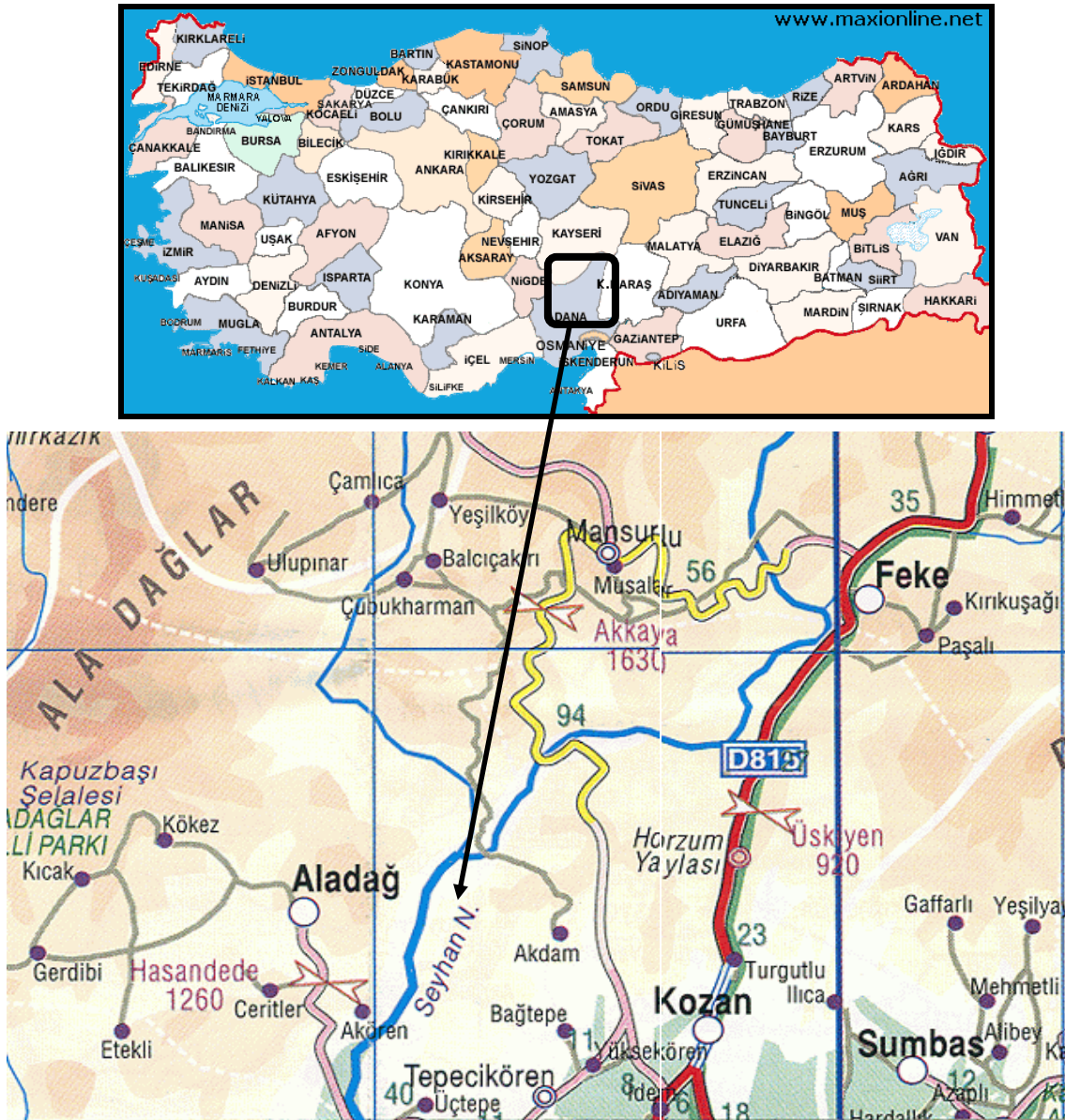


Figure II.1 Location of the Project Site in Turkey

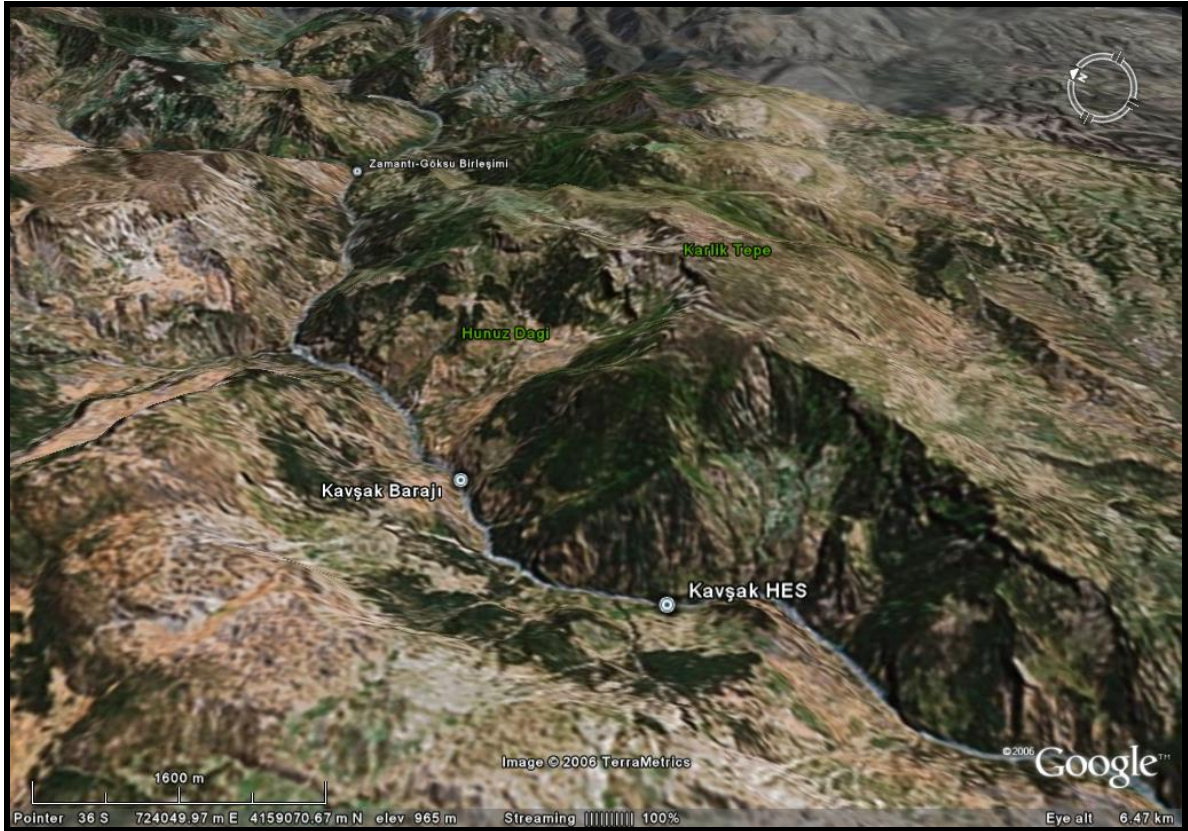


Figure II.2 Satellite photo of the Project Site and its surroundings



Figure II.3 View from the Project Site-I

The closest residential areas to the subject Kavsakbendi Dam, HPP and Quarries Project Site activities are Karahan Village (Aladag), Gokce Village (Aladag), Karakoyak and Guven Neighborhoods of Karahan Village. Transportation to the dam axis is provided with a 22 km – long road from Kozan to Akdam Village and then with a 20 km-long, very coarse stabilized road.



Figure II.4 View from the Project Site-II

II.2 The location of units within the context of Project (Dam Body and Weir Facilities (Spillway and Sluiceway), Transmission Conduits, Building and Facilities relevant to Hydroelectric Power Plant, Technical Infrastructure Units, Administrative and Social Units, Other Units if any, Size of Closed and Open Space within These Units, Presentation of the Location of These Units Within the Project Site on the General Plan or Sketch, Presentations as Representative Drawings or Scale Model with Other Techniques, Presentation of Temporary and Final Storage Areas within the context of the Project, Construction Site where will be constructed within the Dam Site and Rock, Sand, Gravel and Clay Pits which will be Opened in compliance with Mining Law, on 1/25,000, 1/5,000 and/or 1/1,000 scaled Maps)

General Plan of the location of the Kavsakbendi Dam, HPP and Quarries Project units within the Project Site, 1/25,000, 1/5,000 and/or 1/1,000 scaled maps including border coordinates of the construction site and storage sites and sand, stone, gravel etc. quarries which will be opened in compliance with the Mining Law are presented in Appendix B.

Footprint sizes of the Project units are presented in Table II.1.

Table II.1 Footprint sizes of Kavsakbendi Dam, HPP and Quarries Project Units

NAME OF UNIT	FOOTPRINT SIZE (m ²)
Body	13,400
Power House	3,100
Switch Yard	4,600
D1 Depot	192,600
D2 Depot	62,900
D3 Depot	357,400
D4 Depot	603,500
T1 Rock Quarry	13,500
T2 Rock Quarry	13,000
A Impermeable Material Quarry	31,300
B Impermeable Material Quarry	26,200
C Impermeable Material Quarry (substitute)	913,000
Derivation Tunnel Intake Structure	1,700
Derivation Tunnel Outlet Structure	1,600
Derivation Tunnel 1	5,800
Derivation Tunnel 2	5,400
Injection Galleries	1,000
Surge Tank	640
Energy Inlet Structure	1,800
Energy Tunnel	26,500

III. ECONOMICAL AND SOCIAL ASPECTS OF THE PROJECT

III.1. Investment Program and Financial Resources Regarding the Realization of the Project

The planned facilities within the context of Kavsakbendi Dam, HPP and Quarries Project will be completed in approximately 4 years and operated for 49 years once the operation activities are started.

Total investment cost of the Project according to DSI unit prices for the year 2004 is 179,704,461 US dollars. Total annual operation costs are 18,708,827 US dollars. Annual expenses include operation and maintenance expenses, renewal, interest and amortization costs. Construction cost and annual expenses of Kavsakbendi Dam, HPP and Quarries Project are presented in Table III.1.

As seen from Table III.1, total of construction cost is 138,610,713 US dollars including building operations, electromechanical equipment and energy transmission line.. Determined value for survey, project, control and expropriation costs is 10,997,671 US Dollars. In this context, the total investment cost is estimated as 149,608,384 US Dollars. When unexpected expenses -10% for construction and 5% for electromechanical equipment- are added to this value, total facility cost sums up to 387.770 Million US Dollars. Finally, with the addition of survey, control and expropriation costs of the Project, total Project cost amounts to 412,770 Million US Dollars.

Total investment cost was accounted as 179,704,461 US Dollars by adding the construction phase interest amount of 30,096,078 US Dollars which is calculated on the basis of a 9.5 % interest rate in accordance with the DSI criteria for the energy projects..

A part of the total investment cost will be met by equity capital and the remaining will be met by loans.

In order for the completion of construction and equipment works and operation of Kavsakbendi Dam, HPP and Quarries Project Facilities, an investment schedule of 46 months since the date of production license issued by Energy Market Regulatory Authority. First 20 months of this period comprise preparation of the Final Project, expropriation works, negotiations for loan and preparation and approval process of the EIA Report while the remaining 26 months cover construction works, supply and montage of electromechanical equipments and testing stages.

III.2. Work Flow Diagram or Time Table regarding the Realization of the Project

As it was mentioned in the previous chapters, the Project is planned to be completed within 4 years. March chart for the Kavsakbendi Dam, HPP and Quarries Project is presented in Figure III.1

Table III.1 Cumulative Cost and annual expenses of the Kavsakbendi Dam, HPP and Quarries Project

No.	Type of the Work	Survey Cost (USD)	Unknown Expenses (USD)	TOTAL (USD)	Interest + Amortization Factor	Renewal Factor	Operation + Maintenance Factor	Annual Expense		
								Interest + Amortization + Renewal (USD)	Operation + Maintenance (USD)	TOTAL (USD)
1	Cofferdams	351,223	35,122	386,345	0.096027	0.0000326	0.00500	37,112	1,932	39,044
2	Dam Body	22,431,844	2,243,184	24,675,028	0.096027	0.0000326	0.00500	2,370,273	123,375	2,493,649
3	Derivation Tunnel and Underwater Weirs	10,179,907	1,107,991	11,197,898	0.096027	0.0000326	0.00500	1,075,666	55,989	1,131,655
4	Weir	6,638,136	663,814	7,301,950	0.096027	0.0000326	0.01000	701,422	73,019	774,442
5	Surge Tank	2,357,175	235,718	2,592,893	0.096027	0.0000326	0.01000	249,072	25,929	275,001
6	Power Station	5,874,567	587,457	6,462,024	0.096027	0.0018480	0.01000	632,471	64,620	697,091
7	Penstock	3,658,287	365,829	4,024,116	0.096027	0.0008136	0.02000	389,698	80,482	470,180
8	Energy Water Inlet Structure	2,195,346	219,535	2,414,881	0.096027	0.0000326	0.00500	231,972	12,074	244,047
9	Transmission Tunnel	25,705,518	2,570,552	28,276,070	0.096027	0.0000326	0.00500	2,716,188	141,380	2,857,568
10	Construction Site and Roads	3,394,117	339,412	3,733,529	0.096027	0.0018480	0.04000	365,419	149,341	514,760
11	Injection Gallery – Injection	13,556,346	1,355,635	14,911,981	0.096027	0.0000326	0.00500	1,432,439	74,560	1,506,999
12	E/M Equipments	29,080,000	1,454,000	30,534,000	0.096027	0.0041376	0.01500	3,058,426	458,010	3,516,436
13	Energy Line	2,100,000	-	2,100,000	0.096027	0.0041376	0.01500	210,346	31,500	241,846
17	SUBTOTAL			138,610,713				13,470,504	1,292,213	14,762,717
18	Survey, Project and Control			10,597,671	0.096027	-	-	1,017,663	-	1,017,663
19	Expropriation			400,000	0.096027	-	-	38,411	-	38,411
20	TOTAL PROJECT COST			149,608,384				14,526,577	1,292,213	15,818,791
21	Construction Term Interests			30,096,078	0.096027	-	-	2,890,036	-	2,890,036
22	COST OF INVESTMENT			179,704,461				17,416,613	1,292,213	18,708,827



III.3. Cost-Benefit analysis of Project

Economic feasibility of the Kavsakbendi Dam, HPP and Quarries Project is evaluated by the internal rate of return (IRR) and income/expense rates. The internal rate of return is the discount value that equalizes the current value of the income and expenses of the proposed facility till the end of the economic life of the facility. If the discount value of concern is calculated to be higher than the social discount rate, the proposed project is considered to be economically feasible. Income/Expense rate is calculated by transferring the cash flow of the income and expenses during the operation phase of the project to the first year with the discount rate (scrutinizing the national economy, 9.5% for the energy projects) and by calculating this value. Another condition for the feasibility of the Project is satisfied if this rate is greater than 1.

The total energy benefit composed of annual energy benefits (firm and secondary energy benefits in full development case) is 39,706,740 US dollars. The annual expense is composed of interest, amortization, renewal and operation and maintenance expenses. According to this, the annual expense of the Project is 15,818,791 US dollars.

In this case, total income/total expense rate, which estimated by the method of transferring 50 years' incomes and expenses to the first year with a discount rate of 9.5% is 2.28, and the Internal Rate of Return is 20.45%. The Project is considered as feasible since the total income/total expense rate and IRR are higher than 1% and 9.5 %, respectively.

III.4. Other Economical, Social and Infrastructural Projects which are not in the Scope of the Project but are Proposed by the Project Owner or Other Investors Depending Upon the Realization of the Project

Water Supply and Wastewater Treatment

The potable water required in the construction phase of the Project will be supplied from the neighboring springs and creeks with acceptable water quality. Wastewater produced during construction phase will be discharged to the receiving water body in compliance with the Water Pollution Control Regulation (WPRC) after being treated in compact wastewater treatment plant. The wastewater that will be generated during the operation phase will be stored in isolated septic tanks, until the wastewater is transferred to wastewater treatment facilities of Kozan Municipality by a vacuum truck and will be treated in the Municipality's facilities. The relevant document obtained from Kozan Municipality is presented in Appendix C, and the impermeable septic types and projects are presented in Appendix D.

Fire Protection System

An appropriate fire protection system will be established within the scope of Kavsakbendi Dam, HPP and Quarries Project to prevent a possible fire. The fire alarm

system that is equipped with heat, smoke and flame detectors will be used inside the power plant building and the following fire extinguishing systems will be made available:

- Fire Hydrants,
- Fire Extinguishers working with CO₂,
- Hand-held Fire Extinguishers,
- Fire Blankets,
- Fire Extinguisher Powder Generator,
- Fire Extinguisher Foam Generator,
- CO₂ Tank,
- Sand Buckets,
- Foam System,
- Fire Hose System.

Illumination

All the necessary outdoor and indoor illumination equipment will be provided for the Project. In this context, outdoor illumination will be provided especially for hydraulic structures and HPP buildings.

III.5. Other Economical, Social and Infrastructural Projects which are not within the Context of the Project but are Requisite for the Realization of the Project or Planned to be Carried Out by the Project Owner or Other Investors

No additional infrastructural activity is required in the scope of Kavsakbendi Dam, HPP and Quarries Project except for the ones discussed in Section III.4.

III.6. Expropriate and Resettlement

The lands remaining in the reservoir are forestlands that are governmental property and lands of private property occupying a space of 11,015 m². Since the transmission will be provided with tunnel, expropriation and resettlement will not be problematic in these parts.

Presently, the necessary procedures are being carried out for the lands to be expropriated. On the final project stage, as minimum expropriation as possible will be made during the works for the determination of facility sites on appropriate scaled maps. After the determination of the route, expropriation limits and net expropriation cost shall be calculated.

Mutual agreement with the land owners will be the primary way to be followed during expropriation of lands. In case of disagreements, land expropriation will be accomplished in compliance with Expropriation Law (Official Gazette dated 5 May 2001 and numbered 24393).

There will not be any settlement areas under flood due to the Project. Thus, no resettlement will take place.

In case EIA acceptable certificate is given for the Project, by following the legal procedures for quarries to be opened with in the scope of the Project and taking necessary licenses by applying to the Province Customary Administration Office for Group 1-A (soil-gravel) mines and to General Directorate of Mining Works for Group II mines (CaCO_3 -limestone), production activity will commence.

T1, T2 and B Quarries, storage sites and crushing plant to be used for the Project are in the forest lands and prior to construction, as stated the letter of Adana Local Forestry Directorate dated 10 August 2007 and numbered 9908 (see Appendix-C), the required permission will be obtained from the Local Forestry Directorate according to the Article 17 of the Forest Law no. 6831, and a raw material permission license for materials will be obtained in compliance with the law no. 5177.

Some part of the Quarry A lies in forest area and the remaining part in private property. Impermeable Quarry B completely lies in forest zone. Proprietorship of Impermeable Quarry C will be determined when its utilization is deemed as necessary. In such case, applications will be made to the related governmental institutions and the required licenses will be acquired.

Moreover, some part of Andirap Village and Karakoyak quarter will be expropriated in the scope of the Project and the exact data will be obtained during expropriation phase. Expropriation process will be carried out in compliance with the Expropriation Law no. 2942 and with the Expropriation Law (Official Gazette dated 5 May 2001 and numbered 4650) offering various adjustments on the former one.

Expropriation will be performed by Energy Market Regulation Authority as a requirement of Article 15/c (different: Article 5 of the law no 5496) of the Energy Market Law no. 4628 and the expropriation decision will be considered as the public benefit decision and the expropriated real properties will be registered to the Treasury.

The decision of the Council of Ministers concerning the execution of Article 27 of the Expropriation Law no. 2942 in the expropriations carried out by the Energy Market Regulation Authority was published in Official Gazette dated 30 September 2004 and numbered 25599.

Article 27- In the execution of the National Defense Obligation Law, in extraordinary situations stipulated by the particular laws or conditions deemed as urgent by the Council of the Ministers or in need of country defense in expropriating the required real properties completing the processes other than value estimation with the request of the related department within seven days by the court, the value of the real property to be estimated by the expert assigned in accordance with the item 15 and principals of the item 10 by the administrative board on behalf of the owner of the property according to the invitation given in

compliance with the item 10 and depositing to the bank denoted in the advertisement the real property can be confiscated. The amount deposited is the first installment in expropriating in case of situations mentioned in the 2nd clause of the 3rd item of this law. For this reason, an in-situ value estimation is performed by the expert, and the estimated amount is deposited to the declared bank account and it will be paid to the property owner through the channel of the Province Governorship. Construction will begin upon completion of this payment procedure. Afterwards a proposal of housing is directed to the former property owner. The holder of right will request for housing by giving the expropriation amount back.

The law offering adjustments in the Forestry Law no: 5192 (Official Gazette dated 3 July 2004 and numbered 25511) for the facilities located in the forest areas states that “ In case of public benefit or exigency concerning the location or construction of defense, transportation, energy, communication, water supply, wastewater, petroleum, natural gas, infrastructure facilities and solid waste disposal sites; sanatoriums, dams, ponds and cemeteries; governmental health, education and sports facilities and related places in governmental forest areas, real and legal persons can be licensed by the Ministry of Environment and Forestry (MoEF) in return for the determined value. The required licenses will be acquired from the General Directorate of Forestry and value of the trees to be logged will be paid.

III.7. Other Issues

There are not any other issues to be discussed in this section regarding the economical and social aspects of the Project.

IV. IDENTIFICATION OF THE AREA TO BE IMPACTED FROM OF THE REGULATOR, HPP AND QUARRIES WITHIN THE CONTEXT OF PROJECTS AND CLARIFICATON OF ITS ENVIRONMENTAL CHARACTERISTICS

IV.1.1. Identification of the Area to be impacted from the project (According to How and what the impact area will be determined is explained and the impact area will be marked on the map)

Impact area of the Project was determined by considering the nearest residential areas around the Project site and the lands will remain under water. So far, the part of the Cadastral surveys has been completed for the areas within the borders of Aladag District. On the parts of the river passing from the borders of Kozan District, there are partly cadastral borders of private properties. The remaining areas are governmental forest areas.

The lands remaining in reservoir are the forestlands assigned to governmental property and a section of 11,015 m² belongs to private property. Andrap Bridge which connects Gokcekoy-Karahan-Kislak with Kozan and Aladag Districts will also be left in reservoir.

Since the transportation to Aladag District of Gokcekoy, Karahan and Kislak Villages can not be provided in winter months, the local people reach the Province and Aladag District through Kozan District.

Provided that a bridge and 3 km road will be constructed between Kayabasi quarters of Uzunkuyu village and Dogançay, there will not be any interruption in the connection of Gokcekoy, Karahan and Kislak Villages to the district.

Since the two energy transmission columns in Kozan and Aladag sections of Andrap Bridge within the Project Site are in the operation line, these columns must be elevated..The land registry study concerning the Project is presented in Figure IV.1.

No residential area will remain under water due to the Project. Thus, resettlement will not be needed.



IV.2.1. Characteristics of the Physical and Biological Environment within the Impact Area and Utilization of Natural Resources

IV.2.2. Meteorological and Climatological Characteristics

This section comprises an evaluation on the micro- and macro-meteorological conditions of the regional climate. The present meteorological conditions of the region are explained and the data from Kozan Meteorological Station are presented.

Proposed Project Site displays typical climatologic characteristics of Mediterranean region wherein it is located. Summers are hot and dry while winters are mild and rainy. Despite having lower rate of humidity compared to that of Adana Province, the region receives higher amount of precipitation throughout the year.

The Meteorological Station in the Region

In this section, the long term data recorded at Kozan Meteorological Station are assessed. Long Term Meteorological Bulletin (1975-2005) of Kozan Meteorological Station is presented in Appendix E.

Table IV.1 Kozan Meteorological Station

Recorded Period	1975-2005
Latitude	37.27
Longitude	35.49
Height	11 m

Source : State Meteorological Service, Kozan Meteorological Station (1975-2005)

Wind Speed Distribution in the Region

In order to determine the speed and direction of prevailing wind in the region, observation data collected by Kozan Meteorological Station between 1975-2005 were evaluated. According to long term observations, the most prevailing wind direction is north-northwest (NNW).

As a result of the measurements made by Kozan Meteorological Station, long term average annual wind speed was found as 2.0 m/s. After measurements of 30 years, direction of the fastest wind was found as NNW with the velocity of 23.4 m/s. In this observation period, the average number of stormy days was 4.1 (wind velocity ≥ 17.2 m/s), and the number of days with strong wind was 49 (wind velocity ≥ 10.8 -17.1 m/s).

Monthly and annual blowing frequencies are presented in Table IV.2 for the subject period. Annual wind rose is presented in Figure IV.2 according to blowing numbers. Blowing numbers according to the seasons are presented in Tables IV.3, IV.4, IV.5, IV.6 and IV.7, and wind roses are presented in Figures IV.3, IV.4, IV.5, IV.6, and IV.8.

Table IV.2 Blowing Frequencies of Winds (monthly and annual)

DIRECTIONS	MONTHS												Annual
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
N	201	186	152	148	96	71	41	69	144	231	198	201	1738
NNE	151	98	124	110	122	118	77	88	128	124	140	144	1424
NE	13	12	19	26	31	35	28	30	12	11	8	14	239
ENE	25	23	34	17	28	34	20	12	14	13	14	18	252
E	40	42	39	30	27	42	20	14	13	19	42	50	378
ESE	94	74	47	51	62	107	109	86	66	61	83	83	923
SE	18	23	23	32	68	75	118	130	49	41	31	27	635
SSE	47	69	101	95	153	194	290	290	175	96	78	64	1652
S	14	17	30	34	66	64	82	79	37	22	19	28	492
SSW	68	68	111	164	168	176	183	111	119	103	63	60	1394
SW	14	8	15	35	22	18	20	17	14	24	16	8	211
WSW	14	18	26	45	18	22	8	9	7	20	14	11	212
W	8	6	15	6	16	10	7	3	9	11	7	5	103
WNW	18	17	23	27	19	15	7	1	9	14	18	18	186
NW	58	40	37	34	23	19	21	17	30	38	54	52	423
NNW	395	347	296	163	134	107	55	61	153	358	443	470	2982

Source : State Meteorological Service, Kozan Meteorological Station (1975-2005)

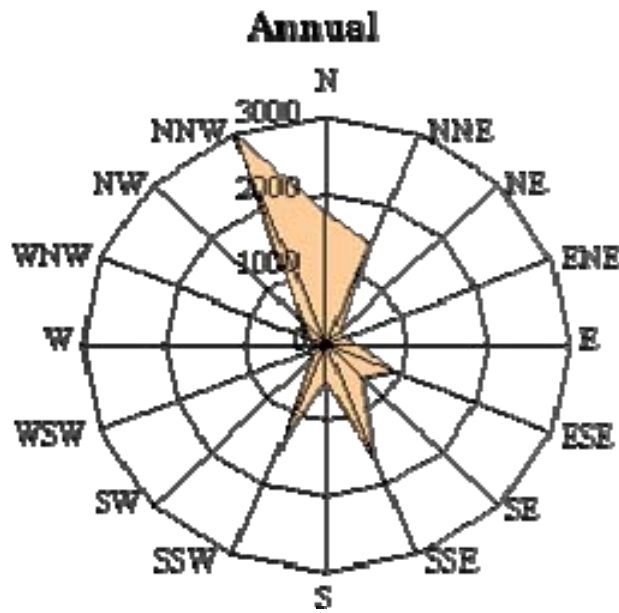
**Figure IV.2** Annual Wind Rose according to Blowing Frequencies

Table IV.3 Blowing frequencies of winds in winter

DIRECTIONS	December	January	February	TOTAL
N	201	201	186	588
NNE	144	151	98	393
NE	14	13	12	39
ENE	18	25	23	66
E	50	40	42	132
ESE	83	94	74	251
SE	27	18	23	68
SSE	64	47	69	180
S	28	14	17	59
SSW	60	68	68	196
SW	8	14	8	30
WSW	11	14	18	43
W	5	8	6	19
WNW	18	18	17	53
NW	52	58	40	150
NNW	470	395	347	1212

Source : State Meteorological Service, Kozan Meteorological Station (1975-2005)

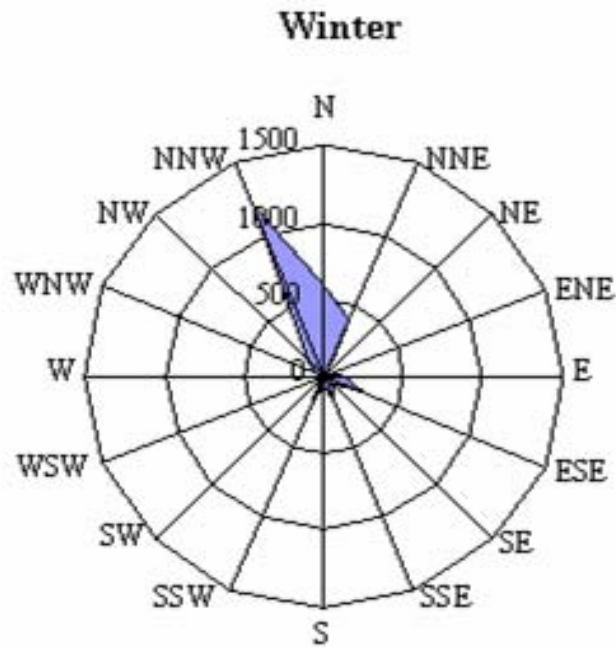
**Figure IV.3** Wind Rose according to Blowing Frequencies in Winter

Table IV.4 Blowing Frequencies of Winds in Spring

DIRECTIONS	March	April	May	TOTAL
N	152	148	96	396
NNE	124	110	122	356
NE	19	26	31	76
ENE	34	17	28	79
E	39	30	27	96
ESE	47	51	62	160
SE	23	32	68	123
SSE	101	95	153	349
S	30	34	66	130
SSW	111	164	168	443
SW	15	35	22	72
WSW	26	45	18	89
W	15	6	16	37
WNW	23	27	19	69
NW	37	34	23	94
NNW	296	163	134	593

Source : State Meteorological Service, Kozan Meteorological Station (1975-2005)

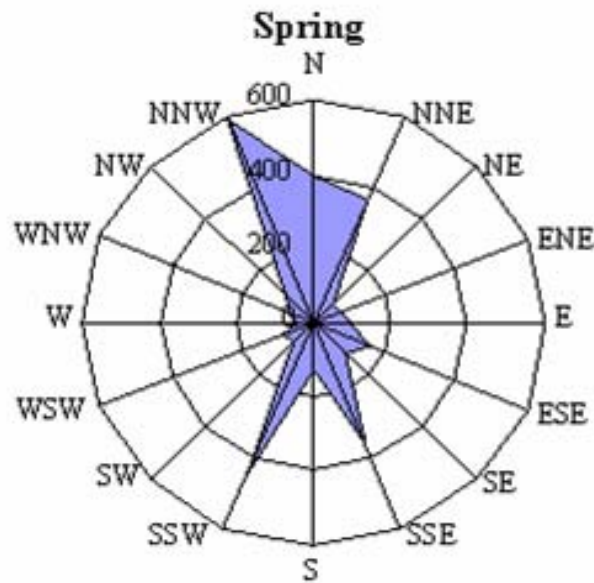
**Figure IV.4** Wind Rose according to Blowing Frequencies in Spring

Table IV.5 Blowing Frequencies of Winds in Summer

DIRECTIONS	June	July	August	TOTAL
N	71	41	69	181
NNE	118	77	88	283
NE	35	28	30	73
ENE	34	20	12	66
E	42	20	14	76
ESE	107	109	86	302
SE	75	118	130	323
SSE	194	290	290	774
S	64	82	79	225
SSW	176	183	111	470
SW	18	20	17	55
WSW	22	8	9	39
W	10	7	3	20
WNW	15	7	1	23
NW	19	21	17	57
NNW	107	55	61	223

Source : State Meteorological Service, Kozan Meteorological Station (1975-2005)

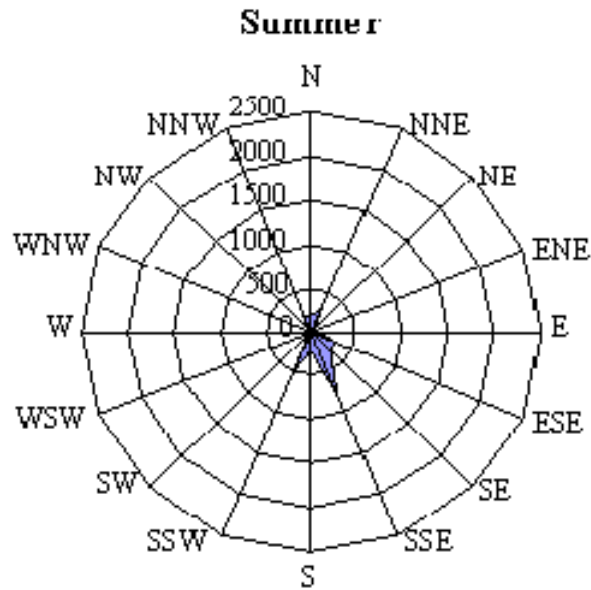
**Figure IV.5** Wind Rose according to Blowing Frequencies in Summer

Table IV.6 Blowing Frequencies of Winds in Autumn

DIRECTIONS	September	October	November	TOTAL
N	144	231	198	573
NNE	128	124	140	392
NE	12	11	8	31
ENE	14	13	14	41
E	13	19	42	74
ESE	66	61	83	210
SE	49	41	31	121
SSE	175	96	78	349
S	37	22	19	78
SSW	119	103	63	285
SW	14	24	16	54
WSW	7	20	14	41
W	9	11	7	27
WNW	9	14	18	41
NW	30	38	54	122
NNW	153	358	443	954

Source : State Meteorological Service, Kozan Meteorological Station (1975-2005)

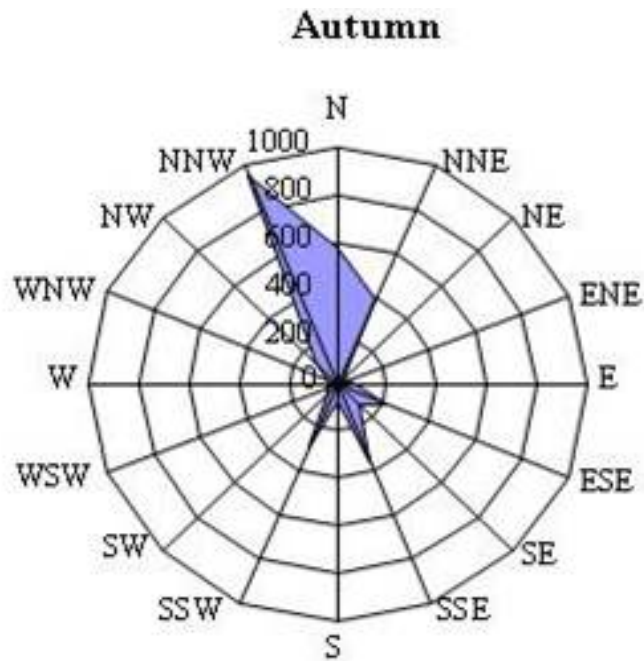
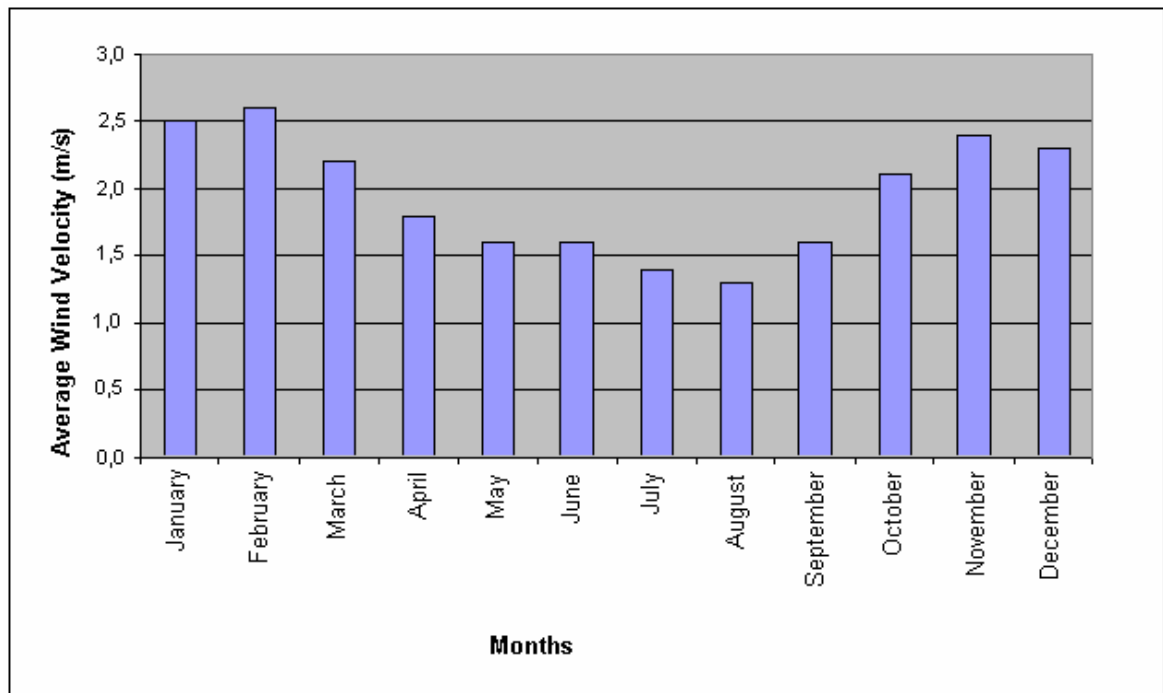
**Figure IV.6** Wind Rose according to Blowing Frequencies in Autumn

Table IV.7 Kozan Meteorological Station Average Annual Wind Velocity Distribution According to Directions (1975-2005)

		MONTHS												ANNUAL
		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
DIRECTIONS	N	2.6	2.9	2.4	2.2	2.4	2.4	2.6	1.9	2.1	2.3	2.6	2.6	2.4
	NNE	2.4	2.7	2.4	1.9	1.7	1.8	1.6	1.3	1.8	2.0	2.0	2.2	2.0
	NE	1.8	2.1	2.7	1.8	1.4	1.3	0.8	0.9	1.3	1.3	1.4	1.0	1.4
	ENE	1.5	1.5	2.5	2.2	1.2	0.9	0.8	0.8	0.7	1.0	1.1	1.7	1.4
	E	2.4	2.4	2.7	2.2	1.3	1.1	1.4	0.8	1.3	1.1	2.1	2.2	1.9
	ESE	1.8	2.1	2.4	2.0	1.2	1.1	1.4	1.6	1.3	1.3	1.6	2.0	1.6
	SE	1.4	1.8	1.4	1.2	1.2	1.2	1.2	1.7	1.6	1.3	1.1	1.3	1.4
	SSE	1.4	1.7	2.0	1.7	1.5	1.4	1.5	1.6	1.7	1.4	1.2	1.1	1.5
	S	1.3	1.9	1.9	1.5	1.2	1.6	1.3	1.3	1.5	1.3	0.9	1.0	1.4
	SSW	1.3	2.1	2.0	2.2	1.9	2.2	2.1	1.9	1.9	1.7	1.4	1.3	1.9
	SW	1.1	1.1	1.9	1.7	1.6	1.7	2.4	1.9	1.7	1.2	1.0	0.6	1.6
	WSW	1.6	1.2	1.5	2.4	1.4	1.3	1.9	2.0	0.8	1.1	1.2	1.0	1.6
	W	1.5	1.5	1.0	1.1	1.5	1.3	2.0	1.9	0.9	1.2	0.6	0.7	1.3
	WNW	1.5	2.0	1.9	1.5	1.9	1.4	1.4	0.3	1.8	1.4	1.3	1.6	1.6
	NW	3.0	3.3	2.6	2.3	2.3	2.5	3.7	4.0	3.1	2.9	3.3	2.8	3.0
	NNW	3.5	3.6	3.2	2.9	3.2	3.4	3.4	3.1	3.3	3.5	3.5	3.1	3.3

Source : State Meteorological Service, Kozan Meteorological Station (1975-2005)

**Figure IV.7** Average Wind Velocity (1975-2005)

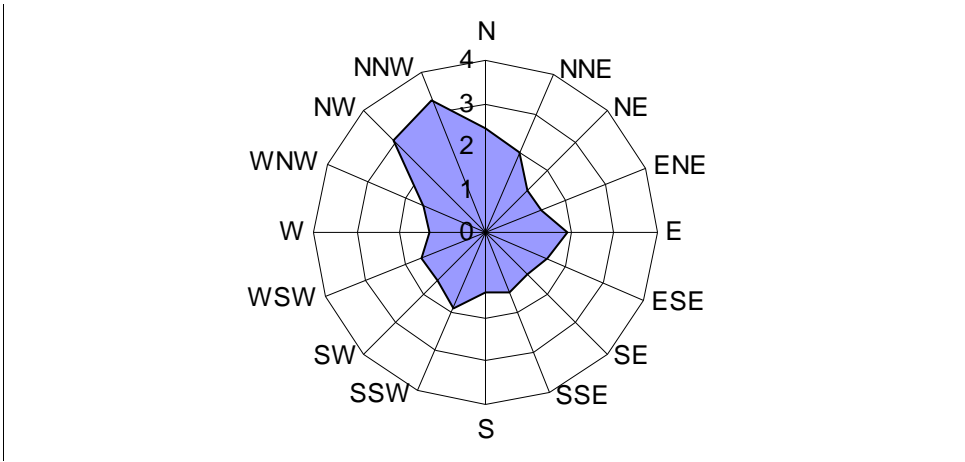
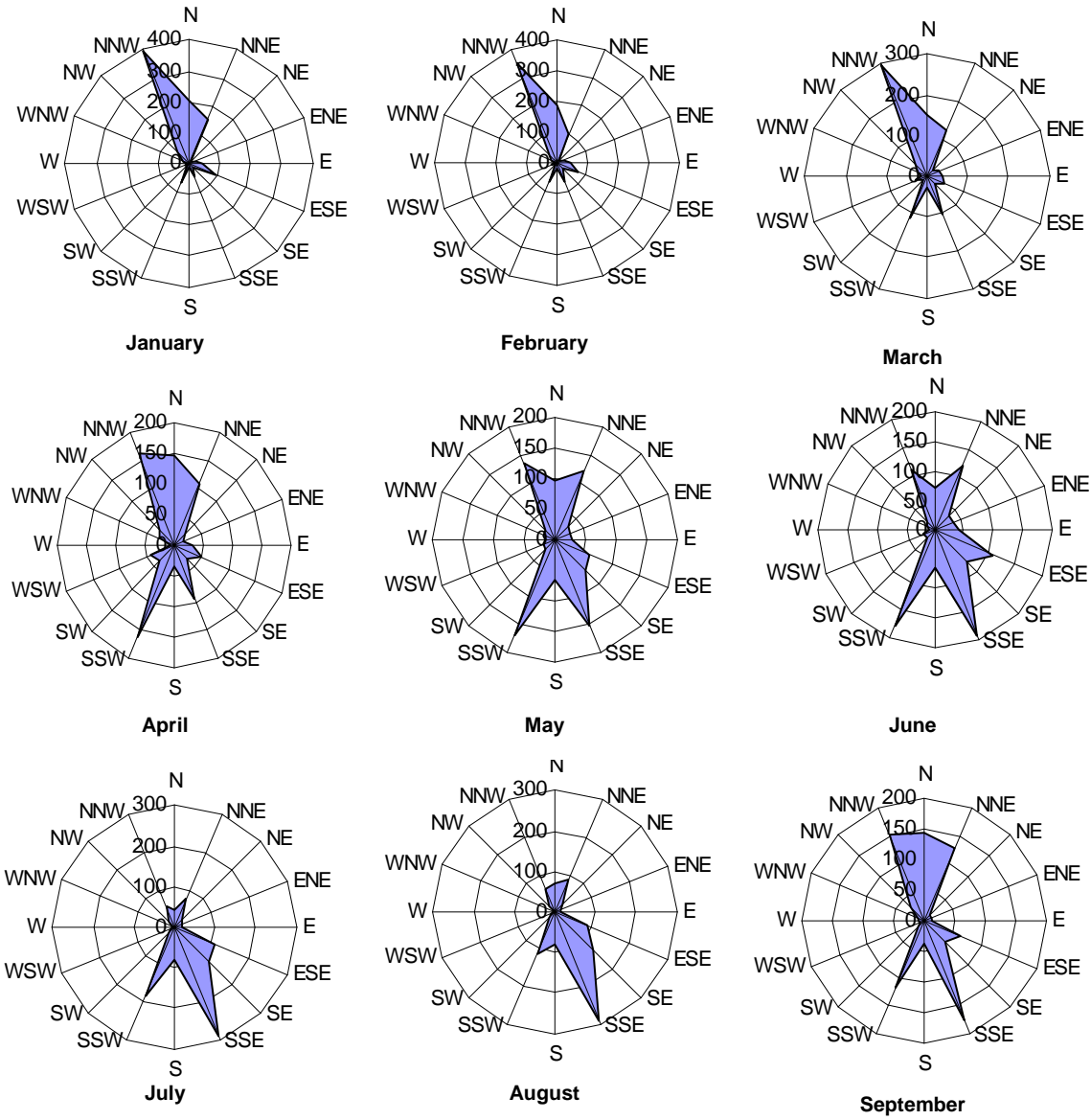


Figure IV.8 Annual Average Weather Vane According to Wind Velocity

Monthly wind roses according to blowing frequencies are presented in Figure IV.7.



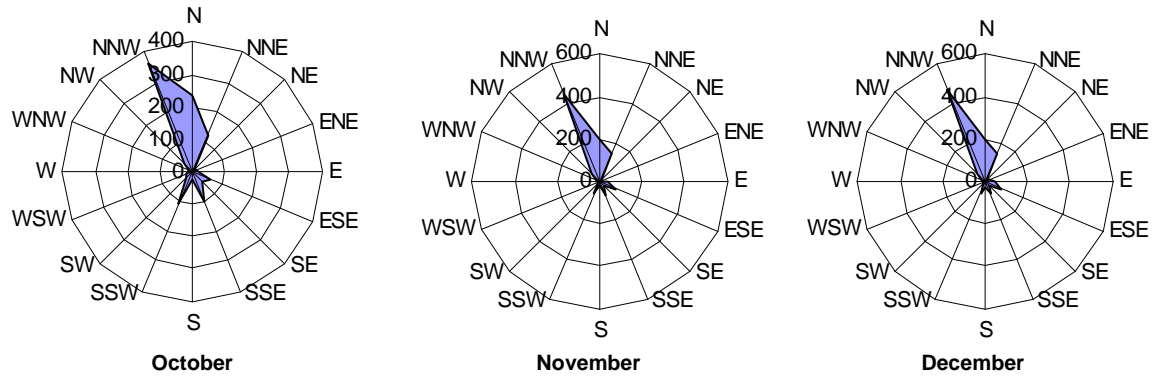


Figure IV.9 Monthly wind roses according to blowing frequencies

Temperature

The lowest weather temperature measured in Kozan District of Adana Province is - 5.0 °C (21 February 1985) and the highest one is 44.8 °C (07 August 1987) since 1975 (www.meteor.gov.tr, 2007). Average temperature changes according to months in the town are presented in Table IV.8, Figure IV.10 and IV.11

Table IV.8 Long-term Temperature Data of Kozan Meteorological Station

Temperature (°C)	MONTHS												Annual
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
Max. Temperature(°C)	25,0	26,9	31,2	37,3	41,5	42,1	44,4	44,8	43,4	39,5	32,4	26,7	44,8
Average Temperature(°C)	9,5	10,2	13,3	17,5	21,9	26,0	28,9	28,9	26,2	21,7	15,4	11,0	19,2
Min. Temperature(°C)	-4,0	-5,0	-3,6	2,0	5,3	11,0	15,0	14,8	13,0	3,6	0,7	-2,2	-5,0

Source : State Meteorological Service, Kozan Meteorological Station (1975-2005)

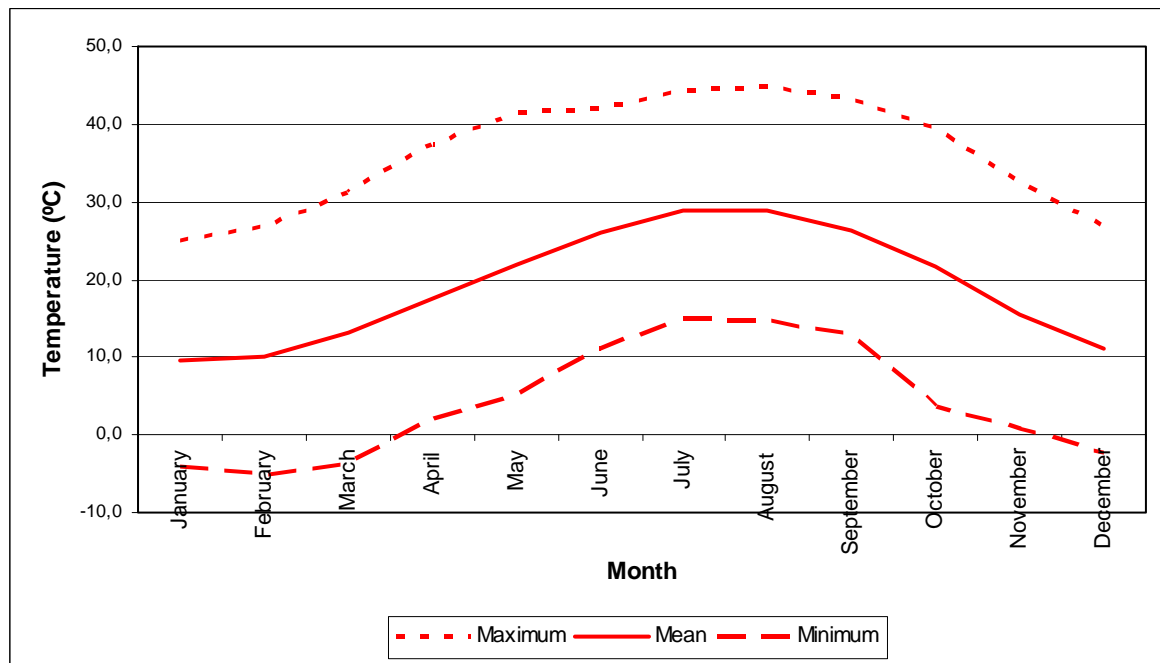


Figure IV.10 Kozan Meteorological Station monthly temperature values (1975-2005)

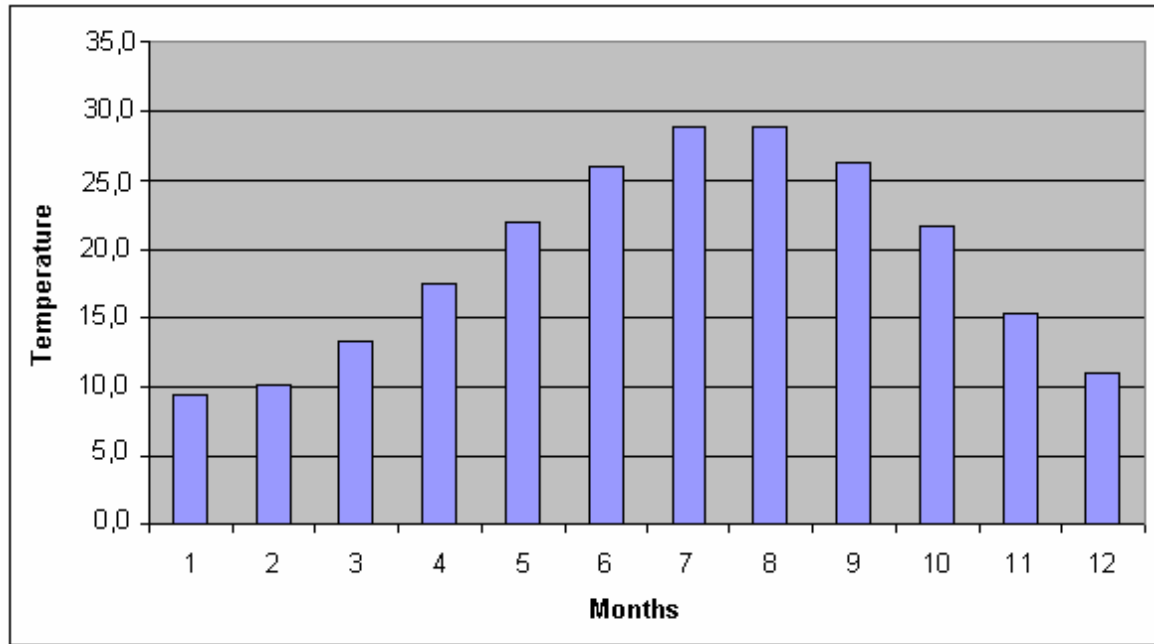


Figure IV.11 Kozan Meteorological Station Average Monthly Temperature Values (1975-2005)

Numbers of Days According to Different Temperatures are presented in Table IV.9.

Table IV.9 Numbers of Days According to Different Temperatures

TEMPERATURE	MEASURING PERIOD (year)	AVERAGE NUMBER OF DAYS
$\geq 30^{\circ}\text{C}$	31	141.8
$\geq 25^{\circ}\text{C}$	31	193.9
$\geq 20^{\circ}\text{C}$	31	248.2
$\geq 10^{\circ}\text{C}$	31	317.2
$\geq 5^{\circ}\text{C}$	31	361.0
$\leq -0,1^{\circ}\text{C}$	31	2.2
$\leq -3^{\circ}\text{C}$	31	0.2
$\leq -5^{\circ}\text{C}$	31	0.0
Average minimum temperature on topsoil	31	12.3
The lowest minimum temperature on topsoil	31	-8.6

Source : State Meteorological Service, Kozan Meteorological Station (1975-2005)

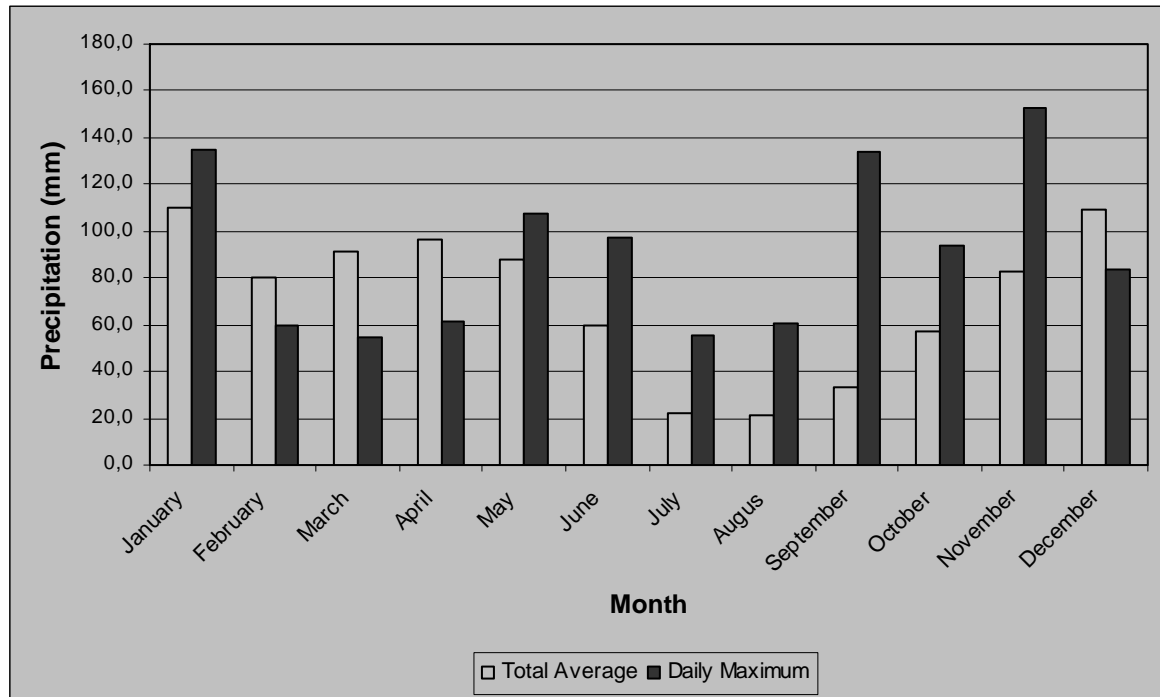
Precipitation

Data collected by Kozan Meteorological Station for 30 years shows that the average total precipitation value in the region is 851.7 mm. The highest rate of precipitation is in winter. When monthly average total precipitation values in this period are considered, the highest precipitation occurs in January with 109.8 mm. while the lowest one occurs in August with 21.4 mm. The annual average of number of snowing days is 0.3. Monthly precipitation values in the region are presented in Figure IV.9.

Table IV.10 Precipitation Data from Kozan Meteorological Station

Precipitation (mm)	MONTHS												Annual
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
Average Total Precipitation (mm)	109,8	80,1	90,9	96,1	87,8	59,3	22,6	21,4	33,6	57,5	83,1	109,5	851,7
Max. Daily Precipitation (mm)	135,1	60,1	54,6	61,0	107,9	97,0	55,1	60,9	134,2	93,8	152,5	84,0	152,5

Source : State Meteorological Service, Kozan Meteorological Station (1975-2005)

**Figure IV.12** Kozan Meteorological Station Monthly Precipitation Values (1975-2005)

The Distribution of Relative Humidity of the Region

Average annual rate of relative humidity is 58%. Minimum relative humidity is measured as 3.0% in April. Annual variations in the average and minimum values of relative humidity are presented in Table IV.11 and Figure IV.13.

Table IV.11 Relative Humidity Data from Kozan Meteorological Station

Relative Humidity	MONTHS												Annual
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
Average Relative Humidity(%)	58	58	59	63	61	60	62	62	57	51	54	59	58
Min. Relative Humidity(%)	4	7	5	5	7	3	4	4	3	4	7	11	3

Source : State Meteorological Service, Kozan Meteorological Station (1975-2005)

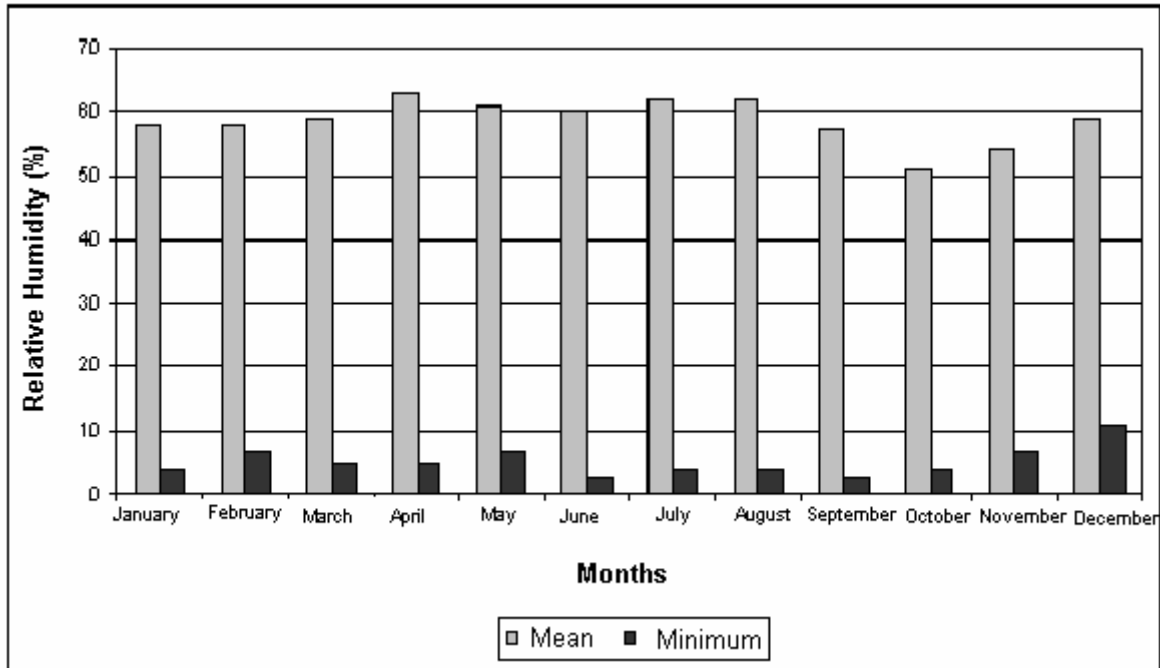


Figure IV.13 Kozan Meteorology Station Monthly Relative Humidity Distribution (1975-2005)

Evaporation Conditions in the Region

The values of monthly average evaporation and daily maximum evaporation values recorded by Kozan Meteorological Station between the years 1975-2005 are presented in Table IV.12 and Figure IV.11. The maximum monthly average evaporation was observed in July (253.7 mm).

Table IV.12 Evaporation Values

Evaporation (mm)	MONTHS												Annual
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
Average Evaporation (mm)	78.6	85.2	116.3	130.6	185.4	228.2	253.7	229.9	200.9	184.7	120.4	75.1	1889.0
Daily Maximum Evaporation (mm)	7.1	10.1	10.7	13.3	14.9	21.6	22.6	20.5	20.8	16.5	13.8	6.7	22.0

Source : State Meteorological Service, Kozan Meteorological Station (1975-2005)

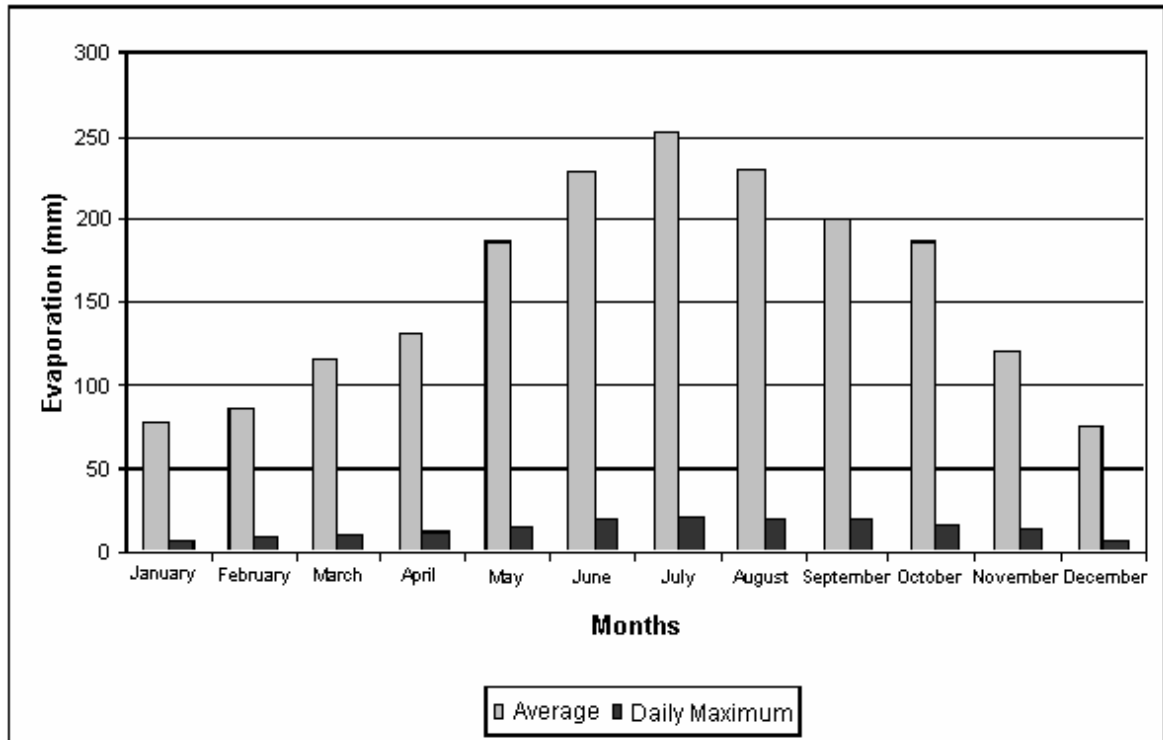


Figure IV.14 Monthly Evaporation Values recorded by Kozan Meteorological Station (1975-2005)

Distribution of the Average Number of Days in the Region

The values of the average number of days in the region recorded between 1975 and 2005 by the Kozan Meteorological Station are given in Table IV.13.

Annual average number of foggy days is 2.5. As seen in the Table IV.13, the foggiest month is June with 0.8 days. Annual average number of days with hail is 1.3. March is the hailiest month with 0.4 days. Annual average number of frosty days is 2.1. As seen in Table IV.13, January is the frostiest month with 0.8 day.

Table IV.13 Values of Average Number of Days in the Region

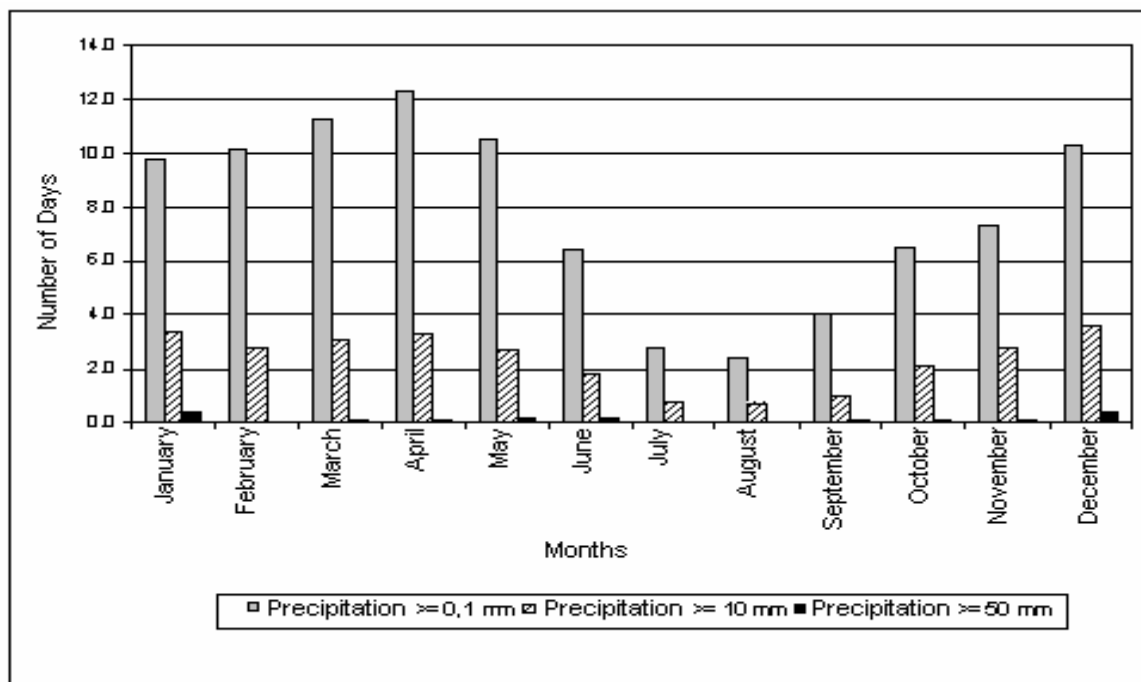
Number of Days	MONTHS												Annual
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
Ave. Number of Days with Snow	0.1	0.2										0.0	0.3
Days with Snow Cover						0.0							0.0
Ave. Number of Days with Hail	0.0	0.1	0.4	0.2	0.2	0.1	0.1	0.0	0.1		0.1	0.1	1.3
Ave. Number of Days with Fog	0.1	0.1	0.1	0.4	0.5	0.8	0.2	0.2	0.0	0.0	0.0	0.0	2.5
Ave. Number of Days with Frost	0.8	0.7	0.1								0.1	0.4	2.1
Maximum Snow Cover Thickness(cm)	4.0												4.0
Ave. Number of Days with Thunderstorm	1.1	1.6	4.0	6.3	8.7	6.2	2.4	2.3	4.3	4.5	2.0	1.4	44.8

Source : State Meteorological Service, Kozan Meteorological Station (1975-2005)

Table IV.14 Average Number of Days in the Region

Number of Days		Measuring Period	Number of Days
Days with Precipitation	>= 0.1 mm	31	93.8
	>= 10 mm	31	28.1
	>= 50 mm	31	1.7
Clear Days		31	130.4
Cloudy days		31	66.6
Partly Cloudy Days		31	167.9
Foggy Days		30	2.5

Source : State Meteorological Service, Kozan Meteorological Station (1975-2005)

**Figure IV.15** Heavy Rain Values Recorded by Kozan Meteorological Station (1975-2005)

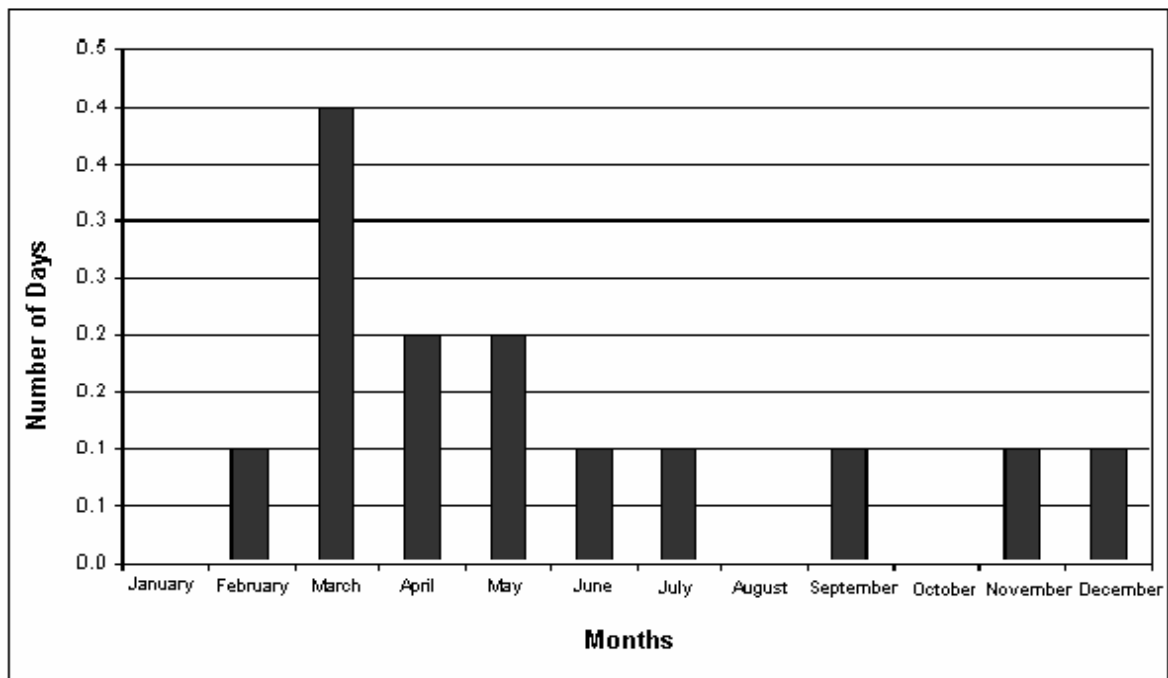


Figure IV.16 Average Number of Days with Hail Recorded by Kozan Meteorological Station (1975-2005)

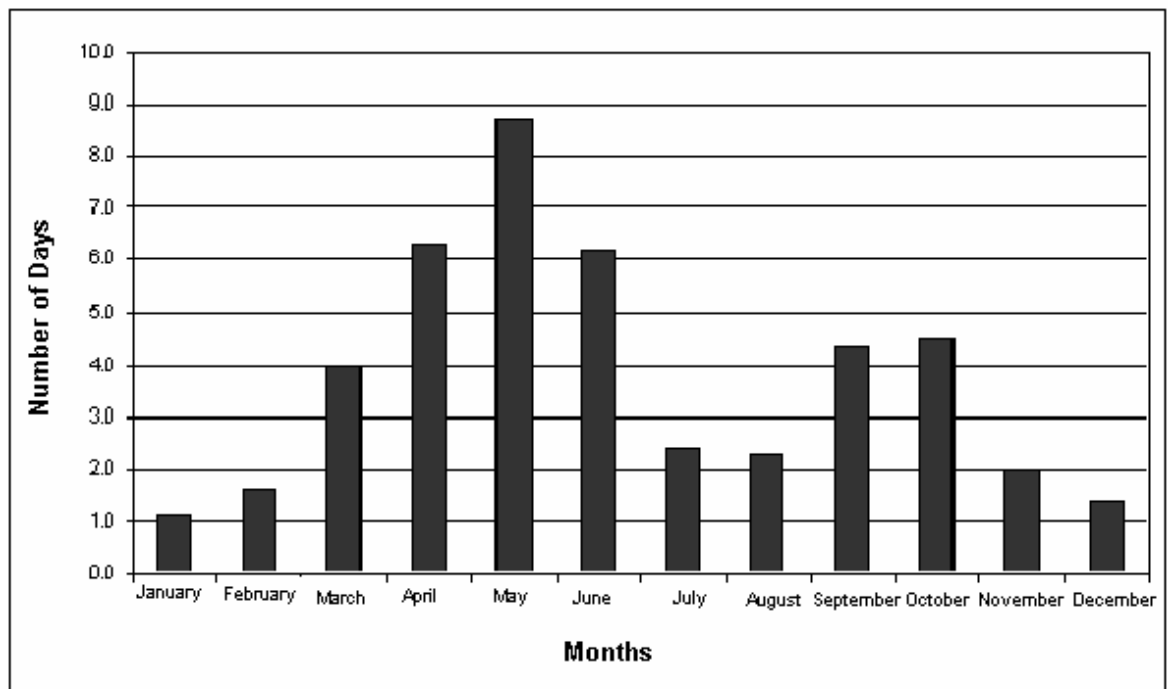


Figure IV.17 Average Number of Days with Thunderstorm recorded by Kozan Meteorological Station (1975-2005)

IV.2.2. Geological Characteristics (Geological structure of project area and quarries are investigated under the topics of tectonic movements, mineral sources, landslide, unique formations, avalanche, flood, rock fall, geological map and legend with 1/100000, 1/25000 and/or 1/5000 scaled, broken lines and faults is marked on map and showed its distance to Project Site, and added Geological and Geotechnical survey report)

General Geology

Rock units varying from Paleozoic to Quaternary are present in the Project Site. They range from lower to upper strata as Early Cambrian aged metagritstone, clay schist, limestone; Middle Cambrian aged limestone; Devonian aged limestone, shale, gritstone; Permian aged limestone, dolomitic limestone; Trias aged marl; Jura-Kretase aged limestone; dolomitic limestone; Miosen aged conglomerate, limestone; Quaternary aged alluvion and slope debris. General geological map of the Project Site is presented in Appendix F.

Stratigrafic Geology

a) Metagritstone, clay schist and limestone

This is the oldest (most aged) unit in the Project Site. It lies along the Seyhan Walley between Guven Village and Kudas Neighbourhood as narrow stript.

The unit contains metagritstone, clayschist, gritstone and seldomly siltstone, claystone and claystone strata which house lateral and vertical transitions. It includes limestone, dolomite and quartzite strata and lenses of different sizes. This formation which may have purple, grey, green and brown colors with green being the dominant one, is thin, with thick strata in patches, graded levels and cross stratified, laminated and jointed. Hematite observed in cracks, joints and on the surfaces of layers is a distinctive property for the formation. Bottom relation is not observed. Age of the formation which does not contain fossils is accepted as Early Cambrian according to its stratigrafic position.

b) Limestone

Limestone have surfaces intersecting with thin strip-like faults in the eastern skirts of the slope that Tekerlek and Cal Valleys, in the east of Henuz Mountain, form together. It is represented by limestone, dolomite and conglomeratic limestone, substituting each other in different zones and displaying lateral transitions. It is middle-thick layered and with grey-black color. Its composition is generally in a calm environment. It exists with gradual transitions over the Early Cambrian. Its age is determined as Middle Cambrian according to its stratigrafic position.

c) Limestone, shale, gritstone (Dk)

It lies as a wide strip in the skirts of the slopes formed by Tekerlek and Cal Valleys. It continues toward north covering a large area within the zone bordered by Gokdere in the east and Zamanti in the west. It is composed of limestone, shale and gritstone succession. It begins with limestone-shale succession in the lower section and continues with shale-limestone-gritstone succession.

The formation, which is thin- medium stratum in upper layers and medium-thick stratum at the bottom, is grey black and brown in color. Wave traces are observed on the strata surfaces. Being rich in coral fossils is the major characteristics of the limestone at the bottom. It settled down in a medium where heat, shallow and the wave energies are dominant. Its age is Late Denovian according to its including fossils. It is considered as impermeable according to its lithological features.

AŞAĞI SEYHAN HAVZASI
KAVŞAK BARAJI ve HES PROJESİ
GENELLEŞTİRİLMİŞ STRATİGRAFİ KESİTİ

ZAMAN	SİSTEM	SERİ	SİMGE	KALINLIK (m)	LİTOLOJİ	AÇIKLAMALAR
SENOZOYİK	KUVATERNER		Qal Qym	35		Alüvyon (Qal) Yamaç Molozu (Qym) Kolüvyon
	TERSİYER	Miyosen	Mi	750		Konglomera, Kireçtaşı; Yatay kalın tabakalı, zayıf-orta dayanımlı, çok karstik, tabanda kalker çimentolu konglomera; üstte kireçtaşı hakimdir.
MEZOZOYİK	JURA-KRETASE		Jkr	675		Kireçtaşı, dolomitli kireçtaşı; açık gri, beyaz, kalın tabakalı, orta dayanımlı-dayanımlı, karstik. İstif altta dolomit, ortada dolomit-dolomitik kireçtaşı-kireçtaşı, üstte kireçtaşı tabakalarından oluşur.
	TRİYAS		T _R	200		Marn; sarı-beyaz, ince kireçtaşı ve kumtaşı tabakaları içeren ince tabakalı, laminalı, geçirimsiz.
PALEOZOYİK	PERMİYEN		Pk	500		Kireçtaşı-dolomitik kireçtaşı; ince, orta, kalın tabakalı, kireçtaşı içerisinde dolomit ve dolomitik kireçtaşı ara seviyeli, dayanımlı.
	DEVONİYEN	Üst	Dk	600		Kireçtaşı, şeyl, kumtaşı; Koyu gri-siyah, kireçtaşı, şeyl, kumtaşı aralanması; zayıf-orta dayanımlı, geçirimsiz.
	KAMBRIYEN	Orta	Ek	340		Kireçtaşı, dolomit; Yanal geçiş gösteren kireçtaşı, dolomit ve konglomeratik kireçtaşı, orta dayanımlı-dayanımlı.
		Alt	Em			Metakumtaşı, killi şist, kireçtaşı; Aralarında yanal ve düşey geçiş gösterir. Farklı boyutlarda kireçtaşı, dolomit ve kuvarsit ara tabaka ve mercekleri vardır. Zayıf-orta dayanımlı-dayanımlıdır.

Figure IV.18 Kavsakbendi Dam and HPP Project Generalized Stratigraphy Cross Section

d) Limestone, Dolomitic Limestone (Pk)

Reservoir area, tunnel and power station lie on this formation. It extends as a wide strip along Seyhan River and its branch Zamanti.

It is represented as a thick limestone. It contains dolomite and quartzite strata and lenses. Limestone is made up of a grey, blackish, thick stratified in patches, jointed, very tough and strong crystal.

It discordantly lies over the more aged formations. It marks gradual transition to Trias marls with a thin layer limestone level at top. It settled in mediums where shallow, hot, having low energy and rich in algae content, and. Its including fossils give the age as Late Permian. Especially, its upper part is very carstic and the carstic behavior have developed along the discontinuity planes

e) Marl (T_R)

It ranges as a wide strip along the two sides of the Seyhan River as higher than elevation of reservoir. It is represented as the yellow, grayish, purple, greenish, thin layered, laminated, unresistant marl deposit containing thin limestone and gritstone strata. The yellow color is dominant in the formation, and its yellow color and soft topography are the most distinctive properties of it. In the formation, the limestone increasing in amount through the upper levels is branched with lamellas, gastropod-shelled and oolitic in patches.

It is concordant with the Permian aged formation below and not concordant with Jurassic-Cretaceous limestone above. Its age is Early Trias according to its fossil content.

f) Limestone, Dolomitic Limestone (Jkr)

It ranges as a wide strip along both sides of Seyhan River including the higher elevations. It appears as a thick carbonate deposit, and is composed of dolomite at the bottom, dolomite-limestone succession in the middle and limestone strata at top. In general, its appearance is grey, blackish, medium-thick layered, jointed, calcite veined and massive in some levels at top section.

It is placed over the lower units discordantly. Its age is Jurassic-Cretaceous according to its fossil content. It is carstic at an extreme degree.

f) Conglomerate-Limestone (Mi)

Henüz Mountain and the southeast skirts of this mountain is entirely composed of this formation. It is a wide bottom conglomerate including claystone, gravel-sanded limestone levels, gritstone in patches, and conglomerate at the bottom. Over this, highly carstic limestone strata with medium-thick layers, rich melt pores and joints are placed.

The Miocene deposit is placed over the older units discordantly, and has Quaternary sediments above.

h) Alluvion (Qal)

Seyhan River flows in a narrow and deep valley in reservoir area. Alluvion is very shallow in river bed and its thickness is estimated to be 4-5 m in reservoir area. Alluvion is composed of low amount of sand, large gravels and blocks in the Project Site.

i) Slope Debris (Qym)

Colluvial material having the characteristics with the slope debris and reaching a thickness of 35-40 m deposited on soft metamorphic rocks, which have relatively flat topography, in front of limestone cliffs in the Project Site. This material is composed of a mixture of large gravel thin material (clay) with dimensions varying from 3-5 cm to 25-30 cm and very large, cornered limestone blocks with dimensions reaching up to 3-4 m. This thick colluvial material on metamorphic clayed rocks has semipermeable-permeable characteristics and can cause landslides on clayed rocks due to precipitation and streams. However, no active landslide has been observed in this unit near to reservoir area.

Structural Geology

a) Stratification

In the Project Site, in the succession of Early Cambrian aged metagritstone clayschist, limestone and gritstone which is the oldest unit, schists are very thinly foliated, and gritstones and limestones are thin-medium and thick-stratified in patches. The unit composed of Middle Cambrian aged limestone dolomite and conglomeratic limestone is generally thick-medium-stratified. The Late Permian aged unit which is formed in the succession of limestone, shale, gritstone are thick-medium on the bottom, thin-medium-thick on mid and upper levels. Permian aged limestones are stratified as thin-medium and thick in patches. Trias sediments which contain limestone and gritstone layers and strips generally dominated by marls are thin-stratified and laminated in general. Jura-Cretace deposit composed of limestone and dolomite is medium-thick-stratified. Conglomerates and limestones forming the Miocene is generally medium-thick-stratified.

b) Folding

The region including Project Site lies in the south of Middle Taurus. The region has generally been affected by the Hercynian and Alpen orogenesises. Development of regional folds came up in Alpen orogenesis (Laramian phase). 1 anticlinal and 1 synclinal axes appear resulting from stratal folds in the Project Site. These are the anticlinal axis along the valley of Seyhan River and the synclinal axis on the left side along the long axis of Henüz Mountain. There are Early Cambrian formations in the core of Syncline and Jura-

Cretace formations in the core of Anticline. Miocene sediments cover the strata subjected to folding discordantly.

c) Jointing

The units in the Project Site gained a richly jointed and fractured structure since they have been subjected to strong tectonic movements. Limestone and dolomite levels, especially very hard and rigid, are distinctive, ordered and disordered, medium-wide-intermittent jointed with gappy fills between joints.

d) Fault Formation

Construction site is many faulted and fractured structure with parallel to intensive tectonic activities which is dominant in region. Faults also played an effective role during formation of the present topography.

The majority of faults in the examination area have developed in 2 main directions as NW-SE and NE-SW .Tensional faults have generally developed as oriented strike or reverse faults in patches. The faults determined on map area are the faults that develop before Miocene.

e) Discordance-Concordance

Early Cambrian aged deposit is the oldest unit observed in the Project Site. Middle Cambrian strata place over these by gradual transition.

Permian deposit places over the Devonian deposit discordantly. Trias marls place over Permian deposit concordantly. Jura-Cretace limestones place over Trias marls discordantly. Miocene sediments place over the Jura-Cretace discordantly in the same way.

Geology of Reservoir Area

Permian aged limestone-dolomitic limestone appears on the surface on both sides of the river in reservoir area (Karakoyak axis). Limestone is dark grey, blackish, recrystallized, hard, stable, durable, stratified thin-medium thickness, densely jointed and fractured and calcite veined carstic. Limestone- dolomitic limestone succession and intermediate levels are observed within the limestone.

Seyhan River flows along an anticlinal axis in these limestones forming a narrow and deep valley. In the core of this anticline, there are impermeable units composed of clayed schist, gritstone and metagitstone levels with lateral and vertical transitions. In this unit there are also intermediate limestone, quartzite and dolomite strata and lenses with different sizes. It can be considered as impermeable according to its lithological properties.

An impermeable Devonian aged unit composed of dark grey, black, weak-medium-durability limestone, shale, gritstone succession is on the surface on the left shore on reservoir area and 450-500 m downstream. This unit is at a 60-80 m deeper zone on reservoir area and is impermeable.

Slope Debris with a very thick colluvial characteristics is found in the vicinity of Guven Neighbourhood and in front of Karakoyak Neighbourhood and limestone cliffs, right above the dam axis on the right shore at 400 m elevation where the topography is relatively flat. No active landslide is observed although the area where the slope debris is located is suitable for landslide. Alluvion is not observed in the river bed since Seyhan River is flowing in a very narrow and deep valley. The Geological Section of the Dam Body is presented in Appendix F.

Permeability of Dam Site

According to the geological survey studies, there is impermeable unit composed of Devonian aged limestone, gritstone and shale succession, 400-450 m upstream of the dam axis and 60-80 m below the Permian aged limestone in the reservoir area. Impermeability problem will be solved by means of an injection curtain reaching to this impermeable unit in the reservoir area.

Stability of Dam Site

It is not expected any problematic situation in terms of stability since the Permian aged limestone-dolomitic limestone on both sides of the reservoir area is hard, durable and stable.

Permeability of the Reservoir Area

There are rock units belonging to Paleozoic aged Late Cambrian, Late Devonian and Permian in the reservoir area.

Seyhan River is flowing along an anticline as it was mentioned in the General Geology part. The Early Cambrian aged unit in the core of the anticline, Late Devonian aged limestone, shale, limestone succession units can also be considered as impermeable. Permian aged limestone, on the other hand, is permeable. However, the carstic Permian limestones mostly lie over the maximum water elevation or surrounded by Early Cambrian or Late Devonian aged impermeable units.

Besides, there is no deeper valley for the water to escape since the Seyhan valley is the deepest one in the region. An escape of water is out of question after constructing a injection curtain extending down to impermeable units in the reservoir area.

Stability of Reservoir Area

Slope Debris lies in Karakoyak quarter immediate vicinity on the left side of reservoir area, Guven quarter 1.5-2 km upstream on the left side and Kise and Çomluk quarters, 6-7 km upstream of the dam axis to the end of the reservoir area where the topography is relatively flat.

No active landslide is observed although the material can cause landslide. Thereby any problematic situation in terms of stability is out of question in the reservoir area.

Spillway

The spillway designed on the dam body with concrete loadings will have the same basic conditions with the body. The geological section of the spillway structure is presented in Appendix F.

Derivation Tunnel

Derivation tunnel will be opened on the left shore and in Permian aged limestone. Since the limestone is hard, stable and durable, encountered an important problem is out of question. There will be excavation works at the entrance and exit points of the tunnel, main joints and along the surfaces of strata. At the 15% of the total length, steel shoring + spotbolting + straw steel + spraying concrete will be used. And at the 85% of it, straw steel and spraying concrete (5+5 cm) will be sufficient. Spotbolting will be used in the tunnel in patches if required. Geological section of the derivation tunnel is presented in Appendix F.

Cofferdams

Upstream and downstream cofferdams will be constructed on the Permian aged with high stability limestone which is the main rock and 4-5 m-thick alluvion.

Energy Tunnel

The energy tunnel will start from the elevation of 300 m and extends down to the elevation of 266 m on the left shore. The tunnel will be 2,315 m long and 7.80 m in diameter with a horseshoe in shape. Energy tunnel will entirely be opened a hard, stable and medium- thick stratified Permian limestone. There will be heavy excavation works at the entrance and exit points of the tunnel and in the below-creek transitions near the middle section according as jointing and stratifications. There may be weakness zones of 15-20m in creek transitions. In these sections (approximately 15% of the total length), steel shoring + spotbolting+ straw steel + spraying concrete will be used. At the parts of 85% of the total length, straw steel and spraying concrete (5+5 cm) will be used.

There may be a significant amount of water coming in from the faults, joints and carstic paths composed of limestones and carbonecous rocks reaching up to an elevation of 1500 m in 2-3 km northeast and intersecting the tunnel in the extensions of Henuz Mountain. However, the existence of impermeable Trias aged marls within carstic limestones inside the carbonecous rocks of Henuz Mountain will decrease the amount of water reaching the tunnel.

The penstock route is on the hard Permian limestone. It will not any problem on account of slope stability. The geological section of the energy tunnel is presented in Appendix F.

Power Station Site

It is to be constructed in the skirts of the inclined limestone slope at an elevation of 236.70 m on the left shore of Seyhan River. It was thought that construction of power station site would be feasible semi-outdoor HPP type as the topographical conditions of the station area were concerned. it is not expected to be any problematic question in terms of bearing strength and stability at Permian limestone forming the basement in the power station. The geological section of the power station area is presented in Appendix F.

Natural Building Materials

Concrete Aggregate

In the Project Site, Seyhan River is flowing through a very narrow and steep valley along the river bed, and there is no appropriate granulometric alluvion suitable for concrete. There is alluvion composed of large blocks with dimensions of 3-4 m and large gravels with poor soil on the lateral creek mouths where river bed is expanding. On this account, concrete aggregate will be supplied by cracking the limestone (Pk), which is durable, jointed, grey in color, thick stratified and extending up to river elevation on 2-3 km upstream and on both sides of dam site. By considering the road conditions and operational convenience, the limestones located on the left side, beneath the Kizildam

slope will be operated as the aggregate quarry (T-1). The location of the T-2 Quarry, which is on right shore, on 700 m upstream of the dam axis and on the near crest elevation of the dam and structured of Permian aged limestone (Pk), shelf and sedimentary rock is marked on the General Geology Map in Appendix K.

Impermeable Material

(A) *Impermeable Material Zone*: composed of the gravel with clay type material (GC-CL) derived from the metamorphic clay rock on the left shore at 0.6-1 km upstream and in the nearest part of Guven quarter to the river bed and roads.

(B) *Impermeable Material Zone*: composed of the gravel with clay type material (GC-CL) derived from the metamorphic clay rocks in Karakoyak quarter located on the right side of the reservoir area and over the elevation of 400 m.

(C) *Impermeable Material Zone*: composed of a material including Late Miocene aged and gritstone, gravel, shelf, sedimentary rock structured on the left shore of the reservoir area and at about 7 km apart from the Project Site.

Similar quarry zones and the natural impermeable material zones mentioned in the Kopru and Maran Passage Dams Natural Building Material Report (1979), examined by DSI before are accepted to be the same origin and equivalent aspects with the materials in the agricultural areas in Gokgoz Village. The results of laboratory experiment conducted by DSI on the sample taken in this region showed that these areas were composed of low-medim plastic, clay-gravel (GC), gravel-clay-sand (CL) and found that it has appropriate character as impermeable material. Quarry wells will be opened in the (A) and (B) impermeable material sites, which are determined at the final project stage, and laboratory experiments will be conducted. Substitute quarry C will be opened if the quarries A and B become insufficient, and the production will begin after the related governmental units and establishments are informed and the necessary licenses will be obtained.

Landslides

As the geological and geomorphologic structure of Kavsakbendi Dam, HPP and Quarries Project Site is examined, it built up colluvial material, characterized as slope debris with a thickness reaching up to 35-45 m on soft metamorphic rocks in the Project Site whose topography becomes relatively flatter. This material is composed of the cornered limestone reaching up to 3-4 m and the mixture of large gravel fine material with dimensions 3-5 m to 25-30 cm in general. This thick colluvial material on the metamorphic clay rocks is semi-permeable-permeable characterized and can cause landslide on the clay rocks located on due to precipitation and streams. However, no active landslide has been observed at this unit near the reservoir area.

Mineral Resources

No mineral resources are present in Kavsakbendi Dam, HPP and Quarries Project Site and in the area affected by the Project.

Seismicity

When it is examined the map of Earthquake Zones of Turkey, the project area is in the 3rd level earthquake region. The Map of Earthquake Zones of Turkey prepared by Republic of Turkey Ministry of Public Works and Settlement, General Directorate of Disaster Affair, Earthquake Research Department, Earthquake map of Adana Province are presented in Figure IV.19 and IV.20, Active Fault Map are presented in Figure IV.21.

Construction of Project will be carried out in compliance with the Regulation on Structures Constructed at Disaster Areas, which became effective upon publication in Official Gazette no. 23098 on 2 September 1997, and all the necessary precautions will be taken against the possible earthquake.

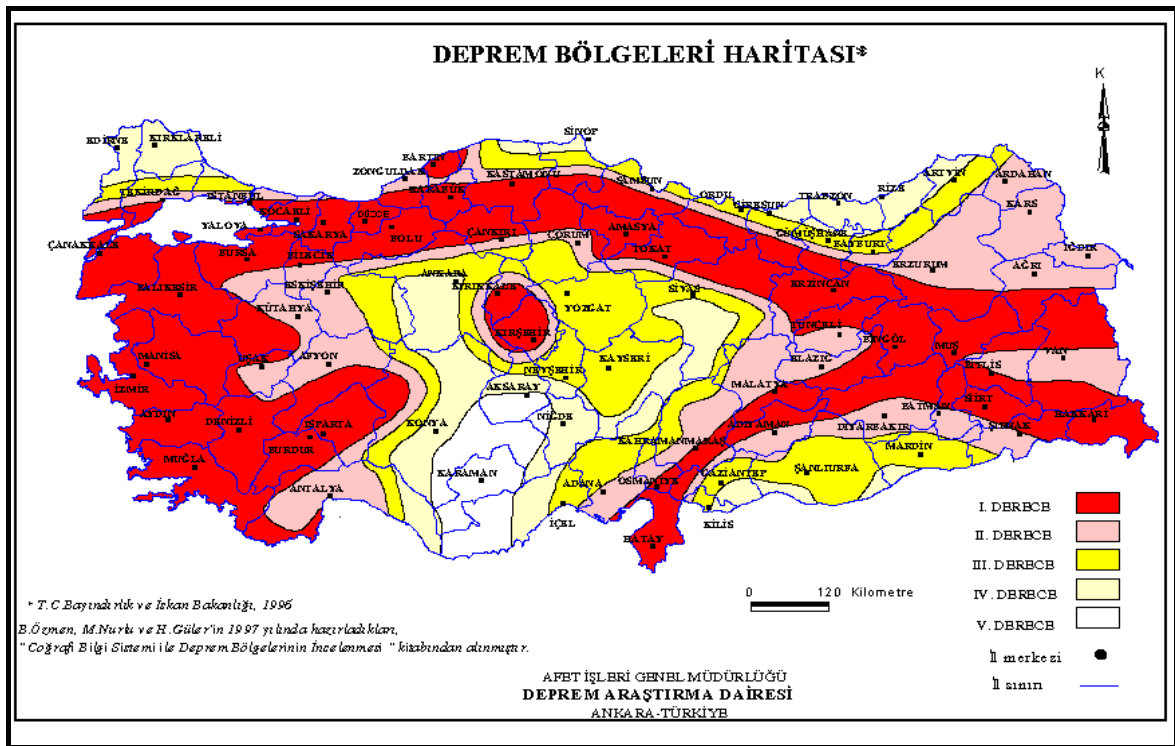


Figure IV.19 Map of Turkey Earthquake Zones

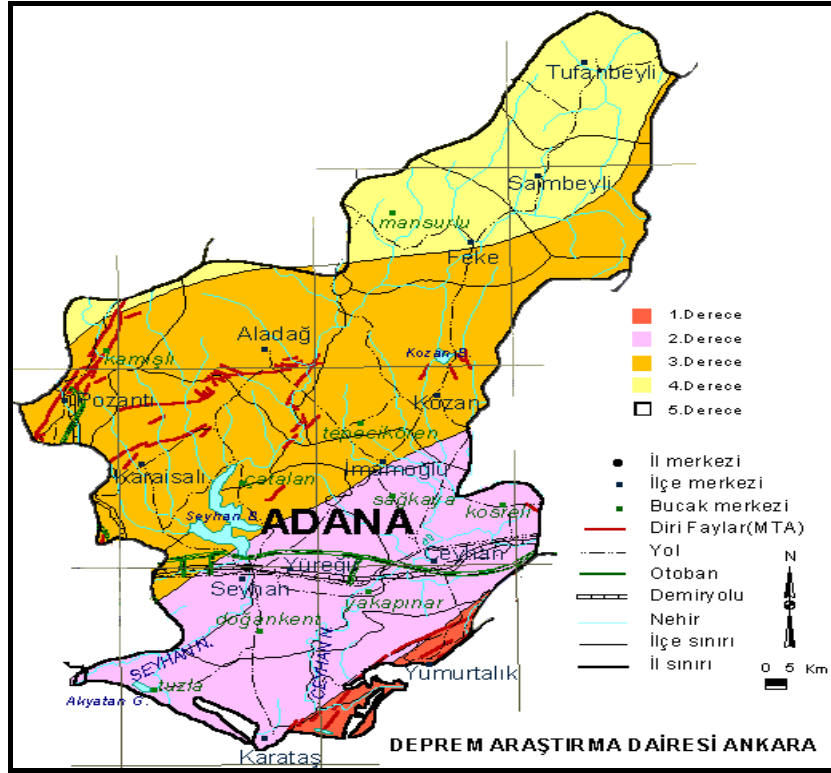


Figure IV.20 Earthquake Map of Adana Province

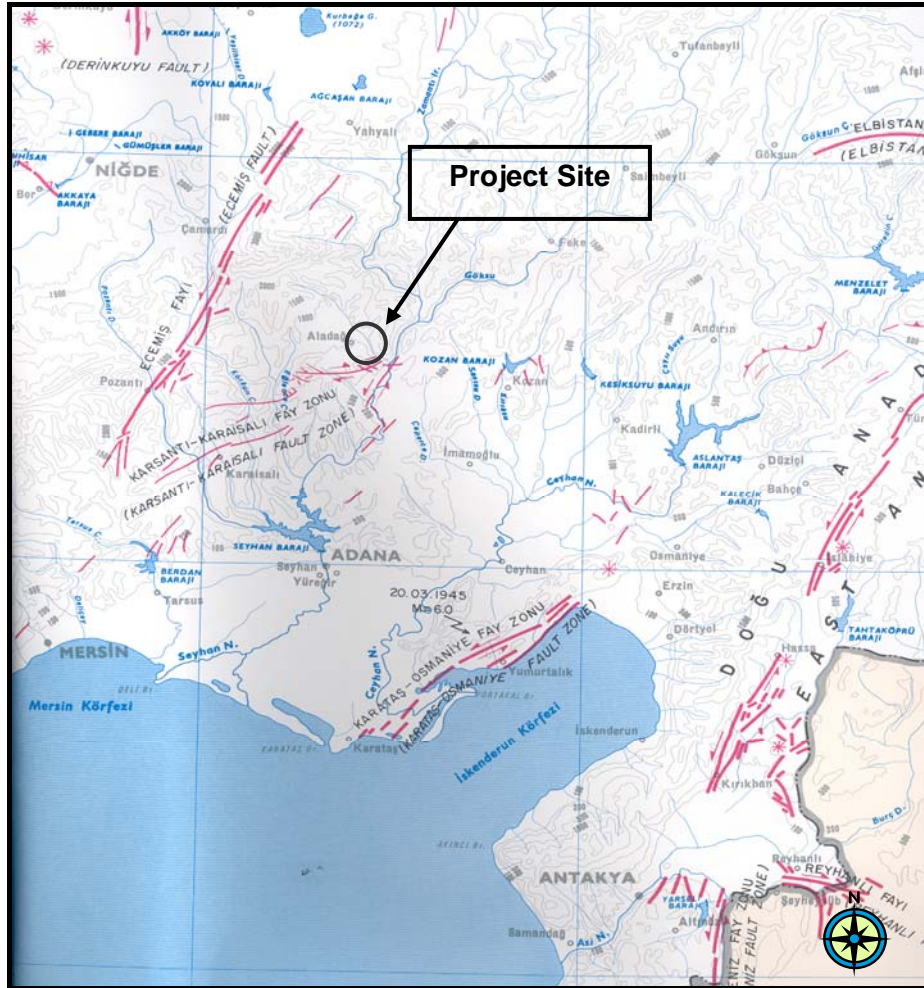


Figure IV.21 Active Fault Map Adana Province and Its Environment

Social, administrative and service buildings which will be constructed in the Project Site placing on the land of geological and geotechnical survey report which will constitute a basement to the construction plan will be approved by the related institution as a requirement of the circular letter no. 4256 on 4 April 2003 by prepared according to the circular letter no. 4343 on 31 May 1989.

IV.2.3 Hydrogeological Characteristics of Groundwater and Thermalwater Springs (Level and amount of water, secure withdraw values, flowrates of sources, present and planned usage)

Adana Province has generally an elevating topography from east, south and west to north starting with 14m and rising up 160 m. Since the establishment of the province, the need of potable-usage water is supplied from groundwater, and depth of drilling wells opened for the purpose of supply potable-usage varies from 20 m to 40 m.

There is rich groundwater potential in the area starting from east, west, south residential area borders to the 50 m elevation line in north. Sources are getting fewer as going to the north.

For this reason, the potable wells given to the province are generally between the elevation of 50 and 150 m and their number is 41. The need of industrial facilities within the residential areas is supplied by their own deep wells for usage. Groundwater Potential of Adana Province is as follows:

Yumurtalik Coomb	: 12.48 hm ³ /year
Ceyhan Kozan Coombs	: 120 hm ³ /year
Lower Seyhan Coomb	: 500 hm ³ /year
Karaisali Pozanti	: 3,041 hm ³ /year
Tufanbeyli	: 14.5 hm ³ /year

Table IV.15 Adana Province Underground Water Sources

MUNICIPALITY	SOURCE	INFORMATION ABOUT THE SOURCE
Karaisali	Incirli Source Karapinar Source	Ave. Flowrate.: 5 L/s Flowrate: 40 L/s
Feke	Agcapinar Source Vanis Source Ciglipinar Source Keklikcinar Source	Flowrate: 4 L/s Flowrate: 8,5 L/s Flowrate: 9 L/s Min. Flowrate:0,25 L/s
Aladag	Yedigoz Source	Flowrate: 65 L/s
Hamdili	Akpinar Source	Flowrate: 10 L/s
Akoren	Eynel Source	Flowrate: 700 L/s
Ceyhan	Baglama Source	Flowrate: 1000 L/s
Gecitli	Catal Source	Flowrate: 9 L/s
Tufanbeyli	Koy Source	Flowrate: 35 L/s
Akcatelikir	Sekerpinar Source	Flowrate: 600 L/s
Kozan	Goz Source	Ave. Flowrate.: 100 L/s Min. : 60 L/s Max.: 300 L/s
Pozanti	Sekerpinar Source Deligoze I Source Deligoze II Source	Ave. Flowrate:600 L/s Flowrate: 9 L/s Flowrate: 100 L/s
Saimbeyli	Soguksu I and II Source Kayapinar Source	Min.:45 L/s, Max:500 L/s Min:32 L/s, Max:1200 L/s

Source: Adana Province Environmental Condition Report

As it is mentioned in Adana Province Environmental Condition Report, There is no geothermal water source within the Adana Province borders.

As a consequence of the drilling works in the Project Site, Ealy Cambrian aged metagitstone, clayschist, and limestone succession is impermeable in terms of their lithological properties, and forms the oldest unit in Seyhan Valley.

Late Devonian aged limestone, shale, gritstone succession is observed along Goksu and Zamanti branches. Not observation of the sources in the upper parts of the areas on which it is widely spreaded shows that this formation is impermeable.

Permian aged limestone and dolomite succession comes on the surface in an area longitudinally in Seyhan Valley. This limestone is carstic. As it will be figured out from the drilling works conducted in Kavsakbendi Reservoir area by EIEI, top section of this structure is more carstic than the lower layers containing carbonaceous levels.

The unit marl strata prevail formed by the Trias aged marl-limestone succession is morphologically distinctive with its soft topography and considered to be impermeable.

Jura-Cretace lies on the Trais formation in higher elevations on both sides of Seyhan River. It is highly carstic, and this mostly developed along strata planes and close vertical joints. In this parts springs with flow rates of 3-4 m³/s come out.

The lower Miocene conglomerate strata are generally hard and lime cemented. The upper limestone, on the other hand, is very porous and carstic. Eyner springs, 16.5 km downstream of the dam axis and on the right shore of Seyhan River, discharge from the Miocene limestone with a flow rate of 4-5 m³/s. (ERA Engineering Geology Report, Agus-2004).

IV.2.4. Hydrological and Ecological Characteristics of Surface Water Resources

Groundwater discharge is not considerably large in the Project Site. Seyhan River is the most important surface water resource in the Project Site.

Seyhan River is formed by the joint of the main tributaries Zamanti and Goksu. Goksu River rises from the Sirlak springs, at an elevation of 1,900 m, in the southern skirts of the 2,601m-elevated Govdeli Mountain in the northeast of Upper Seyhan Basin. In this first part, with Atalti, Eskiyayla and Cavlak springs rising from the slopes of Keçi Mountain, other small creeks and Sarlak springs form Sariz Creek.

Sariz Creek flows through the deep valleys of Tahtali Mountains in the southwest direction and reaches in Sariz District of Kayseri Province. Subsequently Dumanli Creek and Kuru Creek join to Sariz Creek. Damlali, Keyfinin and Demircik Creeks join to Sariz Creek, which Teke Creek rising from the slopes of Soganli Mountain as a part of Tahtali Mountains joins, in the south of Tufanbeyli District of Adana Province. After this region Sariz Creek is named as Goksu River and flows in the south direction. After Demircik Creek joins it, Goksu River flows through Dibek Mountains about 50 km. It directs toward west after Kazan Creek, rising from the springs in the slopes of Dibek Mountains, joins it. The most important creek of lateral creeks on the right and left shore in this region feeding Goksu River is Saimbeyli Creek jointing from right shore. Goksu River flowing through to southwest again reaches in Feke District. Asmaca Creek fed by the several sources in the slopes of Tahtali Mountains joins Goksu River from right shore in the southwest of Feke District.

Having passed over Feke District, Goksu River directs toward west forming a wide arc and continues its flowing through deep and rocky valleys in Gorbiyes Mount (1,943 m elevation) region. In this part of the region, the river is fed by many minor creeks from both sides. The major creeks of these are Salam Creek and Balik Creek from the left shore. Menge Dam is located on 4.5 km upstream of conjunction of Salam Creek and Goksu River. Goksu River forms Seyhan River by joining Zamanti River which is other main tributary of Seyhan River on approximately 2.5 km downstream of the joining point of Balik Creek.

Drainage area of Seyhan River is 13,000 km² in Kavsakbendi Dam axis. Calculated Dam Site Annual cumulative flow is 3.899x10⁶ m³ by considering the still existing irrigations on upstream.

IV.2.5. Present and Planned Utilization of Surface Water Resources (Potable, usage, irrigation water, production of aqua products, transportation, tourism, generation of electricity, other usages)

As mentioned before, the most important water source of the region is Seyhan River. The research, planning, project designing and construction activities in the basin were started in 50's and continued until 1997. Seyhan Basin is in 15th place among 25 hydraulic basins in Turkey with its 20.450 km² precipitation area. (DSI Mapped Statistical Bulletin).

Present Facilities

There is Bahçelik Dam located on Zamanti tributary of Seyhan River as the only existing upstream facility. Bahçelik Dam was constructed only for irrigation purposes. However, later on a HPP with the 7MW installed capacity was constructed to exit of irrigation by Private Corporation for the purpose of energy production from the water which would be discharged from spillway and the water that would be used for irrigation later on rather than irrigation term. Bahçelik Dam, which is a clay cored rockfill type, has an elevation of 53,00 m, total volume of 1.634.330 m³. Its talveg elevation is 1.450 m and its installed capacity is 7MW. Tailwater of the plant is connected to irrigation canal.

The present downstream facilities are Seyhan Regulator, Seyhan Dam, Çatalan Dam and Mentas Dam by order from downstream to upstream. Also There is Yuregir Hydroelectric Plant constructed on left conveyance canal of Seyhan Regulator in 1969 with its 6.000 kW installed capacity.

Seyhan Regulator, constructed between 1939 and 1942, stoppers and stopper lifting systems were renewed between 1965 and 1970, is a facility that feeds right and left shore main canals of irrigation net of Tarsus and Yuregir Coombs. Irrigation and drainage systems of Tarsus and Yuregir Coombs started to construction in 1957 spread out a total area of 181.300 ha.

Seyhan Dam was constructed between 1953 and 1956 for the purpose of irrigation, energy production and flood routing. Its elevation is 77,00 m from the base, 50,70 m from talveg and it is an inclined clay cored earthfill dam. Its total embankment volume is 7.500.000 m³, its reservoir volume is 1.200 hm³. Installed capacity is 59 MW and an annual average energy production is 350 GWh.

Çatalan Dam, earthfilled and having energy production and flood control, was constructed at upstream of Seyhan Dam between 1982 and 1996 with an elevation of 82,00 m from the base and 70,00 m from talveg. Its total embankment volume is 17.000.000 m³ and its reservoir volume is 2126,33 hm³. And also Catalan Dam has an installed capacity of 169 MW and an annual average energy production of 596 GWh.

Mentas Regulator and HPP with installed capacity of 40 MW is a facility that was constructed recently by private corporation for the purpose of benefiting from the drop which is the between tailwater level of 139,00 m of Yedigoze HPP and Reservoir level of 125,00 m of Catalan Dam

Planned Facilities

There is only Yedigoze Dam at the downstream of Kavsakbendi Dam as planned Seyhan and Catalan Dams and Hydroelectric Plants and Mentas Regulator and Hydroelectric Plant which are still operated are benefiting from the drop of head in the downstream of Kavsakbendi Dam, HPP.

There are 6 facilities that are planned to construction on Zamanti and Goksu Rivers which makes up Seyhan River on the upstream of Kavsakbendi Dam.

Among these; Gumusoren, Goktas and Indere Dams are placing on Zamanti and its tributaries; Feke, Menge and Kopru Dams are placing on Zamanti River. The characteristics of the planned upstream facilities are summarized in following paragraphs.

- Gumusoren Dam and HPP: It is a typical homogeneous fill and concrete gravity type facility which was designed with the purposes of irrigation and energy production, in close to Gumusoren residential area of Develi district of Kayseri Province, between 1200,00 m and 1300,00 m levels of Zamanti River. When the construction is completed, it will be Its talveg elevation of 1268,00 m., elevation from the base of 27,00 m and Its total embankment volume of 1.527.000 m³, total concrete volume of 67.600 m³ and total reservoir volume of 202,9 hm³. its installed capacity of 5 MW.
- Goktas Dam and HPP: The location of the dam is on Zamanti River, at 20 km north of Aladag district of Adana Province. It was designed as concrete gravity-type dam with the purpose of energy production. Body volume of the dam is 914.000 m³, its elevation is 139,00 m and its total reservoir volume is 133,34 hm³. Diameter of its energy tunnel will be 5,50 m, with its length of 16,600 m. And will have an installed capacity of 263,50 MW.
- Indere Dam ve HPP: It is planned to be a rockfill type dam with an elevation of 37,00 m., which will be located on Indere tributary of Zamanti River with the purpose of energy production. Talveg elevation of the dam will be 1376,00 m, total base volume will be 703.000 m³, total reservoir volume will be 60,34 hm³ and its installed capacity will be 62 MW.
- Feke Dam ve HPP: It is planned to locate on Goksu River, at 15 km southwest of Feke district of Adana Province. It is a rockfill type dam with the purpose of energy production. Talveg elevation of the dam will be 482,00 m, total body

volume will be 8.105.000 m³, elevation will be 133,00 m, total reservoir volume will be 507,90 hm³ and its install capacity will be 170 MW.

- Menge Dam and HPP: It is planned to locate on Goksu River, at 30 km air distance from northwest of Kozan district of Adana Province. At the location of the dam, talveg elevation of Goksu River is 441,50 m. It is a concrete gravity-type dam with the purpose of energy production. Its elevation will be 41,50 m, total body volume will be 197.800 m³, total reservoir volume will be 41,32 hm³ and its installed capacity will be 33 MW.
- Kopru Dam and HPP: It is planned to locate on Goksu River, at 14 km air distance from northwest of Kozan district of Adana Province. It is a rockfill type with an elevation from the base of 141,00 m. Crest elevation of Kopru Dam will be 450,00 m, total base volume will be 8.054.200 m³ and its reservoir volume will be 260,00 hm³. The dam is designed as 3 units and its installed capacity will be 189 MW.
- Yedigoze Dam and HPP: It is planned to locate on Seyhan River, 45 km air distance to the northeast from the city center of Adana. Its intermediate basin covers 866 km² of area and the total drainage area accounts for 67% of Seyhan Basin. Flood water level is considered to be 240 m. According to the Planning Report, installed capacity is 300 MW, annual power generation being 969 GWh, rentability being 2.01 and the internal rate of return being 10.1%.

IV.2.6. Soil Characteristics and Usage Conditions (Physical-Chemical and biological characteristics of soil, land use capability classification, erosion, present usage of land)

Major soil groups have formed affected by major material, climate, flora and time formed in Adana Province. Besides topic to major soil groups it is observed some land types where are deprived from soil cover and development of profile. Kavsakbendi Dam, HPP and Quarries project impact site located within the borders of Kozan, and Aladag Districts of Adana Province includes two major soil groups. These are Limeless Brown Forest Soil (N) and Red Mediterranean Soils (T). Beside these, naked rocks and debris is also present in the impact area. (ÇK)

Limeless Brown Forest Soils (N)

Poor and highly layered Limeless Brown Forest Soil has formed over schist, serpentine and crystal limestone, under forest and shrubby cover. In a typical profile, dark grey brown Al at top, heather heavier as body or a different as structure B on below and C, R or both on above are present. The soil has a fair color over schist. B is particularly heather over limestone.

The process of organic matter deposition in top soil, lime washing, oxidation, clay, translocation of Fe-Al oxides from A to B are in effect in formation. But it has not been observed any development other than weak Al formation in steep slopes

Limeless Brown soil formation limestone is old and Permian aged. The Schists are Devonian aged and serpentine is Mesozoic aged. Serpentine and the material, decomposed from some certain schist, lack free lime. The material decomposed from limestone has lime content with high level. It has been washed up in profile under heavy precipitation in long-term. Soil does not effervesce although it lies on limestone. However, lime put back formation even if it is washed by joining to the soil with separation of the top gravels is washed rapidly. Thereby the saturation is high with pH base.

Red Mediterranean Soils (T)

Red Mediterranean Soils have formed over crystal limestone in terraces and high lands. They have typical appearance with their color heather than 5 YR. Iron 3 oxide deposit is effective instead of Lime with oxidized along washed hot-dry summer terms during its formation. Since the organic matters are quickly decomposed, their concentration is low in the soil. Soil body lies directly on hard limestone most of the time. In some circumstances, there may be a thin, soft lime layer in the middle. Stoniness and emerging rocks are common, and if strong erosion is effective, soil is only found rock cracks and small pits. Similar soil has formed over crystal-lime-gravel and limestone cemented conglomerates. Red Mediterranean Soil has significant distinctive properties from neighboring Brown Forest Soil and Rendzinas with its characteristic red color. Soil is washed by heavy precipitation in winter, therefore, no free lime is found in upper layers. The pH values are neutral or slightly basic. Since the organic matter content is low, and high amount of iron oxide is present in clay fraction, its capacity to hold nutrients and water is medium.

Naked Rocks and Debris

The naked rocks do not have soil cover on. Although there is limited amount of soil inside rock cracks and in few meter-squared cavities but this is economically insufficient. They are in class VIII.

Land property of the Project Site, agricultural suitability of lands and the distribution of major soil groups are given in Figure IV.22.

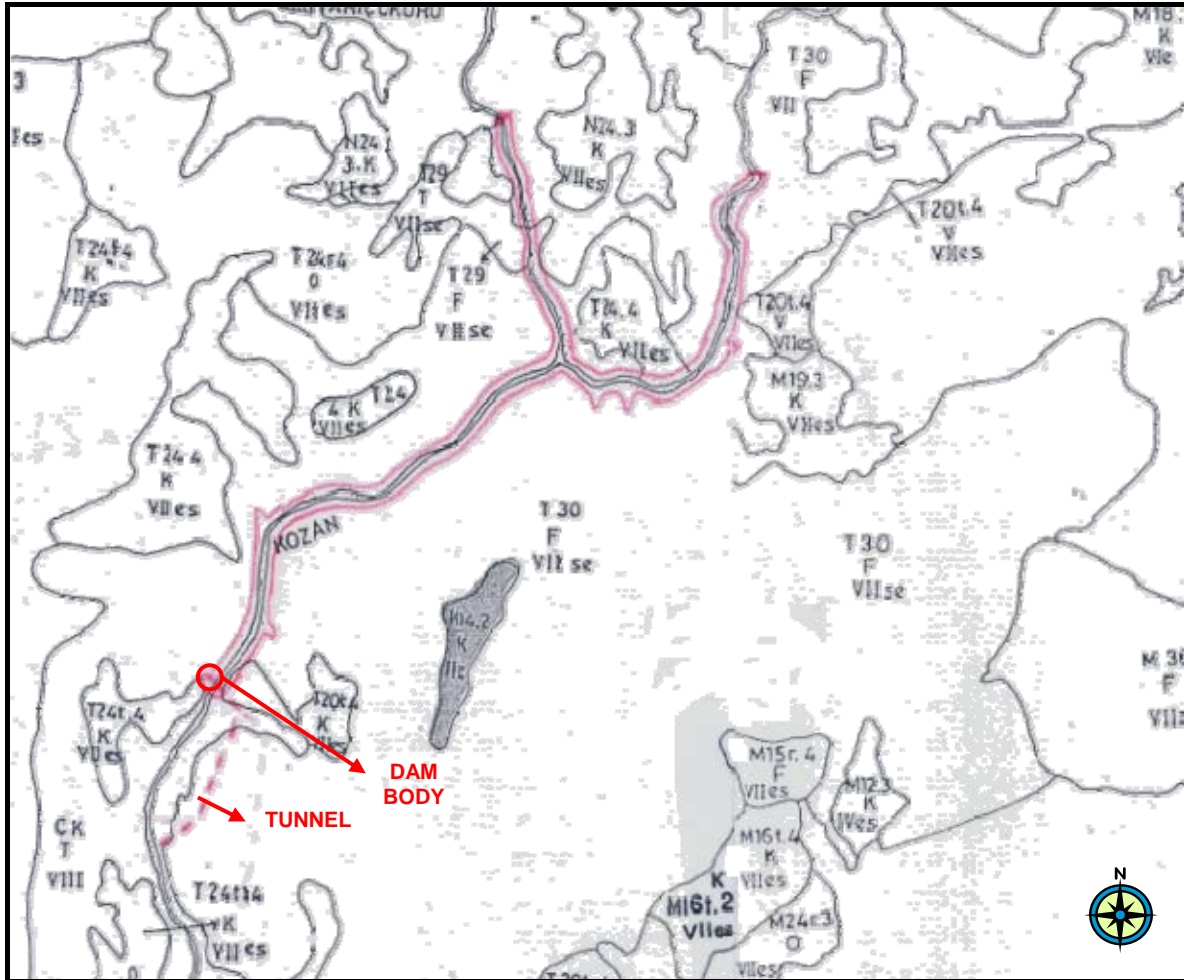


Figure IV.22 Land Property of the Project Site, Agricultural Suitability of Lands and the Distribution of Major Soil Groups

Source: Adana Province Land Assets 1996, General Directorate of Rural Services of Prime Ministry

There are two major soil groups, which are limeless brown forest soil (N) and red Mediterranean soil, within the project impact site. Beside these groups, naked rocks and debris are also present in most of the area. As it is evaluated by the slope-deepness combination, soil deepness values are very shallow and slope values as lithosolic are 30% and more.

The soil groups mentioned have a stony and rocky structure with poor drainage, and high degree of erosion in terms of other soil aspects. At the present day, use of land type in the project impact site places as shrubbery, dry agriculture (fallowing) and

abandoned land. There are classes of VII and VIII as classes of land usage capability within Kavsakbendi Dam, HPP and Quarries Project impact Site and a scheme containing the criteria limiting the factors for agriculture and suitability for planting is given in Table IV.16 (Adana Province Land Assets, Publications of General Directorate of Rural Services, 1996).

Table IV.16 Land Use Capability Classes and Suitability for Cultivation

CAPABILITY CLASS	SUITABILITY FOR CULTIVATION	FACTORS LIMITING AGRICULTURE
I	Suitable for plantation of most crops	Little or no limitation
II	Suitable for cultivation over a long period of time and for a large variety of crops	Requires precautions related to conservation of soil and water
III	Can be cultivated with appropriate crop selection and special preservation methods. Generally requires special attention for agricultural use.	Subject to erosion and requires artificial drainage when cultivated
IV	It may be suitable for the cultivation of a limited number of specific plants through the application of an appropriate ploughing method. When used for agricultural purposes, they require specific attention	It displays too many restrictions with respect to soil depth, excessiveness of stones, humidity, and inclination.
V	Can be used as a pasture due to a insufficient drainage.	Not suitable for cultivation and have poor drainage properties
VI	Generally, not suitable for cultivation. It can be used mostly as a grassland or forestry area.	Restricted in terms of inclination and shallow soil depth.
VII	Not economic in terms of agriculture. However, it is suitable for planting of poor grassland and forest trees.	Restrictions in terms of inclination and shallow soil depth.
VIII	Do not produce agricultural products. Can be used for recreational activities or a prey keeping purposes.	No soil existence.

Source: Land sources of Turkey, ZMO Publications, 2003

IV.2.7. Agricultural Lands (Agricultural development projects lands, special product plantation areas) Size of Irrigated and Rain-fed Agricultural Lands, Product Pattern and Amount of Their Annual Production
Agricultural Lands (Areas of agricultural development projects, special product plantation areas) Size of Irrigated and Rain-fed Agricultural Lands, Product Pattern and Amount of Their Annual Production

That the population of Adana Province lives in villages at of 25% rate are directly related to that agricultural originated economic inputs have important place among the total inputs.

The most important reasons providing to agricultural productivity are that fertile agriculture lands which constitute approximately 38% of the province surface have a plain land structure and that Adana has %1,9 of all the tractors in our country in its agricultural mechanization land. Corresponding to this Adana province land asset and its distribution and distribution of agriculture lands are presented in Table IV.17.

In addition to all these agricultural products, bitter orange and citrus fruits grown in the region make up a significant portion of the total production in throughout our country. Information regarding these is presented in Table IV.18 (www.adana.gov.tr, www.adanatarim.gov.tr).

Detailed distribution of Adana Province in general and district terms are presented in Figure IV.23 by respectively.

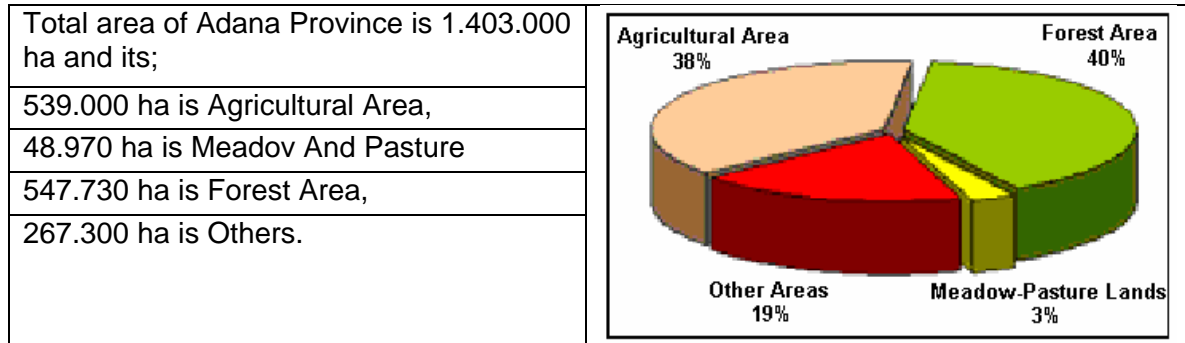


Figure IV.23 Adana Province Land asset

Table IV.27 Adana Province Total Land asset with its districts

DISTRICTS	AREA (ha)	TOTAL AGRICULTURAL AREA (ha)	MEADOW AND PASTURE(ha)	FOREST AREA (ha)	OTHERS (ha)
ALADAG	138.000	7.800	1.600	85.794	42.806
CEYHAN	142.600	111.700	5.000	4.343	21.557
FEKE	133.500	14.200	5.000	92.773	21.527
IMAMOGLU	42.400	34.750	250	6.897	503
KARASALI	149.742	29.550	3.400	81.023	35.769
KARATAS	92.200	57.000	4.000	2.041	29.159
KOZAN	169.000	60.320	1.770	98.707	8.203
POZANTI	77.200	4.980	3.500	55.615	13.105
SAIMBEYLI	113.200	11.700	11.700	69.547	20.253
SEYHAN	42.000	32.000	500	804	8.696
TUFANBEYLI	97.300	32.000	10.600	26.910	27.790
YUMURTALIK	50.100	31.000	650	2.636	15.814
YUREGIR	155.758	112.000	1.000	20.640	22.118
TOTAL	1.403.000	539.000	48.970	547.830	267.300

Source : Adana Province 2003 Environmental Condition Report

Table IV.18 Amounts of Citrus Fruits Production in Adana Province

PRODUCT	PRODUCTION IN ADANA PROVINCE (ton)	PRODUCTION IN TURKEY (ton)	PERCENTAGE IN TURKEY (%)
Orange	358.850	1.250.000	29
Mandarin	198.417	580.000	34
Pomelo	89.502	135.000	66
Lemon	106.690	510.000	21
Sour Orange	1955	3000	65

Source : www.adanatarim.gov.tr

Table IV.19 Amounts of Agricultural Production in Adana Province

PRODUCT	PRODUCTION IN ADANA PROVINCE (ton)	PRODUCTION IN TURKEY (ton)	PERCENTAGE IN TURKEY (%)
Corn	1.035.000	2.300.000	45
Cotton	168.000	2.293.745	7
Soy bean	25.478	50.000	50
Wheat	1.235.000	19.000.000	6,5
Watermelon	653.789	5.795.000	12
Olive	10.894	600.000	0,6

Source : www.adanatarim.gov.tr,2005

77% of Aladag District is covered with forest which 49% (65.554 ha) of it is productive. Agriculture lands have generally undulated topography and agricultural productivity rate is very low. The lands where are suitable for irrigation are very low. Fruits are grown in inclosure gardens as agriculture and wheat is cultivated in dry fields.

Cherry, apple, walnut, palm, etc. are grown. Since both soil structure and meteorological conditions of Aladag are suitable for organic farming, first organic farming activities of Adana Province initiated in Aladag by the collective work of Aladag District Agriculture Office with Faculty of Agriculture of Çukurova University at 2001. And today it has come into value as an export commodity. Size of the organic farming which is only made in Aladag district of Çukurova reached to about 71 quarters of an acre as of 2001. (www.aladag.gov.tr, www.aladag.bel.tr).

Kozan Dsitriect is on total 1,690,000 km² area. Approximately 603,200 km² of the total area are being used as agricultural fields and irrigation of 206.000 km² of the agricultural area is provided by DSI and 94,000 km² of it is provided by local people with using different methods. and Kozan District Land asset and amount of agricultural productions are presented in Table IV.20.

Table IV.20 Agricultural Production and Land asset of Kozan District

Agricultural Production		Land asset	
Product	Production (ton)	Type	Area (dekar)
Wheat	147.000	Field Area	458.830
Barley	3250	Vegetable Gardens	23.200
Oat	600	Vineyards	18.550
Cotton (irrigated- rainfed)	3150	Area of Citrus Trees	76.500
Corn (I-II)	59.500	Area of Olive Trees	10.330
Soy Bean (I-II)	1600	Area of Eucalyptus Trees	2.000
Citrus	180.000	Fallowed Area	13.700
Olive	4600	Total	603.200
Watermelon	18000		
Lettuce	3000		
cabbage	4250		

Source : www.kozan.gov.tr,

Size of irrigated farming land in Adana Province where has very important agricultural fields for Turkey, is only 40.4% of the total agricultural areas with 217.562 ha.

This irrigation of 176,542 ha is provided by 6. Regional Directorate of DSI, 36.020 ha is provided by 3. Regional Directorate of Rural Services and the rest irrigated is provided by the waters supplied from wells, rivers and drainage channels. (www.adanatarim.gov.tr).

IV.2.8. Forestry Areas (type and amount of trees, size of forestry areas and their coverage, their present and planned protection and/or usage purposes)

Land assets of Adana Province are presented in Figure IV.24. As it is seen the figure, 59% of the province is unforested areas, 24% is forested areas and 17% is damaged forests.

Project Site is under control of the borders of Akdam-Meydan-Sogut Operating Office of Kozan and Pos Office, and 1,264 ha red pine forest is located within the boundaries of Project Site. The investigation and evaluation form prepared by Adana Forest Regional Directorate for the forest asset in Project Site is presented in Appendix-C.

There are red pines (Çz) within the area which is accepted as forest. The type of forestry are determined as Çzd2, Çzcd2, BÇz, Çzd1, Çzcd1, Çzcd2, Çzcd3. The 1/25.000 scaled Forestry Map for Project Site is presented in Appendix G.

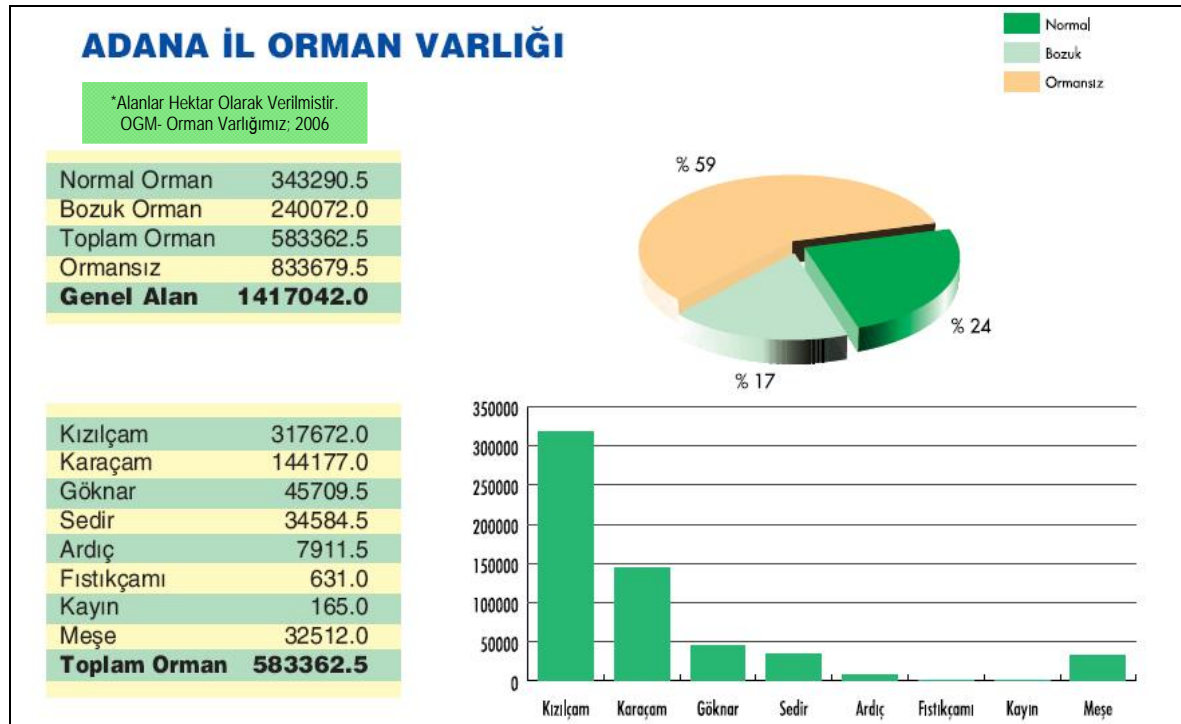


Figure IV.24 Forest asset of Adana Province

Source: R. T Ministry of environment and forestry, General Directorate of Forestry, Forestry assets inventory 2006.

Mesçere tiplerinin gosterimindeki ifadelerin anlamlari asagidaki gibidir.

- a : at youth age mesçere
- b : at frequency age mesçere
- c : at thin tree-pole age mesçere
- d : at thick tree age mesçere
- 1 : closed between 0,1-0,4 mesçere
- 2 : closed between 0,4-0,7 mesçere
- 3 : closed between 0,7 and more mesçere

The seed mesçere of this site is out of national park, protected forest, tourism area, wild life for hunting, hunting production area, military forbidden zone ve private environment protection area, at work of forestry of project has no drawback and Kavsakbendi Dam HPP and Quarry Project facilities sites are sensitive for fires of forest, and all these subjects are stated in Adana Forest Regional Directorate writing with 10.08.2007 date and figure no: B.18.1.OGM.1.01.00.03.240-1745-9908, and land investigation and evaluation form is presented in Appendix-B.

IV.2.9. Protection Areas (National Parks, Natural Parks, Wet Lands, Natural Monuments Nature Protection Areas, Wildlife Conservation Areas, Biogenetic Reserve Areas, Biosphere Reserves, Natural Site and Monuments, Historical and Cultural Sites, Special Environmental Protection Regions, Special Environmental Protection Areas, Tourism Area and Centers, Areas in the content of Pasture Law)

As a compilation of the information gathered from land surveys, official comments fom the related deperntments, web sites and literature research, Kavsakbendi Dam, HPP and Quarries Project Site does not include any;

- ✓ national parks, natural parks, nature protection areas and natural monuments defined in the 2nd item and determined in the 3rd item of the National Parks Law no. 2873,
- ✓ wild life protection and wild animal breeding zones determined by MoEF according to the Law on Terrestrial Hunting no. 4915,
- ✓ cultural and natural assets, protected areas and registered areas according to the 2nd item of the Law on Protection of Cultural and Natural Assets no. 2863,
- ✓ reproduction and production sites of fishery products defined in Fishery Products Law o. 1380,
- ✓ areas determined as Exclusive Environmental Protection Zones according to the 9th item of the Environmental Law no. 2872,

- ✓ there is no objection to utilization of materials provided that the required permissions are taken from Adana Regional Forestry Directorate in compliance with the 17th item of the Forestry Law no. 6831 and that "Raw Material Production License" is taken according to the law no. 5177. The official letter of Adana Regional Forestry Directorate no. B.18.1.OGM.1.01.00.03.240/1745-9908 on 10 August 2007 is presented in Appendix C.
- ✓ areas defined in the Law on Olive Reclamation and Vaccination of Wild Species no.3573,
- ✓ areas defined in the Pasture Law no. 4342,
- ✓ areas determined in the scope of 1st degree restricted military zones according to the Law on Restricted Military Zones no. 2565,
- ✓ areas defined in the Mining Law no. 3213 (5177),
- ✓ areas defined in the Regulation on Protection of Wetlands, published in Official Gazette no. 24656 on 30 January 2002.

The areas that are required to be protected as a necessity of the pacts that Turkey have signed including the following are not present in the Project Site:

- ✓ areas defined under the topic of important first and second caretta-caretta reproduction zones and Mediterranean seal living and reproduction zones according to Convention on Protection of European Wildlife and Habitats (Bern Convention),
- ✓ areas defined under Barcelona Convention (Convention on Protection of Mediterranean against Pollution),
- ✓ protected areas defined in the protocol related to the Exclusive Protected Areas in Mediterranean ,
- ✓ areas in the list of 100 coastal historical places in the Mediterranean with common importance published by the UN Environment Program,
- ✓ coastal zones which are the living places of special Mediterranean species,
- ✓ areas protected in the status of cultural and natural assets by the Ministry of Culture as a requirement of the convention on protection of cultural and natural assets,
- ✓ protected wetlands of international importance defined in Ramsar Convention,

Areas required to be protected;

- ✓ Biogenetic Reserve Areas, Geothermal Areas are not present.
- ✓ Agricultural areas; areas with land use capability classes of I, II, III and IV and special product plantation areas are not present in the Project Site. Land with utilization capability and suitability for agriculture of classes VII and VIII are present in the Project Site and the project-affected area.
- ✓ Areas which have scientific importance and are the special living zones for the threatened species and for the species endemic for Turkey, biosphere reserves, habitats, biogenetic reserve areas and the areas where unique geological and geomorphological formations lie.
- ✓ Cultural and Natural Assets and Archaeological Remains are not present in both the Project Site and the project-affected area. The related official document from the general directorate of Cultural assets and museums, Adana Regional council of Cultural and Natural Assets Protection of the ministry of culture and tourism, no. B.16.0.KVM.4.01.00.03/01.16/60-1896 on 11 July 2007, is presented in Appendix C.

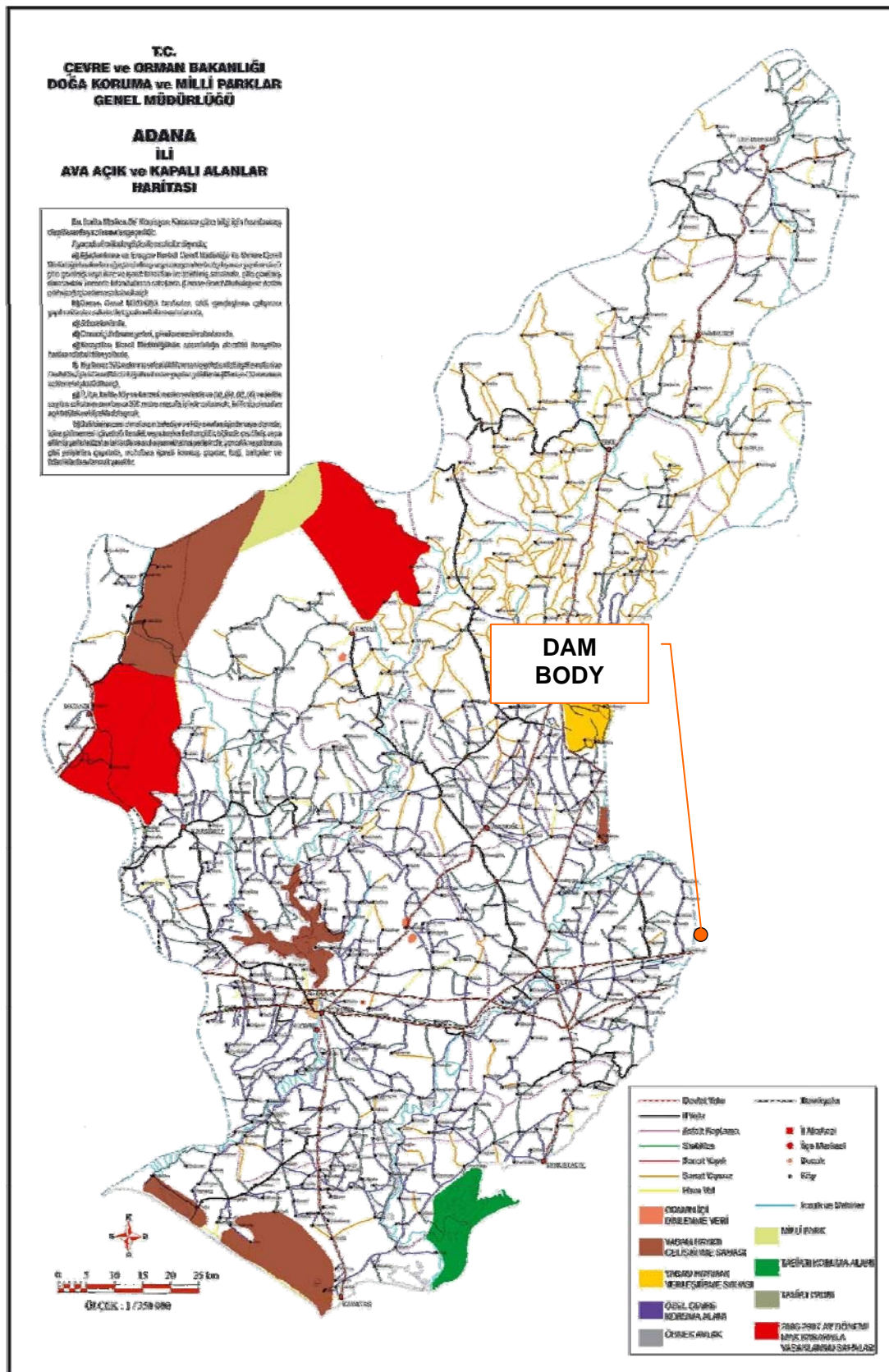


Figure IV.25 Protected Areas in Adana Province

IV.2.10. Species Living in Inner Waters (lake, stream) (Natural Charactersitics of these Species and species protected by national and international legislation, their feeding, reproduction, sheltering and living zones, protective decisions for these areas)

In this study, conducted on the species living in inner waters, aimed at determination of the different species living in upper, medium and lower part of the basin, their habitats and reproduction terms. In this context, the species living not only in the area in question but also the species likely to be encountered in the examined area have also been listed in order to be at the safe side.

Generally, this high-flow rate streams form waterfalls and pans composed of deep pits. Bottom is generally covered with gravel and stone. These waters are always cool and rich in oxygen 1-2 km downstream from the spring. Invertebrate bottom fauna is qualitatively poor. Besides, there are also various insects surviving under stones and in the nests where they build by sticking small soil particles together. The major species having these characteristics are *Tricopter*, *Ephemerit* and *Sialis* larvae.

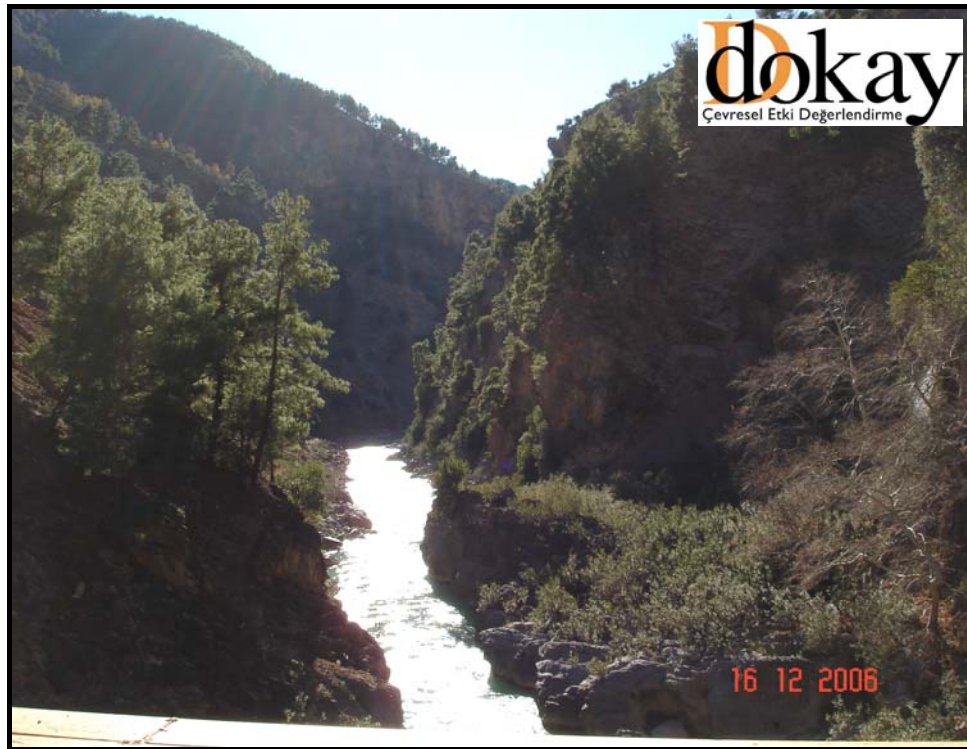


Figure IV.26 A view of the flora structure from the Project Site

Fishes

The typical fish species in the streams in the Project Site is *Salmo trutta macrostigma* (mountain trout and big spotted trout). As the morphology of the mountain trout is examined, it will be seen that it has 10-12 big spots on, composed of small dots gathering in a lateral string. There is always a black spot on probecular. They are

generally considered as miniature form with their maximum 30 cm of length. They are a sedentary of character form which they live in the streams throughout their life and never reach down to the sea. They especially prefer fast flowing and oxygen-rich, cold mountain waters. November – December term is their spawning period. In this period, they always climb up to the higher basins, which are shallow, and they spawn especially in in gravely bases (Turkey Freshwater fish, Ege University, water production faculty publish No.46.1999)

All trout in Turkey belongs to the *Salmo trutta* species. *Salmo trutta* species is observed in a large scale. Starting from the Northern Europe, they can be found in Corsica, Sardinian Islands and Algeria and Caucasia, Himalayas and Iran in the east. *Salmo trutta* is represented by many sub-species over this large territory.

Seyhan, Catalan and Mentas Dams, constructed on Seyhan River, have blocked the migration routes of the fishes. Fishes, which could not migrate, have stayed in the reservoir and have adapted to the environment.

Carp fish and trout growing plants are in operation in Kozan and Aladag and in the reservoirs, and they are contributing to the Turkish economy.

According to the “Red List 2006 Risk Classification” published by IUCN, *Salmo trutta macrostigma* (mountain trout, big spotted trout) and *Cyprinus carpio* (carp fish) species are classified as DD (DD:species about which sufficient information is not present)

The list of the fish species living in the Project Site has been prepared after in-situ surveys and literature research, and is presented in Appendix H.

Amphibians

The region is rich in Amphibians considered as the species living in inner waters. The following amphibian species are present according to both survey studies of the EIA team and literature records (see Appendix H).

- *Urodela* (tailed frog):
Triturus vittatus cilicensis (striped Salamander), *Salamandra salamandra* (spotted Salamander)
- *Anura* (frog):
Pelobates syriacus (eastern spadefoot), *Bufo viridis viridis* (night frog), *Hyla arborea* (tree frog), *Rana ridibunda ridibunda* (marsh frog)

General Evaluation

There are 17 fish and 6 amphibian species in the Project Site as total. Some species have been observed in the Project Site and the remaining has been listed considering their high probability of existence in the Project Site. All species also exist outside the Project Site and they reproduce by leaving thousands of eggs once. The species in question have a high potential of reproduction, and they are not considered as threaded species. However, hunting (except for barb-hunting) all the fish species especially the trout is restricted in reproduction periods.

IV.2.11. Flora and Fauna (species, endemic and particularly local endemic flora species, fauna species living naturally at the site, species protected under national and international legislation, scarce and endangered species and their locations at the Project Site, name and population of game hunting animals, and Central Hunting Commission Decision taken for them) marked of vegetation types in the Project Site on the map. Protection measures required to be taken for the living to be impacted from the project and studies (during construction and operation). Realization of flora studies to be carried out on site during the vegetation period and determination of this period.

In addition to the flora species observed directly in the Project Site, the species, which are registered in the literature for the Project Site and its vicinity and has a high probability of existing at the Project Site according to their biotype characteristics, are also included in the report. These species are explained comprehensively in the sections of fauna and flora.

Flora

The flora species of the proposed Project Site and its vicinity are determined in the consequence of the site surveys and literature studies. On the other hand, the sampling studies and site surveys of EIA team were carried out at all sites probable to be impacted from the project. In addition, considering the richness of flora in Turkey, some species might have been missed out during the local flora studies. In this context, to prevent the likely oversights in this study, all flora species registered for the region in the reference named "Flora of Turkey" were surveyed and the species, especially the endemic ones, probable to be encountered according to the characteristics of the habitat, are considered;.

The flora inventory is prepared in the light of the site surveys and literature studies. The reference named "Flora of Turkey and the East Aegean Islands, Volume 1-10, 1965-1988" of P. H. Davis is utilized in the determination of species. This book is also the reference for the authors of the taxon stated in the list. The regional flora list is prepared in alphabetic order. For each species, the information such as their habitat, flora region, endemism status, relative abundance and risk classes given in Turkish Red Book of Flora are presented. The scale and abbreviations stated in the list are defined below. The Turkish Dictionary of Flora Names is used for the Turkish and local names of species (Baytop, T., 1997).

According to the pertinent literature and field studies conducted on Project Site, 95 plant families and 724 plant species are recorded within the study area. As a result of the same studies, 37 families, 129 species and 292 plant class were detected to be endemic. In accordance to the results obtained from the literature review and site surveys, the flora

list of the Project Site, flora regions of the species, their distribution in the country, endemism statuses and their abundances are given in Appendix-I.

Fauna

The fauna inventory is prepared based on a comprehensive literature review and observations of the local residents as well as the site surveys. As for the population abundance for the birds, it is assessed in terms of the biological (principally reproduction, feeding and adaptation) and ecological characteristics (especially biotype suitability) of the species besides for the observation, questionnaire and literature information. Kiziroglu (1993) is used for the birds under risk. IUCN (2004) is given for other fauna species. The scale for the risk class areas follows.

The species given in Appendix II of Bern Convention are the species that are definitely protected, whereas the ones included in Appendix III are the species that are protected for specific periods. In the content of the lists, the status of the fauna species according to Bern Convention and the condition of the birds and mammals according to “Central Hunting Commission Decision 2006-2007” are stated. In the column of Central hunting Commission Decision, the abbreviations KK and BZ mean always protected and hunted in defined periods (especially expect for reproduction period), respectively.

The terrestrial fauna of the Project Site and its vicinity comprises 17 fish, 6 amphibian, 16 reptiles, 153 birds and 18 mammal species at species and sub-species level (sub-species and variety). The fauna inventory is prepared by an extensive perspective and includes many species not observed directly within the Project Site. In order to assess the impact, the information such as the habitat (biotype) and risk status of the species is also included (see Appendix -H).

Otter (*Lutra lutra*) is in the NT category according to IUCN (The World Conservation Union), and its population status in Turkey is not very clear. Otter is among “Protected Wild Animals” determined by MoEF.

The list of the animals which are restricted to hunt by R.T Ministry of environment and Forestry and Central Hunting Commission according to Central Hunting Commission Decisions (2006-2007) are presented in Appendix List-I and Appendix List-II.

Appendix III includes the animals, hunting of which the Central Hunting Commission permits for certain periods, and they are shown in Table IV.21 and IV.22. Especially Seyhan River is on the migration routes of many bird species. Aladaglar, located in the northwest of the Project Site is one of the Important Areas of Turkey for the Bird. The considered area has gained this status due to the populations of “Lammergeier (5 pairs), Griffon Vulture (10 pairs), Golden Eagle (4 pairs) and also “shy” population.

Table IV.21 Mammals

LATIN NAME	COMMON NAME
Canidae	Dogs
Canis aureus	Jackal
Vulpes vulpes	Fox
Laporidae	Rabbits
Lepus europaeus	European Brown Hare
Oryctolagus cuniculus	European Rabbit
Mustalidae	Martens
Martes martes	Pine Marten
Martes fonia	Beech Marten
Suidae	Boars
Sus scrofa scrofa	Wild Boar
Viverridae	Viverrids
Herpestes ichneumon	Egyptian Mongoose

Source: Central Hunting Commission Decisions 2006-2007, Appendix-III

Table IV.22 Birds

LATIN NAME	COMMON NAME
Anatidae	Ducks
Anser albifrons	White-Fronted Goose
Anas penelope	Wigeon
Anas strepera	Gadwall
Anas crecca	Green-Winged Teal
Anas platyrhynchos	Mallard
Anas acuta	Pintail
Anas querquedula	Garganey
Netta rufina	Red-Crested Pochard
Aythya ferina	Pochard
Aythya fuligula	Tufted Duck
Aythya marila	Greater Scaup
Melanitta nigra	Common Scoter
Bucephala clangula	Common Goldeneye
Phasianidae	Pheasants
Alectoris chukar	Chukar
Alectoris geraeca	Rock Partridge
Ammoperdix griseogularis	See-See Partridge
Coturnix coturnix	Common Quail
Rallidae	Rails
Fulica atra	Eurasian Coot
Charadriidae	Plovers And Lapwings
Gallinago gallinago	Gallinago Snipes
Scolopax rusticola	Eurasian Woodcock
Columbidae	Doves
Columba livia	Rock Pigeon
Columba palumbus	Wood Pigeon
Streptopelia turtur	Turtle Dove
Turdidae	Thrushes
Turdus merula	Common Blackbird
Corvidae	Crows
Garrulus glandarius	Eurasian Jay
Pica pica	European Magpie
Corvus monedula	Jackdaw
Corvus frugilegus	Rook
Corvus corone corone	Carrion Crow
Corvus corone pallescens	Hooded Crow
Passeridae	Songbirds
Passer domesticus	House Sparrow

Source: Central Hunting Commission Decisions 2006-2007, Appendix III

IV.2.12. Mines and Fossil Fuel Resources

Due to its geological location, Adana Province has variety of significant underground resources. In the first instance Iron, many mineral source like ; chromium, lead, zinc, gold, silver, bauxite, manganese, barite, phosphate, quartz and quartzite, gypsum, salt, cement feedstock, construction stone, oil, coal, asbestos, meerschaum etc. are among the natural resources of the region. (www.adana.gov.tr). Moreover, According

to Adana Environmental Situation Report of 2003, 334,481 million ton lignite reserve exists inTufanbeyli. Mining facilities are taking place only in Kozan among the three subject districts, in context of Mining Law numbered 3213 (5177). The mentioned facilities are given in Table IV.23.

Table IV.23 Mining Activities in Kozan District

NAME OF RESERVE	LOCATION	AMOUNT (ton)	ACTIVENESS
Copper-Lead-zinc	Kozan-Horzum	20.000	Some times
Iron	Kozan-Inniktepe	600.000	Inactive
Quartzite	Kozan-Horzum	150.000.000	Some times

Source : www.adana.gov.tr, Adana 2003 Environmental Situation Report

There is not any mining activitiy in Project Site and its environment.

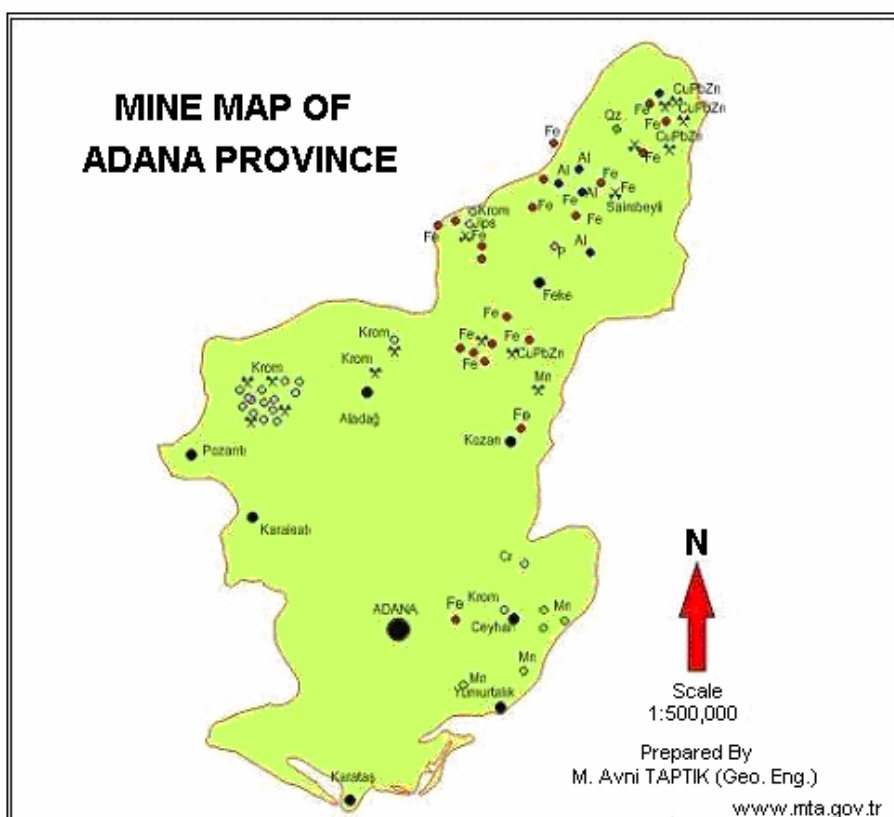


Figure IV.27 Mine Map of Adana Province

IV.2.13. Animal Husbandry (Species, feeding zones, amount of annual production, contribution and value of these products to Turkish economy)

Animal husbandry and industry of animal products are among the major means of living for the local people living in rural areas throughout Adana Province. Cattle and small cattle raising, poultry farming, fish breeding farms and apiculture are the main animal breeding activities of the region.

When it is considered as total of Kozan and Aladag districts where the Project Site will present as built-in, these districts have important portion in terms of animal husbandry and industry of animal products.

Approximately 33% of the small cattle, 26% of the cattle, 66% of beehives and 11% of the poultry are located in the borders of these two districts. The related data is given in Tables IV.24, IV.25, IV.26 and IV.27.

Table IV.24 Small Cattle Property of Adana Province and Districts

DISTRICTS	SHEEP	SHEEP (MERINOS)	GOAT	TOTAL
SEYHAN	4,300		900	5,200
YUREGIR	23,400		7,060	30,460
*ALADAG	17,238		31,864	49,102
CEYHAN	14,290		3,910	18,200
FEKE	21,150		26,600	47,750
IMAMOGLU	7,700		7,000	14,700
KARASALI	21,150		38,850	60,000
KARATAS	9,081		220	9,301
*KOZAN	42,250		28,000	70,250
POZANTI	9,800		9,500	19,300
SAIMBEYLI	18,500	600	42,000	61,100
TUFANBEYLI	6,900	1,660	6,300	14,860
YUMURTALIK	5,090		960	6,050
TOTAL	200,849	2,260	203,164	406,273

Source : www.adanatarim.gov.tr, 2005

Table IV.25 Cattle Property of Adana Province and Districts

DISTRICTS	PURE CULTURE	HYBRID CULTURE	NATIVE	TOTAL CATTLE	BUFFALO	HORSE	MULE	DONKEY
SEYHAN	1,800	6,600	230	8,630	75	120	150	35
YUREGIR	1,158	31,600	267	33,025	46	540		290
*ALADAG	796	2,738	3,563	7,097	0	490	750	700
CEYHAN	793	16,306	557	17,656	47	177		110
FEKE	1,240	3,220	4,600	9,060	0	760	550	820
IMAMOGLU	685	6,000		6,685	0	46	5	215
KARASALI	1120	6,090	2,035	9,245	0	630	305	390
KARATAS		10,022	0	10,022	0	50		6
*KOZAN	5,260	17,300	1,800	24,360	20	1,105	401	1,700
POZANTI	83	227	990	1,300	0	307	107	449
SAIMBEYLI		1,210	6,040	7,250	0	1,060	580	2,100
TUFANBEYLI	2,430	3,980	3,150	9,560	0	93		1,250
YUMURTALIK	312	4,095	290	4,697	0	11		7
TOTAL	15,677	109,388	23,522	148,587	188	5,389	2,848	8,072

Source : www.adanatarim.gov.tr, 2005

Table IV.26 Numbers of Beehives and Amounts of Production of Adana Province and Districts

DISTRICTS	Beehives		Production	
	Number of Beehives of Old Type	Number of Beehives of New Type	Honey (kg)	Beeswax (kg)
SEYHAN		6,586	54,200	6,586
YUREGIR		15,000	190,000	17,540
*ALADAG	140	1,300	21,600	4,300
CEYHAN	130	1,540	33,100	3,310
FEKE	500	7,000	75,000	6,000
IMAMOGLU		45,000	675,000	90,000
KARASALI	30	9,900	120,000	12,000
KARATAS		1,200	18,000	
*KOZAN		92,100	2,302,500	138,150
POZANTI		13,500	337,500	2,300
SAIMBEYLI	125	11,200	185,000	13,900
TUFANBEYLI		3,500	52,500	4,775
YUMURTALIK	140	1,321	27,000	4,800
TOTAL	1,065	209,147	4,091,400	303,661

Source : www.adanatarim.gov.tr, 2005**Table IV.27** Poultry Property of Adana Province and Districts

DISTRICTS	CHICKEN		DUCK (number)	GOOSE (number)	TURKEY (number)	CHICKEN EGGS (number)
	Broiler	Egg Producer				
SEYHAN	1,120,000	6,000	450	700	1,700	1,200,000
YUREGIR	530,000	202,000	800	1,200	14,500	40,400,000
*ALADAG	72,500	6,000				600,000
CEYHAN	50,000	35,000	1,290	375	405	6,200,000
FEKE		5,000				700,000
IMAMOGLU	60,000	60,000		200		3,600,000
KARASALI	230,000	65,000				11,700,000
KARATAS		10,000	700	700	40	2,000,000
*KOZAN	90,000					
POZANTI	11,200	5,000				1,000,000
SAIMBEYLI		51,000	50	35	70	4,500,000
TUFANBEYLI		7,000	270			560,000
YUMURTALIK		28,800	1,032	364	140	5,184,000
TOTAL	2,163,700	480,800	4,592	3,574	16,855	77,644,000

Source : www.adanatarim.gov.tr, 2005

IV.2.14. Lands Under Control and Responsibility of Authorized Governmental Agencies (Military Forbidden Zone, areas allocated to public institutions and corporations for special purposes, etc.)

The Proposed Kavsakbendi Dam, HPP and Quarry Project Site and the neighbouring area do not include any Military Restricted Zones, areas assigned to governmental institutions on purpose and areas restricted by the decision no. 7/16349 of the Council of Ministers.

IV.2.15. Determination of Baseline Pollution Load in Terms of Air, Water, Soil, Noise of Project Location and Its Impact Area

Project Site includes Karahan Village (Aladag), Karayakoyak and Guven Quarters of Karahan Village and Gokce Village (Aladag). No industrial facilities, which may contribute to environmental pollution, are not located in these villages. Villagers deal with animal husbandry regardless of trading purposes. Therefore the soil and air pollution in the Project Site and project-affected area is out of question.

Present Water Quality

As the maps prepared according to the “Quality Criteria According to Intercontinental Water Source Classess”, given in Table-I of “Water Pollution Control Regulation” (WPCR) which became effective upon publication in Official Gazette no. 25687 on 31 December 2004, the water quality of the Project Site and project-affected area will be declared as follows:

In terms of **Group A** parameters, the water quality in the first 3 stations on Zamanti River (upstream to downstream) is 4th class and it raises up to 2nd class due to the tributaries and nitrogen conversion. Seyhan River, formed by the joint of Zamanti and Goksu River, possessing a water quality of 2nd class, has a water quality of 2nd class until Egner Bridge but it decreases down to 4th class there on due to heavy agricultural activities.

In terms of **Group B** parameters, the water quality of the rivers and tributaries in the basin is determined as 2nd class. However, the water quality rises up to 1st class after joining of Goksu and Zamanti in Egner Bridge area where clean tributaries join.

In terms of **Group C** parameters, it has been realized that the parameters were not measured with the same frequency, and thus, the column C in the map, to be prepared in compliance with the regulations, has been drawn only according to iron and manganese to establish continuity considering that there would be gaps otherwise.

In terms of **Group D** parameters, the water quality in the Lower Seyhan Basin is determined to be 3rd class (Adana Province Environmental Condition Report, 2003).

The maps prepared according to the results obtained in compliance with the SKKY are given in Figure IV.28.

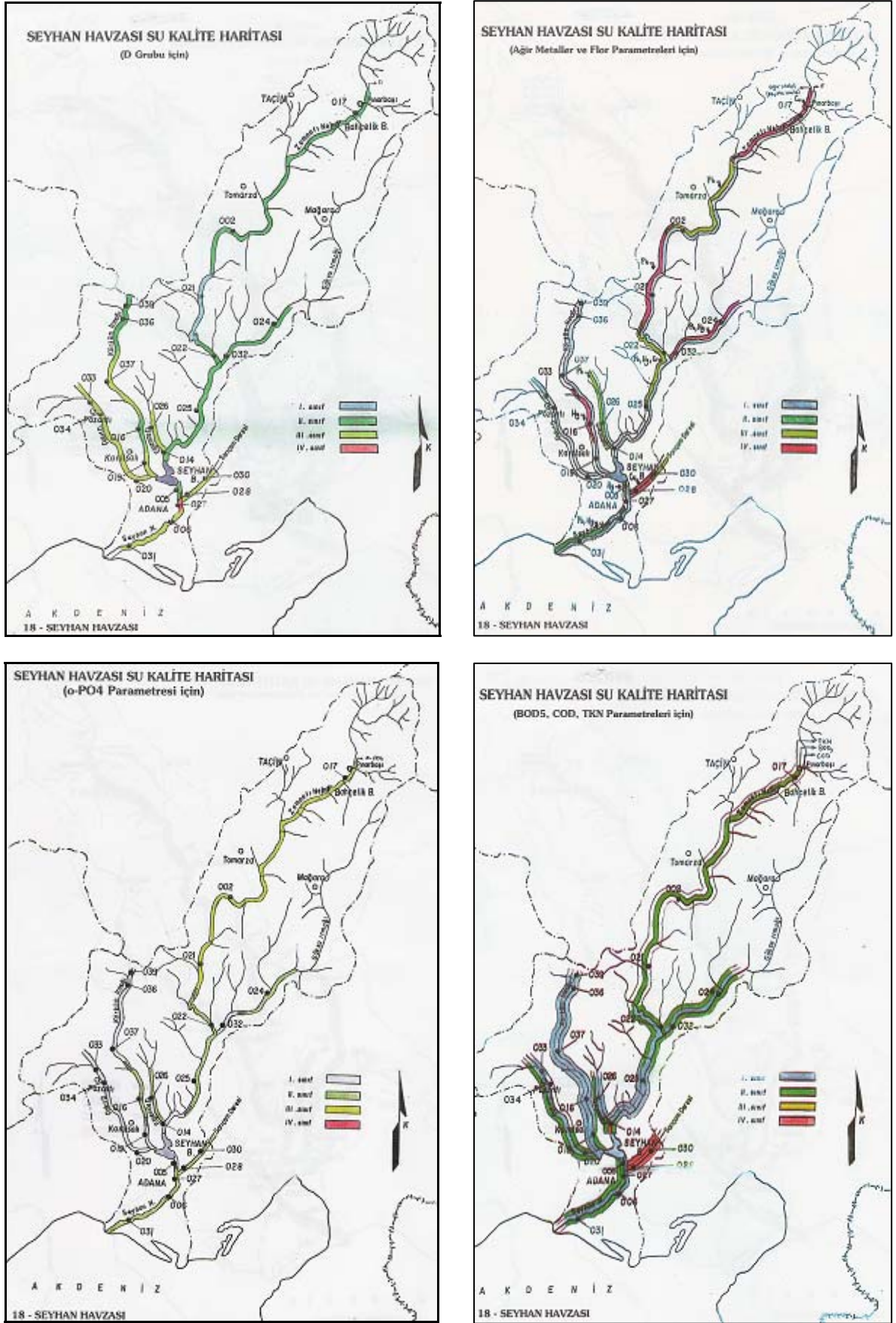


Figure IV.28 Seyhan Basin Present Water Quality
Source: Adana Province Environmental Condition Report

The Acoustic Report prepared as a result of noise measurement studies conducted in the Project Site is given in Appendix J.

IV.2.16. Other Characteristics

There are no subjects to include in this part concerning the utilization of natural resources and the characteristics of the physical and biological environment.

IV.3.1. Characteristics of Socio-Economic Environment

In this chapter, general information regarding the socio-economic status of Project Site and its vicinity is presented. The socio-economic profile of the region is examined in detail to comprehensively evaluate the impacts to be brought about by Kavsakbendi Dam, HPP and Quarries Project.

The residential areas located in the Project Site and to be directly affected by the Project are Karahan Village (Aladag), Karakoyak and Guven Neighbourhoods in Karahan Village and Gokce Village (Aladag). Karakoyak Neighbourhood, 100 m apart from the Project Site and Guven Neighbourhood, 1 km apart from the Project Site are the places to be subjected to the heaviest socio-economic and environmental impacts arising from construction of the dam and post-construction stages.

While it is examined of the socio-economic characteristics, a method of common-to-specific/whole to part has been followed and the determinations related to territories starting from Adana Province continuing with Kozan and Aladag Districts and finally finishing with “Karahana” and “Gokce” Villages are given in the following sections.

IV.3.1. Economical Characteristics (major sectors constituting the economic structure of the region, distribution of local labor force to these sectors, the status and significance of the property and service production in these sectors in the regional and national economy, other information)

Adana city, seventh largest province of Turkey, is both the economic and urban center of Cukurova region. According to the data from State Planning Organization (DPT), Adana is the eighth province in the socio-economic development ranking in Turkey. Data collected in 2000 states that Adana has a share of more than 3% among total Gross Domestic Product (GDP) of Turkey. According to the same data, it was the 19th richest province with 2,057 YTL GDP per capita level.

The major sectors that contribute to the province economy are agriculture, manufacturing and commerce which totally constitute 65% of the economy. Adana Province and especially Cukurova Region is one of the leading agriculture/industry/commerce areas of Turkey and industrial activities have gained importance by agricultural raw material processing.

If the 872 districts in Turkey are considered, Aladag and Kozan are 713th and 273th in the rankings respectively in terms socio-economic development (DPT, 2003). These districts do not have significant contribution to the economy of Adana. In Aladag, mining and plateau tourism and in Kozan agricultural activities are important for economic activity of the districts.

Major Sectors Constituting Economic Structure

The information on the major sectors constituting the economic structure of the region is discussed in the following sections.

Agriculture

Adana Province, where is a door opening to sea, is situated at the middle of Cukurova formed by Ceyhan and Seyhan Rivers on the fertile alluvial soils. Seyhan, Kozan and Catalan Dams are constructed on these rivers. Geographical position and meteorological conditions of the region earns the province a very advantageous position in terms of agricultural productivity. 7.8% share of total national agricultural production belongs to Adana.

Total area of Adana Province is 1,403,000 ha. 539,000 ha of this land are cultivated agricultural areas, 48,970 ha are pasture and meadows, 547,730 ha are forest and shrub lands, 235,300 ha are abandoned lands, 13,000 ha are residential areas and the remaining 19,000 ha are water surfaces.

Cultivation of corn, peanut, soy bean and sunflower is getting more important on the productive soil of the Cukurova Region. In addition, by the application of modern techniques in fields, cultivation of grape and some other fruits has improved. Distribution of agricultural lands is given below:

<u>Distribution of Agricultural Areas</u>	<u>Hectare</u>
Field	445,180
Fruit	44,406
Vegetable	37,435
Fallow	11,979
Total Agricultural Areas	539,000

Besides its being the most developed agricultural region in Turkey, Adana is also the province with the highest usage of modern agricultural machinery. 39% of Adana is suitable for agriculture and very fertile.

Fertile fields of Adana give more than one time yields in a year provided that tractors and other modern agricultural machines are utilized along with proper irrigation, fertilization, rehabilitated seeds and pesticide application.

By the production of 250,000 ton pure cotton, especially Akala and Cocker type, one fourth of national cotton production is achieved in Adana. In addition to cotton, cereal, sesame, melon, watermelon, early vegetables, barley, oat, leguminous seeds, sugar cane, grape, fig, tobacco, rice, peanut and citrus are the other important agricultural products.

Project Site is mostly covered by forests and agricultural fields constitute rather small portion. Forest crafting is main economical facility of the region. Moreover, cereal, cotton and loquat cultivation is common.

Animal Husbandry

Animal husbandry is not as important as agriculture for the province. There are limited amount of meadow and pasture lands in the province so animal husbandry facilities are observed in slopes of Taurus Mountains. Sheep, cow, goat, horse and camel breeding are the main animal husbandry facilities of the province. In addition, apiculture is also developed.

Industrial Activities

Adana is a highly developed province in terms of industrial sector. Adana with its airport, highway projects, biggest Industrial Zone of Turkey, small industrial estates, recently announced housing zones, health and education institutions, is the sixth out of 81 provinces in terms of GDP.

The number of businesses operating in the province, registered to the Adana Chamber of Industry and employing 10 or more workers is 732. Most of the enterprises are large scaled with high employment rates. 18 of Turkey's top 500 industrial enterprises are located in Adana. The number of enterprises with more than 1000 employees is five. In Adana province, 55 companies with foreign capital are operating. Haci Sabanci Industrial Zone and small industrial estates established on Adana-Ceyhan highway are significant institutions for the development of industry. In Adana, where population and economy grow continuously, "Regional Development Plan" requiring a coordinated study for the solution of infrastructural, unplanned urbanization and other problems as well as for the prevention of possible future problems is included in the scope of DPT's investment plan. In order to guide the industrialists, prepare projects and determine alternative investment opportunities, Adana Investment Research and Development Center-AYEGEM was established by the collaboration of Adana Governorship, Adana Metropolitan Municipality, Cukurova University, Chamber of Commerce, and Adana Cooperation Foundation.

In Adana, the number of small and medium-scale enterprises is 1,023. Number of enterprises in manufacturing sector and repair and commercial activities are 525 and 550 respectively.

There are not any industrial establishments or activities in the vicinity of the Project Site or its vicinity.

Mining

The region is rich in terms of mine deposits. Chromium is extracted in Karsanti, quartz is extracted in Karaisali and quartzit and zinc are extracted in Kozan in addition to iron, coal, manganese, quartz, zinc, barite, copper and lead extraction from the districts in the vicinity.

No mining activity, mine or fossil ores exist in the immediate vicinity of the Project Site according to mining maps of the MTA (Mineral Research and Exploration Institute).

Tourism

Thousands of years of history, countless historical artifacts, natural beauty of Yumurtalik and Karatas shores, green plateaus of the Taurus, healing waters and diverse flora and fauna earn Adana a high tourism potential.

The Taurus, surrounding the province in the north and east has a very suitable natural environment for mountain sports, trekking and hunting tourism. Furthermore, it is also very suitable for the development of plateau tourism with its numerous plateaus. Lagoons and marshes created by Seyhan and Ceyhan Rivers provide unlimited opportunities for eco-tourism.

Since summers are too hot in Adana, local people prefer spending summer months in plateaus. There are so many alternative tourism activities as camping, health, river and canoe, cave and hunting tourisms.

Tuzla and Akyatan lagoons created by Seyhan, and Agyatan Lagoon created by Ceyhan, the other remaining lagoons as well as lagoons of Yumurtalik form ideal sheltering and reproduction areas for rarely seen birds along with terrestrial and fresh water species. Areas other than these lagoons are also appropriate for "Coastal Tourism" and "Yatch Tourism".

Other than these, dynamic economical life is another potential of inner Cukurova. Adana holds an important potential for "Business and Conference Tourism" through its university and its traditional social activities. It is the biggest city and business center of the region as well.

Tepebag Artificial Mound, historical Big Clock, mosques, courtyards, covered bazaars and mosaic museum are spectacular places in Adana which is rich in historical artifacts.

A total of 65 large-scale protection areas were determined and declared. Urban protection areas like Kozan Center and Seyhan District Center, archeological production

areas like Misis, Magarsus and Anavarza and natural protection areas like Agyatan-Akyatan Yumurtalik Lagoon are among these protection areas.

Civilizations in Adana formed a cultural mosaic through translation of their cultural diversity to next generations. Hittites, Romans, Arabians, Seljuks, Ottomans, Turkomans and clan in the region contributed to the cultural diversity. Especially in 19th and 20th centuries, considerable development in agriculture and industry due to increasing density of population in Adana Plain lead to important changes in the culture of the region.

Cukurova has a rich folklore as it harboured many different civilizations. It is not possible to determine which folklore products of old civilizations exist until present and which of them were integrated with folklore production. General characteristics of Anatolian folklore are observed in locale folklore except some changes. Dress code which is widespread in some villages of Adana, weddings, folk dances such as javelin, wrestling and “sinsin” are surviving characteristics of folklore.

Distribution of Local Labor Force

In Adana province, the labor force participation rate of economically active population (12 years and older) is 49% and this ratio varies significantly according to sex. Male labor force participation rate is 66% whereas the rate is 32% for their female counterparts. Female labor force participation rate varies significantly according to place of residence. While 84 out of 100 women are employed in villages, the female labor force participation rates are 16% and 12% in province and district centers, respectively.

In the district centers impacted by the Project, Aladag, Kozan labor force participation rates are 27% and 32% respectively and these rates does not differ from the average of all district centers in the province (33%).

The labor force participating in the province economy and its sectoral breakdown according to TUIK classifications with country level statistics are given in the table below (Table IV .28). As it can be seen in the table, the sectoral breakdown of labor force in Adana displays a parallel pattern with that of Turkey. The leading sector on which economy depends is agriculture, followed by community, social and personal services .

Table IV.28 Sectoral Distribution of Economically Active Population (%)

Location	A	B	C	D	E	F	G
Adana Province	43.08	8.28	7.97	6.52	1.32	8.45	24.39
Turkey	35.20	9.50	11.00	6.10	2.40	8.00	27.80

Source: TUIK 2000.

A: Agriculture, animal husbandry, forestry, hunting and fishery

B: Service works

C: Trade and Sale Personnel

D: Executive Personnel etc.

E: Entrepreneurs, directors and senior managers

F: Scientific and technical personnel, self-employed person

G: People working in jobs except for agriculture and People using transportation vehicles

VI.3.2. Population (Urban and rural population in the region, population movements, migrations, population growth rates, average household size, other information)

Administrative Division

The urban and rural population distribution in Adana Province according to 2000 Population Census is presented in Table IV.29. As seen from the table, Adana Province has 13 districts. Among these districts, Kozan District is the largest of three districts representing the Project Site with the surface area of 1,863 km². The district has one sub-district and 85 villages. Besides, 28 villages are in the administrative boundary of Aladag.

According to 2000 Population Census, population of Adana Province is 1,849,478. Population of Kozan and Aladag Districts are 130,875 and 23,579, respectively. In addition, population of Gokce (Aladag) and Karahan (Aladag) villages that are impacted from the Project are 310 and 348 respectively.

Table IV.29 Distribution of 2000 Population Census results according to Districts

NAME OF DISTRICT	TOTAL POPULATION	CENTRE	VILLAGE
Total	1,849,478	1,397,853	451,625
Seyhan	849,283	807,934	41,349
Yuregir	453,799	322,776	131,023
Aladag	23,579	6,674	16,905
Ceyhan	178,543	108,602	69,941
Feke	20,890	4,632	16,258
Imamoglu	43,361	30,428	12,258
Karaisali	35,122	6,883	28,239
Karatas	32,375	9,189	23,186
Kozan	130,875	75,833	55,042
Pozanti	21,756	9,627	12,129
Saimbeyli	17,149	5,198	11,951
Tufanbeyli	20,171	5,332	14,839
Yumurtalik	22,575	4,745	17,830

Source: TUIK, 2000.

Urban and Rural Population

As seen in Table IV.30, according to results of 2000 Population Census, total population of Adana is 1,849,473 and 1,397,853 of the total population live in urban areas (75.6%), with a remainder of 451,625 people living in rural (24.4%).

Urbanization rate of Adana Province is very high when compared with the average of Turkey. While the rural population was 36% of the total population in 1927, with a very sharp increase in urbanization especially after 1950, this ratio reached to a value more than as twice in 2000 (75.6%). Annual urban population growth rate is calculated as 21.70 ‰ for the period between 1990 and 2000.

When the Project affected districts are considered, while most of the population of Aladag District (72%) live in rural areas, it is seen that there is an even distribution of population in Kozan District (58% urban and 42% rural) (see Table IV.30). The population of the Karahan Village where the Project Site lies is 379 whereas the population of Gokce Village is 399 according to 2000 Population Census.

Table IV.30 Annual Population Growth Rate according to Districts of Adana Province (‰)

NAME OF DISTRICT	TOTAL	CITY	VILLAGE
Seyhan	23.39	22.93	32.75
Yuregir	20.54	16.44	31.41
Aladag	1.59	29.07	-7.47
Ceyhan	10.29	24.14	-8.01
Feke	-7.74	-0.80	-9.63
Imamoglu	17.04	34.80	-15.37
Karaisali	20.21	-4.99	-6.35
Karatas	-6.08	1.8	28.56
Kozan	12.8	33.11	-9.77
Pozanti	-5.73	19.87	-22.22
Saimbeyli	-7.95	10.09	-14.88
Tufanbeyli	-11.69	-6.02	-13.64
Yumurtalik	7.44	28.08	2.59

Source: TUIK, 2000.

Population Movements and Migrations

The convenient climate and soil characteristics of Cukurova for cotton cultivation drew attention of England and then France and Germany in 1860s. The changes in economy has as well affected the social life and together with cotton cultivation, the migration of seasonal workers has started. People especially from southeastern provinces have intensely migrated to the province since 1970s. 36.8% of migrants are from Southeast Anatolia Region. 61.4% are from eastern and other provinces. The terrorism in Southeast Anatolia increased the intensity of the migration to Adana after 1990s. 75% of the migration to Adana is driven by economical concerns, 17% by safety concerns and 6% by educational concerns and 2% by health concerns.

According to results of 2000 Population Census, 92,684 people immigrated to Adana from other villages, districts and cities and the number of people migrated from Adana is 133,181. On the basis of these figures, net migration rate in 2000 was calculated as ‰ 23.97 (TUIK, 2000).

Population Growth Rate

Population of Turkey has almost quintuplicated since 1927. On the other hand, population of Adana Province has nearly octuplicated in the same period and reached 1,849,478 in 2000. While Adana Province harboured 1.7% of total population in 1927, this ratio has increased to 2.7% in 2000.

According to 2000 Population Census, population of Adana Province is determined as 1,849,478 and population growth rate between 1990 and 2000 is calculated as 17.71‰ which is nearly the same as national population growth rate (18.28‰).

The population of subject districts, Kozan and Aladag, are 130,875 and 23,579 respectively. Population growth rates of these two districts are 1.59‰ for Aladag and 12.80‰ for Kozan. Populations of Gokce (Aladag) and Karahan (Aladag) villages are 399 and 379, respectively.

Population of Average Household

The total number of households in Adana Province is 402,243, 78% of which lives in urban areas. Average household size is 4.7 across the Province.

Among the districts of concern, Aladag has 1,429 households in total and average household size is 4.9 in the district. Having an average household size of 4.5, Kozan harbours 17,097 households.

The distribution of the total number of households in Adana Province and Aladag and Kozan Districts according to household size are presented in Table IV.31.

Table IV.31 Number of Households in Adana Province and Aladag and Kozan Districts

NUMBER OF HOUSEHOLDS	TOTAL	1	2	3	4	5	6	7	8	9	+10
Adana	402,243	15692	43844	62720	94888	73834	44988	29088	13622	8417	15150
Aladag	1,429	53	139	168	284	284	243	131	57	29	41
Kozan	17,097	563	1758	2616	4128	3656	2243	1240	401	213	279

Source: TUIK, 2000.

Distribution of Age Groups

The distribution of the age groups in Adana Province and Aladag and Kozan Districts are shown in Figure IV.29, Figure IV.30 and Figure IV.31, respectively. Adana has rather a young population structure. According to 2000 Population Census, the predominant age groups in Adana are 10-14 and 15-19 (11.18 % and 11.21% respectively) and this accounts for 10.11% of the population of Turkey. 15-19 age group holds the biggest share in the total populations of both Aladag and Kozan Districts.

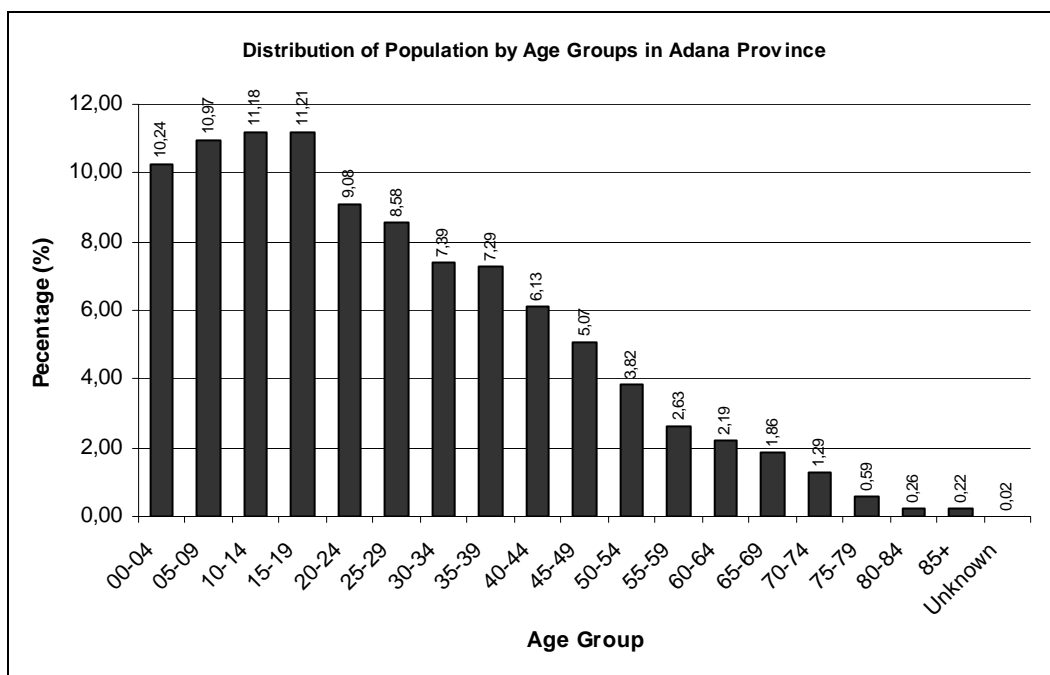


Figure IV.29 Distribution of Age Groups in Adana Province

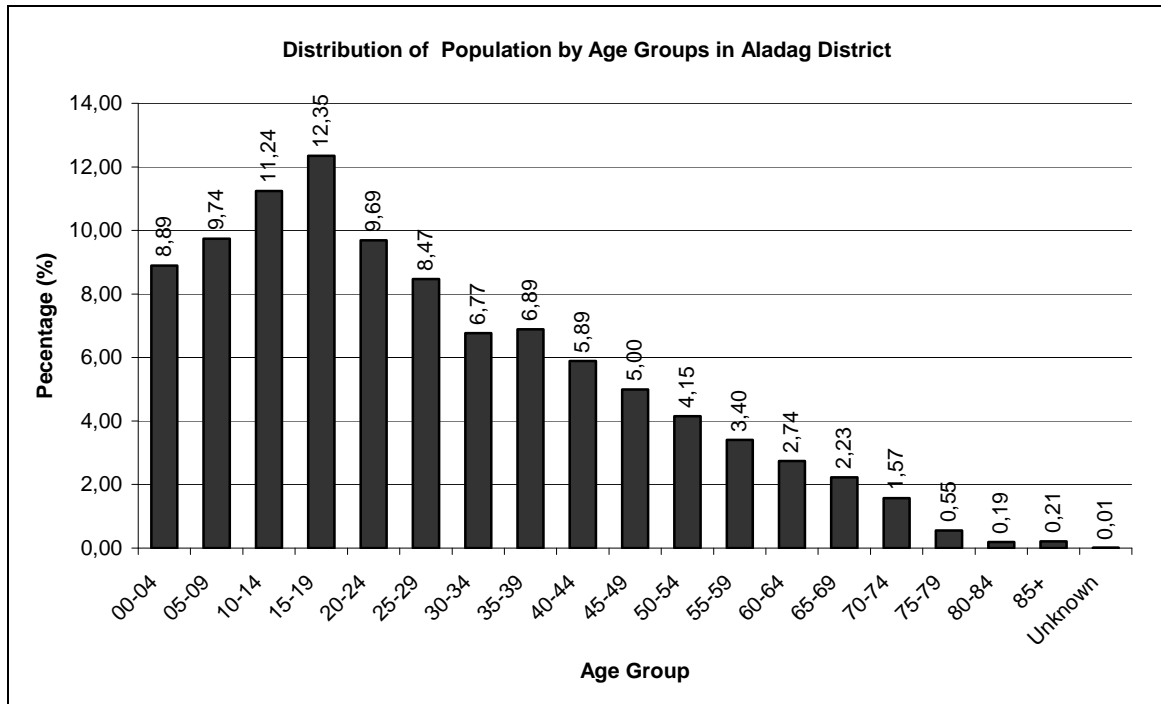


Figure IV.30 Distribution of Age Groups in Aladag District

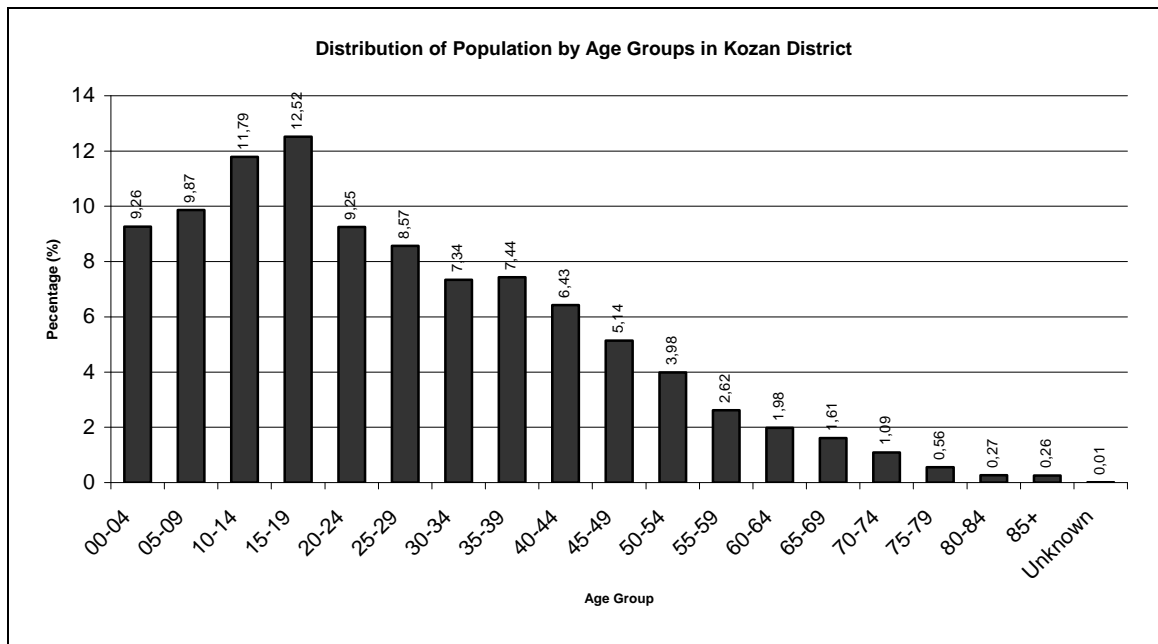


Figure IV.31 Distribution of Age Groups in Kozan District

Population Density

Population density, defined as the capita per kilometersquare, is 133 across Adana Province.

Population densities of Kozan and Aladag Districts are respectively 70 and 18 people per km².

Births and Fertility Rates

According to 2000 Population Census, sex ratio, defined as number of males per 100 females, is 98.98 for Adana Province. This ratio is the lowest of all recorded since 1927.

Total fertility rate of Adana Province is 2.68 where mean age for child bearing is estimated as 28.22. In addition, child woman ratio, i.e., number of children between the age of 0-4 per 1000 woman between the age of 15-49, is 368. Relevant fertility indicators are presented in Table IV.32.

Table IV.32 Indicators Regarding Fertility Rate

Location	Sex Ratio	Total Fertility Rate	Mean Age at Child Bearing	Child/Woman Ratio
Adana	98.98	2.68	28.22	368
Turkey	102.66	2.53	28.08	362

Source: TUIK, 2000.

IV.3.3. Income (Distribution of income as well as maximum, minimum and average income per capita on sectoral breakdown)

Adana Province, seventh largest province of Turkey, is both the economic and urban center of Cukurova region. According to data from SPO, Adana is the eighth in the socio-economic development ranking in Turkey. Data collected in 2000, states that Adana Province produces more than 3% of total GDP of Turkey. According to the same data, it was 19th richest city with 2,057 YTL GDP per capita level.

The sectoral distribution of province GDP in 2001 is shown in Figure IV.32 (SPO, 2006). Service sector, including logistics, telecommunication, warehousing, banking, insurance, housing, professional, governmental and non-profit services, takes first place with a share of 53%. Industrial sector, the aggregate definition of mining and quarrying, manufacturing, electricity, gas and water related activities is second biggest sector of the city with a share of 30%. Finally, agriculture takes the last place with a share of 17%. In addition to these, in Adana, industrial sector has the highest growth rate with 1.9% in 1987-2001 period and the sector has developed along with the development in agricultural production.

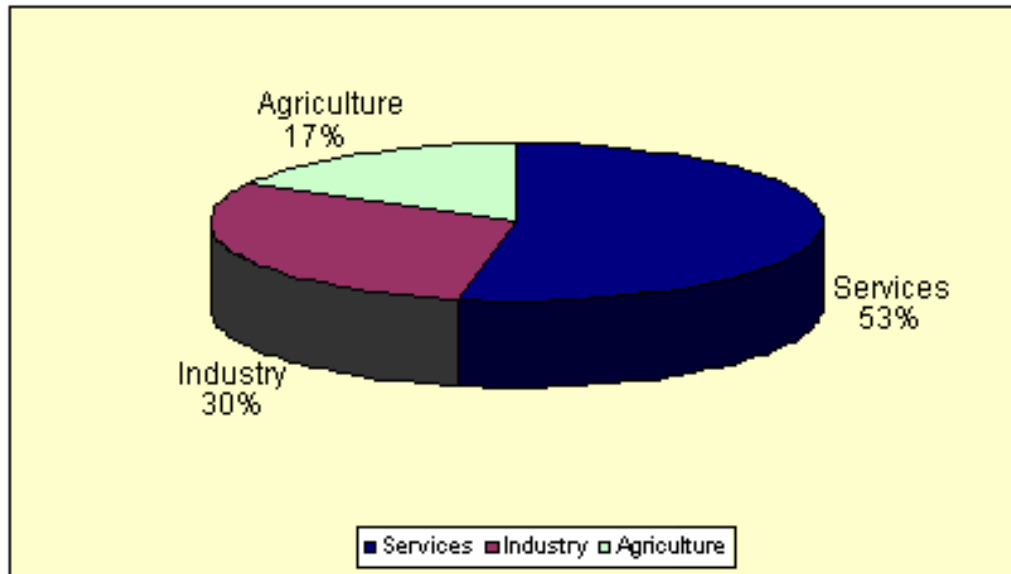


Figure IV.32 Sectoral Distribution of Gross Domestic Products in Adana Province in 2001

IV.3.4. Unemployment (Unemployed population in the region and its ratio to economically active population)

By definition, economically active population is the ratio of population who are older than 12 to the population who are employed, have ongoing relevance with work or seeking a job.

According to the TUIK data of the year 2000, the unemployment rate of Adana Province has increased to 14.3% in 2000 while it was 5.5% in 1980. This ratio is 15.0% for the male population in 2000, while it is 12.8% for females. Unemployment rate by sex in Adana Province is presented in Figure IV.33.

The unemployment rates in the two Project affected districts are 5.89% (Aladag) and 11.68% (Kozan), respectively.

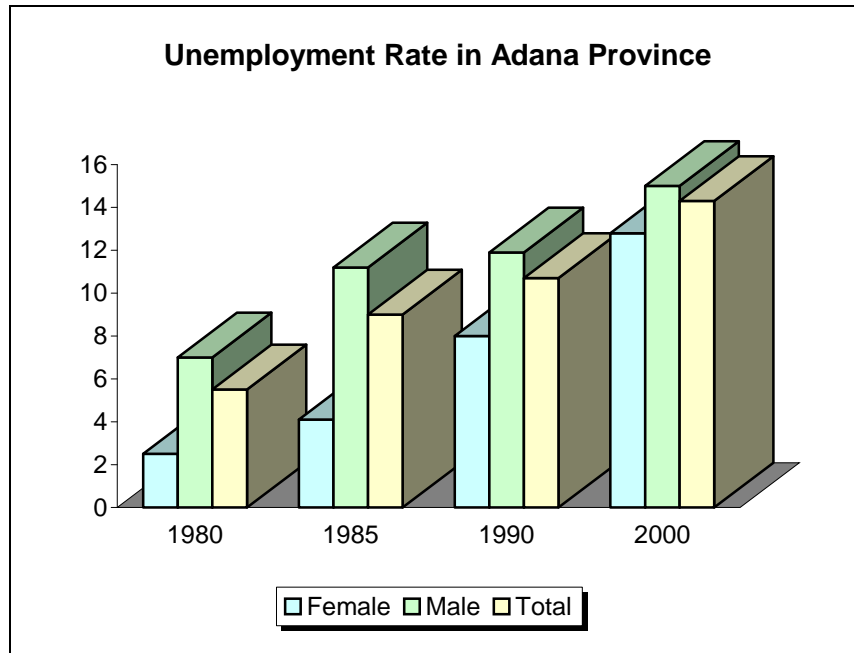


Figure IV.33 Unemployment Ratios with Respect to Sex in Adana

IV.3.5. Social Infrastructure Services in the Region (Education, health, cultural services and utilization from these services)

Education and Cultural Services

According to data of TUIK for the year of 2000, literacy ratio is 93.6% for males and 80.3% for females. Literacy rates for Aladag and Kozan District centers are 86.9%; and 89.6% respectively. Education is achieved by 425,099 students, 14,564 teachers and 8,964 classes at 858 schools 19 of which are nursery school, 714 are primary school and 125 are secondary school. Besides, Public Library, Adana Archeology Museum, Ethnography Museum, Ataturk Science and Cultural Center and Misis Mosaic Museum do exist in Adana Province. Cukurova University is the only higher education institution of the Province. The University has 10 faculties, 12 vocational schools, 27 research centers, 3 institutes and 1 state conservatory.

Literacy rate and schooling ratio in Adana Province is presented in Figure IV.34 and Table IV.33 respectively.

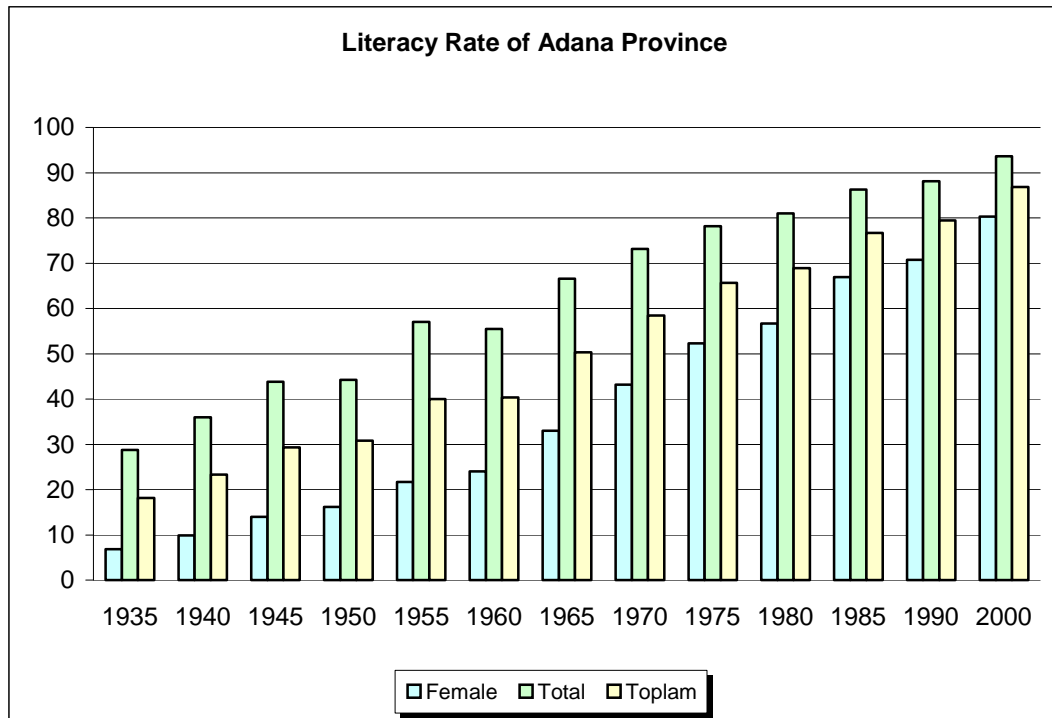


Figure IV.34 Literacy Rates in Adana Province

Table IV.33 Schooling Ratio in Adana Province

TYPE OF SCHOOL		Number of Schools	Number of Students	Number of Teachers	Number of Classes	Number of Students per Class
Pre-school		19	2,602	81	100	26
Primary School	Nursery School	302	8,955	266	358	25
	Primary School	412	320,340	9,837	6,410	50
Secondary School	High School	71	63,904	2,452	1,164	55
	Vocational High School	54	29,298	1,928	932	31
TOTAL		858	425,099	14,564	8,964	-

Source: www.adana.gov.tr

During the period 1975-2000, there has been an increase in the proportion of the population receiving education after primary school. While 13.4% of males completed their education after primary school in 1975, this ratio reached to 38.1% in 2000. Same developments were observed in females as well. 5.6% of females in 1975 and 22.3% in 2000 have completed at least one of the educational stages after primary school.

The number of people who has received at least high school education has increased significantly. While only 5.5% of the males and 3.1% of females were high school graduates in 1975, this ratio has increased to 17.1% for males and 11.1% for females by 2000. Tertiary education graduation rates have also increased in both sexes. While 2.9% of the males and 0.6% of the females were graduates of higher education institutions in 1975, these values have increased to 9.6% for males and 5.3% for females in 2000. Population by educational attainment with respect to TUIK 2000 data in the districts of Aladag and Kozan and Adana Province are presented in Figure IV.35, Figure

IV.36, and Figure IV.37 respectively and the population by literacy and last school completed is shown in Table IV.34.

Literacy rates in the districts of Aladag and Kozan are 81.80% and 85.92% respectively. There is a one-classed primary school where 1st, 2nd, 3rd, 4th and 5th grade students are educated all together in Gokçe village (Aladag), which is one of two the closest villages to the Project Site. 6th, 7th and 8th grade students are educated as pensioners in Aladag district center. The difficulty of transportation in Karahan village, one of the other close village to Project Site, affects the daily life routine negatively and hence, leads to a low level of educational attainment. However, with the welcoming of pensioners by Sinanpasa Primary School in Aladag, the educational attainment level of the village is tried to be improved.

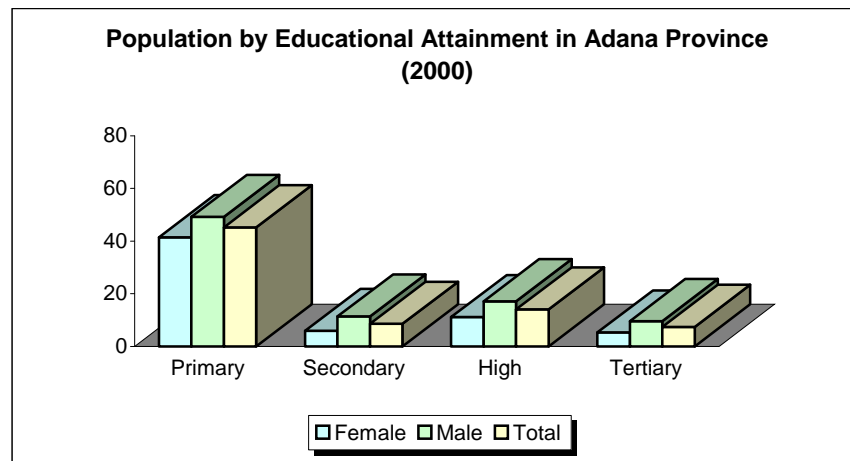


Figure IV.35 Population by educational attainment in Adana Province

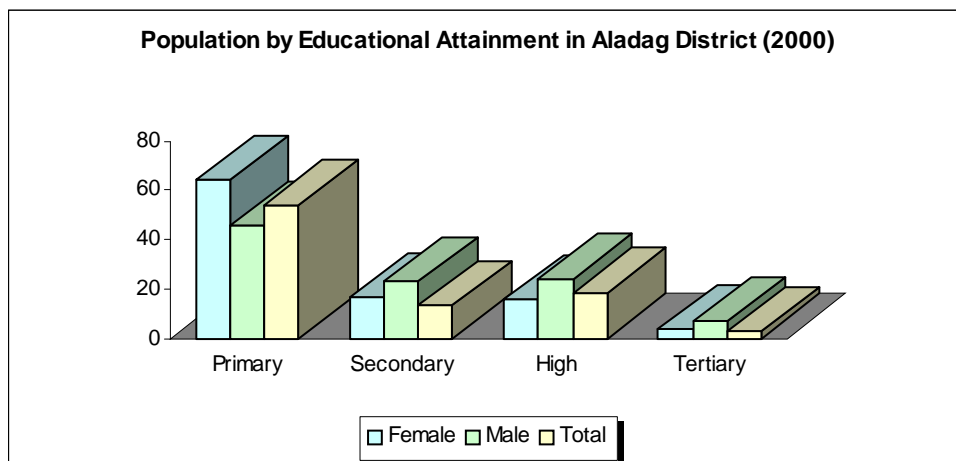


Figure IV.36 Population by educational attainment in Aladag district

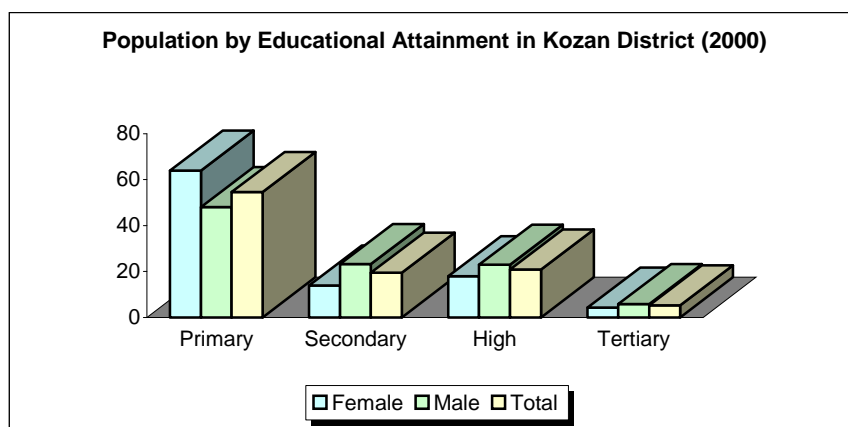


Figure IV.37 Population by educational attainment in Kozan District

Table IV.34 Population by literacy and last school completed

LITERACY STATUS	ADANA PROVINCEI	ALADAG DISTRICT	KOZAN DISTRICT
Illiterate	212.623	778	6.984
Not graduated from any school	382.752	1.278	14.736
Graduated from first school	554.088	2.104	19.079
Graduated from secondary school	167.349	785	9.654
Graduated from High school and Vocational school	226.859	799	13.342
Graduated from senior high school and Faculty.	76.882	202	3.457

Source: TUIK, 2000.

There is no educational institute in the vicinity of the Project Site to be affected by construction of Kavsakbendi Dam, HPP and Quarries Project facilities.

Health Services

There are 143 health clinics in Adana Province of which three are in Aladag and 12 are in Kozan. Total number of patient beds is 5,034 in the Province. 562 medical experts, 849 medical practitioners, 1,245 nurses, 2,825 health officers and 1,049 midwives are working in health sector according to 2005 health data. While the number of patient per bed is 420 in Adana Province according to 2000 World Health Organization (WHO) data, the figure is 380 for Turkey.

In addition to 12 health clinics, there are 70 private asylums in Kozan District centre. I

There aren't any health clinics or private asylums in Karahan village (Aladag) and Gokçe village (Aladag) within the Project Site.

There is no health institute to be affected by the construction of Kavsakbendi Dam, HPP and Quarries Project facilities in the vicinity of the Project Site.

Transportation

Transportation is provided by road, airway, railroad, sea road in the province. There are 454 km state highway, 488 km province road, and 144 km motorway within the borders of Adana Province.

Adana airport came into service as a civil-military airport in 1937. It was started to be used as civil airport in 1956. It is 3,5 km away from the city center. The annual passenger capacity of 2.000.000 by 1997 reached to 5.000.000 passenger/year with the opening of International Lines terminal.

It is possible to travel to many cities by railroad transportation from Adana station which was connected to railroad network in 1860's. There is a total of 205 km long railroad within the borders of Adana Province, of which 156 km is main route, 23 km is double route (Yenice-Adana), 26 km is station route, and indirect routes. There are 11 stations in total.

Kozan District has 86 villages and two towns. In the plain, there is a 200 km long asphalt and 95 km long stabilized road in the resident 33 villages and 56 of it in the part of basin. There is no transportation problem in these villages. Out of the 51 villages resident in the mountains, 20 of them have 125 km long asphalt and 20 km stabilized and 80 km levelled roads. There is partly some problem on arrangement roads in winter. Rest of the 31 villages and 75 of it roads are arrangement roads, there is transportation problem in the roads in all rainy days. The roads or 15 villages cover with snow in winter conditions.

IV.3.6. Land usage of Rural and Urban (the distribution of settlement area, present and planned usage areas, in this context, industrial regions, houses, tourism area etc.)

Present and Planned Usage Areas

The surface area of Adana is 1,403,000 ha of which 539,000 ha is cultivated agricultural land, 48,970 ha is meadow and pasture, 547,730 ha is forest-shrub and brush, 235,300 ha is mountainous and stony, 13,000 ha is residential area and 19,000 is water surfaces. The distribution of land assets of Adana Province is presented in Figure IV.38.

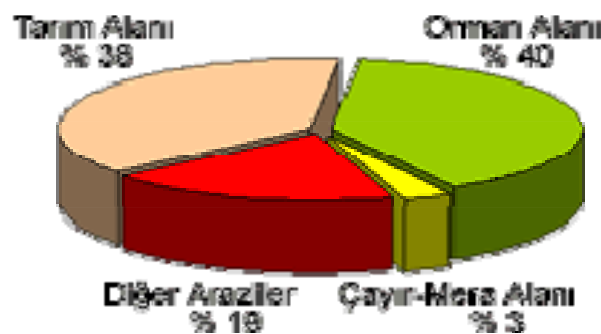


Figure IV.38 Adana Province by Land Assets

Among the agriculture-convenient lands, class I area is 198,000 ha, class II area is 85,000 ha, class III area is 117,000 ha and class IV area is 69.000 ha. Distribution of agricultural lands of Adana Province is given in Figure IV.39.



Figure IV.39 Adana Province by Distribution of Agricultural Lands

Present and Planned Usage Areas

All land assets of Aladag and Kozan districts are 138.000 ha and 169.000 ha, respectively. Land usage patterns of the subject districts are presented in Table IV.35.

Table IV.35 Land Usage Patterns of Aladag and Kozan Districts

LAND USAGE TYPES	ALADAG		KOZAN	
	AREA (HA)	RATE (%)	AREA (HA)	RATE (%)
Area	138,000	100	169,000	100
Total agricultural land	7,800	5,6	60,320	35,7
Meadow pasture area	1,600	1,2	1,770	1,0
Forestry area	85,794	62,2	98,707	58,4
Other lands	42,806	31,0	8,203	4,9

Source: www.adanatarim.gov.tr

Industrial regions and Tourism Areas

Aladag District

Aladag, which is at 105 km distance to Adana has remains from a historical city and a ruined middle era castle as well as the remains from Kırık Church in Akoren town. There are also Acisu fountain at 40 km distance and Bigbigi Cave in Meydan Plateau.

Kozan District

It is 72 km away from city center. Kozan Castle was built by Assyrians. Hoskadem Mosque, one of the important historical buildings, was built in 1448 by Abdullah Hoskadem who was an Egypt Sultan.

Anavarza city which is located 2 km away from Dilekkaya village at 22 km southeast of Kozan was found in B.C. 9th century by Assyrians. Cave tombs, artifacts like church and cistern are the remains that have reached to present. Moreover there are Anavarza mosaics which show 18 types sea animals. Daglicak at 10 km distance to Kozan is famous for its promenades and plateaus.

As a result of the site surveys, it is identified that there are no historical residential areas and plateau tourism lands in the vicinity of the Project Site.

IV.3.7. Other Aspects

There is not any other additional information to be given in this section.

V. PROJECT IMPACTS ON THE AREA WHICH IS DETERMINATION IN SECTION 4 AND TAKING PRECAUTIONS

V.1. Preparation of area, projects which is on the construction and establishment stage, its impacts on physical and biological environment and taking precautions (Including Regulator, HPP, Quarries)

In this section, possible bio-physical and socio economic impacts regarding construction and operation phases of Kavsakbendi Dam, HPP and Quarries Project facilities are evaluated. The section comprises the mitigation measures to be taken against any probable impacts at both the Project Site and on ecological and socio-economical environment at the downstream and upstream.

While the possible effects of construction activities are explained in section V.1, the possible effects during operation and respective mitigation measures are explained in V.2. Possible socio-economic effects in both construction and operation phases are evaluated in detail in section V.3.

V.1.1. Within the context of works for preparation of land, where and how much excavations will be done, amount of excavation, where excavation remnants like soil, stone, soil etc. Will be transported, where they will be stored or for which purposes they will be used, the materials to be used during excavation.

During the construction of dam and HPP as well as other facilities within the context of Kavsakbendi Dam, HPP and Quarries Project, there will be excavation due to digging, fill-in, levelling, material excretion, road opening and rehabilitation processes and topographic structure of the present area will change. The excavation to be undertaken within the context of the Project will be as below.

The area to be excavated and excavation amount

Digging and levelling works in the construction of Kavsakbendi will be carried out for the facilities stated below. In this context, amount of total digging within the context of the Project is approximately 1,842,415 m³, and the distribution of the total excavation material by project units will be as below:

<u>Project Units</u>	<u>Digging (m³)</u>
• Dam Body	500,000
• Derivation tunnels and regarding buildings	828,800
• Energy tunnels and regarding buildings	311,300
• Injection and Drainage Tunnels	17,315
• Other (spring cofferdam, etc,)	185,000
Total	1,842,415

Amount of digging materials derived from dam body, energy tunnel, injection tunnels and derivation buildings and tunnel is significant as seen above. Therefore, usage of digging materials on convenient zones in accordance with digging material characteristics is important for the project economy. A general summary on project fill-in materials is presented below.

<u>Project Units</u>	<u>Needs of fill (m³)</u>
• Dam body	380,000
• Spring and upstream cofferdam	276,000
• Other Fills (spillway, back of wall, switchyard, etc,)	25,000
Total	681,000
• Total Concrete Amount	400,000
• Total Concrete Aggregates Needs (x1,2)	480,000

Needs of rockfill for dam body will be provided from stone quarries on the spring lands. Alluvion digging material deriving from bottom of dam body will be used for purpose of fill on project buildings after stored in appropriate sites, moreover it is able to be used as concrete material according to aggregates aspects appropriateness. In the same way, it is planned that the digging material deriving from tunnels will be used for cofferdam fill

The digging materials deriving from other structures will be used for filling service roads and levelling works. Inconvenient material for fill-in will be stored in D1, D2 deposit sites where are on the direction of spring and in D3 where is on the direction of downstream. In addition to these sites, D4 deposit site where is also on the direction downstream will be used for spare deposit site

As given in section V.1.8, the excavation for T2 and T1 stone quarries will be limited with vegetative soil, which will be dropped from 0.3 m surface. According to this, it is anticipated that excavation will be derived from T1 quarry as 4.050 m³ (0,3mx13.500m²), and T2 quarry as 3.900 m³ (0,3mx13.000m²). The surface soil which will be derived from surface will be stored in convenient site in the survey area and it will lie on the surface again after the works are completed.

Same situation is available for A and B impermeable quarries. By grazed surface soil, material will take from under this soil. The amount of excavation from A quarries will be 9.390 m³ (31.300 m² x 0,30) surface soil. Vegetative soil will be grazed for B impermeable quarry as (26.200 m² x 0,30) 7.860 m³. Vegetative soil will be stored in the site after it is grazed from the surface and after the works in the site are completed it will be lie on the surface again. Rest of it will be stored in deposit areas.

Elimination of waste material

The part of mentioned excavation materials remaining from fill-in and construction will be stored in D1, D2 and D3 deposit sites. Location transportation route of Deposit sites in the Project Site with respective capacities of 756,000 m³, 248,000 m³ and 1,430,000 m³ are shown in Appendix-B.

On all excavation and deposit process within the context of project will be carried out according to published and came into force on 18.03.2004 date and No. 25406 official gazette "Excavation soil, control of construction and ruin waste regulation", excavation material will not be stored by random in Project Site, Vegetative soil deriving during excavation will be stored as covered its surface and it will be used as surface cover during landscape works.

Machine and Equipmant Using for Construction Process

The equipment which is within the context of construction works during the main process like digging, fill, open tunnel, grazing, transportation, concrete will be used as bellow.

- Road cylinder
- Cylinder with wibration
- Bulldozers
- Excavators
- Loaders with tire wheel
- Loaders as Backo type
- Dump truck
- Compressors
- Tunnel Jumbo Drillers
- Open Excavation Rock Drillers
- Portable Compressor
- Generators
- Crushers
- Washing and sifting machines
- Concrete Pump
- Concrete Mixing Unit
- Rock Crusher
- Diesel Electric Generator
- Injection Machine
- Drilling Machine

The number of equipment, which will be used, can change depending on construction stage.

Rock crusher facility will set up to be dimensioned in convenient level of the material deriving from quarries used to facility. The installed capacity of the facility will be 90.000 m³/year. The amount of annual material will be 70.200 m³/year. As seen in the general settlement plan in Appendix-B, the location of Rock crusher is between 724.200-724350 East, 4.162.600-4.162.900 North coordinates. The closet residential area is Karakoyak village distance from 150 km.

The product obtaining from quarry will be dimensioned by crushed in crusher and will be used in project construction as concrete agrega in project construction. The settled facility is composed of a bunker, which provides to feed to facility with ungraded materials, crusher with chin as stated with 90, a cubic mill, systems of shifts and conveyor band systems which provide to transportation among the units as mentioned before and which have several lenghts.

Water consumption on dust pressed system pulverization heading which will be used on Rock crusher are between 1-20 L/hour with 0.5-4 bar and it can change depending on needs. With this system, dust reduction can be provided by spending 2 L water for one ton. Since It is planned that 250 ton material is produced on rock crusher, it will be required water of 500 L/day around. This water will be provided from around springs or around municipalities by paid and will bring to construction site.

V.1.2. The material which is flammable, explosive, dangerous, toxic and chemical of the material which will be used during the Preparation of Land and moreover on construction of units are conveyed, stored and used, the equipment and machines which will be used for these works.

Due to the geological structure of construction site, it is planned to use explosive material. Necessary permissions will be obtained from Adana governorship, and after supplied from the producer, the explosive material will be conveyed to Project Site according to subject regulations. For conveying explosives, escort and 10-tonnes truck and for conveying diesel and oil, 10-tonnes tanker and straight chassis truck will be used. Conveyance, storage and usage of flammable and explosive materials (dynamite, capsule, benzene, diesel etc.) will be done according to the rudiments of statute on "Taking Measures on work place and works worked with Explosive, Flammable, dangerous, and noxious substance" published and come into force on publication in Official Gazette No.14752 on 24 December 1973 and the rudiments of statue on "Production, import, carrying, hiding, storing, selling, using, annihilating, checking of the explosive, hunting equipment and etc.substances excluded from monopoly of procedures and basis" published and come into force on publication in Official Gazette No.19589 on 29 September 1987.

Diesel and benzene will be conveyed to construction site by tanker and stored in buried tanks and it will be distributed by pump according to regulations. Motor oil will be

provided with barrels and conveyed to construction site with trucks and used within the area where is connected to drained oil holder, thereby leaking will prevent.

Oil waste from construction equipment will be annihilated according to regulation on "Control of Waste Oil" (Official Gazette dated 21 April 1987 and numbered 25353)..

V.1.3. Prevention of flood and Drainage Process

Derivation Tunnels and upstream-downstream cofferdams will be constructed for construction of dam and the facilities for provided dryness. Derivation tunnel diameter was determined by calculated tunnel discharge curves and cofferdam upper elevation for the diameter was determined by made computations of flood-routing for 25 years succession of flooding hydrography. As result of these computations, it was determined that derivation tunnel diameter was 8.50 m, cofferdam upper elevation was 271.20m.

Derivation Tunnel was designed in the shape of horseshoe and in number of two. Derivation tunnel will be used as bottom outlet later, and Derivation Tunnel 2 will be closed with plugged at the end of construction stage.

The bottom outlet will be constructed within the Derivation Tunnel 1. The diameter of bottom outlet penstock was dimensioned with the capacity that it is able to discharge to dam reservoir in 10 days at maximum water level.

The spillway will be constructed on concrete body. For the purpose of flooding size and prevention of the floodings structure of spillway was designed as having cover, energy crasher, having dash threshold.

Downstream cofferdam upper part was determined as 265.40m from river bed on 25 years succession flooding flowrate. Downstream cofferdam crest length is 44m, and Upstream cofferdam crest length is 77.70m.

With in the context of the Project, during the works related to tunnel construction, constructions sites, switch yard and roads construction. Flood prevention and drainage control are the most important topic to pay attention

The control of sedimentation erosion and sedimentation is important for all construction sites. For this purpose, drainage ditches and channels, which are able to discharge with artificial drainage of rainwater, which will come from creeks for both sides, will be constructed on necessary parts.

In addition, Drainage tunnels will be constructed on both shores for possible leaking water from injection covering, and drainage holes will be drilled on it. The tunnels

in question will push possible water leakage into drainage pits with gravity and it will be transferred from drainage pits to downstream with pump if necessary.

After the construction activities are completed, the necessary forestation works will be carried out on the area where trees and other plant cover were cleared within the scope of a landscape programme to be prepared (Kavsakbendi and HPP Feasibility Report, August, 2004).

V.1.4. Amount of stone, soil, gravel will be taken out by reason of digging, deep survey etc. process that will be realized for any purpose in water environments within the Project Site and where they will be transferred or what purposes for they will be utilized.

Permeable material that will be needed within the context of the project will be supplied from units where are on the both sides of creek bed within the reservoir area.

For this reason, soil and gravel quarries that were determined on planning stage at determined downstream were largely canceled. The detailed information related to the subject are given in Part V.1.5

Except this, not any process will be carried out in the water environment.

V.1.5. The number of quarries like stone quarry, soil quarry, clay quarry etc., area size of quarries, size of operating area and its coordinates, amounts of planning production depending on years, production techniques that will be applied, step height, its largeness, angle of repose, number of step, marking the beginning and final situations of quarries on production map.

An application will be made for obtaining permission Appendix I to Adana Province Directorate of Environment and Forestry according to regulation of "Protection of waterland" for the quarries that are on the creek river of the quarries from them of which will be opened within the context of the Project. Works will not be started until the necessary permissions are obtained.

The information related to quarries, which will be used within the context of Kavsakbendi Dam, HPP and Quarries project, and amounts of production according to years are given in Table V.1

Table V.1 Quarries and Amounts of Planned Productions

MATERIAL SITE	AMOUNT OF RESERVE (m ³)	PLANNED PRODUCTION (m ³)	SIZE OF ARE (m ²)	1.YEAR (m ³)	2. YEAR (m ³)	3. YEAR (m ³)	4. YEAR (m ³)	5. YEAR (m ³)
T1 Stone quarry	1.000.000	245.000	13.500	80.000	55.000	65.000	35.000	10.000
T2 Stone quarry i	1.000.000	500.000	13.000	140.000	70.000	140.000	100.000	50.000
A Imperable material area	100.000	30.000	31.300	30.000	-	-	-	-
B Imperable material area	50.000	20.000	26.200	20.000	-	-	-	-
C Imperable material area (Substitute)	1.400.000	yedek	913.000	-	-	-	-	-

The number of quarries, area size of quarries, size of operating area and its coordinates, area size of quarries, size of operating area and its coordinates, amounts of planning production depending on years, production techniques that will be applied, step height, its largeness, production maps which number of steps and angle of repose are marked on are given in Appendix-K.

Open operation technique will be carried out in T1 and T2 quarries, lockering explosive will be done. Later the materials that will be gotten pieces on its site, they will be sent to rock crusher unit, dimensioned and they will be transferred to area that will be used on. The numbers of steps of both quarries will be 5, and angle of repose will be 78.8°.

Total production on T1 stone quarry is 245.000 m³, 5 years will have been made production. Total number of step is 5, and steps are graded on among each other. According to this, 1st step 30 m height in total, height of each step 10 m, it is composed of 3 step. It is projected that second and third steps are T graded and at 10 m height, fourth and fifth steps are 5 m height as T graded.

Amount of total production T2 stone quarry is 500.000 m³, 5 years will have been made production and total number of step is 5. Steps are graded on among each other. According to this, 1st step is composed of 8 grades in total and its height is 80m. Height of each grade is 10 m. Second step is composed of 2 grades height of which is 10 m, its total height is 20 m. Third step is composed of 3 grades, height of which is 10 m, its total height is 30 m. Fourth step is composed of 2 grades, height of which is 10 m, its total height is 10 m. Fifth steps are T graded and it is projected as 10 m.

A and B imperable quarries will be used for 1 year, and they are planned as one grade. Amount of material which will be taken from quarries will be 30.000 m³ and 20.000 m³.

Storage sites D1, D2, D3 and D4 are 5 grades that will have been operated for 5 years. Amount of area that will be used according to years is given in Table V.2 as below.

Table V.2 Annual Usage Plans of Storage Sites

Grade	Amount of Material for Storing (m ³)				
	D 1	D 2	D 3	D 4	D1+D2+D3+D4
1	54.500	18.000	103.000	174.000	349.000
2	107.700	35.300	203.500	343.500	690.000
3	156.000	51.000	295.000	498.000	1.000.000
4	107.000	35.000	202.000	341.000	685.000
5	54.500	18.000	103.000	174.000	349.500
Total	497.700	157.300	906.500	1.530.500	3.074.000

All precautions related to slope stability will be taken on storage sites. They will be laid out in accordance with Topography and stored in a total of 5 steps. Each step is 5 m high. Cros section of storage sites are given in Appendix-F.

The result of laboratory experiments made on the samples taken from T1 and T2 quarries in material site are summarized in Table V.3 and Table V.4.

Table V.3 (T1) Material site – Stone Sample Laboratory Experiment Results.

SAMPLE NO: T1			
SPECIFIC GRAVITY		gr/cm ³	2,71
WATER ABSORB		%	0,18
VISIBLE POROZITE		%	0,49
PRESSURE RESISTANCE WITH ONE AXIS		gr/cm ²	1.320 1.390 1.400 1.575
LOS ANGELES EROSION BIN	100 REVOLUTION	%	4,8
	500 REVOLUTION	%	23,0

Table V.4 (T-2) Material site – Stone Sample Laboratory Experiment Results

SAMPLE NO: T2			
SPECIFIC GRAVITY		gr/cm ³	2,73
WATER ABSORB		%	0,31
VISIBLE POROZITE		%	0,83
PRESSURE RESISTANCE WITH ONE AXIS		gr/cm ²	1.100 1.372 1.130 1.372
LOS ANGELES EROSION BIN	100 REVOLUTION	%	6,0
	500 REVOLUTION	%	24,5

According to results of experiment, physical aspects of material site show that material is in the utilizable limits.

On the Kavsakbendi Dam, during the planning works regarding natural construction equipments and on the studies made on final project works previously, since type of dam type was chosen as reinforced concrete, it was understood that convenient material was available sufficiently.

On the studies made by Ser Power Generation and Trade Inc. it is understood that it would not be need to great amount imperable material after type of dam type was chosen as reinforced concrete. For this reason, it needed no use for many material sites where was determined on previous studies and within the dam reservoir downstream. In the event of it is not met to enough needs from the quarries as mentioned above within the context of project and (C) imperable quarry is not used, it will be obtained necessary permissions by informed to regarding foundations and institutions.

Before started to production to the quarries that will be used within the context of project, the vegetative soil on the surface will be grazed from the surface and stored in appropriate site in order to lay out again on the surface after site study is completed. Later, after the enough material will be derived from the stone quarries, it will be carried to stone crusher site by truck for crush-sift process. After that, the appropriate dimensioned material will be transferred to the site where it will be used in by truck again. The material taken from the imperable quarries will be directly carried to construction site after taken from the source since it will not be crush-shift process

V.1.6. It is explained that how explosive process will be made in quarries, it is figured of explosive pattern, amount of explosive material for one usage, its carried, its storaged and usage, air schok and stone jump, and it is evaluated of its effects.

During the construction, it is realized to diged of all hard stones that could not taken out from its location with the drilling-explosive and the process like stone digging,stabbing, and stif structured composed blocks that could not be digged and taken out with dozer. Prior to explosive process in the construction site, hole pattern, method and amount of explosive which will be used will be made in a plan by taken all necessary precautions.

The air shock, seismick movement and stone jumps due to the exploded which will be made in T1 and T2 quarries. The closest residential area is Çakırlar quarter where is approximately 750 m away from T2 quarry, it is not expected any negative effect to the quarter by taken security precautions. Amount of explosive is 525 kg/explode for each explode since it is calculated to used for 0,250-0,300 kg/m³ in limestones. On account of step quarry operating technique of explosive, it will be used 4-5 sequence delayed capsule and explosive impact will be around 100-130 kg.

Exploded method is stepped. For minimum amount of used explosive and minimum particule spread on exploded, it will be splitted previously. It was determined that the vibration speed is 5 mm/s that is not harmful for ordinary buildigs on international application. This vibration speed depends on the distance between explosion point and the buildings in question and amount of dynamite per each delayed capsule. In this sense, in order to be made production on enough level and not be passed to determined vibration speed, it is imperative to be used delayed capsule.

With the stepped exploded method, number of exploded hole will be decreased at the same time by using delayed capsule in order to be affected in minimum level from tremors and noises that will be occurred in around.

Moreover, small diametered holes where is drilled on the surface will provide to decrease of earth tremor and air shock. It will show sensivity to these techniques. This matter is carried out under responsibility of contractor obligation by presented with Ser Power Generation and Trade Inc. to contractor.

Imperable material (especially clay-based) will be used as tamping materials. In this way, it will be prevented to jump of explosive materials from hole and exploded performans will be increased. Stone jumpeds depends on drill, fill and detonation system directly. For this reason, good planning of drill cover, figuring of fill according to jeological conditions and used to sequence and enough capsule are prerequisite for the control of stone jumps. The chosen of locations and distances of exploded holes and fit to computations on dynamite fill process are very important for efficiency of explosion and prevention of possible harms to environment. The conditions that can be provided is possible if experiencing personnel on this subject performs.

On the stepped exploded method, amount of explosive material which will be used in holes and howmany holes will be exploded at the same time can be determined with the helping od exploded calculations of engineers on the area conditions entirely. Because, the amount of explosive materials that will be used in holes can be determined as a result of evaluated some criteria together like; geological structure of quarriy (hardness of stone, strata planes, splits, jointed and faults etc.) hole diameter, hole length, hole number, hole inclination, step height, piece thickness, environmental interaction and economical operating of quarriy. These criteria are different for each quarry so the most economic and secured application can be optimized as a result of tries that will be made on area one to one. Operating planing of stone quarries that is planned to operated will be perepared collectively with one mining and one geology engineers. That the quarriy is operated as harmony with environment and secure is possible that the rudiments of statue, regulation and legislation of environment and work security are carried out under control of a mining engineer. Since T1 and T2 stone quarries have same jeological formation (limestone) it will be used same pattern on both quarry. Explosive design will be revized according to quarry geometry and unexpected jeological formation.

Drill – Exploded Activity :Stepped Exploded Design

Total exploded number	For T1 Stone quarry 42 exploded/year For T2 Stone quarry 73 exploded/year
Exploded interim	For T1 Stone quarry one exploded for each week For T2 Stone quarry two exploded for each week
The amount which will be produced	
with exploded	: 1925 m ³ / exploded
the number of quarry- mirror	: 3-4
Explosive material	: Dynamite and ANFO
Hole number for one exploded	: 22
Hole tapping length	: 5,8 m.
Length of exploded area	: 35 m
Size of exploded area	: 5,0 m
Hole array number	: 4-5
Hole Charging length	: 5,2 m
Stone volume that one hole is exploded	87,5 m ³

<u>Hole Charging Plan</u>	<u>Bottom Charge</u>	<u>Tapping</u>
Hole length (m)	5,2	5,8
Amount of explosive material (kg/hole)	26,0 kg	

Hole settlement plan

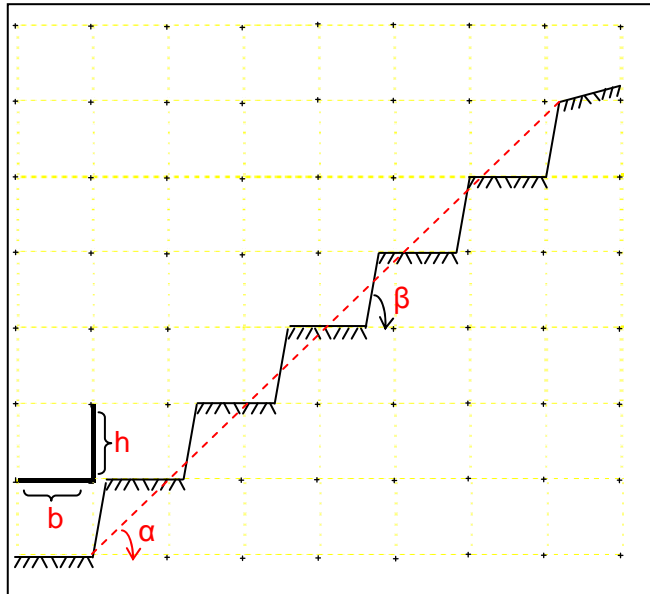
Hole array interim	: 2,5 m
Hole interim	: 3,5 m
Hole diameter	: 89 mm

Step cross sectionStep Section

Step height	:h= 10 m- 25 m
Step Size	:b= 10 m- 25 m
Angle of repose	:β= 35°-80 °
General angle of repose	:α= 20°-45°
Maksimum step number	:n= 5 items

Step parameter can show variation as below when it is taken consideration quarries repose stabilize and effect of quarry topography to production

Holes will be drilled as confused system and in order to decrease of tremors, delayed detonation system will be used. Operating plan will be prepared that drilling and exploded will be started and ended within the day shift. Step design on stone quarries are given in Figure V.1



h (step height) = 10 m-25 m

b (step size) = 10 m-25 m

β (angel of repose) = $35^\circ - 80^\circ$

α (general angle of repose) = $20^\circ - 45^\circ$

Figure V.1 Stone Quarries Step Cross section.

It will be exploded on digging of derivation, energy and transportation tunnel. All of these will be made under ground. Exploded pattern is given in Figure V.2. Flammable and explosive materials that will be used on construction are dynamite and ANFO. Necessary permission will be obtained from Adana governship for this materials and they will be bought from MKE or explosive production and carried to Project Site according to regulations.

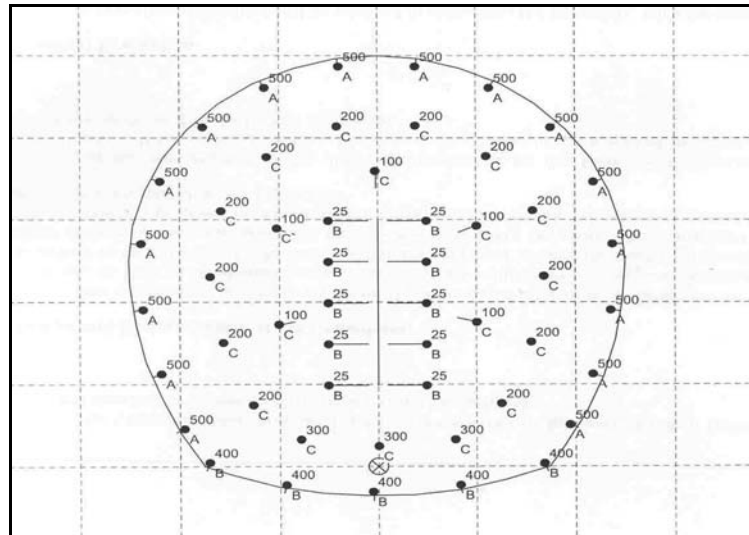


Figure V.2 Exploded Pattern

Transported as securing way, stored and used of he flammable and explosive material that will be used during the construction will be under responsibility of contractor firm.

Vibration Calculating

It is in question to occurring vibration due to explosive usage during tunnel opening works within the context of project.

Depending on amount of used explosive materials for one exploded, the vibration after the exploded will be calculated with the formula as below. (Olofsson, 1991):

$$V = K \times (Q / R^{3/2})^{1/2}$$

V : Vibrasyon speed (mm/sn) (calculation value)

Q : Amount of exploded substance (kg) (130 kg)

R : Distance from explosion area (m) (it is changed between 0-1000 m)

K : Transmission coefficient (≤ 400) (the worst condition K=400)

The vibration speed that is calculated by using the parameter on above and at the same time proposed vibration speed limits that show to unharmed speed for the buildings where is located on around explosion points depending on geological structure are presented in Table V.5. In the table for various geological structures, it is summarized that it is possible to which speed will be harmful and which kind of harms will be possible for the buildings located on around of explosion point.

Table V.5 Effects of vibration speeds on buildings on surface exploded.

	Soil, Clay and undergroundwater	Soft limestone	Granite, Hardlimestone, Kuvarts	The effect on buildings
Vibration speed (mm/sn)	18	35	70	Hasarsız
	30	55	100	Küçük çatlaklar
	40	80	150	Belirgin çatlaklar
	60	115	225	Önemli deformasyon

Source : (Olofsson, 1991).

By taking into consideration to be used 130 kg explosive (the worst situation) for each explodeds within the context of project, the vibration speeds that will occur with respect to distances by using formula on above are given in Figure V.2. Transmission coefficient is taken K=400 for securing.

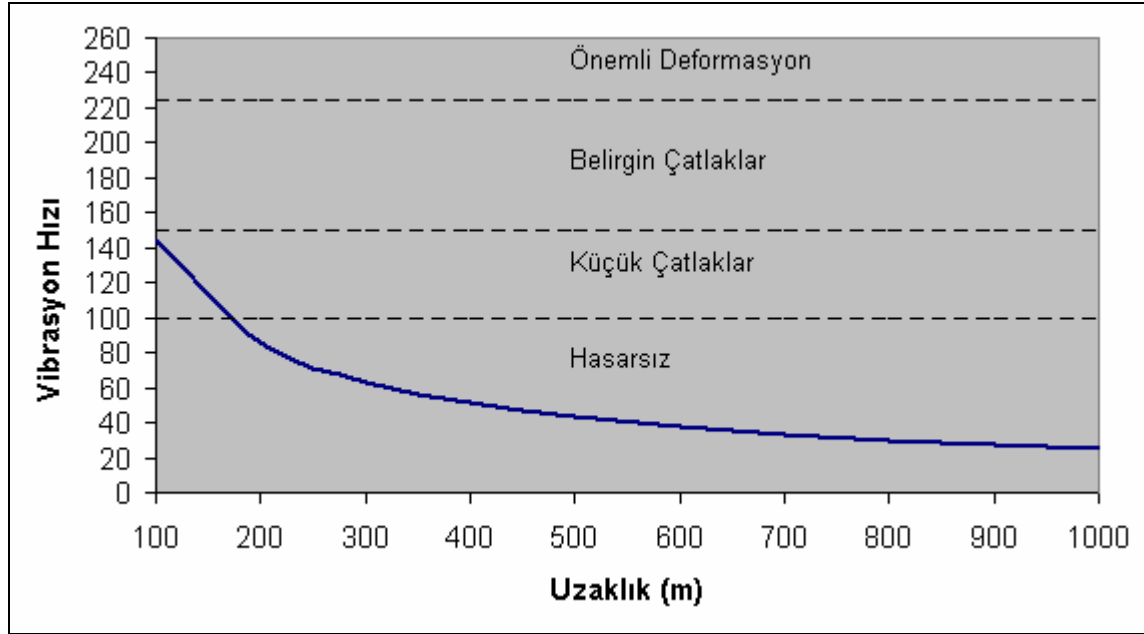


Figure V.3 Variation of Vibration speed according to distance

As seen on the Table V., the valuation of vibration speed that will not be any harm on hard and strong surfaces explosion is 100 mm/s. in this case, as seen on the figure, any effect of explosion is not in question after 150 m.

Effect Decreased Precautions

Explosive materials that will be used during the dam construction like dynamite, capsule will be stored in the area where is faraway from settlement area, under control on an appropriate area and in storage buildings that has wooden inside as stated in regulations, placed both dynamite and capsule on separate parts and enclosed with fence and warning and caution table which is around the storage building. It will be worked experienced and trained detonation workers at explosion works. Experienced exploded and security engineers will accompany with the works.

The transportation and storage of flammable and explosive materials (dynamite, benzene and diesel ect.) as secure way will be under responsibility contractor firm.

All explodeds that will be made in quarries will be realized in day shift for not disturbing to local people. Not all explodeds will be made at the same time and at the same place.

Trained and experienced will carry out at exploded works under the responsibility of engineers. Thereby security will be provided in maximum.

During the exploded, the exploded date and hours will be inform to closet settlement area for purpose of provided environmentall security previously, and unlicence personell will be prevented to enter the explosion area.

During the carrying, storing and using of explosive materials as stated above it will be conformed to rudiments stated in statue "Taking Measures on work place and works worked with Explosive, Flammable, dangerous, and noxious substance" of ministry of labour and social security, statue "Workers health and work security" of ministry of labour and social security and statue "Production, import, carrying, hiding, storing, selling, using, annihilating, checking of the explosive, hunting equipment and etc.substances excluded from monopoly of procedures and basis".

V.1.7. Working time (Day-Mounth- Year) in quarries, transportation routes, transportation infrastructure plan, process regarding construction of infrastructure, machine equipments that will be used.

The location, area, amount of reserve, amount of which will be used, consturction equipments and its amount that will be used of quarries that will be opened and operated within the context of project are presented in Table V.6. Other information related to quarries are given in Section V.1.5.

Table V.6 Quarries that will be used.

Activity Area	Location	Area (m ²)	Amount of reserv (m ³)	Amount of which will be used (m ³)	Operating	
					Kullanilacak Is Makinalari	Item
T1 Stone Quarry	Dam Upstream is on Kizildam slope.	13.500	1.000.000	245.000	Truck Loader Diriller Dozer Watertanker	-
T2 Stone Quarry	Dam Upstream is on the near crest elevation.	13.000	1.000.000	500.000	Truck Loader Diriller Dozer Watertanker i	-
A Imperable material site	Dam Upstream is on left shore.	31.300	100.000	30.000	Excavator Truck	-
B Imperable material site	Dam Upstream is on right shore	26.200	50.000	20.000	Excavator Truck	-
C Imperable material site	Dam Upstream is on right shore	913.000	1.400.000	yedek	Excavator Truck	-

V.1.8. The dust spreader process like crush, grind, transport, storage, cumulative values.

During the construction works it will be used stone quarries, imperable device quarries and depositee sites, it is in question dust formation during the process of taken out from the quarries, loaded, transported, unloaded, crushed, stored of the materials.

Usage of material areas is spreaded in construction time, all quarries will be used together only first years of construction. A and B imperable device quarries will not be used after the first years of construction. Hence, modeling study will be made taking into consideration emissions that will be occurred in firs years of construction.

The emission factors that will be used for dust amounts growing out of material site where will be used whitin the context of project are given in Table V.7.

Tabel V.7 The emission factors that will be used for dust amounts

ACTIVITY	UNIT	EMISSION FACTOR
Exploded	kg/ton	0,08
Take out	kg/ton	0,025
Load	kg/ton	0,01
Transport	kg/km-araç	0,7
Unload	kg/ton	0,01
Storag	kg/ha.gun	5,8
Crush	kg/ton	0,243 (Uncontrolling State) 0,0243 (Controlling State)

Source : www.cedgm.gov.tr

(A) Imparable Device Quarry:

Amount of (A) Imparable Device Quarry that will be used is 30.000 m³. The area where material will be taken out is approximately is 9.400 m².

After the 0.3 m vegetative soil is grazed from material area, imperable material can be taken with average 3.2 m dig.

Dust emission will occur on the process of taken out, loaded and transported that will be realized in (A) imparabel Device Quarry.

Dust emission that will be grown out from these processes is figured on below.

- **Dust Emission on account of taking out process:**

Vegetative soil depth = 0,30 m

Dig depth = 3,2 m

Intensity of material = 1,6 ton/m³

Amount of total excavation = 9.400 m² x (0,30 + 3,2) m x 1,6 ton/m³ = 52.640 ton

Amount of one-hour excavation = 52.640 ton / (10 month x 30 day x 20 hour) = 8,77 ton/hour

Dust emission = 8,77 ton/hour x 0,025 kg/ton = 0,22 kg/hour

- **Dust Emission on account of loading process:**

Amount of Taken out material = 30.000 m³/year / 6000 hour/year x 1,6 ton/m³ = 8 ton/hour

Dust emission = 8 ton/hour x 0,01 kg/ton = 0,080 kg/hour

- **Dust Emission on account of transport process:**

It will be used 2 trucks of 40- ton for carrying of material.

Expedition number = 8 ton/hour x 20 hour/date / 40 ton/expedition / 2 trucks = 2 expedition/day

Total transport distance = 2 expedition/day x 0,6 km/expedition = 1,2 km

$$\text{Dust emission} = 1,2 \text{ km} \times 0,7 \text{ kg dust/km-vehicle} \times 1 \text{ date/24 hour} = 0,035 \text{ kg/hour}$$

$$\text{Total dust emission} = 0,22 + 0,080 + 0,035 = 0,335 \text{ kg/hour}$$

(B) Imperable Device Quarry:

Amount of (B) Imperable Device Quarry that will be used is 20.000 m³. The area where material will be taken out is approximately 10.500 m².

After the 0.3 m vegetative soil is grazed from material area, 20.0000 m³ imperable material can be taken with average 3.2 m dig.

Dust emission will occur on the process of taken out, loaded and transported that will be realized in (B) imperable Device Quarry. Dust emission that will be grown out from these processes is figured on below.

- Dust Emission on account of taking out process:

Vegetative soil depth = 0,30 m

Dig depth = 1,9 m

Intensity of material = 1,6 ton/m³

Amount of total excavation = 10.500 m² x (0,30 + 1,9) m x 1,6 ton/m³ = 36.960 ton

Amount of one-hour excavation = 36.960 ton / (10 month x 30 day x 20 hour) = 6,16 ton/hour

Dust emission = 6,16 ton/hour x 0,025 kg/ton = 0,154 kg/hour

- Dust Emission on account of loading process:

Amount of taken out material = 20.000 m³/year / 6000 hour / year x 1,6 ton/m³ = 5,3 ton/ hour

Dust emission = 5,3 ton/ hour x 0,01 kg/ton = 0,053 kg/ hour

- Dust Emission on account of transport process:

It will be used 2 trucks of 40- ton for carrying of material.

Expedition number = 5,3 ton/ hour x 20 hours / day / 40 ton/ expedition / 2 truck = 2 expedition /day

Total transport distance = 2 expedition /day x 0,5 km/ expedition = 1 km

Dust emission = 1 km x 0,7 kg ton/km-vehicle x 1 day/24 hour = 0,029 kg/hour

$$\text{Total dust emission} = 0,154 + 0,053 + 0,029 = 0,236 \text{ kg/hour}$$

(D1) Storage Area:

The total capacity that will be used of (D1) Storage Area is 479.700 m³, it will be used 54.500 m³ of it in the first year of construction. During the storage process, approximately 21.900 m² will be used.

Dust emissions will occur on the process of loaded and transported that will be realized in (D1) Storage Area. Dust emission that will be grown out from these processes is figured on below.

- Dust Emission on account of unloading process:

Amount of material = 54.500 m³/year / 6000 hour /year x 1,6 ton/m³ = 14,5 ton/ hour

Dust emission = 14,5 ton/ hour x 0,01 kg/ton = 0,145 kg/ hour

- Dust Emission on account of storage process:

Storage area = 21.900 m²/year

Dust emission = 21.900 m²/ year / 300 day/ year / 10.000 m²/ha x 5,8 kg/ha.day / 24 hour/day = 0,002 kg/hour

Total dust emission = 0,145 + 0,002 = 0,147 kg/hour

(D2) Storage Area:

The total capacity that will be used of (D2) Storage Area is 157.300 m³, it will be used 18.000 m³ of it in the first year of construction. During the storage process, approximately 7.200 m² will be used.

Dust emissions will occur on the process of loaded and transported that will be realized in (D2) Storage Area. Dust emission that will be grown out from these processes is figured on below.

- Dust Emission on account of unloading process:

Amount of material = 18.000 m³/ year / 6000 hour / year x 1,6 ton/m³ = 4,8 ton/ hour

Dust emission = 4,8 ton/ hour x 0,01 kg/ton = 0,048 kg/ hour

- Dust Emission on account of storage process:

Storage area = 7.200 m²/ year

Dust emission = 7.200 m²/ year / 300 hour / year / 10.000 m²/ha x 5,8 kg/ha. day / 24 hour / day = 0,001 kg/ hour

Total dust emission = 0,048 + 0,001 = 0,049 kg/saat

(D3) Storage Area:

The total capacity that will be used of (D3) Storage Area is 906.500 m³, it will be used 103.000 m³ of it in the first year of construction. During the storage process, approximately 40.600 m² will be used.

Dust emissions will occur on the process of loaded and transported that will be realized in (D3) Storage Area. Dust emission that will be grown out from these processes is figured on below.

- Dust Emission on account of unloading process:

Amount of material = 103.000 m³/ year / 6000 hour / year x 1,6 ton/m³ = 27,47 ton/ hour

Dust emission = 27,47 ton/ hour x 0,01 kg/ton = 0,275 kg/ hour

- Dust Emission on account of storage process:

Storage area = 40.600 m²/ year

Dust emission = 40.600 m²/ year / 300 day/ year / 10.000 m²/ha x 5,8 kg/ha.day / 24 hour / day = 0,003 kg/ year

Total dust emission = 0,275 + 0,003 = 0,278 kg/ hour

(D4) Storage Area:

The total capacity that will be used of (D4) Storage Area is 1.530.500 m³ it will be used 174.000 m³ of it in the first year of construction. During the storage process, approximately 68.600 m² will be used.

Dust emissions will occur on the process of loaded and transported that will be realized in (D4) Storage Area. Dust emission that will be grown out from these processes is figured on below.

- Dust Emission on account of unloading process:

Amount of material = 174.000 m³/ year / 6000 hour / year x 1,6 ton/m³ = 46,4 ton/ hour

Dust emission = 46,4 ton/ hour x 0,01 kg/ton = 0,464 kg/ hour

- Dust Emission on account of storage process:

Storage area = 68.600 m²/ year

Dust emission = 68.600 m²/ year / 300 day/ year / 10.000 m²/ha x 5,8 kg/ha.day / 24 hour / day = 0,006 kg/ hour

Total dust emission = 0,464 + 0,006 = 0,470 kg/ hour

(T1) Stone quarry:

Total reserve that will be used of (T1) Stone quarry is 245.000 m^3 , it will be used 80.000 m^3 of it in the first year of construction. During the storage process, approximately 4.400 m^2 will be used. The material intensity is $2,73 \text{ ton/m}^3$

Processing of Taking out , exploded, loading and transport will be realized in (T1) Stone quarry. Dust emission on account of these processes are figured below. Dust emission on account of exploded process is evaluated on follow.

- Dust emission on account of taken out of vegetative soil process:

Vegetative soil depth = $0,30 \text{ m}$

Intensity of material = $1,6 \text{ ton/m}^3$

Amount of total excavation = $4.400 \text{ m}^2 \times 0,30 \text{ m} \times 1,6 \text{ ton/m}^3 = 2.112 \text{ ton}$

Amount of one-hour excavation = $2.112 \text{ ton} / (10 \text{ month} \times 30 \text{ day} \times 20 \text{ hour}) = 0,352 \text{ ton/ hour}$

Dust emission = $0,352 \text{ ton/ hour} \times 0,025 \text{ kg/ton} = 0,009 \text{ kg/ hour.}$

- Dust Emission on account of loading process:

Amount of taken out material = $36,4 \text{ ton/ hour}$

Dust emission = $36,4 \text{ ton/ hour} \times 0,01 \text{ kg/ton} = 0,364 \text{ kg/ hour}$

- Dust Emission on account of transport process:

It will be used 2 trucks of 40- ton for carrying of material.

Expedition number = $36,4 \text{ ton/hour} \times 20 \text{ hours /day} / 40 \text{ ton/ expedition} / 2 \text{ truck} = 9 \text{ expedition /day}$

Total transport distance = $9 \text{ expedition /day} \times 1 \text{ km/ expedition} = 9 \text{ km/day}$

Dust emission = $9 \text{ km/day} \times 0,7 \text{ kg toz/km-vehicle} \times 1 \text{ day /24 hour}$
 $= 0,263 \text{ kg/ hour}$

Total dust emission = $0,009 + 0,364 + 0,263 = 0,636 \text{ kg/hour}$

(T2) Stone quarry.:

Total reserve that will be used of (T2) Stone quarry is 500.000 m^3 , it will be used 140.000 m^3 of it in the first year of construction. During the storage process, approximately 3.700 m^2 will be used. The material intensity is $2,73 \text{ ton/m}^3$

Processing of Taking out , exploded, loading and transport will be realized in (T2) Stone quarry. Dust emission on account of these processes are calculated below. Dust emission on account of exploded process is evaluated on follow.

- Dust emission on account of taken out of vegetative soil process :

Vegetative soil depth = $0,30 \text{ m}$

Intensity of material = $1,6 \text{ ton/m}^3$

Amount of total excavation = $3.700 \text{ m}^2 \times 0,30 \text{ m} \times 1,6 \text{ ton/m}^3 = 1.776 \text{ ton}$

Amount of one-hour excavation = $1.776 \text{ ton} / (10 \text{ month} \times 30 \text{ day} \times 20 \text{ hours}) = 0,296 \text{ ton/ hour}$

Dust emission = $0,296 \text{ ton/ hour} \times 0,025 \text{ kg/ton} = 0,007 \text{ kg/ hour}$

- Dust Emission on account of loading process:

Amount of taken out material = $63,7 \text{ ton/ hour}$

Dust emission = $63,7 \text{ ton/ hour} \times 0,01 \text{ kg/ton} = 0,637 \text{ kg/ hour}$

- Dust Emission on account of transport process :

It will be used 40- ton 2 trucks of for carrying of material.

Expedition number = $63,7 \text{ ton/ hour} \times 20 \text{ hour /day} / 40 \text{ ton/ expedition} / 4 \text{ trucks} = 8 \text{ expedition / day}$

Total transport distance = $8 \text{ expedition / day} \times 1,5 \text{ km/ expedition} = 12 \text{ km/ day}$

Dust emission = $12 \text{ km/ day} \times 0,7 \text{ kg dust /km- vehicle} \times 1 \text{ day/24 hours} = 0,350 \text{ kg/ hour}$

Total dust emission = $0,007 + 0,637 + 0,350 = 0,994 \text{ kg/hour}$

Rock crusher:

Some of the materials that will be taken out from the stone quarries will be crushed in the crusher. The one-hour capacity of crusher is 50 ton/hour.

Unloading, crushing, and loading processes will be realized on this area. Dust emission on account of these processes are calculated below.

- Dust Emission on account of unloading process:

$50 \text{ ton/hour} \times 0,01 \text{ kg/ton} = 0,500 \text{ kg/ hour}$

- Dust Emission on account of crushing process:

$50 \text{ ton/ hour} \times 0,243 = 12,150 \text{ kg/ hour}$

- Dust Emission on account of loading process:

$50 \text{ ton/ hour} \times 0,01 \text{ kg/ton} = 0,500 \text{ kg/ hour}$

Total dust emission = $0,500 + 12,150 + 0,500 = 13,150 \text{ kg/hour}$

The technique which is used for Modelling

The computer programme that is used for air quality modelling have been developed by United States Environmental Protection Agency-USEPA and it has international validity.

ISC Model can guess hourly, daily and annual ground level concentration value of various pollutant parameters which are gaseous and powdered by using "Gaussian Plume" equation.

The model can calculate many different (point, area, volume) spread models from isolate chimney to escape pollutants.

Moreover it takes consideration aerodynamic waves, turbulence and similar events that the pollutants may be met and that come out from the sources in any working area.

ISCST model works on a net system that is determined by user, accounts are made for corner points of each unit of environment that comprised to net system. The net system that model of ISCST3 is used can be determined as polar or cartesian ; moreover, by determined detached receiver points out of net system, more detailed calculations can be made on this points.

On spread calculation, it is used pasquil stability class. There is an option for taking into consideration to undulating land.

ISCST3 model is used 4 different data type as presented below :

- Wind direction, wind speed, hot, pasquil stability class, interference height (depending on user's choices), hourly meteorological data set including wind profile exponent and potential vertical difference in hot.
- The coordinates and height of each unit on net system that is determined as receiver environment
- Source coordinates, area, pollutant flowrate according to starting point where is determined by user.

Model inputs has a structure that is possible to prepare to distribution maps for entire field of study. So, it is possible to evaluate to air quality of region under various scenarios (for example; various refining conditions, different pollutant sources or varying seasonal conditions)

The modeling study that is provided to guess concentration of pollutant that is in environment air and as gaseous and powdered by means of mathematical calculations is composed of steps as stated below.

- Distribution area is determined according to sources.
- The Distribution area is separated in squares 250 m × 250 m or 500 m × 500 m dimension, latitude, longitude, height information is supplied. Corner points of square are top points.
- The pollutant source information is determined.
- An relative annual meteorological information is supplied
- Hourly stability class and intersection height are calculated with meteorological

information

After the processes stated in above are transferred to programme, hourly, daily and annual ground level concentration values of pollutants in environment air can be guessed. Ground level

Source Parameters

Soruce Parameters used in modeling is dust emissions that is grown out from quarries, storage area and stone quarries whitint the context of Kavsakbendi Dam, HPP and quarries. According to calculated dust emissions, dust emissions growing out from D3 and D4 quarries is lower than 1,5 kg/ hour that is the limit value of KTKHKKY. As seen on the map that is presented in Appendix- B, source is far away from the each other. For this reason, source is considered as separet construction site. Since the sources of A, B, T1, T2, D1, D2 or stone crusher are close to each other, D3 and D4 storage areas do not enter the impact area of these sources as determined by regulation and dust emission values calculated for these sources is more than 1,5 kg/hour, modeling study has been carried out for dust emission calculated from sources of A, B, T1, T2, D1, D2 and stone crusher.

Modeling study was made within the 2 scenerio as taken precaution (controlled) condition and not taken precaution (uncontrolled) condition for dust emission. On uncontrolled conditions amount of dust emissions are given in previous paragraphs. On controlled condition, on account of the precautions which will be taken in the area that dust is grown out, dust emission at the source that is crusher is on is considered 90% lower as uncontrolled condition.

The sources were considered as area source and modeling study has been caried out as this. The information whic is used in modeling study are given in Table V.8.

Table V.8 The information which is used in modeling study

Source	Dust emission values (kg/hour)		Area (m ²)
	Controlled condition	Unontrrolled condition	
A	0,167	0,167	9.400
B	0,118	0,118	10.500
T1	0,318	0,318	4.400
T2	0,497	0,497	3.700
D1	0,074	0,074	21.900
D2	0,025	0,025	7.200
Stone crusher	0,658	6,575	48.800

50% part of total dust emission that is calculated with emission factors given by USEPA makes up PM₁₀ emission. That is, while half of the total dust emission is sedimentated dust, other part of it is suspended dust. For this reason, emission modeling study was made that half of the value calculated as dust emission is taken as source value.

Facility Impact Area

It is determined according to ETKHKY Appendix-2.(b). Facility impact area for dust emission growe out from size of 0,04 km² area is taken as 2 km x 2 km dimensions square areas according tothis article. According to this, 3 km x 4 km dimension area including entireley 2 km x 2 km impact areas of sources where is evaluated whitin the context of the modelling study is determined as “Distribution Area” and the modeling study was made as including the distribution area way.

Top Points

It is stated in the regulation that the eveluation should be made top points based whitin the (500 m x 500 m) or (1000 m x 1000 m) study areas. According to this, it was used (500 m x 500 m)-one karelaj (grid system) for corresponding to top points whitin the (1000 m x 1000 m) study area. Coner points of 500 m x 500 m dimension square whitin the distribution area was considered as top point. Total top point number is 63 on the study, total 551.880 item hourly pollutant concentration data was obtained. Evaluated of the data is presented in following parts. The topographic map of distribution area that is used on modeling study is presented in Figure V.4.

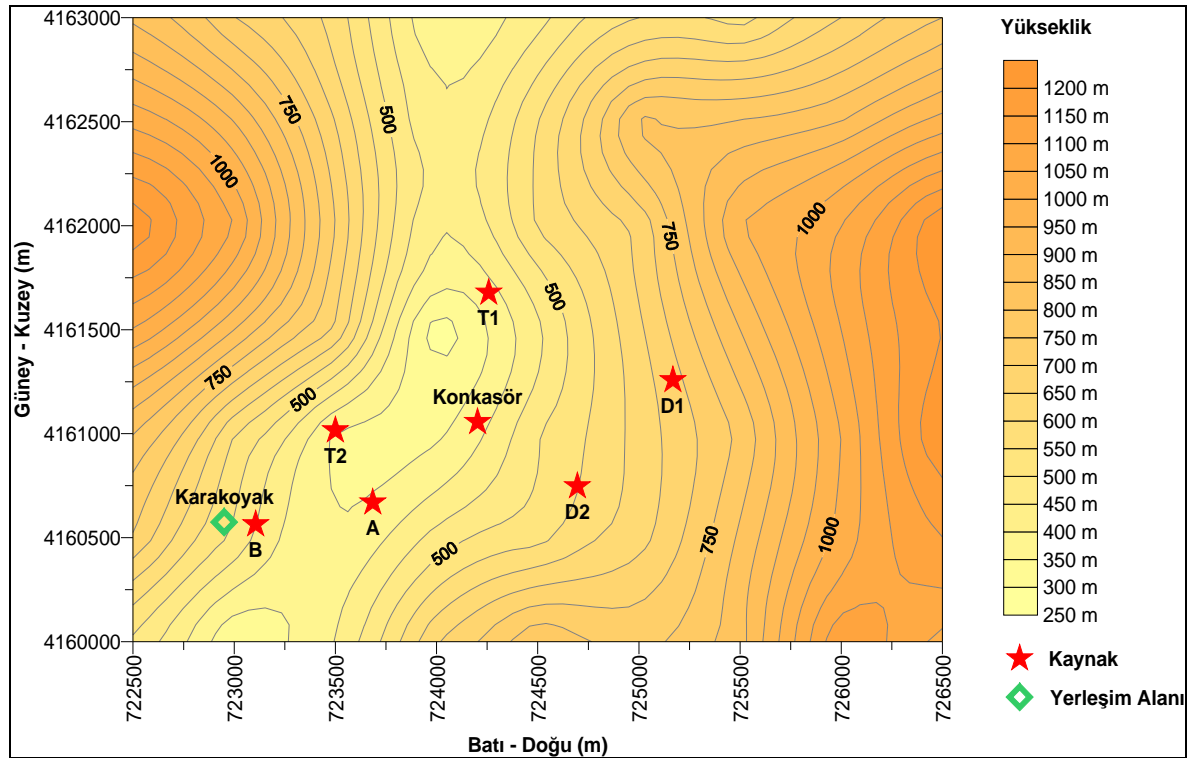


Figure V.4 Showed of Distribution area with 2 dimensioned topographic map.

Meteorological Date Set

Although there are a lot of meterorology stations operated by Turkish State Meteorological Service (DMI) few of them made hourly measuring.

The preferred technique in this case is that data is obtained from the closet station made hourly measuring. On this study, it is considered to be used the date obtained from the Kozan Meteorological Station that is the closet staiton. The station in question is a synaptic station, it records meteorological data that is able to be used in the study.

Wind regime whic is playing important role in distribution of pollutants is important in modeling study for reliability of modeling study

In this context, the hourly wind data that was recorded on Kozan station between 2001-2006 for each year was compared to statistics gotten from (DMI) including avarage directions between 1975-2005. The seasonal wind roses that show long-term regime are shown in Figure V.5 and Figure V.6.

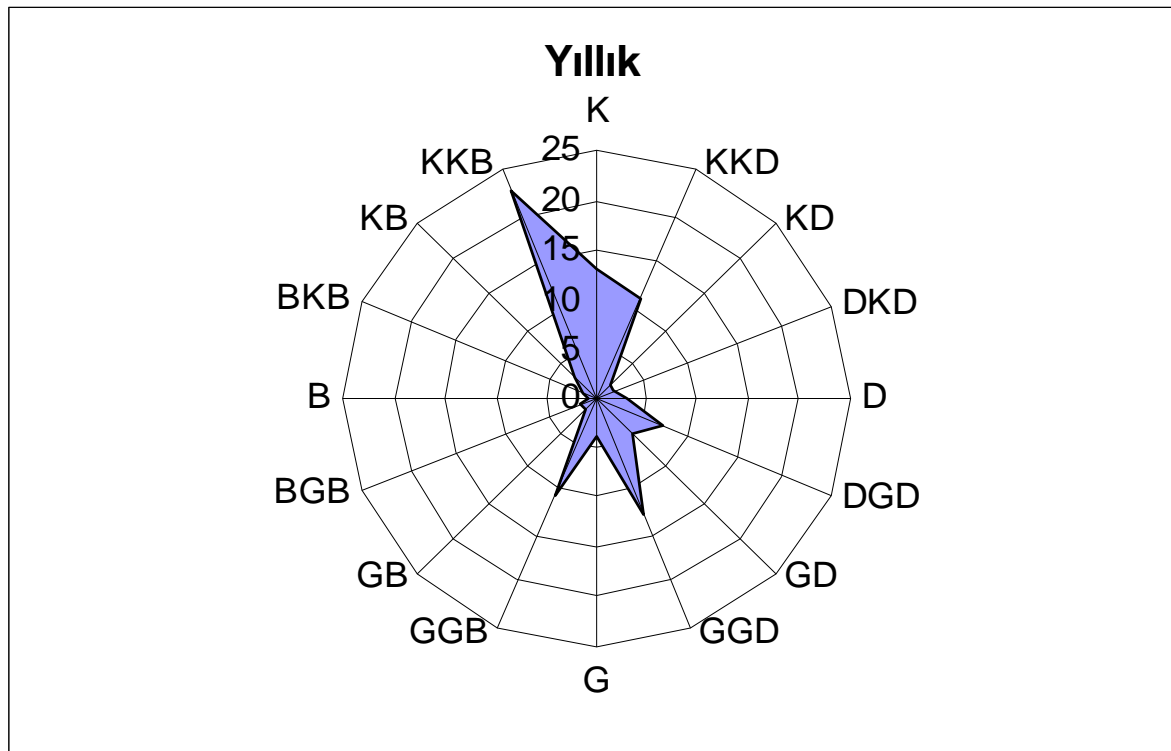


Figure V.5 Kozan Meteorology Station Long-Term wind rose (1975-2005)

In conclusion, it was determined that 2005 year wind rose is the best wind rose that represents to long-term avarage (See. Figure V.6). In this context, all variations of win speed and wind direction within the one year is evaulated by investigated the 2005 yearly hourly data getting from Kozan Meteorology Station.

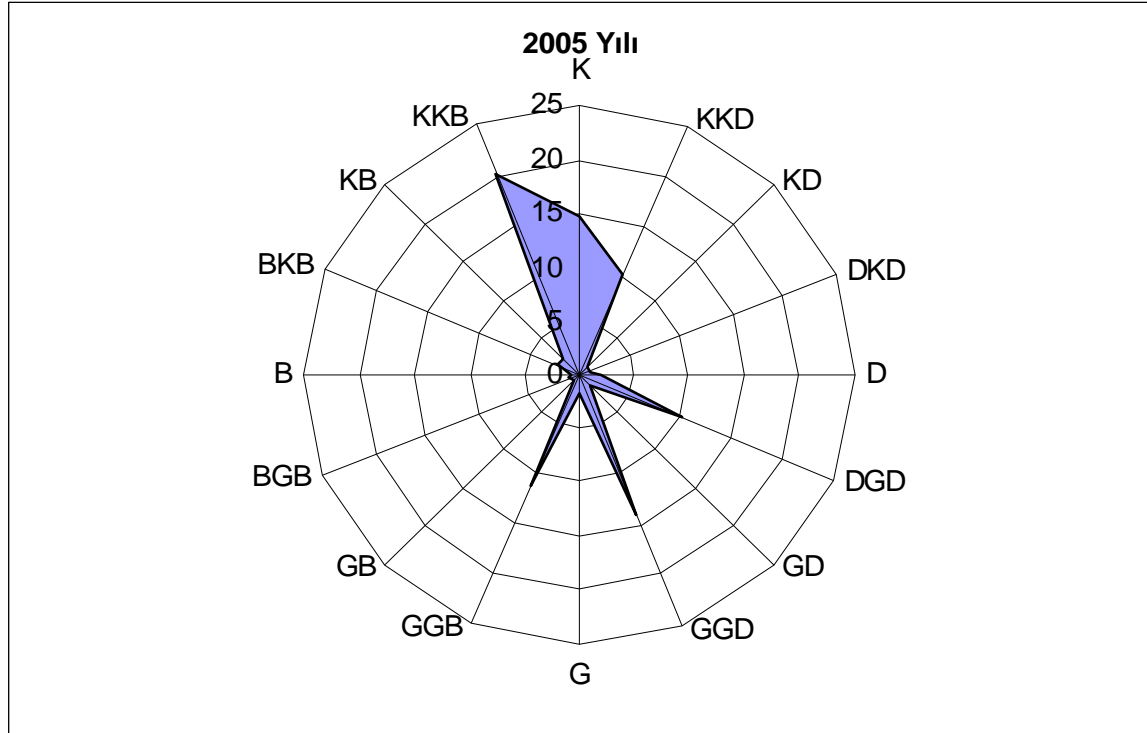


Figure V.6 Kozan Meteorology Station 2005 Year Wind Rose (1975-200)

Results of Modeling

At the end of dust modeling study, hourly, daily and yearly ground level PM₁₀ (particulate substance in air that aerodynamic radius is lower than 10 micron) concentrations were calculated at 63 top points and at receiver points for settlement areas for both conditions (controlled and uncontrolled condition).

As a result of study, PM₁₀ concentrations getting from settlement area are presented in Table V.8. By reason of the study, evaluated according to HKKY of maximum PM₁₀ concentrations getting from the distribution area is presented in Table V.9. As a result of modeling study the PM₁₀ concentrations distribution maps made up for controlled and uncontrolled situation are presented in Figure V.7, Figure V.8, Figure V.9 and Figure V.10

Table V.9 PM₁₀ Concentrations calculated in settlement area.

Settlement Area	Controlled condition		Uncontrolled condition	
	Daily Maximum Value (µg/m ³)	Yearly Maximum Value (µg/m ³)	Daily Maximum Value (µg/m ³)	Yearly Maximum Value (µg/m ³)
Karakoyak	13	1	52	2
Regulation limit values	300	150	300	150

According to Table V.9, PM₁₀ concentrations that were calculated for both situations in settlement area are lower than regulation limit values. According to this, the dust emission impact to the settlement area that will be grown from facilities will be minimum level.

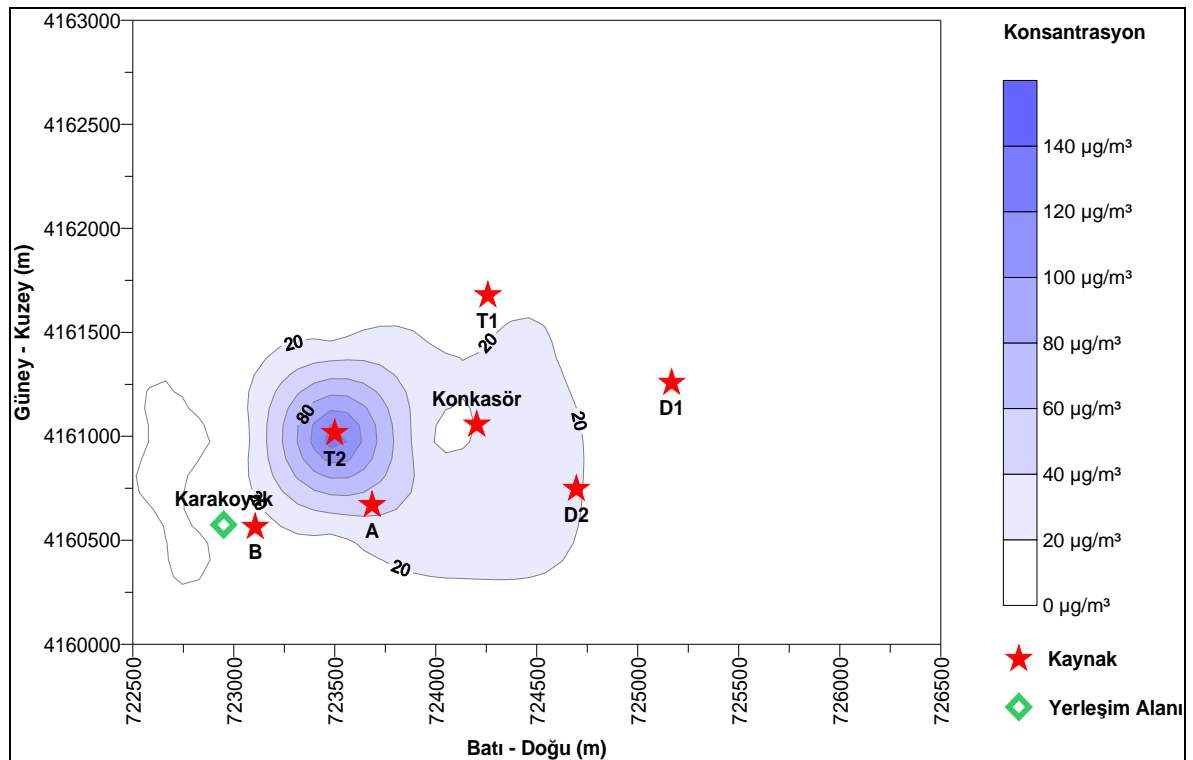
Table V.10 Compared results of modeling to regarding limit values

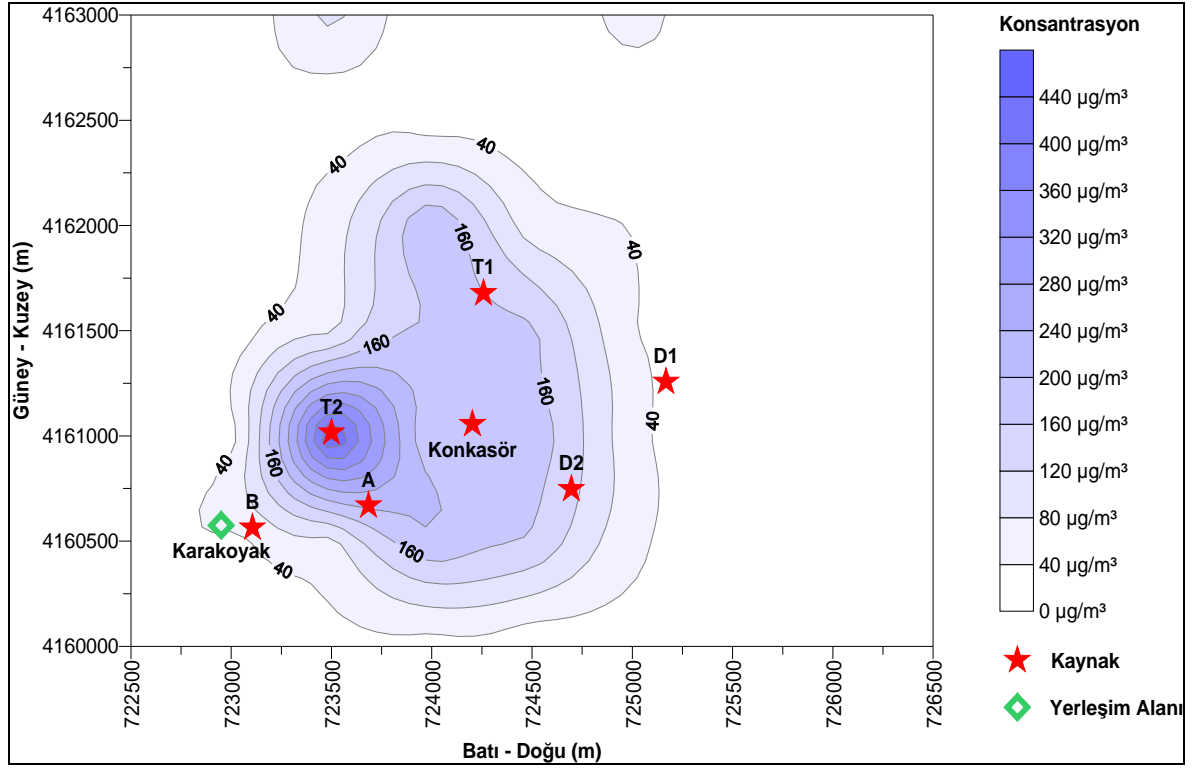
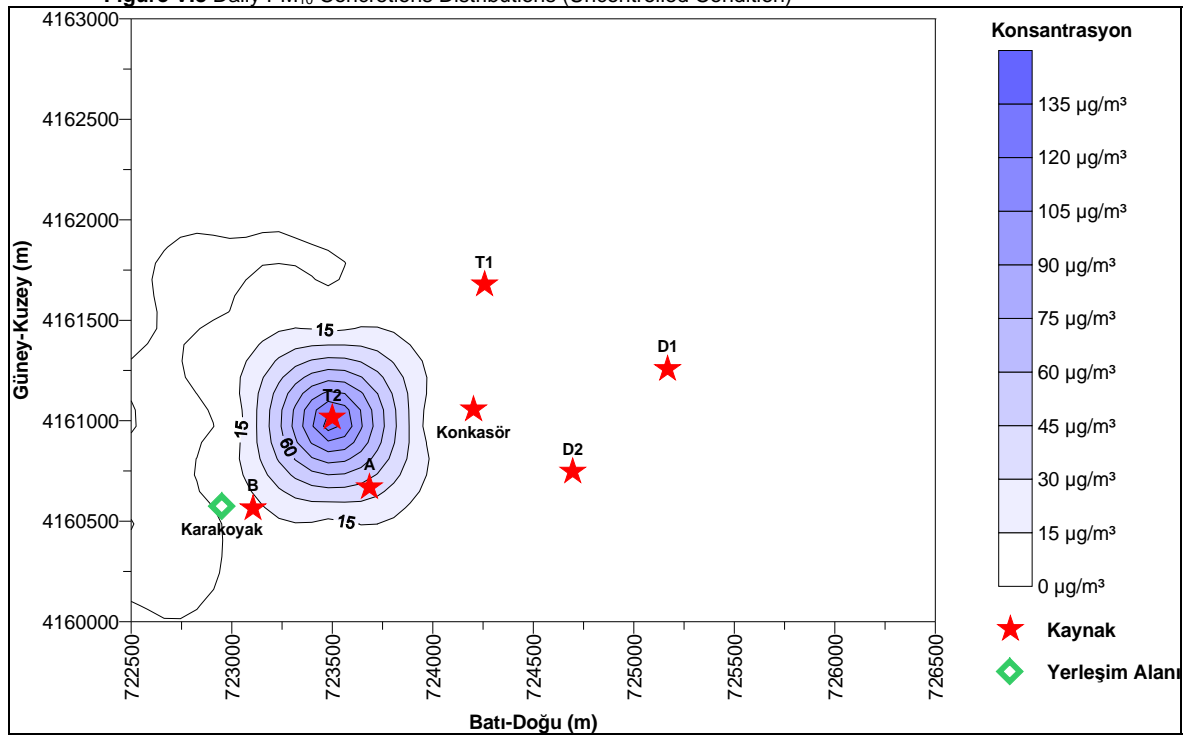
Air Quality Values	Controlled Condition		Uncontrolled Condition		Regulation Limit Values ($\mu\text{g}/\text{m}^3$)
	Calculated Values ($\mu\text{g}/\text{m}^3$)	Calculated Coordinates	Calculated Values ($\mu\text{g}/\text{m}^3$)	Calculated Coordinates	
Long-Term Value (LTV)	138	723500, 4161000	140	723500, 4161000	150
Short-Term Value (LTV)	294	723500, 4161000	310	723500, 4161000	300

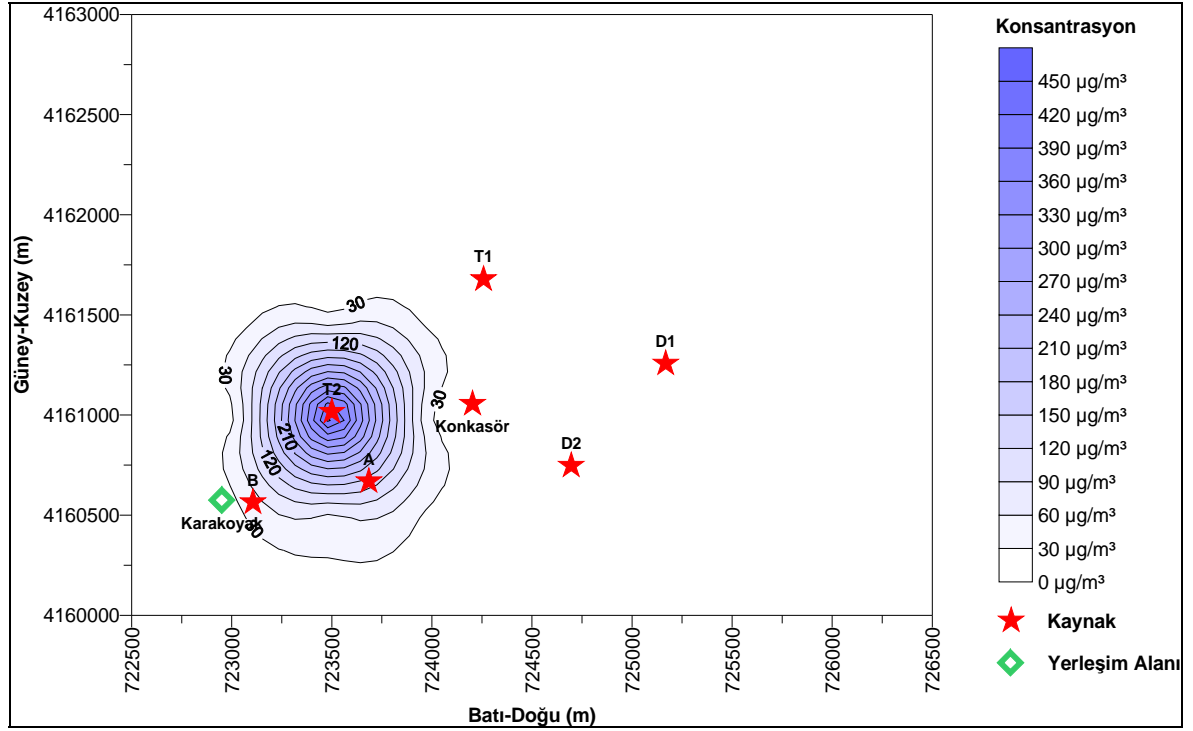
* When all results are arranged as its numerical size, the value corresponds to 95 % of measuring number.

According to Table 10, the value calculated for controlled and uncontrolled conditions is compatible with regarding limit values, only short term value calculated for uncontrolled condition is more than regarding limit value. Calculated maximum values are in the T2 stone quarry area. As seen in the distribution maps that is presented in Figure V.7, Figure V.8, Figure V.9 and Figure V.10, calculated dust concentrations is made up around the sources and a limited area. Calculated dust concentrations shows important decrease at 250 m distance. In addition to this, since the calculated concentration for both conditions in the closet area to the source is lower than regarding limit value, it will not be negative impact grown out from the facility (see Table V.9)

When it is considered that the activities within the facility will be carried out by taking necessary measurements (irrigation etc.), it is expected that dust emissions grown out from the facility has no negative impact on facility impact area and especially settlement area.

**Figure V.7** Annual PM₁₀ Concretions Distributions (Uncontrolled Condition)

Figure V.8 Daily PM₁₀ Concretions Distributions (Uncontrolled Condition)Figure V.9 Annual PM₁₀ Concretions Distributions (Controlled Condition)

Figure V.10 Daily PM₁₀ Concentrations Distributions (Controlled Condition)

Amount of Sedimented Dust

As a result of modeling study, on each top point by used the ground level dust concentraion values calculated for controlled and uncontrolled conditions by means of the formule in belowe, it was obtained dust concretions that was sedimented at the same locations for both situations. The distribution map belonging to calculated sediment dust value is prepared, it is presented in below. It is accepted that particule size was between 10 and 50 µm, dropping speed was taken as 0,05 m/s and sediment dust concretions was calculated by means of the formule on below.

FORMULA III:

$$d(x, y) = 86400 \sum_{i=1}^4 V_{di} C_i(x, y, 0)$$

Table V.11 Compared sediment dust values toregarding limit values

Air Quality Values	Controlled Condition		Uncontrolled Condition		Regulation Limit Values (mg/m ² .gun)
	Calculated values (mg/m ² .day)	Calculated Coordinates	Calculated values (mg/m ² .day)	Calculated Coordinates	
Long-term Value (LTV)	596	723500, 4161000	605	723500, 4161000	350
Short-Term Value (LTV)	1270	723500, 4161000	1339	723500, 4161000	650

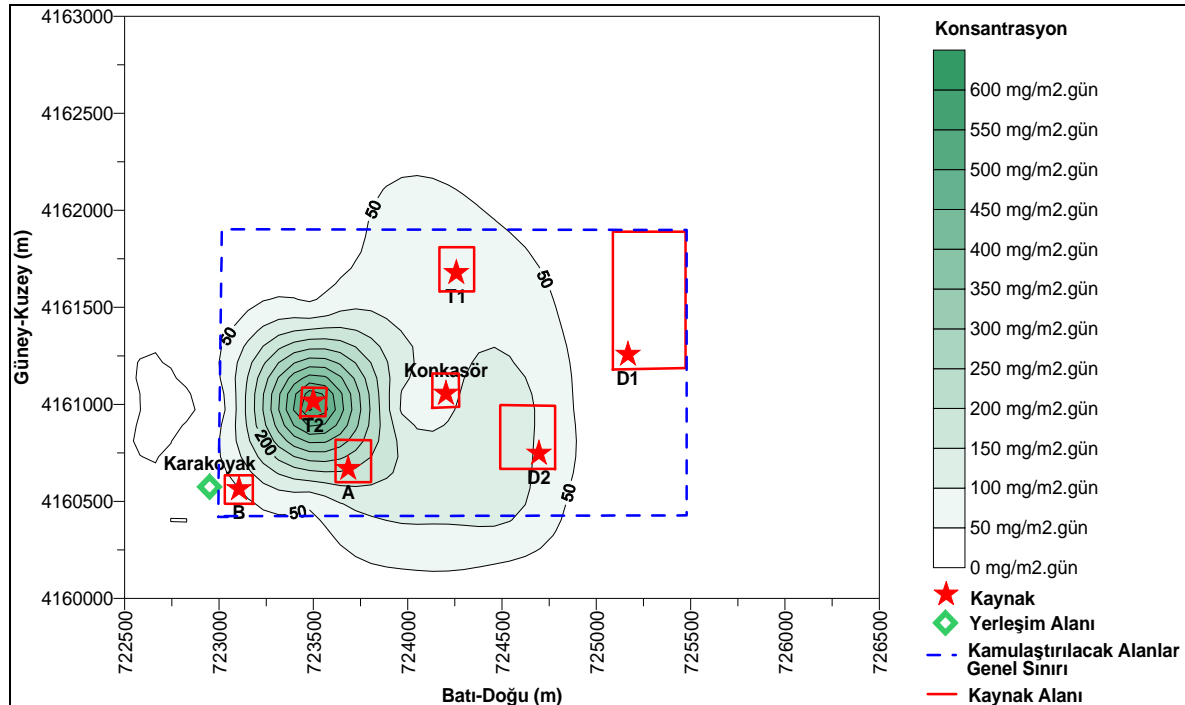
* When all results are arranged as its numerical size, the value corresponds to 95 % of measuring number.

Table V.12 Sediment dust concentration in settlement area.

Settlement Area	Controlled Condition		Uncontrolled Condition	
	Daily Maximum Value (mg/m ² . day)	Yillik Maksimum (mg/m ² . day)	Gunluk Maksimum Deger (mg/m ² . day)	Yillik Maksimum (mg/m ² . day)
Karakoyak	56	4	225	7
Regulation limit values	650	350	650	350

According to Table 11, the value calculated for controlled and uncontrolled conditions is more than limit values given in HKYK. But calculated this high values is made up around the sources and limited area, it decrease to under limit values from 200-250 distance (see Figure V.11, Figure V.12, Figure V.13 and Figure V.14). In addition to this, since some parts of Karakoyak quarter will be expropriated, it is not expected any question.

When it is considered that the activities within the facility will be carried out by taking necessary measurements (irrigation etc.), amount of sedimented dust emissions will be lower than calculated. For this reason, it is expected that sedimented dust emissions grown out from the facility has no negative impact. Moreover, in order to be protected to workers from the dust which will be made up within the material site, necessary precautions will be taken according to regulation of work and workers health.

**Figure V.11** Annual Sedimented Dust Concentrations Distributions (Uncontrolled Condition)

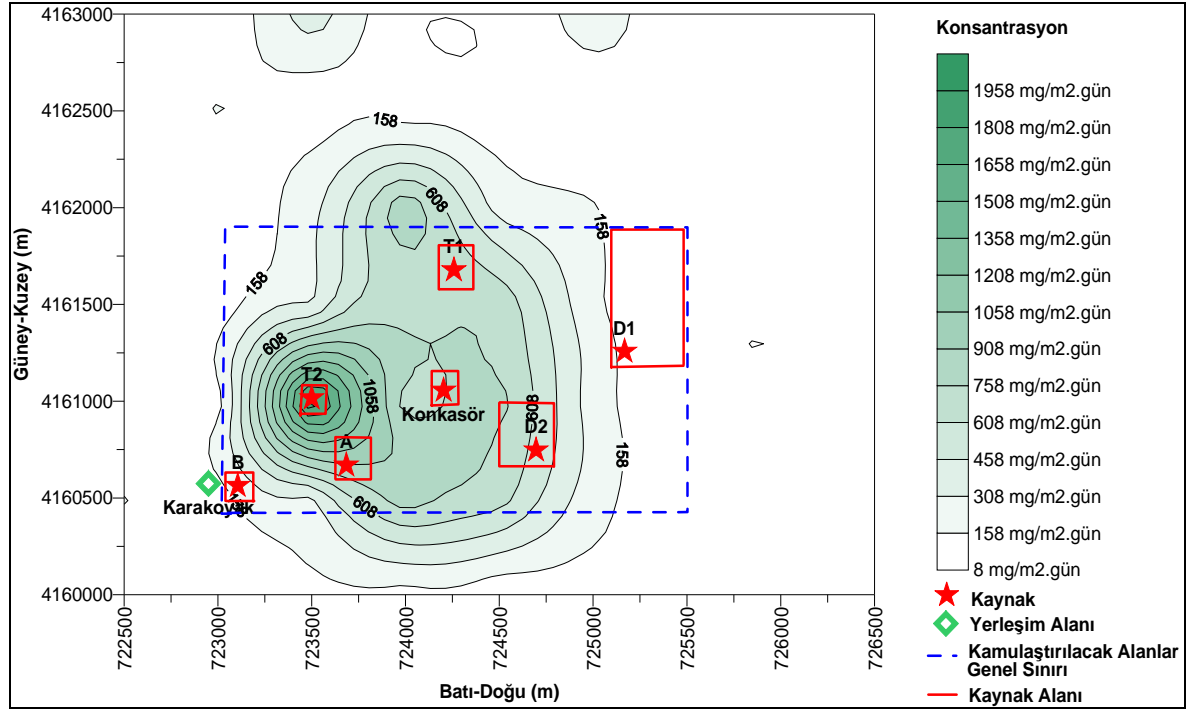


Figure V.12 Daily Sedimented Dust Concretions Distributions (Uncontrolled Condition)

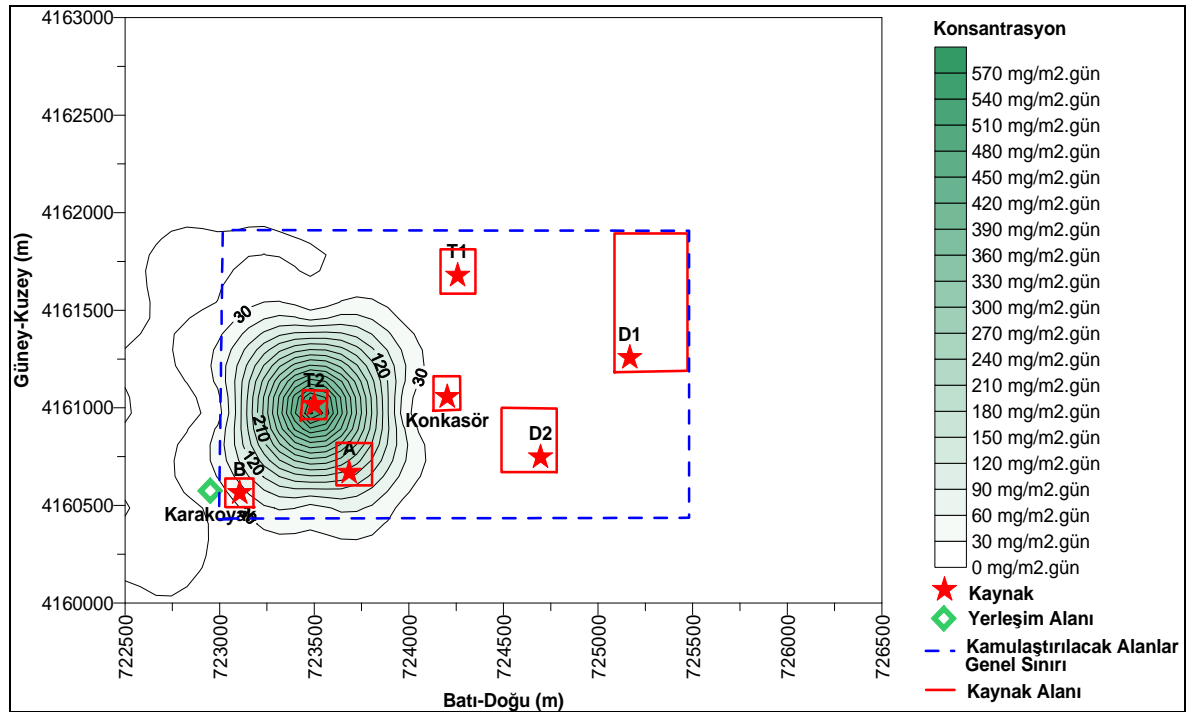


Figure V.13 Annual Sedimented Dust Concretions Distributions (Controlled Condition)

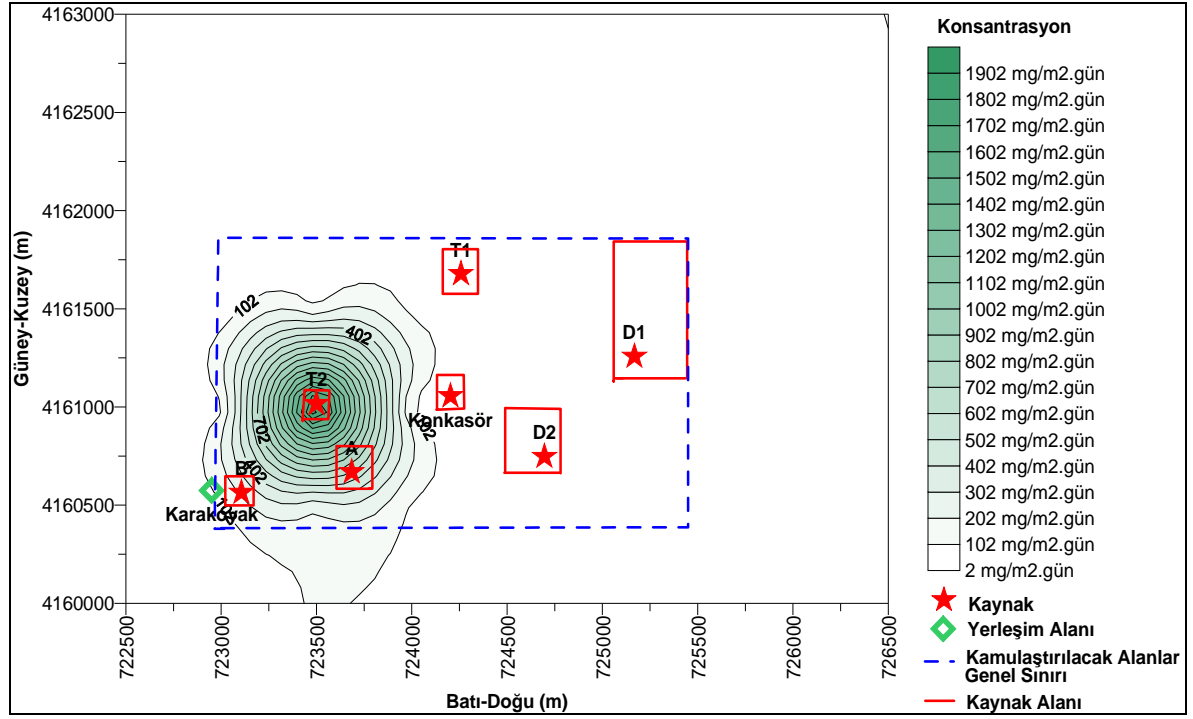


Figure V.14 Daily Sedimented Dust Concentrations Distributions (Controlled Condition)

Dust emissions that will be grown out from the explosion process

T₁ Stone Qurarriy:

Explosion occurs in a moment, during the explode process is made up short term dust emission. It is assumed that dust impact that will be grown out from explode process continue maximal 1 hour, dust emissions grown out from explode process were evaluated separately. 80.000 m³ materials will be obtained by made explosion one for 6 days in a week, total 42 explodes in a year. Dust emission that will be made up during the explode:

Headstock height	= 10 m
Distances between holes	= 3,5 m
Distances between hole orders	= 2,5m
Amount of material obtained from 1 hole	= 2,5m x 3,5 x 10,0 = 87,5 m ³
Amount of material obtained from 1 explode	= 87,5 m ³ x 22 = 1.925 m ³
Material intensify	= 2,73 ton/m ³
Amount of material obtained from one explode will be	1925 m ³ x 2,73 ton/m ³ = 5255,25 ton.

When it is considered that explode emission is 0,08 kg/ton and the time between 2 explosion is 6 days, dust emission will be :

$$5255,25 \text{ ton} / (6 \text{ gun} \times 24 \text{ saat}) \times 0,08 \text{ kg/ton} = 2,919 \text{ kg/hour.}$$

T₂ Stone Qurarriy :

Explosion occurs in a moment, during the explode process is made up short term dust emission. It is assumed that dust impact that will be grown out from explode process continue maximal 1 hour, dust emissions grown out from explode process were evaluated separately. 140.000 m³ materials will be obtained by made explosion one for 6 days in a week, total 43 explodes in a year. Dust emission that will be made up during the explode:

Headstock height	= 10 m
Distances between holes	= 3,5 m
Distances between hole orders	= 2,5m
Amount of material obtained from 1 hole	= 2,5m x 3,5 x 10,0 = 87,5 m ³
Amount of material obtained from 1 explode	= 87,5 m ³ x 22 = 1.925 m ³
Malzemenin yogunlugu	= 2,73 ton/m ³
Amount of material obtained from one explode will be	1925 m ³ x 2,73 ton/ m ³ = 5255,25 ton.

When it is considered that explode emission is 0,08 kg/ton and the time between 2 explosion is 4 days, dust emission will be :

$$5255,25 \text{ ton} / (4 \text{ gun} \times 24 \text{ saat}) \times 0,08 \text{ kg/ton} = 4,379 \text{ kg/saat olacaktır.}$$

Since dust emissions grown out from explode process is more than limit values stated in ETKHKKY Appendix – 2 Table 2.1 as 1.5 kg/hour, dust distributions modeling study was made for the process of explode that will be carried out in T1 and T2 stone quarry

The Techniques on Modeling Study

For the purpose of guessing of dust emission of concentration values on ground level anticipated that it will be occur higher level than limit value stated in ETKHKKY during the operating of quarry on construction stage, it was used to SCREEN3 model developed by U.S. Environmental Protection Agency. SCREEN is a computer-based air quality modeling programme developed by U.S. Environmental Protection Agency-USEPA for the purpose of guessing roughly of the impact of any source on air quality. The one important point in development of the programme is that it is intended for pre estimation (roughly) of pollutant concentration and usage of it is easy.

With the SCREEN program, the following can be achieved:

- The program work on PC and as interactive. Meanwhile, inputs are taken from user by asked various question.
- Short-term concentration values of spreading from only one source are calculated in the program. Meanwhile, maximum ground level concentration and distance are anticipated. Building impact calculation can be added to maximum concentration values.
- Simple sources of area and volume can be modelled.

It is predicted on Gaussian distribution model on SCREEN model and factors of source and meteorological are added to this. It is accepted that pollutants do not enter any chemical reaction and any sedimented during the transferred. 3 various meteorology inputs can be preferred by user during the used of program.

First option is “ Full Meteorology“, all stability class and winds correspond to these class are evaluated in this option. Later, the most concentration value calculated for determined each distance is presented as output.

On the second option, only stability class is presented as input. In this case, program adds the wind speed values to calculation for only this class and it presents maximum concentration value as output.

On the third option, a stability class and a wind speed value are presented as input. Program calculates concentration values for only these values and it presents maximum value as output.

When it is made dust distribution modeling, sources were introduced to model as volumetric source. It is accepted that 50 % of calculated dust emission value is PM₁₀. In accordance with the worst condition scenario, resolution class is considered as 6 (F). Model inputs are given on belowe.

For T₁ Source;

Amount of Emission (g/s) : 0,405
 Distiribution Height (m) : 10
 Emission area (m x m) : 14 x 14
 Resolution class (A-F) : F
 Avarage wind speed (m/s) : 2 m/s

T₂ Kaynagi için;

Amount of Emission (g/s) : 0,608
 Distiribution Height (m) : 10
 Emission area (m x m) : 14 x 14
 Resolution class (A-F) : F
 Avarage wind speed (m/s) : 2 m/s

Modeling Results

Dust emissions which will be grown out from explode processes on T₁ ve T₂ stone quarryy are given in tabled as below.

Table V.13 Air quality values calculated for T₁ Quarryy.

Distance from source (m)	Calculated Values (µg/m ³)	Regulation Limit Values (µg/m ³)	
		UVS	KVS
100	199,2	150	300
200	152,4	150	300
300	126,1	150	300
400	106,5	150	300
500	91,3	150	300
600	89,25	150	300
700	79,45	150	300
800	71,35	150	300
900	64,55	150	300
1000	60,36	150	300
1100	55,23	150	300
1200	50,96	150	300
1300	47,23	150	300
1400	43,94	150	300
1500	41,03	150	300
1600	38,43	150	300
1700	36,10	150	300
1800	34,00	150	300
1900	32,10	150	300
2000	30,38	150	300

Table V.14 Air quality values calculated for T₂ Quarry.

Distance from source (m)	Calculated Values ($\mu\text{g}/\text{m}^3$)	Regulation Limit Values ($\mu\text{g}/\text{m}^3$)	
		UVS	KVS
100	289,0	150	300
200	233,7	150	300
300	194,3	150	300
400	154,9	150	300
500	132,1	150	300
600	124,0	150	300
700	119,3	150	300
800	107,1	150	300
900	96,91	150	300
1000	90,61	150	300
1100	82,91	150	300
1200	76,50	150	300
1300	70,90	150	300
1400	65,96	150	300
1500	61,59	150	300
1600	57,69	150	300
1700	54,19	150	300
1800	51,04	150	300
1900	48,19	150	300
2000	45,61	150	300

As seen in Table V.13 and Table V.14, calculated dust concentration values for explode process is higher than UVS value in limited area, after 200-300 m distance, it is corresponding with UVS values. As seen in tables, dust concentrations calculated for explode process is lower than KVS values. The highest dust concentration values are in the stone quarries area. The closet settlement area to T₂ stone quarry is approximately 450 m distance, the calculated PM₁₀ concentration value in this area is under regarding limit value. Exploded process occurs in short time, since dust emission grown out from this process will spread, it has no negative effect on environment. Moreover, since irrigation will be made in quarry headstock before explode, dust emission in practice will be lower than calculated values.

Amount of Sedimented Dust

As a result of model study, sedimented dust concentrations are obtained by using calculated ground level dust concentration values. It is accepted that particle size was between 10 and 50 μm , dropping speed was taken as 0,05 m/s and sediment dust concentrations were calculated by means of the formulae on below.

FORMULA III:

$$d(x, y) = 86400 \sum_{i=1}^4 V_{di} C_i(x, y, 0)$$

Amount of sedimented dust that will be grown out form explodes in T₁ ve T₂ stone quarries are given in tables as below.

Table V.15 Amount of sedimented dust that will be grown out form explodes (For T₁ Stone Quarry)

Distance from source (m)	Calculated Values (mg/m ² day)	Regulation Limit Values (mg/m ² day)	
		UVS	KVS
100	860,5	350	650
200	658,4	350	650
300	544,8	350	650
400	460,1	350	650
500	394,4	350	650
600	385,6	350	650
700	343,2	350	650
800	308,2	350	650
900	278,9	350	650
1000	260,8	350	650
1100	238,6	350	650
1200	220,1	350	650
1300	204,0	350	650
1400	189,8	350	650
1500	177,2	350	650
1600	166,0	350	650
1700	156,0	350	650
1800	146,9	350	650
1900	138,7	350	650
2000	131,2	350	650

Table V.16 Amount of sedimented dust that will be grown out form explodes (For T₂ Stone Quarriy)

Distance from source (m)	Calculated Values (mg/m ² day)	Regulation Limit Values (mg/m ² day)	
		UVS	UVS
100	1.205,3	350	650
200	966,4	350	650
300	796,2	350	650
400	626,0	350	650
500	570,7	350	650
600	535,7	350	650
700	515,4	350	650
800	462,7	350	650
900	418,7	350	650
1000	391,4	350	650
1100	358,2	350	650
1200	330,5	350	650
1300	306,3	350	650
1400	284,9	350	650
1500	266,1	350	650
1600	249,2	350	650
1700	234,1	350	650
1800	220,5	350	650
1900	208,2	350	650
2000	197,0	350	650

As seen in Table V.15 and Table V.16, calculated sedimented dust concentrations for explode process is high in limited area of sources around, after 200-300 m distance, it decreases under KVS values. The highest sedimented dust concentration values was calculated in quarries area. Since it is normal that amount of sedimented dust grown out from explode process is this much, necessary measurements will be taken in the explosion time. Moreover, because irrigation will be done in quarriy headstock before explode, amout of dust will be lower than expected. On account of this, it is anticipated that amount of sedimented dust grown out from explode process will be minimum level. In order to be protected to workers from the dust that will be made up, necessary precautions will be taken accordig to regulation of work and workers health.

V.1.9. The process that should be do for ground security and prevention of leak

There are unit of imperable limestone, grindstone, shale (DK) under 60-80 m of carstic limestone (Pk) in the proposed dam site (Karakoyak axis). This imperable unit is on the surce in the 400-450 m upstream of dam axis. For this reason, imperable problem will be solved with an injection cover that reaches the imperable unit in the dam site.

Carstic limestones are generally present on maximum water elevation or surrounded by impermeable clay stones in the dam reservoir area. In this case, water leak that will be occur in reservoir area will be prevented after injection cover that reaches to impermeable units in the dam site is made.

V.1.10. For the purpose of land preparation and obtained necessary area for construction type and number of trees that will be cut, effects of trees that will be cut on forest ecosystem in environment, types of natural plant that will be annihilate and how many area the process will be carried out, possible effect on fauna.

“Study and Evaluation Form” prepared by Adana Regional directorate of forestry for forestry asset in Project Site is presented in Appendix- C. According to this form, Project Site is within the borders of Sogut, Akdam and Meydan operating office of chiefs. As stated in Part IV.2.8, red pine (Çz) presents in the area that is accepted as forestry area within the dam reservoir area. Types of mesçere are determined as Çzd2, Çzcd2, BÇz, Çzd1, Çzcd1, Çzcd2, Çzcd3. 1/25.000 scaled mesçere map belonging to Project Site is given in Appendix – G.

It is impossible to determine the number of trees on this stage in the Project Site. Within the context of necessary permission that should be taken prior to facility construction, 1/1.000 scaled “Tree Roleve Plan” will be prepared, type of tree and its number will be determined on this plan.

The effect of tree that will be cut on forestry ecosystem in the region is annihilated of approximately 1.264 ha forestry land where will be under dam reservoir. The areas where are around the Project Site are the forestry land where has the same aspects with the mentioned lands. For this reason, it is not expected that the trees, which will be cut, do not have negative effect on forestry ecosystem in the region. Moreover, species of fauna living in the Project Site will be immigrated to the forestry lands in around where have same aspects. Moreover the effect will be minimum with forestation works that will be made in Project Site and its near environment. All trees are under control of R.C. Ministry of Environment and Forestry in the area. For this reason, during the land preparation on construction stage, for the purpose of decreasing of cutting trees in minimum, it will be acted according to decisions and recommendations of R.C. Ministry of Environment and Forestry. The wealth that will obtain depending on land preparation will be evaluated according to directives and views of R.C. Ministry of Environment and Forestry.

It is largely possible to be compensated cutting trees within the context of project. This compensation is able to be carried out both in the Project Site and/or its near environment and different zones in our country as an entire and in every meaning.

V.1.11. Size of agricultural lands where will be disposed with a view to obtaining necessary field for construction site and land preparation, capability of them and agricultural production types.

As mentioned in part III.6, the areas which is in the dam operating elevation are forestry lands where is under control of state and 11.015 m² private properties.

There are VII. and VIII. Class soil within the Kavsakbendi Dam, HPP and Quarries project impact area as land using capability. Project Site is generally forestry area and agricultural field is fairly little. Local people works for their living as mostly forest workers. On account of mediterranean climate, agricultural productions are grain, cotton and loguata.

For the purpose of using except agriculture of dam reservoir, construction facilities, quarries and other usage areas within the context of project, in conjunction with the applications that were made to Adana governorship province agriculture directorship, 5403 numbered "Soil protection and fields usage law" and regarding other laws and legislations were looked into by directorships and it was determined that total 235,6 ha area was "Dry Marginal Agriculture Field" and remaining was forestry and natural area. In accordance with 09/05/2007 and 13/07/2007 dated writings of Adana governorship province agriculture directorship and 2th item of 13rd article of 5403 numbered "Soil protection and fields usage law" it was stated that using except agriculture of demanded areas was approved provided taken necessary precautions that would not damage to agricultural activity in environment on operating stage. Regarding foundation writings are given in Appendix-C.

V.1.12. Starting from land preparation to opening of unit to activity types of fuels that will be used for works, its aspects, its emission

Diesel will be used as fuel on the various heavy construction equipments such as grader, excavator, bulldozer, mixer, compressor, mobile lifter, tower lifter and welding machine that they will be used for construction works of Kavsakbendi Dam, HPP and Quarries project facilities. The chemical aspects of diesel are given in Table V.17. on other activities except diesel, benzene and electric, it is in question that wood and coal will be used for the purpose of heating of construction buildings. The fuel except type of used in environment in winter will not be used on construction buildings

Table V.17 Chemical Aspects of Diesel

PARAMETER	UNIT	VALUE
Intencify (at 15°C)	kg/L	0,820-0,860
Flame point	°C	55 (asgarî)
Cool filter blocking point – winter	°C	-10 (azamî)
Cool filter blocking point – summer	°C	5 (azamî)
Distillation – at 250°C recovered	% (Volume)	65 (azamî)
Distillation – at 350°C recovered	% (Volume)	85 (asgarî)
Distillation – at 370°C recovered	% (Volume)	95 (asgarî)
Sulphur	% (agirlik)	0,70 (azamî)
Carbon remnant (Over 10% remnant)	% (agirlik)	0,30 (azamî)
Fluidity (at 40°C)	cSt	2,0-4,5
Ash	% (agirlik)	0,01 (azamî)
Setan index	-	46 (asgarî)
Water	Mg/kg	200 (azamî)
Particule substance	Mg/kg	25 (azamî)
oxidation stability	g/m³	25 (azamî)

Source: www.tupras.com.tr

Diesel motors work more different principles than benzine motors and although their carbonmonoxide (CO), hydrocarbhone (HC) emission is lower, azoteokside (NO_x) and their particule substance (PM) emissions is higher. Generally in diesel motors air pollution in diesel motors occurs from exhaust emissions and carter leaks. These evaporation loses can be decreased by used closed circuit injection systems and less volatile diesel. According to USEPA, emission factors of a heavy construction equipment that has been maintained regularly and when it goes with 0-30 km/hour speed; for CO is 8,61 g/minute, for HC and NO_x are 6,27 g/minute.

Provided that taking into consideration, construction equipments working with electric, it was calculated daily pollutant emission that will be grown out from dozer, loader, grader, cylinder, beko, truck, compressor and generator. On a specific location, daily CO, HC and NO_x emissions grown out construction equipments were calculated with USEPA emission factors by considered that there is only one for each machine and it is worked 8 hours in a day continiously. These emission values is given in Table V.18.

Table V.18 Emission guesses that will be grown out from construction equipments.

POLLUTANT	EMISSION FACTOR (g/minute)	TIME (hour)	DAILY EMISSION (kg/day)
CO	8,61	8	33,0
HC	1,38	8	5,3
NO _x	6,27	8	24,0

The emission from working of construction equipments is temporary. In addition this, the expected emissions do not have impotent effect on air quality. It is anticapeted that air pollutants (CO, HC ve NO_x and PM) will be very low value in the Project Site. Besides, the air pollution from construction traffic will be also insignificant levels.

All vehicle exhaust emission will be measured by authorized foundations regularly and it will be documented that they provide determined limit values for exhaust emission.

V.1.13. Amount of water that will be obtained from the sources that will provide water for used within the context of project, water supply system and amount of water according to purpose of usage, type and amount of waste water, environments that will be discharged to.

During the construction activity of project, it is considered that utmost 500 people will work according to work program intensify. According to Turkey statistic foundation regional statistic 2004-year data, daily per water consumption is 178 litres in Adana. Taken into consideration bad case scenarios, by based on assumption that per water consumption will be 200 litre/day, it is expected that daily water consumption will be around $500 \text{ person} \times 200 \text{ L/person-day} = 100 \text{ m}^3/\text{day}$. The potable water will be supplied from surface water in the region, drinking water will be supplied from near settlement areas for making concrete, dust control and cleaning on construction stage. Water will be supplied by tankers.

Wastewater will be grown out from basic process as stated in below:

- Personnel origin domestic wastewater.
- Concrete mixing, material preparing, storage site waters,
- Equipments park waters,
- Construction site drainage system waters.

With the assumption that entire of water that will be consuption will be turn into wastewater, approximately 100 m^3 wastewater will be made up in a day. Project Site is approximately 55 km far away as air distance from Çatalan Dam upstream where provides to drinking water of Adana, it is within the "long distance protection area". In accordance with regulation of "Control of Water Pollution, the part of long distance protection area, article 20, item B" 31/12/2004 dated and no. 25687 published and came into force on official gazette, it is stated that in impossible conditions as technique and economic, provided that reached wastewater to class II water quality by used advanced cleaning techniques, it can be given permission that waste water can be discharged to basin.

With the assumption that entire of daily water needs turns into wastewater, if BOI_5 load for domestic wastewater is 60 gr/day/person, total BOI_5 load will be 42,9 gr/day/person.

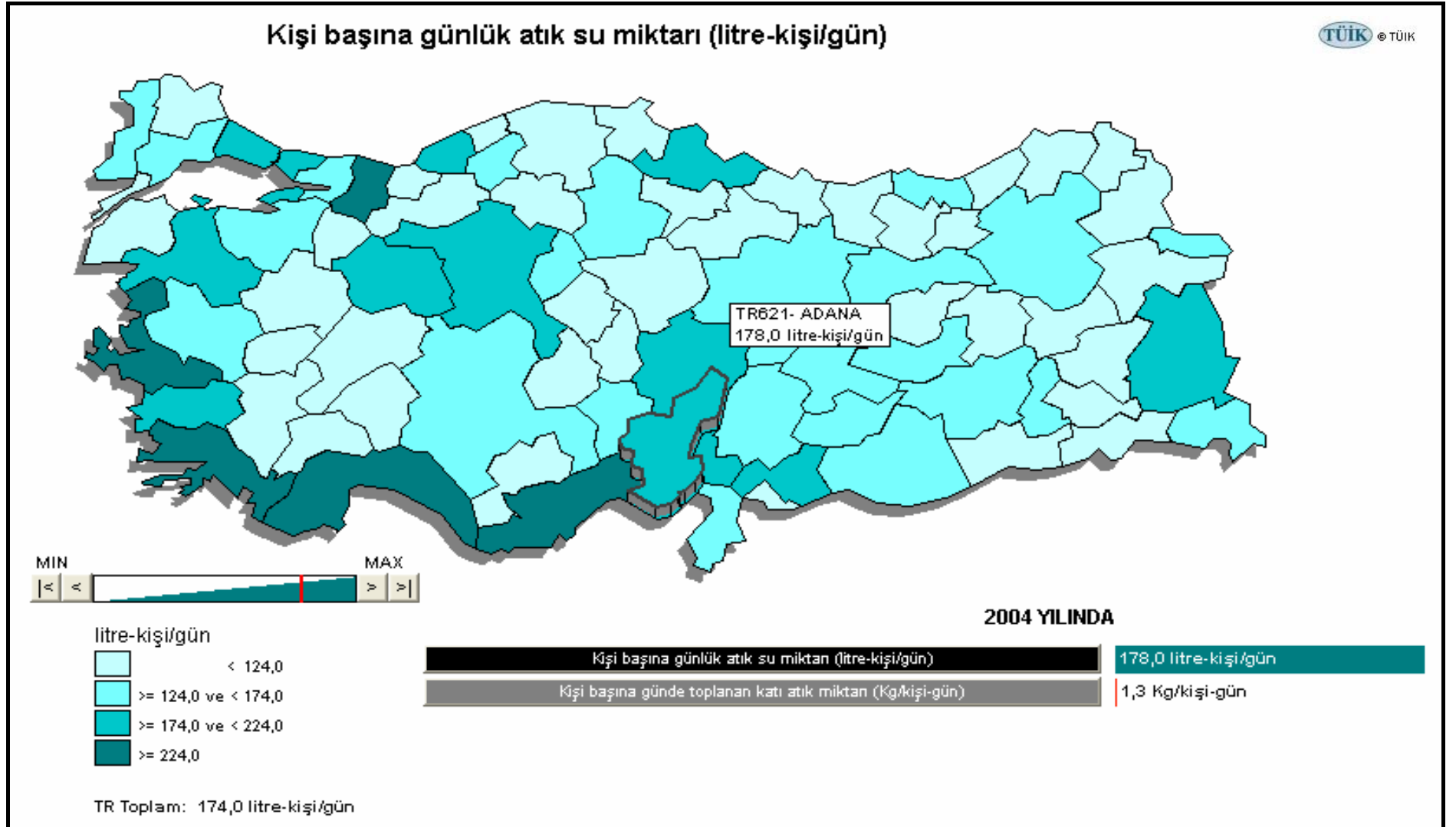


Figure V.15 Adana Province, Amount of per daily wastewater and solid waste (litre-day/day)

Source: www.tuik.gov.tr

V.1.14. Amount of solid waste starting from land preparation to opening units, how it will be annihilated

Within the context of Kavsakbendi, HPP and Quarries project, during the land preparation, on account of excavation and due to similar reasons there will be some excavation waste. As explained in part V.1.1. Some of these wastes will be used in fill and concrete works, the remaining of it will be stored in D1, D2 and D3 storage sites.

In the construction phase, besides the excavation material, there will be iron, table, packaging material and some similar wastes. From these materials, the ones that could be recycled like the iron, steel and similar materials will be stored separately and sold as scrap. The ones that could not be recycled will be spilled over into an area depicted by Kozan and Aladag municipalities in an appropriate manner. It is expected that the construction phase of the project will take 46 months. During the construction activities of the project, it is expected that 500 people will work depending upon the workload. (Part V.1.16)

In Adana, according to the Turkish Statistical Studies Foundation 2004 Regional Statistics, the daily amount of solid waste produced per person is 1.3 kg/person-day (Figure. V.11). However, the amount of solid waste produced in the construction site will be less than that number. However, when we consider the worst case scenario, the amount of solid waste emanating from 500 people will be approximately 650 kg.

The domestic solid wastes formed during the construction phase will be kept in containers that are appropriate for short-term protection and Kozan and Aladag municipalities will dismiss their transportation on the condition that its ownership will belong to the project owners. The collection, storage, recycling and the dismissal of the domestic solid wastes formed in the construction phase will be executed depending upon the relevant clauses of the "The Control of Solid Wastes Regulation", published in the 20814 numbered official newspaper on the date of 14.03.1991.

The waste oils caused by the construction machines will be dismissed according to the "The control of waste oils regulation" published in the 25353 numbered Official newspaper on the date of 21.04.2004.

V.1.15. The preparation of the report according to the regulation for the evaluation and management of the environmental noise for the vibration, sources and the level of noise, cumulative values and for the material quarries that will take place as a result of the jobs that will be conducted starting from the preparation of the area and ending when the units will start to function.

In the scope of the project, the report prepared according to the "The evaluation and the management of the environmental noise regulation" for the vibration, sources and

the level of noise, cumulative values and for the material quarries that will emerge because of the work that will be done is provided in Appendix-J.

V.1.16. The accommodation of and other social infrastructure needs of the personnel that will work starting from the land preparation to the opening of the units their families. How and where these needs will be handled.

It is expected that the construction phase will take 46 months and the number of the people that will work during this period and their duties are shown in Table V.19.

Table V.19 The number of the personnel that will work during the construction period and their duties

THE SCOPE OF THE WORK	NUMBER
Derivation Tunnels Construction	60
Construction of the Body of the Dam	75
Energy Tunnels Construction	100
Spillway Construction	80
Hydroelectric Powerhouse Construction	120
Switchyard Fields Construction	50
Public Housing and other Facilities	15
The number of the personnel that will during the peak period	500

The construction sites that be built during the construction phase of Kavsakbendi Dam, HPP and querries project are limited by the unities below:

- The field offices of the contractor the control personnel
- Equipment and spare part warehouses
- The parking fields for the atelier and machines
- Stonecrusher facilities
- Facilities for concrete preparation
- Pressured Air and Water Obtainment Systems
- Cafeteria
- Health Center

The works on the project field are going to be delegated to different contractors specializing on construction, hydromechanics and electromechanics and each contractor will work with his own workers.

All of the construction sites will be built near the construction places. The number of people working during the construction phase is expected to be 500 at the peak period and these people will have their daily meals on the prefabric restaurants built on the construction site. It is also planned that the huge amount of the working personnel will be obtained from the districts that are near the construction site. Because of that reason, it is expected that there will be no accommodation for these people and servis buses are planned to be utilized for the transportation of them to the project field. The other workers will be recruited from outside of the district and they will stay in the prefabric contruction

buildings. Moreover, for the works in the construction places, restaurant, canteen, warehouse building, dormitory are going to be built.

For the workers staying in the construction site to enjoy their free times; prefabricated sport fields, reading rooms, TV rooms, telephone booths will be built. The environment and the field will be arranged accordingly.

The temperature in Adana is relatively high depending upon the information taken from Kozan Meteorology Station. Fuel is needed between the months of November and March to heat up. During the activities, the kind of the fuel to be utilized in the social facilities is distillate fuel oil and it will be used only for the heating activities. This kind of fuel is fluid and volatile and it does not contain a significant amount of nitrogen(N) compared to the other fuel-oil kinds.

When we consider that a large proportion of the workers will be obtained from the district, we can say that service and food industries will benefit from this situation a lot.

In the field, there will also be a health center and personnel as required by the relevant health laws and regulations. The treatment for the less significant wounds and hurts will be made on that center. For the more crucial incidents, the personnel will be taken to one of the health units in Adana, Aladag and Kozan regions.

V.1.17. Starting from the land preparation to the opening of the units, the jobs that pose risks and dangers for the human health and environment

It is not expected that the execution of the project will cause a problem for the human health and for the environment. The traffic jam and the traffic accidents arising out of the construction material and worker transportation are planned to be prevented if not at least minimized by training the personnel, putting the relevant traffic signs, speed limitation and through periodic maintenance and control of the vehicles. The use of heavy construction machines for tunnel and powerhouse construction activities is also planned. In the works related to the electricity, electric shocks and in the atelier studies, penstocks could be risky and dangerous for the human health. To prevent the accidents here, qualified personnel will be recruited and they will be trained on the topic of job security.

In all of the construction works, there is always a risk getting hurt and wounded. The other dangers awaiting the workers are traffic accidents, falling from a high place and some materials falling on top of the workers. Speed limitations, showing maximum care while going backwards, using a cage and a ladder with security handfold, utilizing safety belt and webs could be some precautions for minimizing the accidents and dangers. Also for the contractors, a workplace safety scheme and an accident prevention plan in accordance with the relevant laws will be prepared and put into practice. The personnel and the workers will be equipped with the relevant work security materials depending

upon the nature of the work and it will be ensured that they work under the conditions dictated by the health and job security laws.

To minimize the risks and dangers on the subject of worker security; number 1475 work law, number 7/7583 worker health and security legislation of the ministry of work and social safety, number 7/5734 legislation about the worker health and job security, the regulation about the working conditions of the workplace doctors and their duties, obligations and number 2872 environment law and other laws and regulations about collective bargaining will be taken into consideration.

The most serious threat for the worker health is the contagious diseases. To minimize this, workers will have periodic check-ups on the health center that will be constructed in the field. To deal with the more serious diseases, they will be taken to one of the hospitals in either Aladag or in Kozan districts and in the city center of Adana.

V.1.18. In the project field, creating landscape figures and making the field arrangements for the other reasons(forestation and green field arrangements). How they will be made, how much land is required for that and what kind of plants and trees are needed for that.

To minimize the erosion potential in Seyhan River due to the increase in the opacity level of it, special care will be given to building waste warehouses and to stabilizing these warehouses. Before the process of waste storage begins, the plants and the soil will be removed from the waste field. After the waste fields are prepared, the surface soil will be stored on a separate place to be utilized on the landscape business. To protect its characteristics until its use for the landscape goals, the soil will be taken off as late as possible and used in the nearest time. As long as the soil is stored, its surface is going to be sporuted. Also, plant wastes and plant roots will not be allowed to be thrown into the river.

The contractors will cover all of the waste and construction fields with herbal soil, before they leave the construction site and they will recreate the field with the appropriate tree kinds and bushes within the initiative of T.R. Ministry of Environment and Forests. The choice of the tree kinds that will be used in the studies done for that purpose contains the kinds stated in the report. Beyond these kinds, some kinds that make up a nice view may also be asked to be planted. Similarly, the opinions and views of T.R. Ministry of Environment and Forests will be taken into consideration.

V.1.19. The evaluation of the possible effects of the project on the underground and belowground entities(traditional urban infrastructure, archeological heritage and other natural entities that should be protected)

As explained in detail in Part IV.2.9.; in the project field, there are no archeological heritages and cultural, natural entities on below and above ground.

On the examinations made to detect the immovable cultural entities, no entity could have been discovered. However, if a discovery is made, the relevant museum or the relevant regional authority will be informed about that. On the topic, number 07/062 and 11.07.2007 dated article of T.R. Ministry of Culture and tourism is presented in Appendix C.

V.1.20. Other Activities

There are no other activities in the project field.

V.2. The projects in the execution phase of the project: Their effects on the physical and biological environment and the precautions that will be taken

V.2.1. The characteristics of all the units within the scope of the project, which activity will be executed in which unit, the goods and services that will be produced in these units and the production amounts of the secondary and final goods

The project is expected to be finished in 5 years. The characteristics of the project is given in Table V.20 and in table V.21'de

Table V.20 The characteristics of Kavsakbendi Dam, HPP ve Materials Quarries Project

CONSTRUCTION	CHARACTERISTIC	UNIT	AMOUNT
Reservoir	Max. Lake Volume	m ³	51,052 x 10 ⁶
	Min. Lake Volume	m ³	39,064 x 10 ⁶
	Active Lake Volume	m ³	11,988 x 10 ⁶
	Max.Lake Area	m ²	2,007 x 10 ⁶
	Min. Lake Area	m ²	1,673 x 10 ⁶
	Flooding Level	M	320,00
	Min. operating water level	M	312,00
	Max. operating water level	M	318,00
Dam	Drenaige Area	Km ²	13.000
	Yearly avr. Flow(with present irrigations, 1974-2003)	m ³	3899,05x10 ⁶
	Yearly avr. Flow (Full Development situation, 1974-2003)	m ³	3462,93x10 ⁶
	Dam kind	-	Concrete Weight
	Concret Body Volume	m ³	381.000
	Crest Elevation	m	323,00
	Elevation	m	240,60
	Talveg Elevation	m	249,00
	Elevation	m	82,40
	Elevation from Talveg	m	74,00
Power Plant	Brut Drop	m	83,00
	Net Drop	m	79,00

CONSTRUCTION	CHARACTERISTIC	UNIT	AMOUNT
	Kind of Turbine	-	Vertical Axis Francis
	Number of Units	-	3
	Power of Units	MW	48,50
	Installed Power	MW	145,40
Derivation Tunnels	Derivation Flowrate	m ³ /s	1.765
	Tunnel number	-	2
	Diameter	m	8,50 (horseshoe)
	Length	m	L ₁ =337, L ₂ =391,20
	Tunnel Section	-	Corrected Horseshoe
Spillway	Kind	-	Covered on the Concrete Body
	Cover	-	4 Ad, 18 m (H), 12 m (W)
	Capacity	m ³ /s	7.005
Penstock	Kind	-	Inside the shaft
	Internal Diameter	m	7,40 (Steel Covered)
	Width	mm	28
	Length	m	90
Energy Tunnel	Length	m	1.950
	Internal diameter	m	7,80
	Width	m	0,80
Balance Chimney	Elevation	m	59,35
	Internal Diameter	m	18,00
Upstream Cofferdam	Kind	-	Rock fill with clay kernel
	Crest Elevation	m	271,20
	Talveg Elevation	m	249,50
	Elevation from Talveg	m	21,70
	Crest Lenght	m	77,70
Downstream Cofferdam	Kind	-	Rock fill with clay kernel
	Crest Elevation	m	265,40
	Talveg Elevation	m	249,00
	Elevation from Talveg	m	16,40
	Crest Lenght	m	44,00
Generator	Kind	-	3 section, sencron generator
	Number	-	3
	Power	kVA	54.000

Source: Kavsakbendi Dam, HPP ve Materials Quarries Project Physiblity report, October 2006

Table V.21 Kavsakbendi Dam, HPP ve Malzeme Quarries Data

Installed Power	145,40
Project Flowrate	210 m ³ /s
Yearly Cumulative Energy(GWh)	701,70 (Present Irrigation)
	650,78 (Full Development Situation)
Yearly Reliable Energy (GWh)	321,40 (Present Irrigation)
	434,20(Full Development Situation)
Yearly Secondary Enerji (GWh)	380,38(Present Irrigation)
	216,58 (Full Development Situation)

Source: Kavsakbendi Dam, HPP ve Materials Quarries Project Physiblity report, October 2006

The units that will be included in the Kavsakbendi Dam, HPP and Materials Quarries Project that is planned to be executed in Adana city center are:

- Dam
- Derivation Tunnels and Cofferdams (Upstream and Downstream Cofferdam)
- Spillway and Bottom spillway
- Transmission Tunnel and Balance Chimney
- Penstock
- Power Plant and Tailway water channel
- Shaft Field

Dam type and Elevation

By taking the topography of the valley and the elevation of the dam into consideration, the dam is determined as concrete weighted dam. In this vertical downstream surfaced dam, the duration of the construction for large diameter derivation tunnels and for the body gets shorter. Apart from that, by building the spillway on the body, excavation on the dam axe is avoided and as a result of that, the cost of the spillway and the concrete is lessened.

In the project, as it is not possible to obtain concrete agregra from the material fields, the agregra that will be utilized the concrete body will be obtained by crushing the rocks from the formations that have limestone roots.

In the determination of the elevation of the Kavsakbendi dam, the elevation of the tailwater of downstream Goksu and Kopru Dams that has been proposed in the master plan of below Seyhan reservoir was taken as reference. So the talveg elevation of Kavsakbendi Dam is 24900 m, crest elevation is 32300 m, its elevation from the talveg is 7400 m, and its elevation from the base is 8240 m.

Derivation Facilities and Coferdams

The elevation of the derivation tunnel and of the upstream cofferdam was determined by the optimization studies. In the studies, firstly different diameters (7.50 m, 8.50 m, 9.50 m) of derivation tunnels has been chosen and for these tunnel discharge

curves were calculated and drawn. After that for every alternative derivation tunnel diameter and flood hydrograph, the necessary upstream elevation has been determined by making the flood routing calculations. In the beginning of the flood, the calculated elevation in the river headstock for the flood hydrograph is 264.60 m.

The construction of the cofferdam is very critical in the business program of the project. The diameter of the derivation tunnel has been determined as 8.50 to shorten the duration and not to raise the costs a lot. At this aspect, the upper elevation of the cofferdam was determined as 271.20 m by taking the role of the air into consideration.

The upper elevation of the downstream cofferdam has been determined as 265.40 m by taking the water level in the flood as reference point and by looking at the flowrates. Cofferdams will be constructed as clay kerneled and they will be in the type of rock fill. The crest length of the upstream cofferdam is 77.70 m and the one of the downstream cofferdam is 44 m.

The derivation tunnel was proposed as corrected horseshoe to provide some construction easiness. One of the derivation tunnels will later be used as bottom spillway. The other derivation tunnel will be closed. (Kavsakbendi Dam, HPP and Materials Quarries Project Physibility Report, August 2004)

Spillway and Bottom Spillway

The spillway will be located on the concrete body. As the flood flowrate is high, a cover was added to its design. The flowrate of the spillway has been calculated as 7005 m³/s and it will have four covers with the dimensions of 18.00 and 12.00 m. The energy cutting structure of the spillway has been designed as having a dashing threshold.

In the dam, bottom spillway and the derivation tunnel will be built in a year. In that tunnel, water taking shaft and entrance building will be constructed at the end of the construction works, after the pad region, a bottom spillway penstock with a diameter of 2.20 m will be placed in the tunnel and the tunnel will turned to a bottom spillway by constructing a pad concrete in the upstream part of the shaft. The axis of the water taking shaft is on the 0+067.34 km of the tunnel. After the pad and the transition region, penstock starts on the 0+205.07 km of the tunnel and the length of the bottom spillway penstock is 131.93 m. The diameter of the penstock has been calculated in order to meet the minimum water requirement and to spill the water of the dam in 10 days. In the exit of the penstock, there will be a tune valve, a valve room and connected to that valve room, a device to cut the energy will also be present.

Installed Power Optimization

At the end of the installed power optimization the diameter of the tunnel has been chosen as 7.80 m, the one of the penstock as 7.40 m and the installed power has been determined as 145.40 MW

Energy Water Taking Structure

Minimum operating water level is 312.00 m and the floor elevation is 300 m. The entrance structure has been designed in order to prevent entrance of the air into the tunnel.

Transmission Tunnel and Balance Chimney

The transmission tunnel begins after the energy water taking structure and its diameter has been chosen as 7.80 m after the installed power optimization. The section of the tunnel has been designed as corrected horseshoe as it is economic, fast and as it provides easiness in construction. The total tunnel length is 2028.61 m until the valve room. The interior part of the tunnel from the balance chimney axis to the valve room will be covered with steel and the length of this part is 78.16 m.

The balance chimney has been constructed by estimating the pressure increases and decreases and by taking the role of the air into consideration the upper elevation was calculated. After these calculations a platform having a diameter of 18.00 m, a lower elevation of 282.45 m and an upper elevation of 341.80 m.

Valve Room and Penstock

The penstock beginning with the valve in the valve room is 48.78 m from the exit of the valve room and it is 90.15 m as oblique. The diameter of the penstock has been determined as 7.40 m at the end of the installed power optimization and its width is 28 mm. The penstock will be separated into different branches to provide water to the unities near the entrance of the power plant. The diameters of the branches have been calculated as 4.30 m. While doing that, it has been assumed that the speed of the water in the penstock stays constant.

Power Plant Building and Tailwater Tunnel

The power plant building of the Kavsakbendi dam and HPP is located on the left side of the Seyhan River and its talveg elevation is 232.00 m. The power plant is between the Henuz district on the left and Gokçe district on the right, on the downhill of Karasivri mountains. Currently, there is no transportation facility to the power plant. On the left coast, a new road will be constructed and with that new road the transportation to the dam crest, power plant building and to the balance chimney will be made possible.

In the power plant building that has been designed according to 235 m tailwater elevation, there will be 3 vertical axis Francis turbine. The elevation of this turbine axis is 230.90 m. At the exit of the power plant, a tailwater tunnel will be constructed to send the water back to Seyhan river. At the power plant exit of the tunnel, there will be covers and lifting equipment. The tailwater has been designed in order to send the water to the stream next to it from the shortest possible way.

In the power plant, apart from the section reserved for the turbines, there are also montage platforms, control and mechanic equipment and closed shaft rooms, storage parts and some administrative sections.

Turbine Type, Unit Power and Number

The turbine type has been chosen as Francis (having a vertical axis) according to the flow rate that has been obtained at the end of the installed power optimizations. The unit numbers and unit flowrates in the power plant has been found as sufficient for the efficient turbination of the flowrate.

The capacity of the three units in the powerplant: $3 \times 70.00 \text{ m}^3/\text{s} = 210.00 \text{ m}^3/\text{s}$

As a result of the powerplant installed power optimization studies, the project flowrate has been chosen as $20.00 \text{ m}^3/\text{s}$ and the diameter as 7.40 m. According to these characteristics

Installed power : 145.40 MW
Turbine type : Vertical Axis Francis
The number of units : 3
Unit installed powers : $3 \times 48.5 \text{ MW'}$ dir

Generator Type and Capacity

The 3 generators belonging to the three units in the power plant will be 3 phased, sencron typed and they will have vertical axis. They will have the power of 54.000 kVA, their turnover number will be 150 d/d, their frequency will be 50 Hz.

Transformer type and number

There are three transformers in the power plant. Their power is 54.000 kVA' dir and their type is external 3 phased.

Switchgear Field

The switchgear of the powerhouse will be built outside. The switchgear field will be opened in the balance chimney platform excavation and it is foreseen that it is located onto an area that with the dimensions of 50 m x 60 m.

Energy Transmission

The energy produced in the powerplant will be transmitted to Kozan Trafo center on a 30 km distance. The characteristic of the energy tansmission line will be "30 km, 154 kV, 2 x 795 MCM conductive double cycle line"

V.2.2. Possible effects of the water blockage on the water quality and on the living organisms in the water, the amount of water released on the stream headstock and how it is calculated.

As explained in section V.2.1 table V.20, the volume of the reservoir that is planned to be built within the scope of Kavsakbendi Dam, HPP and Materials Quarries Project is 51 hm³. When we compare this value with these of Yedigoze, Çatalan ve Seyhan dams located in the downstream of this project, we can see that it is smaller than theirs. When the project design flowrate of 210 m³/s is considered, the waiting period for the water stored in the reservoir becomes approximately 70 hours. As the waiting period is short, anaerobic conditions are not expected to emerge in the dam lake. Besides that, as a part of the sediments carried by the river will be kept in Kavsakbendi dam, a better quality water will be provided to the downstream parts of the dam. Therefore, Kavsakbendi dam will create positive effects to the upstream part of the river.

By the construction of the dams with warehousing capacity, the habitat of the river turns into a lake habitat. In the area formed by the land and river ecosystem staying under the dam lake, a lake ecosystem will emerge. There are organisms surviving in both ecosystems and there are some type of organisms that have adapted themselves to these ecosystems as well. Especially, water organisms are affected from this situation. As a result of that effect, with the adaptation to the new ecosystem, some changes in the composition of the species and some migration movements may be seen.

As seen in figure V.16, in the downstream of the project field, Yedigoze dam is planned to be constructed and after that there are Çatalan and Seyhan dam lakes. As a result of the presence of these dams, different kinds of living species in the region have adapted themselves to the new ecosystem. For this reason, the adaptation to the new ecosystem that will be formed with the project will be much easier. Also, coastal erosion will fall and this will also cause a decrease in the opacity level. The decrease in the opacity level will affect water life in a positive manner. When the dam lake is formed, the organisms will find a living space within the land ecosystem and migration birds will have an accommodation environment.

In the dams located in the downstream of the project field, there are no gates for the movement of fishes. Therefore, no fish gates will be constructed. For the continuation of the lives of the living things, 5 m³/sn of water determined in Kavsakbendi HPP Feasibility Report will be released into the stream.

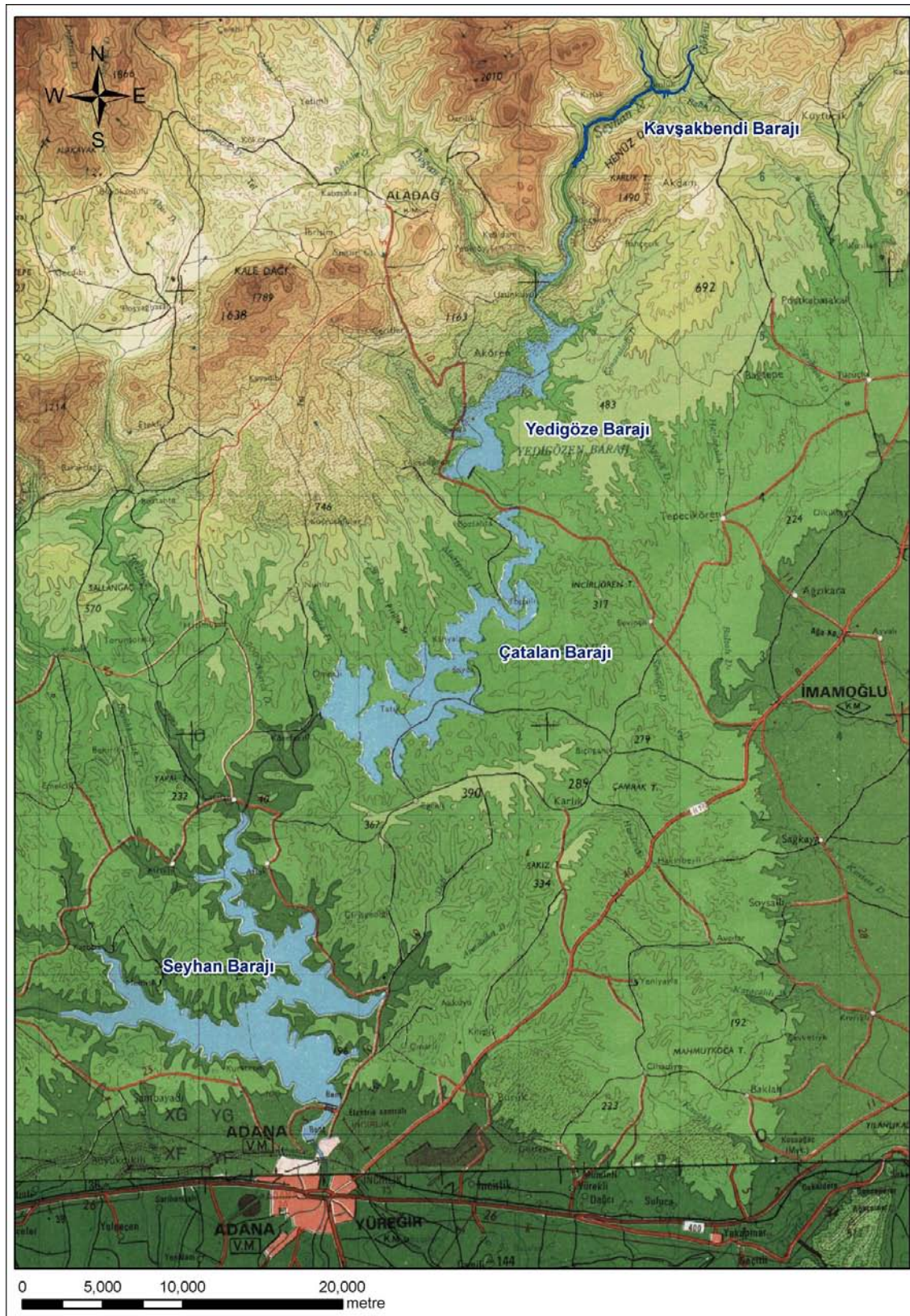


Figure V.16 The dams on Seyhan River

V.2.3. The effects on the areas that should be protected by the national and international legislations

Within the context of Kavsakbendi Dam, HPP and Material Quarries Project, there are no areas that are taken under protection by the national and international legislations.(Appendix-C)

V.2.4. The possible changes in the downstream that will take place as a result of the utilization of the resources to obtain water (Erosion, River Hydrology, Sediment Arrival, etc.)

Water Ecosystem

The river ecosystem turns into a lake ecosystem as a result of the construction of dams with warehousing capacity. A lake ecosystem will emerge in the area formed by the land and river ecosystems that stay under the dam lake.

There are organisms that could live in both of the ecosystems and there are also ones that have adapted themselves to these ecosystems as well. Water organisms are deeply affected from this situation and as a result, some changes in their compositions, migration movements and some downstream effects take place.

With the formation of the dam lake, a stagnant water surface will emerge and an appropriate environment will be shaped for the photosynthesizing plants to grow in the lake due to the increase in the light permeability of the lake.

In the downstream of the project field, Yedigoze Dam is planned to be built and after that there are Mentas, Çatalan and Seyhan dam lakes. The routes of the migrating fishes are blocked because of these 4 dams. In these dams there are no gates for the movement of the fishes. Therefore, the construction of fish gates is not within the scope of this project.

With the presence of three dam lakes and with the construction of Yedigoze dam near the project field, the living organisms have adapted themselves to this new system. Therefore, the adaptation to this new ecosystem formed by the project will be much easier.

Apart from that, with the water habitats becoming more stable, coastal erosion will decrease causing a fall in the opacity level as well. Also, forestation activities to be made will also have a decreasing effect on the opacity level. This decrease in the opacity level will certainly affect the water life positively.

When the dam lake is formed, around the lake, flora and living organisms included in the land ecosystem will find a living space and benefit from the lake water. This

situation will also create a nice accommodation environment for the migrating birds as well.

The dam lake of Kavsakbendi Dam, HPP and Materials Quarries Project is small. Inside the dam lake, anaerobic conditions will not emerge as there is daily regulation. As the dam will release an adequate amount of water with its bottom spillway structure, it is out of the topic that the dam will create undesired outcomes on the water ecosystem of the downstream.

Sedimentation Situation

In Seyhan River reservoir, sedimentation measurements are made in 1801 Goksu River-Himmetli, 1826 Zamanti River-Ergenusagi, 1818 Seyhan River-Uçtepe AGI, 1820 Korkun S.- Hacili Bridge AGIs. The most appropriate station to calculate the efficiency and the amount of sediment in Seyhan River is 1818 AGI station. (Figure V.17)

According to the 1818 AGI sediment measurements (1968-1999) the average sediment efficiency is 151 ton/years/km (EIE-2000). For the amount of sediment coming from Zamanti side, 1826 AGI (Goktas dam place) measurements have been benefited from. 1826 AGI sediment efficiency is less compared to the one in Goksu side. According to the data in EIEI Sediment Yearbook, the pending sediment efficiency is 27 tons/years/km. Also Bahçelik Dam on the Zamanti side is under construction. Therefore, the amount of sediment for Zamanti side has been calculated by subtracting the Bahçelik dam drainage area from Zamanti side drainage area.

QS: Sediment amount (tons/years)

QW: The river flowrate when the sediment example is taken (m^3 /s)

C: Concentration (ppm)

$$A_{1826} = 8698.3 \text{ km}^2, \quad A_{Bahçelik} = 2756 \text{ km}^2, \quad A_{Zamanti} = 8698.3 - 2756 = 5942.3 \text{ km}^2$$

$$QS_{Zamanti} = 5942.3 \times 27 \text{ ton/year/km}^2 \times 1,15 = 184.500 \text{ ton/year}$$

$$QS_{1826} = 184.500 \text{ ton/year} = 184.500 / 1,165 = 158.400 \text{ m}^3/\text{year}$$

The sediment amount coming from Goksu side has been taken as equal to the 1818 sediment efficiency on Seyhan river and instead of Kopri Dam 1805 AGI sediment amount has been calculated.

$$A_{Kopru} = A_{Goksu} = 4242.8 \text{ km}^2$$

$$QS_{Goksu} = 4242.8 \times 151 \text{ ton/year/km}^2 \times 1,15 = 736.760 \text{ ton/year}$$

$$QS_{Goksu} = 736.760 \text{ ton/year} = 736.760 / 1,165 = 632.420 \text{ m}^3/\text{year}$$

After these calculations, with the addition of these two sides, the total sediment amount for Kavsakbendi dam;

$$QS_{Kavsak} = QS_{Zamanti} + QS_{Goksu} = 158.400 + 632.420 = 790.820 \text{ m}^3/\text{yil}$$

The dead volume left in the dam(312.00 m) is more than adequate for that total sediment to be stored for 50 years. During the construction of Memba and Feke Dams, the amount of the coming sediment will decrease and if Kopru Dam is constructed, only the sediment coming from Zamanti side will be benefited from. Also, as Kavsak Dam spillway is below, the coming sediment will be thrown from the spillway. Therefore, sediment amount will not pose any problems during the construction and functioning of Kavsakbendi, HPP and Material Quarries Project (Kavsakbendi HPP Feasibility Report Raporu, August 2004).

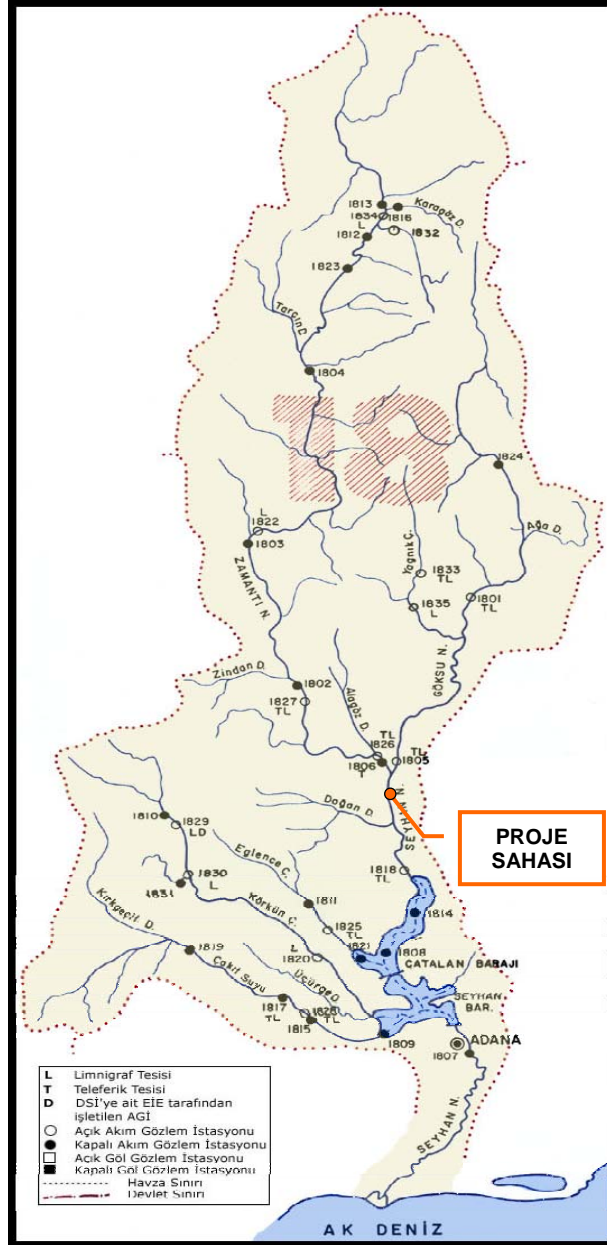


Table V.17 AGI Stations on Seyhan River

Erosion

Causing significant damages especially in our country, water erosion is the most significant erosion type when we consider all types of erosion. The project field is under a crucial threat of water erosion (3. degree)

The soil eroded is carried to the streams then to the dams. The soils carried to the dams accumulates there and soon causes the dam lake to be filled. In the dams filled, soil is held instead of water. As the time passes, the dam gets filled a lot and it may be benefited from which means a huge loss of money. In our country, the lifetime of the dams is very short due to high erosion. For example, a dam in Europe is utilized for 1000 years, however, in our country this amount is about 100 years, even shorter because our dams get filled by the soil coming from the bare areas.

In order to prevent the water erosion and to make the increase the projects lifespan, some measures that could be taken are listed below.

1) *Administrative measures*

The necessary administrative precautions will be taken about the 4856 numbered TR Ministry of Environment and Forests duties according to the 11th article of the law

2) *Cultural meaures*

They aim to stop the erosion by building flora or developing the existing flora. They include forestation, flora development, grassing activities, breeding the appropriate plant types

3) *Mechanical Meausres*

a) Measures that will be implemented in the hillsides (Terracing, draining, etc.)

b) Measures that will be taken against the carve erosion (Soil barriers, thresholds, coastal walls, etc.)

Landslides

When the geological and geomorphological structure of the project field of Kavsakbendi Dam, HPP and Material Quarries project is examined, in the project field near the limestones, there are some coluvial materials having a width of 35-45 m and a flat topography. This material is a mixture of limestone blocks with the dimensions of 3-4 meters and clay material with the dimensions ranging from 3-5 cm to 25-30 cm. This thick coluvial material has a permeable-semi permeable character on the metamorphic clay rocks and it may cause landslides due to the rains and river flows. However, in the places near the dam, an active landslide has not been observed upto date.

The precautionary measures below will be taken by considering the worst-case scenarios.

1) *Administrative measures*

The goal of these measures is to keep the people away from the negative effects of the landslides and to warn them against them. After detecting the potential landslide areas, alert signs will be placed in these places. Also, there will be no housing in the places that have the danger of landslides. If there is any, they will be removed to other places not having the risk of landslide.

2) *Technical measures*

The precautions will be taken to remove the landslide causes or at least to stop them in a way that they will not harm the other parties.

V.2.5. Other usage patterns belonging to the resources and their effects if there are any

There is no other usage belonging to the resources

V.2.6. The effects on the below ground and surface water resources

The above ground water resource in this project is Seyhan River. Kavsakbendi Dam, HPP and Material Quarries Project that will be built on an elevation of 249 m within the river will be taken to the transmission tunnel and will be transmitted to the power plant that is on a 2231 m distance. The area of the lake is small. The active volume of the dam can make only 16 hours regulation on the project flow rate. For this reason, the water needed for energy purposes will be released into the water headstock by being taken into the water transmission tunnel. There will also be no serious effect on the water balance as the downstream water will be released at the times when the water is insufficient. Moreover, there will not be a change in the hydrolic regime of the water as the lake area is small and since the the flow direction, rate and amount of the water transmitted to the power plant will not show a significant conversion.

In the project field, Kavsakbendi Dam, HPP and Quarries project will not have an effect on the below ground water resources because the below groundwater will not be discharged (Kavsakbendi ve HPP Feasibility Report, August 2004).

V.2.7. How and where will the accommodation and other social, technical infrastructure needs of the personnel and of the parties related to them be met

The duties and number of the people that will work on maintenance, security, control and on other areas during the management of the project are shown on Table V.22. In the functioning period of the project, 40 people are planned to be employed. The personnel will be chosen out of the people living in the district and the accommodation facilities for the personnel will be built in the nearest district. For this reason, an administrative building will be constructed and a housing arrangement will also be made for the families of the personnel. Also, a service bus will be provided for the school, doctor and shopping needs of the personnel. The personnel that will work in shifts will be obtained from the nearest districts and in the shift changes they be released to their houses by buses.

In the units of Kavsakbendi Dam, HPP and Quarries project, a tight foseptic tank will be utilized to remove the domestic waste water. This waste water will be drawn away by the vacuum trunks and destroted by the Kozan municipality waste water treatment center. Concerning the topic, the 447 numbered and 14.06.2007 dated article of Kozan municipality science department could be found in Appendix-C.

In winter, distile fuel-oil will be utilized in heating the facilities that the personnel will spend their time. This type of fuel is fluid and volatile and it contains a smaller amount of clay and nitrogen(N). In the fuel that is proposed to be utilized, there is going to be a 1.5% proportion of sulfur (S).

Table V.22 The number and duties of the personnel that will work during the functioning phase

DUTY	NUMBER
General Manager	1
General Manager Asistant	1
Electricity Head Engineer	1
Machine Head Engineer	1
HSE Engineer	1
Shift Technical Personel	5
Mechanical Atelier Expert and His Assistant	2
Electric Atelier Expert and His Assistant	2
IT-computer and Programme Technician	1
Warehouse responsible and the Assistant	2
The manager for the Social and Administrative Affairs	1
Human Resources Manager	1
Accountant	1
Purchaser	1
Security Chief	1
Security Personnel	15
Power Plant Responsible	1
Driver	2
TOTAL	40

Kavsakbendi Dam, HPP and Quarries project planned under these circumstances does not have any negative effect on the social and technical infrastructure of the region.

V.2.8. The characteristics of the treatment facility for the waste water that emerges after the utilization of the water for drinking and usage purposes in the administrative and social unities. The detailing of the process and where, how will the treated water be given and on what amounts

In the operation phase, there will be 40 people in the facility working in shifts. The domestic waste water arising out of them will be collected by tight fosseptic tanks then will be pulled by vacuum trunks and dismissed in the waste water treatment center of Kozan municipality according to the relevant articles of SKKY. The fosseptic holes will be digged according to the regulations published in the 13783-numbered Official newspaper.

In the operating period, as the number of working people will be 40, 3 eyed fosseptic was thought to be built. The drawings for the fosseptic plan are provided in Appendix-D. In the table provided in Appendix-D, the volume of the fosseptic is 8 m³ for a population of 40 people.

V.2.9. The amount and characteristics of solid waste that will be emerges from house, social and administrative facilities, where and how these waste will be carried or for which purposes and how they will be evaluated.

It is predicted that approximately 52 kg of solid waste will be formed in the operating phase of the project. The solid wastes formed in the operating phase of the proposed project will be collected periodically and poured into the garbage areas determined by the Aladag and Kozan municipalities. The activities concerning the solid wastes will be executed in line with the Solid Wastes Control regulation.

V.2.10. The sources of the noise that will appear during the operation of the project units and the measures that will be taken for the control of it

The most crucial source of noise during the operation of the facility is the mechanical noise that arouses while the turbine mile turns around the axis. The other kinds of noise in the power plant arise out of the heating process of the building, diesel generators and of pipes. The acoustic report that has been prepared in accordance with the regulation of "The evaluation of the environmental noise and management of it" is presented in Appendix D.

To lessen the effect of the noise, vibration and land plates that have a sound absorbing character will be used. Also, the personnel will be provided safety equipment and it will be made sure that they use these equipment. The activities will be executed in line with the "Worker Health and Internal Security Legislation" (12.09.1974 dated and 15004 numbered Official Newspaper)

V.2.11. Possible Effects on Forests and the definition of the measures that will be taken against these effects

The only effect on the forests during the operation phase of the project could only be fire. Therefore, during the operations within the scope of the project, it will not be allowed that any material to be set on fire without control. There will always be equipment to extinguish fire. These equipment will be obtained in accordance with the relevant articles of 11.01.1974 dated and 14765 numbered "Worker Health and Internal Security Legislation" and they will be controlled periodically. Also, the personnel will be trained about this issue. In spite of all of these preconditions, if a fire happens, the nearest fire department will be informed about that. Besides fire, there is no other negative effect of the project on forests.

V.2.12. Other Charactersitics

There is no other activity on the project field.

V.3. THE EFFECTS OF THE PROJECT ON THE SOCIO-ECONOMIC ENVIRONMENT

V.3.1. The expected increases in the income levels; Employment Oppoprtunities created, population movements, migrations, education, health, culture, other social and technical, infrastructure services and changes in these services, etc.

Kavsakbendi Dam, HPP and Material Quarries Project will create a potential economic growth for the local and regional society. However, it will also cause some kind commitment on the societal services and on the infrastructure. The effects of the on the local and regional economies and on the societal services and infrastructure are explained in the parts below.

The dam lake that will be formed within the context of Kavsakbendi Dam, HPP and Material Quarries Project is rather small. The active volume of the dam can only make 16 hours of regulation. For this reason, there are no area, agricultural land and social facility being left under water.

Employment Oportunities Created and Income Increases

Increase in the employment level in a particular region is considered as a positive development. Spendings that will rise in parallel with the salaries will create new local job opportunities. To conclude, proposed Kavsakbendi Dam, HPP and Material Quarries Project will provide economic benefits to the region both directly and indirectly.

The construction phase has been predicted as approximately 46 months. During this period an average of 500 people will work and they will be obtained from the district. In addition to the worker salaries; contractor services, building and equipment rental are other sources of income. Also, the gasoline for the use of the trucks and other business machines will be obtained from the gasoline stations. Moreover, any kind of food and drink will be bought from the district through which the local economy will benefit.

In the operation phase, 40 people will be employed continually. In the construction phase all of the needs of the construction site will be met by the local opportunities and this will make the general economic life especially food, textile, local transportation industries much more profitable.

During the 49 years life of operation, a large amount of the needs for the operation and maintenance will be met from the region. There is not a certain number on the amount of the spendings for the operation and maintenance activities but a large amount of these spendings will be met from the region. In addition, it is not foreseen that

forestation, stockbreeding and agricultural activities will be effected negatively from the project.

Population movements and Migrations

In the scope of Kavsakbendi Dam, HPP and Material Quarries Project, we cannot talk about new housing activities, as there is no residential area being left under water. Therefore, problems like finding new income resources and getting adapted to a new life will not be faced.

Education, health, culture, other social and technical, infrastructure services and changes in the ways of benefiting from these services, etc.

Development projects may usually create negative consequences on the societal services and infrastructure by creating a demand that is beyond the current service capacity. However, these kinds of projects may create positive effects by providing additional funds that could be utilized in increasing the service capacity. In the scope of Kavsakbendi Dam, HPP and Material Quarries Project, the workers coming from outside of the region are expected to leave after the completion of the project. Also, through providing some needs of the workers(first aid, canteen, communication facilities,etc.) from the construction site and camps, their contact with the local people will be maintained at the maximum level.

Andrap Bridge that connects Kozan-Gokçekoy-Karahan-Kislak villages of Aladag district is left under the dam. In winter, the transportation to Adana from Aladag village is made from Kozan district as the transportation to Aladag could not be provided due to weather conditions. To connect Gokçekoy, Karahan, Kislak villages to Aladag district, a bridge on Dogançay and a road of 3 km will be built so that no problems in the transportation activities will emerge.

The project will not create any negative effect on the educational, cultural activities, health services and on communication, irrigation facilities as well.

V.3.2. Environmental Cost-Benefit Analysis

Kavsakbendi Dam, HPP and Material Quarries Project as depicted in the “Downstream Seyhan Reservoir Master Plan Report” published in 1980, is on 8 km downstream of the Zamanti and Goksu rivers (2 main bodies of Seyhan River) connection and aims to produce energy.

The Environmental Benefits of the Project

- Beyond the contributions to the Turkish economy and the energy market, the contribution to the amount of “Green Energy” that Turkey produces.

- Prevention of the Floods
- Benefiting from the dam lake that will be formed in fishing and recreation activities
- Prevention of erosion through the forestation activities and environmental regulations
- Improvement in the tourism activities around the dam lake
- Building of new roads for transportation
- A softening climate
- New employment opportunities by recruiting workers in the construction and operation phase of the project from the local people (In construction 500, in operation 40 people)

Certain Costs

- Project Costs (Costs related to the construction of Dam Body, Spillway-Bottom Spillway, Penstocks, Energy Tunnels and other technical equipment)
- Costs related to the construction of the transportation roads
- The costs of the working personnel and the work machines
- The costs related to the environmental regulation and security measures that will be taken
- Infrastructural Costs

The installed power of Kavsakbendi Dam, HPP and Material Quarries Project is 145,40 MW, the energy production is 650,78 GWh, its rentability is 2,28 and its internal profitability rate is %20,45'

The economic lifespan of the project is foreseen as 50 years and it may raise to 100 years if, in every 35 years the electro-mechanical equipment is renewed and rehabilitation activities are conducted.

VI. THE EFFECTS THAT WILL EMERGE AND CONTINUE AFTER THE END OF THE PROJECT AND THE MEASURES THAT WILL BE TAKEN AGAINST THEM

In this section, the environmental effects after the completion of the activities in the facilities of Kavsak Dam and HPP Facilities are analyzed. Usually in all countries, HPP projects are planned as functioning without interruption. The license period of the project is 49 years. However, the lifespan of the hydrolic buildings is much more longer. The lifespan of the electromechanic equipment (turbines, generators, control equipment) is planned as 35 years. If the maintenance and repair of the electromechanic equipment is conducted regularly, the lifespan of the facility gets longer. The environmental effects that may emerge in case of a stoppage in the activities are explained below.

VI.1. Land Adjustment

The lifespan of the hydroelectric power plants is dependent upon the lifespan of concrete buildings. With the renewal and maintenance of the concrete buildings, the operations of the facility continues for many years depending on hydrolic conditions. Hydroelectric power plants may produce energy for many years efficiently with the renewal of the electromechanical equipment. When land adjustment is needed, area design and terracing will be made. Also, to prevent the surface flow that may emerge as a result of the rains during the land adjustment studies, accumulating in the project field, the surface drainage will be controlled by opening drainage channels in the required places.

VI.2. The Land Adjustment that will be made in the Dam, HPP and in material quarries and the promotional studies

With the project lifespan of 49 years, the lifespan of the hydrolic buildings is much more longer. If the maintenance and repair of the electromechanic equipment is conducted regularly, the lifespan of the facility gets longer. However, during the 49 years operating period if the dam needs to be removed due to some internal and external conditions, land adjustment studies that are appropriate for the topography will be conducted. The land will be adjusted for the topography after the materials are purchased and if necessary the soil will be put in its place and forestation activities will begin.

If the facility is decided to be closed, before the process starts a promotional study will be done depending upon the conditions of that day. After the completion of the facilities in the materials quarries and warehouses, there will be land adjustment in these fields too. The purpose of these land adjustment activities is not only to green the land but also to adjust the field to the natural architecture and make it utilized in the best possible way.

A special care will be given to the rehabilitation studies of the degraded areas (warehouses, material quarries, digging fields). It will be ensured that they are conducted simultaneously with the production activities. Around the dam lake, forestation and

landscape studies will be made during the operation phase of the project. Also, the surface soil that is in the areas of warehouses and material quarries will be removed and stored in a different place inside the field. During the storage, a special care will be given not to make the soil lose its characteristics by mixing with foreign substances. After the studies in the field completion, the soil will be spilled over the surface and greened by the plants that are appropriate for the flora.

VI.3. Effects on the Water Resources

After the activities of the dam have been completed, there will not be any negative effects on the present water quality

VII. THE ALTERNATIVES OF THE PROJECT

Alternative Technologies for Electricity Production

When compared with natural gas, nuclear and coal aided power plants, hydroelectric power plants have some significant advantages such as being renewable and working in peaks. They are the most appropriate power plants as they can start working very fast in peak hours and stop working very fast at the times that demand falls. To determine the economic feasibility of the hydro electrical power plants, the resources that can produce the same energy in the interconnected system is looked for. After that they are compared in economic terms and it is proposed only if it is cheaper.

Alternatives of the Project

Kavsakbendi Dam, HPP, Materials and Quarries Project has been planned on Seyhan River, upstream of Goktas Dam and Kopru Dams and downstream of Yedigoze Dam. Kavsakbendi Dam has a transmission tunnel of 8600 m, the installed power of the power plant is 120 MW and the total energy production has been forecasted as 563,8 GWh. However, as it has been determined that the construction of the power plant was not possible due to geologic conditions and even if it is possible, as it will be too costly, a new project was formulated in which the tunnels could be constructed in a less costly and shorter manner. At this respect, in the master plan the axe of Kavsakbendi Dam was determined as approximately 7.5 m downstream and it has been moved to 249 m talveg elevation. The dam type has been offered concrete weight and the dam body was designed as having 323 m crest elevation and 74 m talveg elevation. With all these adjustments, the planning of Seyhan River was not spoiled. The place of the power plant and tailwater is kept constant and through that way the length of the energy tunnel was dropped to 1950 m.

The smartest approach to meet the increasing need of the region is to make the hydroelectric potential function in Çukurova. This project aims to make the maximum contribution both to the regional and national economy by achieving this.

As could be seen, this project is very crucial for the region. The place where the project will be executed has been determined after long years of planning and project management. The axe of the dam has been chosen in the most suitable topographic and economic axe. For this reason, this project has no other alternative.

Inactivation Alternative

Any investment may have lots of alternatives in terms of place and technology. All of these alternatives are different investment options that aim to realize the project. Beyond these, not effectuating the project could be seen as an alternative. These kind of studies are called inactivation alternative and their aim is to evaluate the benefits and costs that emerge when the project is not put into action. Usually, since these kinds of

qualitative evaluations are hard to make, different scenarios in which the project is realized and in which the project is not realized are presented to the decision makers.

In Kavsakbendi Dam, HPP and Material Quarries Project, if the inactivation alternative happens, a yearly energy loss of 563,8 GWh will occur and a financial burden as a result of that will take place. Also, if this is not put into action, the electric energy production of our country that is dependent on only local resources will suffer from that situation. When we consider our country's situation and need for energy, we can see that inactivation alternative is not a rational solution.

VIII. FOLLOW UP PROGRAM

The follow up studies will be implemented in line with the EIA Report and follow up reports will be written and sent to TR Ministry of Environment and Forests.

SER Energy Production and Commerce has planned the project and taken the production licence from the Energy Market Regulatory Authority with the decision of that authority on the date of 18.07.2007 and with the number of 3923 (Appendix-C). An agreement will be signed with the state directorate of hydraulic works for the right of water usage and operating. According to the production license Ser Energy Production and Commerce is authorized to make the necessary follow up and audits. In line with the agreement signed with the state directorate of hydraulic works, the activities will also be audited by that authority on the relevant issues

VIII.1. The follow up program proposed for the construction of the facility, operation of the facility and for the stages after the operation, Emergency action plan

The Follow Program Proposed for the Construction Phase

The issues below should be paid attention during the construction phase

- The construction must be executed according to the plan and the regulations
- The quality of the construction must be inspected and every record about the Construction must be documented regularly.
- In the implementation phase, the construction must be executed in line with the prepared project documents and drawings
- The relevant actions for the work and worker security must be taken according to the regulations

Apart from these, in order to lessen the effects of the construction on the environment follow up must be made during the time of the construction in line with the regulations in practice. The rehabilitation areas are the contractor site and material areas, Seyhan river environment and the construction environment.

The follow up program will cover the points below.

- The evaluation of the construction areas, potential erosion in warehouse areas and of the sediment entering downstream
- The dismissal of the domestic solid wastes formed during the construction
- Readjustment of the landscape spoiled in the construction phase
- Periodical review of the water quality parameters (PH, AKM, etc.)
- Periodic review of the dust emissions and the noise arising out of the construction area

According to the 11th article of the Water Usage Rights and Operational Aspects Agreement, the follow up rights have been given to the firm.

Follow Up Program Proposed for the Operation Phase

Built for the purpose of energy production, the Projects' facilities' civil defense, protection and private security services will be provided in line with the regulations.

In the follow up program of the operating phase, it will be enough to measure the temperature, PH, AKM and sediment values in Seyhan River.

The collection of the solid waste and their transportation to the waste fields of the municipality are the other issues that need to be controlled.

All of the follow up studies will be conducted with the equipment offered by the TR Ministry of Environment and Forests. These equipment will also be maintained and repaired regularly. One of the copies of the follow reports will be delivered to Adana City Agriculture Directorship.

Follow Up After the Operation

After 49 years operating period, if it is decided that the facility to be closed as a result of the daily conditions, the points below will be paid attention.

- Land adjustment, if necessary area design and terracing will be made
- Because of the dense rains, the flora of the region has the capacity quickly renewing itself. So the green field will quickly rehabilitate itself after the land adjustment.
- The surface drainage will be checked by opening drainage channels and ditches so that the accumulation of the surface flow in the project field will be prevented.

Emergency Intervention Plan

An emergency intervention plan having information about the organizations to be informed in emergencies, the places of the safety equipment and the escape routes will be prepared and utilized when necessary during the construction phase. The most important aim of these plans is to define what must be done in emergencies. The accidents, natural disasters, mistakes within the project or sudden flows are defined as "emergencies". Apart from that, there will be some adjusting interventions on the issues such as vibration and noise. Emergency Intervention Plans will be prepared for the issues below.

- The equipment for the emergency intervention will be determined and kept in a separate place. These kinds of equipment will include picks and paddles, face masks, protecting glass, gloves, pipes, electrical motors that do not explode, etc.

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- The contribution of the heavy work machines to the emergency interventions will be determined and their parking spaces will be chosen accordingly.
 - Emergency Intervention Plans will include the lists of the emergency teams, the places of the safety vehicles, their escape routes and procedures.
 - Emergency Intervention Plans will be checked regularly and the periodical maintenance of the related equipment will be executed regularly. The personnel will also be trained about this issue.

VIII.2. On the condition that EIA Positive Document is given, The program for realizing the points in the second paragraph of the “The Obligations of the Directorships that have received a Competency Document” Regulation

According to the “Competency Announcement” published on the 24/02/2004 dated and 25383 numbered Official Newspaper, all of the directorships that have received this document are required to fill the EIA Report Follow Up Report and send this to the ministry. So, On the condition that EIA Positive Document is given for Kavsakbendi Dam, HPP and material quarries project, the final EIA report will be filled and sent to the ministry within the time allowed.

IX.2. PARTICIPATION OF THE PUBLIC

It was decided that the public disclosure meeting about the project to be conducted on 23.02.2007 in Adana. The meeting was held in Kozan district, Akdam Koyu, Hacı Kara Café. Advertisements shown in figure IX.1 showing the meeting date, time, place and the content were published in local and national newspapers (Zirve and Vatan newspapers). The meeting was made on 23.03.2007 at 14.00 with the coordination of Adana Governorship City Directorship of Environment and Forests and a wide participation was achieved (Figure IX.2)



Figure IX.1 The Newspaper Advertisements Given to Inform the Public About the Meetings



Figure IX.2 Scenes from the Meeting

X. RESULTS

- The purpose of Kavsakbendi Dam, HPP and Materials Quarries Project is to produce energy. It is located on the lower Seyhan reservoir, 8 km downstream from the connection point of Zamanti and Goksu rivers that are two main bodies of Seyhan River. Project Area is within the city center of Adana and in the boundaries of Aladag and Kozan districts. The project field is 7 km far from the center of Aladag and 27 km from the center of Kozan. The coordinates of Kavsakbendi dam axe are 4 160 250 K – 723 350 D. Kavsakbendi Dam is on 249,00 m talveg elevation located on Seyhan River and on the bottom parts of Somakli. On the dam axe Karasivri hill is on the left coast and Karasivri ridge is on the right coast.
- The installed power of Kavsakbendi Dam, HPP and Materials Quarries Project is 145,40 MW, its annual energy production is 650,78 GWh, its rantability is 2,28 and its internal profitability rate is %20,45. The lifespan of the project is assumed to be 50 years but if the electro-mechanical equipment is renewed and rehabilitation activities on hydrolic buildings are conducted in every 35 years, the lifespan of the project raises to 100 years. It is forecasted that the project will be completed in 4 years.
- The dam that will be constructed within the scope of the project as a facility without a warehouse will make only daily storage. The maximum area of the lake will be $2 \times 10^6 \text{ m}^2$. Therefore, some of the area near the river will be left under water. Within the scope of Kavsakbendi Dam, HPP and Materials Quarries Project, 200 m^2 of land of which some of it is agricultural will be left under the dam lake.
- In the project field, there are no areas related to tourism, natural and environmental activities (Appendix-C)
- Some of the excavation material coming out of the project facilities will be used in occasions that are suitable concerning the environmental effects and project economics. If there are any material left from the excavations, they will be stored in the appropriate places. This storage will be dismissed in line with the regulation of “ The control of Excavation Soil, Construction and Wreckage Wastes”. The herbal soil emerging during the excavations will be obscured and stored that way. The layer of the herbal soil will be utilized as surface cover in the landscape studies.
- In the downstream of the project field, yedigoze dam is planned to be built and following that there are Mentas, Çatalan and Seyhan dam lakes. The routes of the migrating fishes are cut because of these four dams. In all of these 4 dams,

there will be no fish gate; therefore, no fish gate will be built within the project scope.

- The transportation and storage of the explosive materials that will be used during the excavations are going to be done in line with the rules and regulations in practice and in a way that human health and environment will not be harmed. All of the precautions will be taken to prevent the out-of purpose use of these explosives. The storage will be done in locked places and all of the necessary activities for heating, cooling and fire extinguishing will be executed.
- During the construction activities of the project a significant of water will be needed for concrete building, dust control and for cleaning activities. Also, during the construction and operation of the dam, water is going to be required for the use of the personnel too. At this instance, water will be obtained from the nearest sources and living places. Moreover, the water required for concrete building, dust control and cleaning activities will be supplied from the surface water in the district.
- During the land preparation and construction, there will be considerable amount of dust due to certain activities that will take place in the excavation and digging studies. In these areas, the speed limit will be 30 km/h. Also, in the rainy days, it will be ensured that trucks do not carry the mud on their wheels to the main roads. By that way, the effect of the dust that emerges during the construction activities will stay on an acceptable level.
- On the condition that EIA makes an affirmative decision for the project. By following the legal procedure for the material quarries that will be opened within the scope of the project, in order to get licence allowance for group 1-a mines (sand-pebble), applications will be made to city administration, for group 2 mines (CaCO_3 - Limestone) to Mining Works General Directorate. After the licences are taken, the production is going to start.
- During the construction phase, the waste water will only have domestic character. They will be treated in package units treatment centers and after they acquire Class II water quality status, they will be decharged within the reservoir according to the relevant clauses of SKKY. The domestic waste water collected during the operation phase will be collected by foseptic tanks then pulled by the vacuum trunks and dismissed in the waste water treatment center of Kozan municipality according to the relevant clauses of the regulation (Appendix-C). The opening process of the foseptic tanks will be conducted in line with the relevant regulation (Official Gazette dated 13.03.1971 and numbered 13783).

- The activities concerning the solid waste emerging during the construction and operation will be dismissed in line with the regulation of “The control of solid wastes” (Official Gazette dated 14.03.1991 and numbered 20814).
- According to the map of Turkey earthquake regions, the project field is regarded as third degree earthquake region. In the implementation phase of the project, the regulation about constructing buildings in disaster regions that has been published by the Ministry of Public works and Settlement will be obeyed.
- During the functioning of the project, the regulation about the evaluation and management of environmental noise will be strictly obeyed (Official Gazette dated 11.12.1986 and numbered 19308).
- To make the material fields utilizable again, landscape studies and forestation activities will be held.
- To evaluate the effects of the investment on the environment, mathematical modeling studies are going to be executed. To keep safe, worst-case analyses will be made and at the end of all of these studies, potential effects will be determined and some precautions and measures are going to be established to lessen these effects.

General Evaluation

Kavsakbendi Dam, HPP and Materials Quarries Project will make many contributions to the electrical energy production of Turkey. This project will not create any additional load on the government spendings. Increase in the energy production, employment levels and recreation are among the potential benefits of this project.

Our country uses 35% of its hydroelectric energy production potential and in the developed countries this percentage is 80%. Because of that, we must improve the number of HPPs in our country. At this instance, the other alternatives to produce the energy that HPPs produce may pose some environmental risks. At the same time, in energy production, our dependence to the foreign nations will fall.

The project being successful environmentally and the environmental effects remaining on acceptable levels are dependent upon the implementation of the measures developed during the EIA process. These measures and arrangements could be realized without causing any changes in the expected energy production and income flows. So, an investment aiming energy production could turn into a project that includes multiple goals such as environment protection and recreation. Our country definitely needs these kinds of integrated development projects.

Kavsakbendi Dam, HPP and Materials Quarries Project will contribute to the national economy and energy markets. Also, as a result of its geographic location, transportation facilities and its proximity to the large ports, it will generate new energy opportunities in the region. With this project, the amount of green energy that our country produces will increase and there will also be opportunities for exporting to Europe as the European countries must consume at least 22% of their existing energy as green energy. Moreover, this project will enable the state resources to be utilized more effectively as it will be financed only by national capital. In return, the need for the foreign energy sources will decrease and some opportunities will emerge to benefit from our renewable energy resources.

The laws and regulations that will be obeyed within the scope of Kavsakbendi Dam, HPP and Materials Quarries Project are listed below :

- Number 1380 water products law and related regulations
- Number 2863 Cultural and Natural Resources Protection Law and related Regulations
- Number 2872 Environment Law and Related Regulations
- Number 4857 Business Law and Related Regulations
- Number 5187 Meadow Law and Related Regulations
- Number 6831 Forests Law
- The Regulation about the Holes that will be opened in the places that building mine drains is not possible
(Official Gazette dated 13.03.1971 and numbered 13783)
- The Regulation about the Protection of the Air Quality
(Official Gazette dated 02.11.1986 and numbered 19269)
- The Regulation about the Control of the Solid Wastes
(Official Gazette dated 14.03.1991 and numbered 20814)
- The Regulation about the Dangerous Chemicals
(Official Gazette dated 13.03.1971 and numbered 13783)
- Water Products regulation
(Official Gazette dated 10.03.1995 and numbered 22223)
- The Regulation about the Buildings that will be constructed in the Disaster Regions
(Official Gazette dated 02.09.1997 and numbered 23098)
- Environmental Audit Regulation
(Official Gazette dated 24.07.2002 and numbered 24825)
- Worker Health and Safety Regulation
(Official Gazette dated 09.12.2003 and numbered 25311)
- The Regulation about the Evaluation of Environmental Effects and Safety Regulation
(Official Gazette dated 16.12.2003 and numbered 25318)
- Health and Security on the Construction Businesses Regulation
(Official Gazette dated 23.12.2003 and numbered 25325)
- The Regulation about the Control of the Waste Lubricants
(Official Gazette dated 21.01.2004 and numbered 25353)
- The Regulation about the Control of the Excavation Soil, Construction and Wreckage Wastes
(Official Gazette dated 18.03.2004 and numbered 25406)
- The Regulation about the Worker Health and Security in Temporary Periods
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(Official Gazette dated 14.03.2005 and numbered 25755)
- The Regulation for the Protection and Usage of Agricultural Lands
(Official Gazette dated 25.03.2005 and numbered 25766)
- The Regulation for the Control of the Herbal Wastes
(Official Gazette dated 29.04.2005 and numbered 25791)
- The Regulation for the Control of the Soil Pollution
(Official Gazette dated 31.05.2005 and numbered 28831)
- The Regulation for the Evaluation and Management of the Environmental Noise
(Official Gazette dated 01.07.2005 and numbered 25862)
- The Regulation for the Control of the Medical Wastes
(Official Gazette dated 22.07.2005 and numbered 25883)
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APPENDICES

Appendix-A

The EIA Report Format

KAVŞAK BENDİ BARAJI, HES VE MALZEME OCAKLARI PROJESİ ÇED RAPORU FORMATI

Başlık Sayfası

Proje sahibinin adı, adresi, telefonu, faks nosu:
 Yeterlik Belgesi Nosu, tarihi,
 Raporu hazırlayan kuruluşun adı, adresi, telefonu, faks nosu:
 Projenin adı:
 Raporun hazırlanış tarihi:
 Proje için seçilen yerin adı, mevki, koordinatları:

İçindekiler Listesi**Bölüm I : Projenin Tanımı ve Amacı**

(Proje konusu faaliyetin tanımı, ömrü, hizmet amaçları, pazar veya hizmet alanları ve bu alan içerisinde ekonomik ve sosyal yönden ülke, bölge ve/veya il ölçeğinde önem ve gereklilikleri)

Bölüm II : Proje İçin Seçilen Yerin Konumu

II.1. Projenin yeri (İlgili Valilik veya Belediye tarafından doğruluğu onanmış olan proje yerinin, lejant ve plan notlarının da yer aldığı Onanlı Çevre Düzeni Planı ve İmar Planları üzerinde, bu planlar yoksa mevcut arazi kullanım haritası üzerinde gösterimi),

II.2. Proje kapsamındaki ünitelerin konumu (Baraj gövde ve savak tesisleri (dolu savak-dipsavak), iletim kanalları, hidroelektrik santral ünitesi ile ilgili bina ve tesisler, teknik altyapı üniteleri, idari ve sosyal üniteler, varsa diğer üniteler, bunlar için belirlenen kapalı ve açık alan büyüklükleri, bu ünitelerin proje alanı içindeki konumlarının vaziyet planı veya kroki üzerinde gösterimi, diğer tekniklerle temsili resim veya maket benzeri gösterimler, proje kapsamında yer alan geçici ve nihai depolama alanlarının, inşa edilecek baraj sahası içinde gerçekleştirilecek olan inşaat alanının ve Maden Kanunu'na göre açılacak olan taş, kum, çakıl vb.ocak alanlarının 1/25000, 1/5000 ve/veya 1/1000'lik haritalar üzerinde gösterimi),

Bölüm III : Projenin Ekonomik ve Sosyal Boyutları

III.1. Projenin gerçekleşmesi ile ilgili yatırım programı ve finans kaynakları,

III.2. Projenin gerçekleşmesi ile ilgili iş akım şeması veya zamanlama tablosu,

III.3. Projenin fayda-maliyet analizi,

III.4. Proje kapsamında olmayan ancak projenin gerçekleşmesine bağlı olarak, proje sahibi veya diğer yatırımcılar tarafından gerçekleştirilmesi tasarlanan diğer ekonomik, sosyal ve altyapı projeleri,

III.5. Proje kapsamında olmayan ancak projenin gerçekleşebilmesi için zaruri olan ve proje sahibi veya diğer yatırımcılar tarafından gerçekleştirilmesi planlanan diğer ekonomik, sosyal ve altyapı projeleri,

III.6. Kamulaştırma ve/veya yeniden yerleşimin nasıl yapılacağı,

III.7. Diğer hususlar.

Bölüm IV :Proje Kapsamında Yer Alan Regülatör, HES ve Malzeme Ocakları Projelerinden Etkilenecek Alanın Belirlenmesi ve Bu Alan İçindeki Mevcut Çevresel Özelliklerin Açıklanması (*)

IV.1. Projeden etkilenecek alanın belirlenmesi, (etki alanının nasıl ve neye göre belirlendiği açıklanacak ve etki alanı harita üzerinde gösterilecek)

IV.2. Etki Alanı İçerisindeki Fiziksel ve biyolojik çevrenin özellikleri ve doğal kaynakların kullanımı,

IV.2.1. Meteorolojik ve iklimsel özellikler,

IV.2.2. Jeolojik özellikler (proje alanı ile malzeme ocaklarının jeolojik yapısının fiziko-kimyasal özellikleri, tektonik hareketler, mineral kaynaklar, heyelan, benzersiz oluşumlar, çığ, sel, kaya düşmesi başlıkları altında incelenmesi, 1/100000, 1/25000 ve/veya 1/5000'lik jeolojik harita ve lejanti),

IV.2.3. Yeraltı ve termal su kaynaklarının hidrojeolojik özellikleri (su seviyeleri, miktarları, emniyetli çekim değerleri, kaynakların debileri, mevcut ve planlanan kullanımı),

IV.2.4. Yüzeysel su kaynaklarının hidrolojik ve ekolojik özellikleri,

IV.2.5. Yüzeysel su kaynaklarının mevcut ve planlanan kullanımı (içme, kullanma, sulama suyu, su ürünleri istihsalı, ulaşım, turizm, elektrik üretimi, diğer kullanımlar),

IV.2.6. Toprak özellikleri ve kullanım durumu (toprağın fiziksel-kimyasal ve biyolojik özellikleri, arazi kullanım kabiliyeti sınıflaması, erozyon, toprağın mevcut kullanımı),

(*) Bu bölümde proje için seçilen yerin çevresel özellikleri verilirken etki alanı dikkate alınmalıdır. Bu bölümde sıralanan hususlar itibarı ile açıklanırken, ilgili kamu kurum ve kuruluşlarından, araştırma kurumlarından, üniversitelerden veya benzeri diğer kurumlardan temin edilen bilgilerin hangi kurumdan ve kaynaktan alındığı raporun notlar bölümünde belirtilir veya ilgili harita, doküman vb. belgeye işlenir. Proje sahibince kendi araştırmalarına dayalı bilgiler verilmek istenirse, bunlardan kamu kurum ve kuruluşların yetkileri altında olanlar için ilgili kurum ve kuruluşlardan bu bilgilerin doğruluğunu belirten birer belge alınarak rapora eklenir.

IV.2.7. Tarım alanları (tarımsal gelişim proje alanları, özel mahsul plantasyon alanları) sulu ve kuru tarım arazilerinin büyüklüğü, ürün desenleri ve bunların yıllık üretim miktarları,

IV.2.8. Orman Alanları (ağaç türleri ve miktarları, kapladığı alan büyüklükleri ve kapalılığı bunların mevcut ve planlanan koruma ve/veya kullanım amaçları),

IV.2.9. Koruma alanları (Milli Parklar, Tabiat Parkları, Sulak Alanlar, Tabiat Anıtları, Tabiatı Koruma Alanları, Yaban Hayatı Koruma Alanları, Biyogenetik Rezerv Alanları, Biyosfer Rezervleri, Doğal Sit ve Anıtlar, Tarihi, Kültürel Sitler, Özel Çevre Koruma Bölgeleri, Özel Çevre Koruma Alanları, Turizm Alan ve Merkezleri, Mera Kanunu kapsamındaki alanlar),

IV.2.10. İç sulardaki (göl, akarsu) canlı türleri (bu türlerin tabii karakterleri, ulusal ve uluslararası mevzuatla koruma altına alınan türler; bunların üreme, beslenme, sığınma ve yaşama ortamları; bu ortamlar için belirlenen koruma kararları, orman inceleme değerlendirme formu),

IV.2.11. Flora ve Fauna (türler, endemik özelliklerle lokal endemik bitki türleri, alanda doğal olarak yaşayan hayvan türleri, ulusal ve uluslararası mevzuatla koruma altına alınan türler, nadir ve nesli tehlikeye düşmüş türler ve bunların alandaki bulunış yerleri, av hayvanlarının adları, popülasyonları ve bunlar için alınan Merkez Av Komisyonu Kararları) proje alanındaki vejetasyon tiplerinin bir harita üzerinde gösterilmesi. Projeden ve çalışmalardan etkilenecek canlılar için alınması gereken koruma önlemleri (inşaat ve işletme aşamasında). Arazide yapılacak flora çalışmalarının vejetasyon döneminde gerçekleştirilmesi ve bu dönemin belirtilmesi,

IV.2.12. Madenler ve Fosil Yakıt Kaynakları (rezerv miktarları, mevcut ve planlanan işletilme durumları, yıllık üretimleri ve bunun ülke veya yerel kullanımlar için önemi ve ekonomik değerleri),

IV.2.13. Hayvancılık (türleri, beslenme alanları, yıllık üretim miktarları, bu ürünlerin ülke ekonomisindeki yeri ve değeri),

IV.2.14. Devletin yetkili organlarının hüküm ve tasarrufu altında bulunan araziler (Askeri Yasak Bölgeler, kamu kurum ve kuruluşlarına belirli amaçlarla tahsis edilmiş alanlar, vb.),

IV.2.15. Proje yeri ve etki alanının hava, su, toprak ve gürültü açısından mevcut kirlilik yükünün belirlenmesi,

IV.2.16. Diğer özellikler.

IV.3. Sosyo - Ekonomik Çevrenin Özellikleri

IV.3.1. Ekonomik özellikler (yörenin ekonomik yapısını oluşturan başlıca sektörler, yöresel işgücünün bu sektörlerde dağılımı, sektörlerdeki mal ve hizmet üretiminin yöre ve ülke ekonomisi içindeki yeri ve önemi, diğer bilgiler),

IV.3.2. Nüfus (yöredeki kentsel ve kırsal nüfus, nüfus hareketleri; göçler, nüfus artış oranları, ortalama hane halkı nüfusu, diğer bilgiler),

IV.3.3. Gelir (yöredeki gelirin işkollarına dağılımı, işkolları itibarıyla kişi başına düşen maksimum, minimum ve ortalama gelir),

IV.3.4. İşsizlik (yöredeki işsiz nüfus ve faal nüfusa oranı),

IV.3.5. Yöredeki sosyal altyapı hizmetleri (eğitim, sağlık, kültür hizmetleri ve bu hizmetlerden yararlanılma durumu),

IV.3.6. Kentsel ve kırsal arazi kullanımları (yerleşme alanlarının dağılımı, mevcut ve planlanan kullanım alanları, bu kapsamda sanayi bölgeleri, konutlar, turizm alanları vb.),

IV.3.7. Diğer özellikler.

Bölüm V: Projenin Bölüm IV'de Tanımlanan Alan Üzerindeki Etkileri Ve Alınacak Önlemler :

(Bu bölümde; projenin fiziksel ve biyolojik çevre üzerine etkileri, bu etkileri önlemek, en aza indirmek ve iyileştirmek için alınacak yasal, idari ve teknik önlemler V.1 ve V.2 başlıkları için ayrı ayrı ve ayrıntılı bir şekilde açıklanır).

V.1. Arazinin hazırlanması, inşaat ve tesis aşamasındaki projeler, fiziksel ve biyolojik çevre üzerine etkileri ve alınacak önlemler (*Regülatör, HES, malzeme ocakları dahil*),

V.1.1. Arazinin hazırlanması için yapılacak işler kapsamında nerelerde ve ne kadar alanda hafriyat yapılacağı, hafriyat miktarı, hafriyat artığı toprak, taş, kum vb. maddelerin nerelere taşınacakları, nerelerde depolanacakları veya hangi amaçlar için kullanılacakları, hafriyat sırasında kullanılacak malzemeler,

V.1.2. Arazinin hazırlanması sırasında ve ayrıca ünitelerin inşaatında kullanılacak maddelerden parlayıcı, patlayıcı, tehlikeli, toksik ve kimyasal olanların taşınımları, depolanmaları ve kullanımları, bu işler için kullanılacak aletler ve makineler,

V.1.3. Taşkın önleme ve drenaj işlemleri,

V.1.4. Proje alanı içindeki su ortamlarında herhangi bir amaçla gerçekleştirilecek kazı, dip taraması vb. işlemler nedeni ile çıkarılacak taş, kum, çakıl ve benzeri maddelerin miktarları, nerelere taşınacakları veya hangi amaçlar için kullanılacakları,

V.1.5. Baraj yapımı dolayısıyla açılacak olan taşocağı, kum ocağı, kil ocağı gibi malzeme ocaklarının sayısı, ocakların alan büyüklükleri, işletme alan büyüklükleri ve koordinatları, yıllara bağlı planlanan üretim miktarları, uygulanacak üretim yöntemleri, basamak yüksekliği, genişliği, şev açısı, basamak sayısı, ocakların başlangıç ve nihai durumlarının imalat haritaları üzerinde gösterimi,

V.1.6. Malzeme ocaklarında patlatma işleminin ne şekilde yapılacağına açıklanması, patlatma paterni, bir atımda kullanılacak patlayıcı madde miktarı, taşınımları, depolanmaları ve kullanımları, hava şoku ve kaya fırlamaları hesaplarını yapılarak etkilerinin değerlendirilmesi,

- V.1.7. Malzeme ocaklarında üretim miktarlarının çalışma süreleri (gün-ay-yıl), nakliye güzergahları, ulaşım altyapısı planı, altyapının inşaatı ile ilgili işlemler, kullanılacak makine ekipmanları,
- V.1.8. İnşaat esnasında kırma, öğütme, taşıma ve depolama gibi toz yayıcı işlemler, kümülatif değerler,
- V.1.9. Zemin emniyeti ve su kaçağı olmaması için yapılacak işlemler,
- V.1.10. Arazinin hazırlanması ve inşaat alanı için gerekli arazinin temini amacıyla kesilecek ağaçların tür ve sayıları, kesilecek ağaçların bölgedeki orman ekosistemi üzerine etkileri, ortadan kaldırılacak tabii bitki türleri ve ne kadar alanda bu işlerin yapılacağı, fauna üzerine olabilecek etkiler,
- V.1.11. Arazinin hazırlanması, inşaat alanı için gerekli arazinin temini amacıyla elden çıkarılacak tarım alanlarının büyüklüğü, bunların arazi kullanım kabiliyetleri ve tarım ürün türleri,
- V.1.12. Arazinin hazırlanmasından başlayarak ünitelerin açılmasına kadar yapılacak işlerde kullanılacak yakıtların türleri, özellikleri, oluşacak emisyonlar,
- V.1.13. Proje kapsamında kullanılacak suyun temin edileceği kaynaklardan alınacak su miktarları, su temini sistemi, ve bu suların kullanım amaçlarına göre miktarları, oluşacak atık suların cins ve miktarları, deşarj edileceği ortamlar,
- V.1.14. Arazinin hazırlanmasından başlayarak ünitelerin açılmasına dek meydana gelecek katı atık miktarı, ne şekilde bertaraf edileceği,
- V.1.15. Arazinin hazırlanmasından başlayarak ünitelerin açılmasına dek yapılacak işler nedeni ile meydana gelecek vibrasyon, gürültünün kaynakları ve seviyesi, kümülatif değerler, malzeme ocakları için Çevresel Gürültü'nün Değerlendirilmesi ve Yönetimi Yönetmeliği'ne göre akustik raporun hazırlanması,
- V.1.16. Arazinin hazırlanmasından başlayarak ünitelerin açılmasına dek yerine getirilecek işlerde çalışacak personelin ve bu personele bağlı nüfusun konut ve diğer teknik/sosyal altyapı ihtiyaçlarının nerelerde ve nasıl temin edileceği,
- V.1.17. Arazinin hazırlanmasından başlayarak ünitelerin açılmasına dek sürdürülecek işlerden, insan sağlığı ve çevre için riskli ve tehlikeli olanlar,
- V.1.18. Proje alanında, peyzaj öğeleri yaratmak veya diğer amaçlarla yapılacak saha düzenlemelerinin (ağaçlandırmalar ve/veya yeşil alan düzenlemeleri vb.) ne kadar alanda, nasıl yapılacağı, bunun için seçilecek bitki ve ağaç türleri,
- V.1.19. Proje alanı ve malzeme ocakları dahil olmak üzere yeraltı ve yerüstünde bulunan kültür ve tabiat varlıklarına (geleneksel kentsel dokuya, arkeolojik kalıntılara, korunması gerekli doğal değerlere) olabilecek etkilerin belirlenmesi,
- V.1.20. Diğer özellikler.

- V.2. Projenin işletme aşamasındaki projeler, fiziksel ve biyolojik çevre üzerine etkileri ve alınacak önlemler,
- V.2.1. Proje kapsamındaki tüm ünitelerin özellikleri, hangi faaliyetlerin hangi ünitelerde gerçekleştirileceği, kapasiteleri, ünitelerde üretilen mal ve/veya hizmetler, nihai ve yan ürünlerin üretim miktarları,
- V.2.2. Su tutulması sonucu su kalitesine ve su ortamındaki canlılara olabilecek etkiler, dere yatağına bırakılacak su miktarı ve nasıl hesaplandığı,
- V.2.3. Ulusal ve uluslararası mevzuatla korunması gereken alanlar üzerine etkiler,
- V.2.4. Suyun temin edileceği kaynağın kullanılması sonucu mansapta olabilecek değişimler (erozyon, nehir hidrolojisi, sucul hayat, sediment gelişi vb.),
- V.2.5. Kaynağa ait varsa diğer kullanım şekilleri ve etkileri,
- V.2.6. Yeraltı ve yüzeysel su kaynaklarına olabilecek etkiler,
- V.2.7. Projenin işletilmesi sırasında çalışacak personelin ve bu personele bağlı nüfusun konut ve diğer sosyal/teknik altyapı ihtiyaçlarının nerelerde, nasıl temin edileceği,
- V.2.8. İdari ve sosyal ünitelerde içme ve kullanma amaçlı suların kullanımı sonrasında oluşacak atık suların arıtılması için uygulanacak arıtma tesisi karakteristiği prosesinin detaylandırılması ve arıtılan atık suların hangi alıcı ortamlara, ne miktarlarda, nasıl verileceği,
- V.2.9. Konut, sosyal ve idari tesislerden oluşacak katı atık miktar ve özellikleri, bu atıkların nerelere ve nasıl taşınacakları veya hangi amaçlar için ve ne şekilde değerlendirileceği,
- V.2.10. Proje ünitelerinin işletilmesi sırasında oluşacak gürültünün kaynakları ve kontrolü için alınacak önlemler, Çevresel Gürültü'nün Değerlendirilmesi ve Yönetimi Yönetmeliği'ne göre akustik raporun hazırlanması, (her bir tesis için ayrı ayrı hazırlanacak)
- V.2.11. Orman alanlarına olabilecek etki ve bu etkilere karşı alınacak tedbirlerin tanımlanması,
- V.2.12. Diğer özellikler.

V.3. Projenin Sosyo-Ekonomik Çevre Üzerine Etkileri

- V.3.1. Proje ile gerçekleşmesi beklenen gelir artışları; yaratılacak istihdam imkanları, nüfus hareketleri, göçler, eğitim, sağlık, kültür, diğer sosyal ve teknik altyapı hizmetleri ve bu hizmetlerden yararlanılma durumlarında değişiklikler vb.,
- V.3.2. Çevresel fayda-maliyet analizi.

Bölüm VI : İşletme Proje Kapandıktan Sonra Olabilecek Ve Süren Etkiler Ve Bu Etkilere Karşı Alınacak Önlemler

- VI.1. Arazi ıslahı,
- VI.2. Proje alanı ve Malzeme ocaklarında yapılacak arazi ıslahı ve reklamasyon çalışmaları,
- VI.3. Mevcut su kaynaklarına etkiler,

Bölüm VII : Projenin Alternatifleri

(Bu bölümde yer seçimi, teknoloji, alınacak önlemler, alternatiflerin karşılaştırılması ve tercih sıralaması belirtilecektir.)

Bölüm VIII : İzleme Programı

VIII.1. Faaliyetin inşaatı için önerilen izleme programı, faaliyetin işletmesi ve işletme sonrası için önerilen izleme programı ve acil müdahale planı,

VIII.2. ÇED Olumlu Belgesinin verilmesi durumunda, Yeterlik Tebliği'nde "Yeterlik Belgesi alan kurum/kuruluşların yükümlülükleri" başlığının ikinci paragrafında yer alan hususların gerçekleştirilmesi ile ilgili program.

Bölüm IX: Halkın Katılımı

(Projenin etkilenmesi muhtemel yöre halkının nasıl ve hangi yöntemlerle bilgilendirildiği, proje ile ilgili halkın görüşlerinin ve konu ile ilgili açıklamaların ÇED Raporuna yansıtılması)

Bölüm VIII : Sonuçlar

(Yapılan tüm açıklamaların özeti, projenin önemli çevresel etkilerinin sıralandığı ve projenin gerçekleşmesi halinde olumsuz çevresel etkilerin önlenmesinde ne ölçüde başarı sağlanabileceğinin belirtildiği genel bir değerlendirme, proje kapsamında alternatifler arası seçimler ve bu seçimlerin nedenleri)

Ekler :

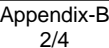
(Raporun hazırlanmasında kullanılan ve çeşitli kuruluşlardan sağlanan bilgi, belge ve tekniklerden rapor metninde sunulamayanlar,)

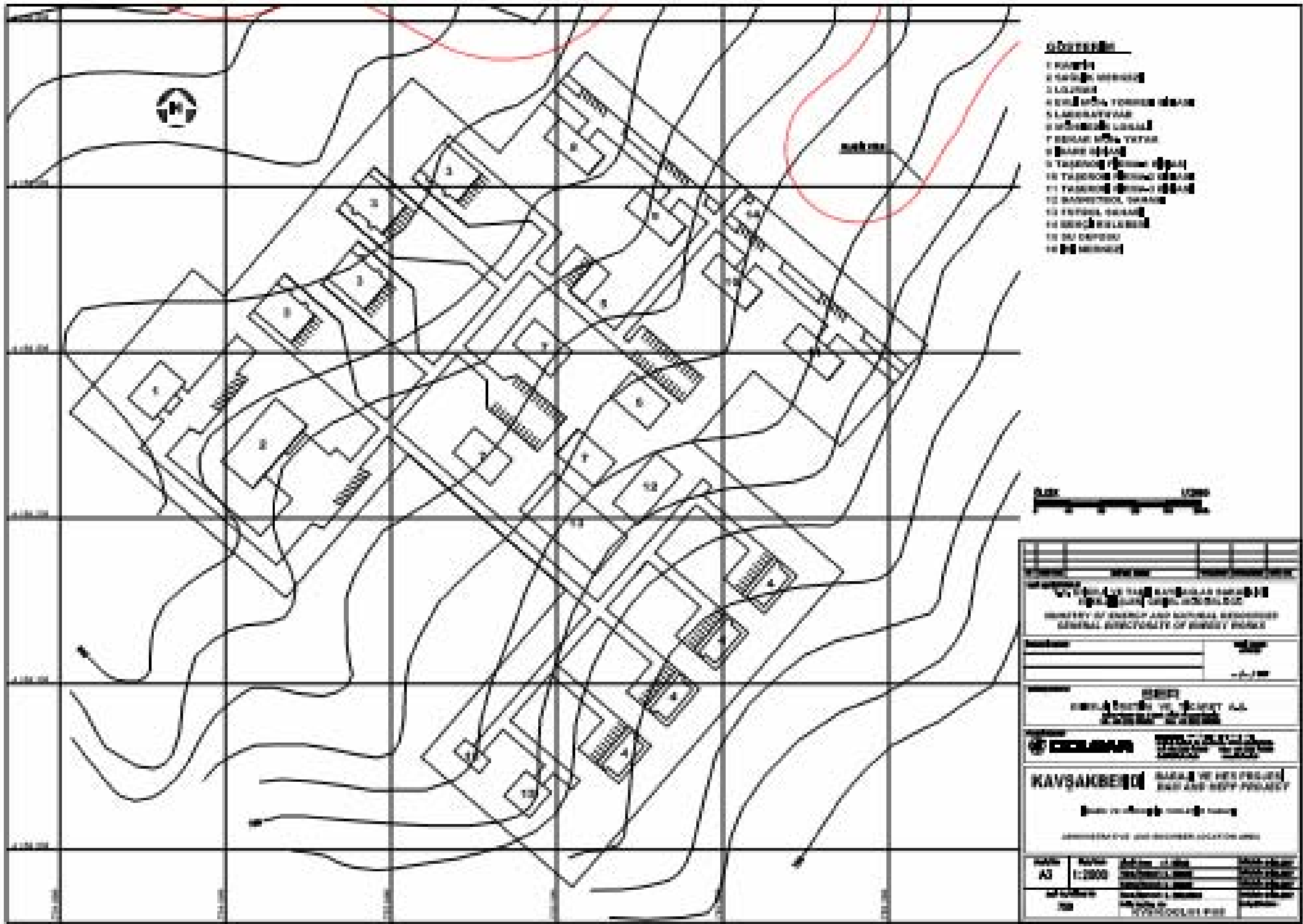
Notlar ve Kaynaklar :

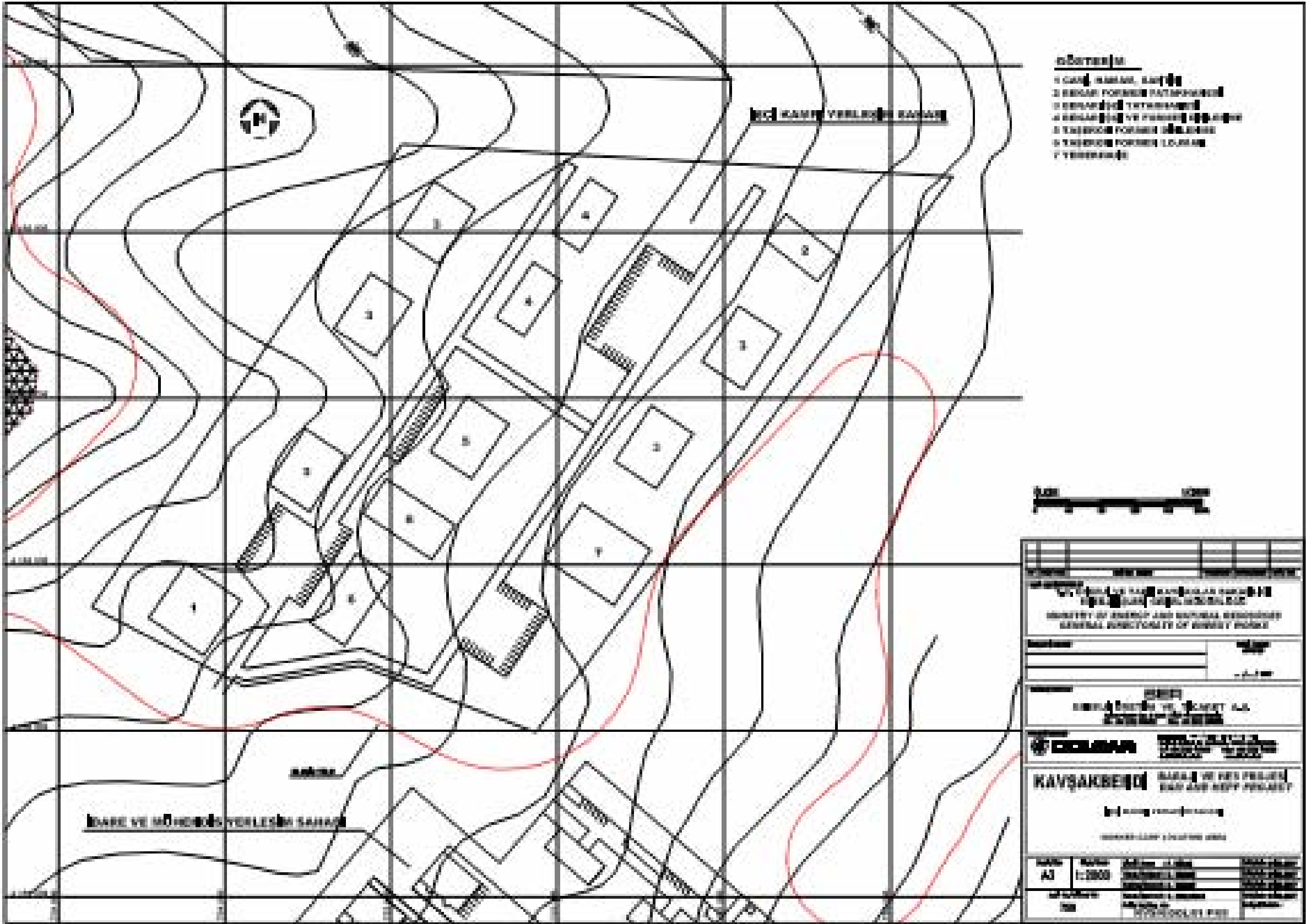
ÇED Raporunu hazırlayanların tanıtımı (Adı Soyadı, Mesleği, 1 kişi için 1 sayfayı geçmeyecek şekilde hazırlanmış kısa özgeçmiş, Referansları ve Rapordan sorumlu olduğunu belirten imzası)

Appendix-B

General Layout







Appendix-C

Official Letters

ÇEVRE VE ORMAN BAKANLIĞI
Orman Genel Müdürlüğü Adana Orman Bölge Müdürlüğü

Kısım: KD

10.08.2007

Sayı : B.18.1.OGM.1.01.00.03.240-1745-9908
Konu :ÇED Formu (Kavsakbendi Barajı.)

DOKAY-ÇED
Çevre Mühendisliği Ltd.Şti.
(Öveçler 4. Cad.No:140/A)
06460-Dikmen-ANKARA

İLGİ: 18.06.2007 gün ve DKÇ.-07/081 sayılı yazınız.

İlgi sayılı yazınız ile talep edilen, Ser Enerji Üretim A.Ş. tarafından yapımı planlanan, Kavsakbendi Barajı ve Hidroelektrik Santrali'nin yapımına ait olarak ÇED İnceleme ve Değerlendirme Formu Kozan ve Pos Orman İşletme Müdürlüğümüzce ortak olarak tanzim edilmiş olup, 08.08.2007 tasdik tarihli ÇED İnceleme ve Değerlendirme Formu yazınız ekinde gönderilmiştir.

Gereğini bilgilerinize rica ederim.


Cumali AKIN
Bölge Müdür Yrd.

Eki:1 ÇED Formu (2 sayfa)

Z.US 10.08.2007
A.SEVGİ Şub.Müd.

Orman Bölge Müdürlüğü Kadastro ve Mülkiyet Şube Müdürlüğü
Adres : Reşatbey Mahallesi Fuzuli Cad.No:19 01120 Seyhan/ADANA
Tel : (0322) 457 06 36 PBX Fax: (322) 453 49 66
e-posta:kdm@ogm-adanaobm.gov.tr web:www.cgm-adanaobm.gov.tr

ÇED
İNCELEME VE DEĞERLENDİRME FORMU

İLİ : ADANA
İLÇESİ : KOZAN, ALADAĞ
KÖYÜ : ENİŞÇAKIRI-ERGENUŞAK
MEVKİİ : ENİŞÇAKIRI-ERGENUŞAK

ORMAN BÖLGE MÜDÜRLÜĞÜ : ADANA
ORMAN İŞLETME MÜDÜRLÜĞÜ: KOZAN, POS
ORMAN İŞLETME ŞEFLİĞİ : AKDAM-MEYDAN-SÖĞÜT

1-Müracaat Sahibinin
Adı Soyadı : SER ENERJİ ÜRETİM VE TİCARET A.Ş.
Adresi : Sabancı Center Kule 2 kat:1 34330 4. Levent İstanbul

2-Tesisin Cinsi : Baraj ve HES Yapımı

3-Seri Adı : AKDAM-MEYDAN-SÖĞÜT

4-Bölme Numaraları :

Akdam İşletme Şefliği Sınırlarında Kalan : 301,302,304,349,350,88,100,111,125,126,138-142,144,145,160,161,163,164,158,159,181-183, 235,204,236,232-234,262-266,237-238,296-297

Meydan İşletme Şefliği Sınırlarında Kalan : 232,233,236-240

Söğüt İşletme Şefliği Sınırlarında Kalan : 134,148,150,156-158,161-166,173,175-178,180-189,191,193

5-Meşçerenin
a) İşletme Şekli : Kızılçam, Doğayı Koruma, Toprak koruma
b) Ağaç Cinsi : Çz
c) Meşçere Tipleri : Çzd2, Çzd2 Bçz, Çzd1, Çzd1, Çzd2, Çzd3

6-1/25.000 Ölçekli meşçere haritası üzerinde ÇED raporuna konu sahanın sınır noktasının koordinatları : Ektedir. Ayrıca izin talep edilmesi durumunda kesin koordinatlar istenecektir.

7-Orman Tahdit ve Kadastro Durumu :Yapılmıştır.

Tesis Sahasının Genel Alanı :1683,35 Ha

a)Orman Sayılan Alan : Meydan(123,0) Ha,Söğüt (415,0)Ha. Akdam(726,0)Ha. Toplam(1264,0)Ha.

b)Orman Sayılmayan Alan : Meydan (16,0) Ha,Söğüt (131,5) Ha. Akdam(271,5) Ha. Toplam(419,0)Ha.

8-İzin İstenen Sahanın Alanı :1264,0Ha.

Talebin Amacı :Baraj ve HES Yapımı

10-Talep Sahasında Başka Bir Müracaatın Yapılıp Yapılmadığı: Yapılmamıştır.

11-Talep sahası yerin 6831 sy Orman Kanununun 18. maddesindeki yangın görmüş ormanlarla gençleştirmeye ayrılmış ve ağaçlandırılan sahalarla baraj havzasında kalıp kalmadığı: Kalmamaktadır.

12-Talep Sahasının Tohum Meşçeresi, Milli Park,Muhafaza Ormanı,Turizm Alanı,Av-Yaban Hayatı ,Av Üreme sahası, Askeri Yasak Bölge Özel Çevre Koruma Bölgesi olup olmadığı: Kalmamaktadır.



13- Ormancılık Çalışmaları ve Orman - Halk Münasebetleri Bakımından Sakınca Bulunup Bulunmadığı: Sakıncası yoktur.

14-Orman Yangınları açısından hassasiyet derecesi ve alınması gerekli tedbirler neler olmalıdır: 1.dereceden yangına hassas bölge olup, izin talep edilmesi durumunda gerekli bütün tedbirler alınacaktır.

15-Orman envallerinin nasıl değerlendirileceği: Mevzuat hükümlerine göre değerlendirilecektir.

16-Toprak Muhafaza Karakteri taşıyan yerlerden olup olmadığı:kalmamaktadır.

17-Talep sahasının daha önce başka bir kişi kurum ve kuruluşa tahsisinin olup olmadığı: Yapılmamıştır.

Yukarıdaki özellikleri belirtilen ve belgeleri ek te sunulan 1264,0 hektarlık saha üzerinde Baraj ve HES yapılmasında 6831 Sayılı Orman Kanunu'nun 17. maddesine göre İdarelerimizden izin alınması ve kullanılacak malzeme için 5177 sayılı yasaya göre Hammedde Üretim İzin Belgesi alınması koşuluyla sakınca olmadığı kanaatıyla bu rapor tarafımızdan düzenlenmiştir 22/07/2007

Erol BİLMEZ
Kazan İşletme Müdür Yard.

Zafer KIZIL
Meydan İşletme Şefi

İbrahim DENİZ
Akdam İşletme Şefi

Emine TÜRKMEÑOĞLU
Sığirci İşletme Şefi

UYGUNDUR
22.7.2007
Mehmet SAĞLAM
İşletme Müdürü

uygundur.
08.08.2007
ADIL SEVGİ
Kadastro Mülkiyet
Şube Müdürü

08.08.2007
TASDİK ÖLÇÜMÜR
Bölge Müdürü

SEYİTİDİN YILMAZ
Orman Bölge Müdürü

KAVŞAKBENDİ BARAJI VE HİDROELEKTRİK SANTRALİ SINIRLARINI GÖSTERİR KORDİNATLARDIR.

Nokta No	Y	X
A1	727124.244	4167992.004
A2	727565.858	4168207.425
A3	728570.550	4165337.071
A4	729945.997	4165351.469
A5	730535.272	4166203.355
A6	730458.410	4167759.809
A7	731111.736	4168182.549
A8	731297.486	4167945.558
A9	730701.806	4167618.895
A10	730663.375	4167279.422
A11	730945.202	4166805.440
A12	730407.169	4165159.314
A13	728985.224	4164749.384
A14	728299.872	4165242.581
A15	725806.360	4163377.405
A16	724337.565	4162922.079
A17	724340.171	4161884.972
A18	725701.603	4161888.393
A19	725440.442	4159868.750
A20	723833.341	4160208.825
A21	723372.281	4158260.894
A22	724888.373	4157852.500
A23	724661.861	4157112.435
A24	722257.555	4157447.014
A25	721651.647	4160436.116
A26	722927.297	4160535.817
A27	723910.480	4161883.892
A28	723896.699	4163259.287
A29	725940.611	4163945.891
A30	727213.308	4165008.715
A31	728118.480	4165459.734

A ALANI = 15635096.68 m2

Nokta No	Y	X
B1	728501.253	4156451.338
B2	728675.591	4155917.494
B3	728658.720	4155557.852
B4	728113.209	4154849.807
B5	727410.230	4155029.628
B6	727770.155	4155984.927

B ALANI = 1198385.69 m2

Erol BİLMEZ
Közan İşletme Müdür Yard.

Zafer KIZIL
Meydan İşletme Şefi

İbrahim DENİZ
Akdam İşletme Şefi

Emine TÜRKMENOĞLU
Sagun İşletme Şefi

T.C.
ADANA VALİLİĞİ
İl Tarım Müdürlüğü

Sayı : B.12.4.İLM.0.01.00.01-TAD/1351
Konu:Kavşakbendi Barajı ve HES Projesi.

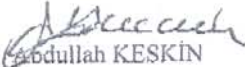
03/04/2007

Dokay Mühendislik ve Danışmanlık Ltd.Şti.
Öveçler 4.Cadde 140/A 06460 Dikmen / ANKARA

İLGİ: 13.03.2007 tarih ve DKÇ-07/37 sayılı yazınız.

İlgi yazıda; Adana İli Kozan ve Aladağ İlçe sınırları içerisinde Seyhan Nehri'nin iki ana kolu olan Zamanlı ve Göksu Nehirlerinin birleşim yerinin 8km mansabında Ser Enerji Üretim ve Ticaret A.Ş tarafından kurulması planlanan "Kavşakbendi Barajı ve HES Projesi." ile ilgili olarak, 5403 sayılı Toprak Koruma ve Arazi Kullanımı Kanunu ve ilgili diğer mevzuatları çerçevesinde değerlendirilebilmesi için firmanızın Müdürlüğümüz ile irtibata geçmesi gerekmektedir.

Bakanlığımız 30.01.2007 tarih ve 01379 sayılı yazılarında etüt ücreti olarak; özel araçla gidilecekse 450YTL, İl Müdürlüğümüz resmi aracı ile gidilecekse 550YTL'nin yatırılması gerektiği belirtilmiştir. Bu nedenle, Adana İl Tarım Müdürlüğü'nün Döner Sermaye hesabı olan Ziraat Bankası Adana Merkez Şubesi nezdinde ki 304230-36777942-5001 sayılı hesabına yatırılarak dekontun faks ile gönderilmesini rica ederim.


Abdullah KESKİN
İl Müdürü

Eski Vilayet Karşısı 01330 Seyhan/ADANA
Telefon: 0322 359 46 40

Ayrıntılı Bilgi İçin İrtibat: Müh: Z.SEYRAN Müh: E.YÜCEL
Müh: E.GÜVERCİN Müh: Y.S.GÜNER

T.C.
ADANA VALİLİĞİ
İl Tarım Müdürlüğü

Sayı : B.12.4.İLM.0.01.00.01-TAD/3208-**3362**
Konu:Kavsakbendi Barajı ve HES Projesi.

13/07/2007

Dokay Mühendislik ve Danışmanlık Ltd.Şti.
Öveçler 4.Cadde 140/A 06460 Dikmen / ANKARA

İLGİ: 18.06.2007 tarih ve DKÇ-07/082 sayılı yazımız.

İlgi yazımız ilç Adana İli Kozan ve Aladağ İlçeleri sınırları içerisinde Seyhan Nehri üzerinde Ser Enerji Üretim ve Ticaret A.Ş tarafından yapımı planlanan "Kavşak Bendi Barajı, HES ve Malzeme Ocakları" projesi kapsamında daha önce izin verilen alanlara ek olarak 1/25000 ölçekli haritada etrafı siyah renkle işaretli alanlar (baraj gölü, şantiye, tesisleri ve kullanım alanları) ile ilgili Müdürlüğümüz görüşü sorulmaktadır.

Söz konusu projenin yapılacağı sahanın 5403 sayılı Toprak Koruma ve Arazi Kullanımı Kanunu ve ilgili diğer kanun ve mevzuatları çerçevesinde incelenmesi ve değerlendirilmesi neticesinde yazımız ekinde gönderilen 1/35000 ölçekli haritada sarı renkle işaretli 235,6 ha' lık alan Kuru Marjinal Tarım arazisi(KTA) geriye kalan araziler ise orman(O) ve doğal arazi (T) tipleri olduğu tespit edilmiştir. 1380 sayılı Su Ürünleri Kanununun 22. maddesinde nehir yatağından suyun borulara ya da kanala alınması ve regülatörlerin kurulması durumunda su ürünlerinin geçmesine mahsus balık geçidi veya asansörlerin yapılması ve bunların devamlı olarak işler durumda bulundurulması hükmü yer aldığından, balık geçidi ve asansörlerin yapılması gerekmektedir.

Yukarıda belirtilen hususlara uyulması durumunda "Kavşak Bendi Barajı, HES ve Malzeme Ocakları Projesi" kapsamında ek olarak talep edilen arazinin Kanunun 13. maddesinin 2. fıkrasına göre tarım dışı amaçla kullanılması **uygun görülmüştür.**

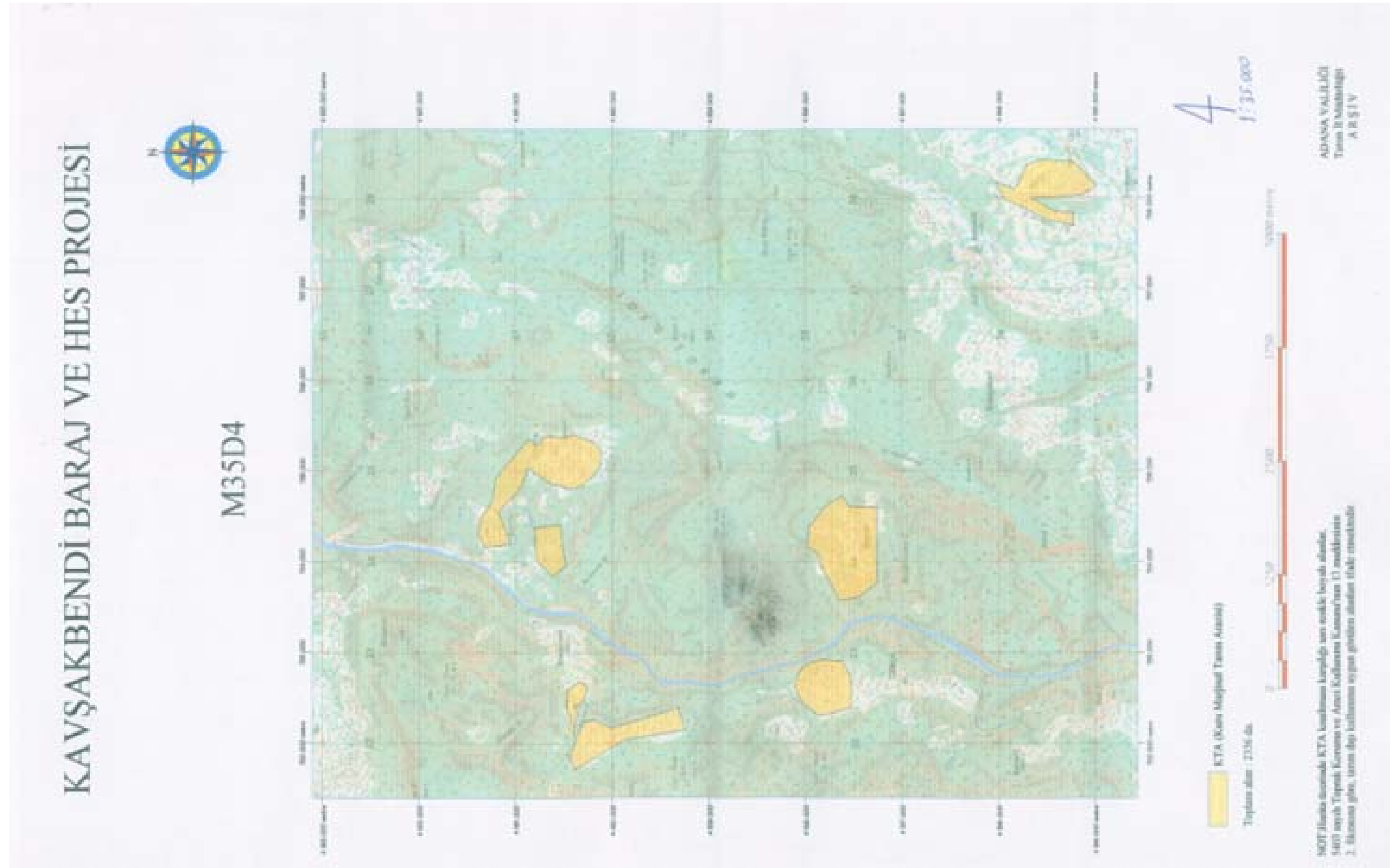
Bilgi ve gereğini rica ederim.


Filiz DENİZ

Vali a.

Vali Yardımcısı

Eki: 1/35.000 ölçekli harita (1 adet)



T.C
KOZAN
BELEDİYE BAŞKANLIĞI
(Fen İşleri Müdürlüğü)

Sayı :M.01.6.KOZ.0.11/ 447
Konu : Evsel nitelikli atıksu bertarafı

14 / 06 / 2007

Sayın: DOKAY-ÇED Çevre Mühendisliği Ltd.Şti.

İlgi: 13.06.2007 tarih ve DKÇ-07/079 sayılı dilekçeniz.

İlgi dilekçenizde Evsel nitelikli atıksuyun tüm taşıma maliyetleri Ser Enerji Üretim ve Ticaret A.Ş. ait olarak belediyemize ait atıksu arıtma tesislerinde bertaraf edilmesi istenmektedir. Evsel nitelikli atık suyun masrafları ilgili firma tarafından karşılanması şartıyla belediyemize ait atıksu arıtma tesislerinde bertaraf edilmesinde sakınca yoktur.
Bilgilerinize rica ederim.

İhsan BOLAT
Fen İşl. Md. V.

T.C.
KÜLTÜR ve TURİZM BAKANLIĞI
KÜLTÜR VARLIKLARI VE MÜZELER GENEL MÜDÜRLÜĞÜ
ADANA KÜLTÜR VE TABİAT VARLIKLARINI
KORUMA BÖLGE KURULU MÜDÜRLÜĞÜ

Sayı : B.16.0.KVM.4.01.00.03/01.16/60- 1896
Konu : Kavşak bendi barajı

ADANA
11 TEM 2007

Dokay-Çed Çevre Mühendislik Ltd. Şti.
Öreçler 4 cad. 140/A

Dikmen /ANKARA

İLGİ: 30.04.2007 gün ve 07/062 sayılı yazınız.

Adana İli, Kozan ve Aladağ İlçesi sınırları içinde, Seyhan Nehrinin iki anakolu olan Zamantı ve Göksu Nehrinin yaklaşık 8 km mansabında kurulacak Kavşak Bendi Barajı ve HES nına ilişkin Kültür ve Tabiat Varlıklarını Koruma Kanunu kapsamında yapılan inceleme sonunda hazırlanan rapor yazımız ekinde gönderilmektedir.

Bilgilerinize ve gereğini rica ederim.

EK: Uzman raporu


İsmail SALMAN
Bölge Kurulu Müdürü

01.16/60

RAPOR
ADANA KÜLTÜR VE TABİAT VARLIKLARINI
KORUMA BÖLGE KURULU MÜDÜRLÜĞÜNE

Adana İli, Kozan ve Aladağ İlçe sınırları içinde, Seyhan Nehrinin iki ana kolu olan Zamanti ve Göksu nehrinin yaklaşık 8 km mansabında kurulacak Kavşak Bendi barajı, HES ve malzeme ocakları projesinin, Kültür ve Tabiat Varlıklarını Koruma Kanunu kapsamında incelenmesini isteyen Dokay-ÇED Çevre Mühendislik Ltd. Şti'nin 30.04.2007 gün ve 07/062 sayılı yazısı gereği, Bölge Kurulu Müdürlüğünün görevlendirmesi üzerine tarafımızdan gerekli inceleme yapılmıştır.

Müdürlüğümüz arşivinde yapılan incelemede Baraj ve hidroelektrik santrali yapılacak alanın çevresinde yer alan Kozan İlçesi, Henüzçakırı Koyu ve Aladağ İlçesine bağlı Kışlak, Gökçeköy ve Karahan köylerinde kurullarca tescilli yapılmış kültür ve tabiat varlığına rastlanamamıştır.

Yerinde yapılan incelemede; baraj yapılacak olan ve HES yapılacak olan alanların etrafının yüksek vadi kenarları ile çevrili olduğu görülmüştür. Vadi yamaçlarında çeşitli bitki toplulukları bulunmaktadır. Bu bitkilerin içinde endemik bitkiler olup-olmadığı tarafımızdan tespit edilememiştir. Bölgede Çevre ve Orman Bakanlığı yetkililerince yapılan inceleme sonucu hazırlanacak olan raporda endemik bitki türüne rastlandığının belirtilmesi ve bunların Yüksek Kurulun 05.11.1999 gün ve 666 sayılı ilke kararında belirtilen türler olması halinde, tescili için Koruma Bölge Kuruluna getirilmesi ve kurulun alacağı karara göre ~~gerekli~~ uygulama yapılması gerektiği, endemik bitki türü olmadığının belirtilmesi halinde Müdürlüğümüzce görüş bildirilmesinin uygun olacağı görüşündeyiz. Jeolojik oluşumlar açısından ise toros dağ kuşağının geleneksel vadi yapısı dışında ilginç bir oluşuma tarafımızdan rastlanamamıştır.


Taşınmaz kültür varlıkları açısından yapılan gözlemlerde herhangi bir kültür varlığına rastlanamamıştır. Ancak projenin uygulanması aşamasında Kültür ve Tabiat Varlıklarını Koruma Kanunu kapsamında kalan taşınır-taşınmaz kültür varlığı çıkması halinde, ilgili Müzeye veya Bölge Kurulu Müdürlüğüne haber verilmesi gerektiği görüşündeyiz.

Yazıda belirtilen malzeme ocaklarının yeri yazı eki haritada gösterilmediğinden herhangi bir inceleme ve görüş oluşturulamamıştır.

Bilgilerinize ve gereğini arz ederiz.

EKLER:

- 1- Fotoğraf albümü
- 2- 666 sayılı ilke kararı örneği


Kerem BEŞALTI
Müze Araştırmacısı


Hasan BATUN
Şehir Plancısı



01.16/60 2554 26-06-07

**T.C.
KÜLTÜR BAKANLIĞI
KÜLTÜR VE TABİAT VARLIKLARINI KORUMA
YÜKSEK KURULU**

Toplantı No. ve Tarihi : 60 05.11.1999
Karar No. ve Tarihi : 666 05.11.1999

Toplantı Yeri
ANKARA

İLKE KARARI

**KORUNMASI GEREKLİ TABİAT VARLIKLARINDAN ANIT AĞAÇLARIN
TANIMI VE KORUNMASI**

Danıştay 6.Dairesinin 11.11.1997 gün ve 1996/3313 esas, 1997/4875 sayılı kararı doğrultusunda "Korunması Gerekli Tabiat Varlıklarından Anıt Ağaçların Tanımı ve Korunması" na ilişkin 14.07.1998 gün ve 597 sayılı ilke kararının yeniden düzenlenmesi sonucunda;

Doğal yapısı, ölçüleri ve diğer özellikleri bakımından anıtsal nitelikler kazanmış bulunan ağaçlara "Anıt Ağaç" denilmesine,

Buna göre;

- a) Tarihi olaylarla bağlantısı bulunan yerli ve yabancı ağaç türlerinden herhangi birinin,
- b) Güzellik açısından plastik değerde bir görünüme sahip olan veya doğal görünümünden esassız şekilde sapma göstererek dikkat çekici biçimler (çatal, şamdan, kıvrık, yatay, vb.) kazanmış ağaçların,
- c) Doğal yaşam tarzı bakımından benzerlerinden farklı gelişme nitelikleri gösteren ağaçların (aynı gövde ve kök üzerinde iki veya daha fazla türün bir arada yaşaması gibi garip kaynaşma ve birlikte yaşama örnekleri gibi).
- ç) İlgili uzman kurum ve kuruluşların rapor ve görüşü alınmak koşuluyla, endemik ve nesli tükenmeye maruz yerli ağaç türlerinden: Porsuk (*Taxus baccata*), Halep Çamı (*Pinus halepensis*), Andız (*Arceuthos drupacea*), Finike Ardıcı (*Juniperus phoenicea*), Kasnak Meşesi (*Quercus vulcanica*), Şimşir (*Buxus sempervirens*), Huş (*Betula verrucosa*, *Betula pubescens*, *Betula medwediewii*), Kazdağı Göknarı (*Abies equitrojani*), Sığla (*Liquidamber orientalis*), Toros Göknarı alt türü (*Abies cilicia ssp. isaurica*), bazı akçağaç tür



d.16/60 2554 26-5-97

T.C.
KÜLTÜR BAKANLIĞI
KÜLTÜR VE TABİAT VARLIKLARINI KORUMA
YÜKSEK KURULU

Toplantı No. ve Tarihi : 60 05.11.1999
Karar No. ve Tarihi : 666 05.11.1999

Toplantı Yeri
ANKARA

ve alt türleri (Acer divergens, Acer hyrcanum, ssp. sphaerocaryum, Acer mons pessulanum ssp. aksalinum) ve benzeri ağaçların,

d) Kent dokusunu tamamlayan, kent imajına etkisi olan grup, dizi veya tek ağaçların,

2863 sayılı Yasa uyarınca "Korunması Gerekli Anıt Ağaç" olarak koruma kurulundan karar alınması gerektiğine;

Korunması gerekli anıt ağaçlardan yaşlanmış veya hastalanmış ağaçların, ilgili kuruluşlarca hazırlanacak teknik raporlar doğrultusunda Koruma Kurulu tarafından alınacak karar uyarınca kaldırılarak, yerine yenisinin dikilebileceğine,

14.07.1998 gün ve 597 sayılı ilke kararının iptal edilmesine,
karar verildi.

BAŞKAN
Prof. Dr. O. Tekin AYBAŞ
Müsteşar

Üye
ÖKMEN (Özgün)
Başbakanlık Müsteşar
Yardımcısı
(Bulunmadı)

Üye
DÖRTLEMEZ (Abdullah)
Kültür Bak.
Müsteşar Yard.

Üye
AVCI (Nadir)
Kul. ve Tab. Var. Kor.
Gn. Md. V.

Üye
YARDIMCI (Nurettin)
Vakıflar Gn. Md.
(Bulunmadı)

Üye
AKAR (Haluk)
Tunzın Bak.
Yat. Gn. Md.

Üye
DUYGULUER (Feridun)
Tek. Arş. ve Uyg.
Gn. Md.
(Bulunmadı)

Üye
BAHADIR (Ali)
Orman Gn. Md. Yrd.

Üye
UNAL (Mete)

Üye
UYDAŞ (Nurcan)

Üye
TUNCER (Orhan Cezmi)
(Bulunmadı)

Üye
ERUZUN (Cengiz)

Üye
BİLGİ (Önder)

Üye
GOK (Tamer)



T.C.
ENERJİ PİYASASI DÜZENLEME KURUMU
Elektrik Piyasası Düzenleme, İzleme ve Değerlendirme Dairesi Başkanlığı

Sayı : B.62.0.EPUN10.30.223 *3923*
Konu : Üretim lisansı başvurusu

17955 *18.07.2007

SER ENERJİ ÜRETİM VE TİCARET ANONİM ŞİRKETİNE
Sabancı Center Kule:2 Kat:1 34330 4. Levent İSTANBUL

İlgi : 10/3/2005 tarihli ve 9007 sayılı üretim lisansı başvurunuz.

İlgi yazı ile, Adana İli'nde kurulması planlanan 160,35 MW_m/145,5 MW_e gücündeki Kavşak Bendi HES için Kurumumuzdan üretim lisansı verilmesi talep edilmiştir. Başvurunuzun inceleme ve değerlendirmesi sonucu, Elektrik Piyasası Lisans Yönetmeliğinin (Yönetmelik) 10 uncu maddesinin üçüncü fıkrası hükmü uyarınca ve Enerji Piyasası Düzenleme Kurulu'nun 12/7/2007 tarihli ve 1252-6 sayılı Kararı ile Şirketinize, Kavşak Bendi HES üretim tesisi için üretim lisansı verilmesi uygun bulunmuştur.

Bu çerçevede, Şirketinize üretim lisansı verilmesi için;

- Şirket sermayesinin asgari 56.132.332,49 YTL'ye artırılması,
- DŞİ Genel Müdürlüğüne müracaat edilerek Su Kullanım Hakkı Anlaşması imzalanması,
- Şirketinize inşaat öncesi dönem için 16 ay ve inşaat dönemi için 32 ay süre verilmesine karar verilmiş olup bu çerçevede kurmayı planladığınız üretim tesisinin toplam 52 (elliiki) ay tesis tamamlanma süresine ilişkin, inşaat öncesi dönem ve inşaat dönemi olarak iki bölüm halinde termin programının hazırlanması,

gerekmektedir.

Mücbir sebepler dışında, bu yazının tarafınıza tebliğ edildiği tarihten itibaren Yönetmelikte öngörülen 90 (doksan) günlük süre içerisinde bu yükümlülüklerin yerine getirildiğine ilişkin belgelerin Kurumumuza sunulmaması halinde, lisans başvurunuz Kurul kararıyla reddedilecektir.

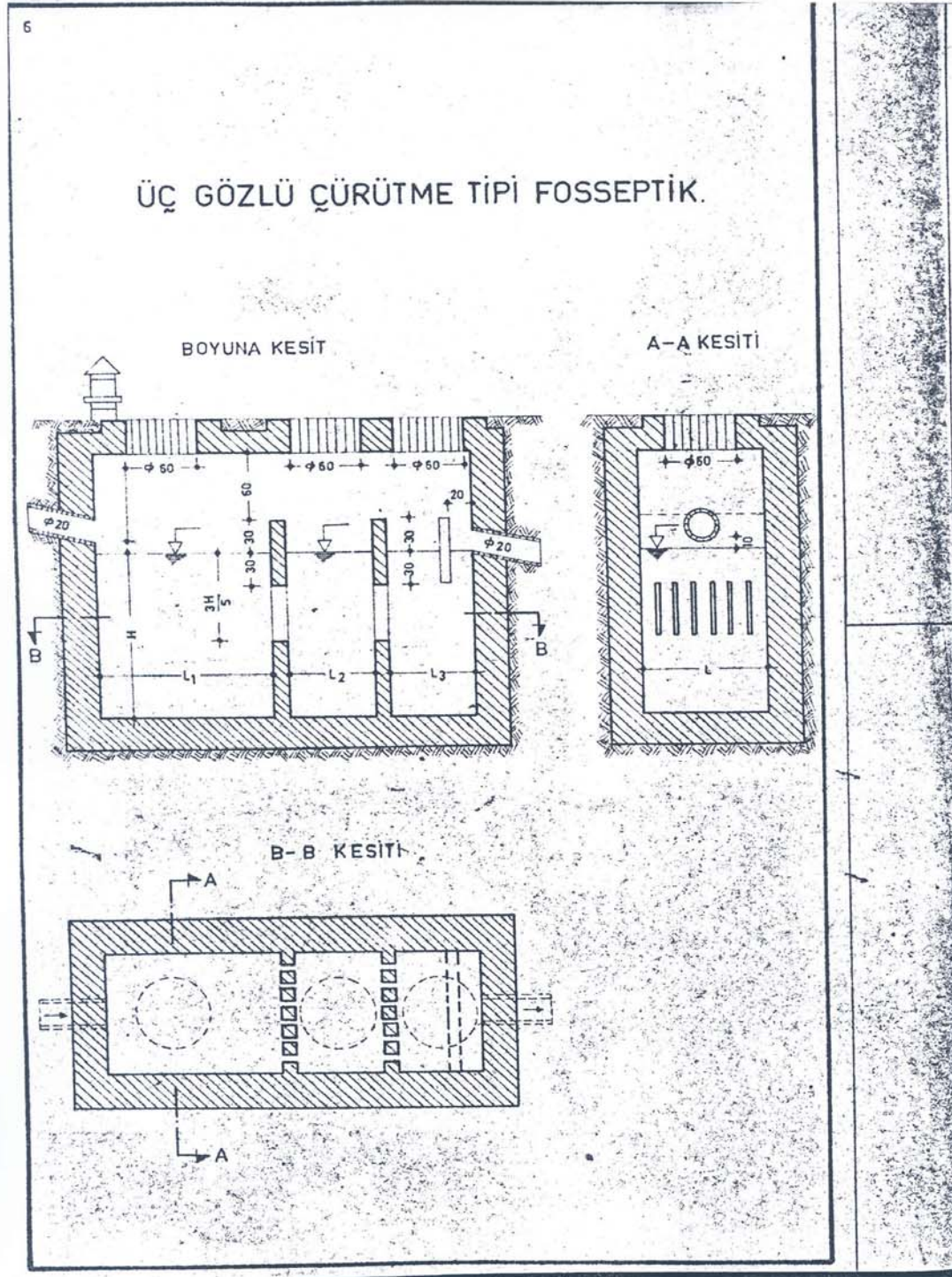
Bilgilerinizi rica ederim.


Ahmet ÖCAK
Başkan a.
Daire Başkanı V.

Appendix-D

Septic Type Projects

D E Ğ İ Ş İ K L İ K			TARİH	İMZA
a)				
b)				
FOSSEPTİKLER VE FOSSEPTİKLERDEN ÇIKAN PİS SULARI BERTARAF EDİCİ TESİSLER			ÖLÇEK	1/40
			NO. LU PLAN İPTAL EDİLDİ	
			NO. LU PLAN İPTAL EDİLDİ	
PROJEYİ YAPAN	İMZA	İMZA TARİHİ	İLLER BANKASI KANALİZASYON DAİRESİ BAŞKANLIĞI	
İNS. Y. MÜH. NİHAT BAŞ		24.12.1969		
İNS. Y. MÜH. MİRAC KÜVÜLÜLÜ		24.12.1969		
ÇİZEN: ATILLA TÜRÜNG				
			PLAN NO:	T.C. 226
			ARŞİV KAYIT NO:	



ÇOK GÖZLÜ ÇURUTME TİPİ FOSSEPTİKLERE AIT TABLO.

NÜFUS	TOPLAM HACİM V (m ³)	1. GÖZ			2. GÖZ			3. GÖZ			4. GÖZ		
		BOY L ₁ (m)	EN L ₂ (m)	DERİNLİK H ₁ (m)	BOY L ₂ (m)	EN L ₃ (m)	DERİNLİK H ₂ (m)	BOY L ₃ (m)	EN L ₄ (m)	DERİNLİK H ₃ (m)	BOY L ₄ (m)	EN L ₅ (m)	DERİNLİK H ₄ (m)
15	3	1,88	0,90	1,33	0,84	0,90	1,33	-	-	-	-	-	-
20	4	1,82	1,10	1,50	0,81	1,10	1,50	-	-	-	-	-	-
25	5	1,52	1,10	1,50	0,76	1,10	1,50	0,76	1,10	1,50	-	-	-
30	6	1,74	1,15	1,50	0,87	1,15	1,50	0,87	1,15	1,50	-	-	-
40	8	2,06	1,25	1,55	1,03	1,25	1,55	1,03	1,25	1,55	-	-	-
50	10	2,32	1,35	1,60	1,16	1,35	1,60	1,16	1,35	1,60	-	-	-
60	12	2,42	1,50	1,65	1,21	1,50	1,65	1,21	1,50	1,65	-	-	-
80	16	2,88	1,76	1,70	1,34	1,76	1,70	1,34	1,76	1,70	-	-	-
100	20	2,86	2,00	1,76	0,95	2,00	1,76	0,95	2,00	1,76	0,95	2,00	1,76
125	25	3,08	2,25	1,81	1,03	2,25	1,81	1,03	2,25	1,81	1,03	2,25	1,81
150	30	3,26	2,50	1,85	1,09	2,50	1,85	1,09	2,50	1,85	1,09	2,50	1,85
200	40	3,32	2,75	1,90	1,27	2,75	1,90	1,27	2,75	1,90	1,27	2,75	1,90
250	50	4,27	3,00	1,95	1,42	3,00	1,95	1,42	3,00	1,95	1,42	3,00	1,95
300	60	4,28	3,50	2,00	1,43	3,50	2,00	1,43	3,50	2,00	1,43	3,50	2,00
400	80	5,00	4,00	2,00	1,66	4,00	2,00	1,66	4,00	2,00	1,66	4,00	2,00
500	100	5,55	4,50	2,00	1,85	4,50	2,00	1,85	4,50	2,00	1,85	4,50	2,00

1. GÖZ : $\frac{2}{3}$ V
2. GÖZ : $\frac{1}{3}$ V

1. GÖZ : $\frac{1}{2}$ V
2. GÖZ : $\frac{1}{4}$ V

3. GÖZ : $\frac{1}{4}$ V

1. GÖZ : $\frac{1}{2}$ V
2. GÖZ : $\frac{1}{6}$ V

3. GÖZ : $\frac{1}{6}$ V
4. GÖZ : $\frac{1}{6}$ V

Appendix-E

Long-Term Meteorological Data of Kozan Meteorological Station

Enlem : 37.27 Boydam : 35.49 Yukseklik : 11 m		(ADANA) KOZAN											
METEOROLOJİK ELEMENTLER		Rasat S. (YIL)											
		A Y L A R											
		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
		YILLIK											
Ortalama Yerel Basıncı (hPa)		31	1004.0	1003.5	1001.0	999.5	997.9	995.4	992.2	993.6	997.5	1001.4	1005.4
En Yüksek Yerel Basıncı (hPa)		31	1015.1	1017.1	1013.5	1011.9	1006.7	1002.3	998.9	998.2	1003.0	1010.9	1015.9
En Düşük Yerel Basıncı (hPa)		31	981.7	984.4	980.1	986.8	986.1	985.7	985.1	989.1	988.9	989.4	985.1
Saat 07 deki Ortalama Sıcaklık (C)		31	7.3	7.6	10.3	14.8	19.0	22.6	25.3	25.0	22.0	18.3	12.9
Saat 14 deki Ortalama Sıcaklık (C)		31	13.4	14.2	17.8	22.2	27.1	31.7	34.6	34.7	32.3	27.7	20.6
Saat 21 deki Ortalama Sıcaklık (C)		31	8.6	9.5	12.6	16.6	20.7	24.8	27.9	27.9	25.2	20.4	14.1
Ortalama Sıcaklık (C)		31	9.5	10.2	13.3	17.5	21.9	26.0	28.9	28.9	26.2	21.7	15.4
Ort. Sıcaklık >= 5 C Old. Gunler Sayisi		31	29.6	26.3	30.8	30.0	31.0	30.0	31.0	31.0	30.0	31.0	30.0
Ort. Sıcaklık >= 10 C Old. Gunler Sayisi		31	13.8	15.9	26.0	29.7	31.0	30.0	31.0	31.0	30.0	31.0	27.5
Ortalama Yuksek Sıcaklık		31	14.4	15.4	19.0	23.6	28.5	33.0	35.8	35.6	33.4	28.7	21.6
Ortalama Düşük Sıcaklık		31	5.9	6.3	8.8	12.4	15.9	19.5	22.7	22.9	20.2	16.8	11.5
En Yüksek Sıcaklık Günü		31	18	21	19	30	31	10	8	7	7	11	11
En Yüksek Sıcaklık Yılı		31	1987	1977	1981	1979	1980	2002	1978	1987	1978	1976	2005
En Yüksek Sıcaklık (C)		31	25.0	26.9	31.2	37.3	41.5	42.1	44.4	44.8	43.4	39.5	32.4
Yuk. Sıcaklık >= 30 C Old. Ort. Gunler Sayisi		31	0.0	0.2	0.2	3.4	11.6	24.9	30.7	30.8	26.7	12.9	0.6
Yuk. Sıcaklık >= 25 C Old. Ort. Gunler Sayisi		31	0.0	0.2	3.0	10.8	24.7	28.8	31.0	31.0	29.8	25.2	8.1
Yuk. Sıcaklık >= 20 C Old. Ort. Gunler Sayisi		31	0.9	3.9	13.4	23.5	29.9	30.0	31.0	31.0	30.0	30.1	20.0
Yuk. Sıcaklık <= 0.1 C Old. Ort. Gunler Sayisi		31											
Günlük En Yüksek Sıcaklık Farkı													
En Düşük Sıcaklık Günü		31	28	21	7	10	8	1	1	23	22	30	14
En Düşük Sıcaklık Yılı		31	1983	1985	1993	1997	1978	1978	1978	1978	1976	2003	1988
En Düşük Sıcaklık (C)		31	- 4.0	- 5.0	- 3.6	2.0	5.3	11.0	15.0	14.8	13.0	3.60	0.7
Dus. Sıcaklık <= 0.1 C Old. Ort. Gunler Sayisi		31	0.7	1.0	0.2								0.3
Dus. Sıcaklık <= 3 C Old. Ort. Gunler Sayisi		31	0.1	0.1	0.0								0.2
Dus. Sıcaklık <= 5 C Old. Ort. Gunler Sayisi		31											0.0
Dus. Sıcaklık <= 10 C Old. Ort. Gunler Sayisi		31											0.0
Dus. Sıcaklık <= 15 C Old. Ort. Gunler Sayisi		31											0.0
Dus. Sıcaklık <= 20 C Old. Ort. Gunler Sayisi		31											0.0
Dus. Sıcaklık <= 25 C Old. Ort. Gunler Sayisi		31											0.0
Dus. Sıcaklık <= 30 C Old. Ort. Gunler Sayisi		31											0.0
Dus. Sıcaklık >= 15 C Old. Ort. Gunler Sayisi		31	2.4	3.0	10.7	23.6	30.2	30.0	31.0	31.0	30.0	30.5	20.1
Dus. Sıcaklık >= 10 C Old. Ort. Gunler Sayisi		31	19.7	19.4	27.7	29.6	31.0	30.0	31.0	31.0	30.0	31.0	28.9
Dus. Sıcaklık >= 5 C Old. Ort. Gunler Sayisi		31											24.1
Ortalama Toprakustu Minimum Sıcaklık		31	4.1	4.5	6.8	10.5	14.0	17.7	20.9	21.1	18.2	14.7	9.6
En düşük Toprakustu Minimum Sıcaklık		31	- 6.0	- 8.6	- 4.4	1.2	3.8	10.0	13.0	14.0	10.4	0.6	- 3.0
Top. us. min. sic. <= 0.1 C Old. Gunler Sayisi		31	2.3	2.6	0.5								1.5
Top. us. min. sic. <= 3 C Old. Gunler Sayisi		31	0.4	0.6	0.1								0.3
Top. us. min. sic. <= 5 C Old. Gunler Sayisi		31	0.0	0.2									0.2
Top. us. min. sic. <= 10 C Old. Gunler Sayisi		31											0.0
Ortalama Buhar Basıncı (hPa)		31	7.1	7.4	9.2	12.6	15.8	19.4	23.9	24.3	18.9	13.1	9.8
Saat 07 deki Ortalama Bagil Nem (%)		31	61	61	65	72	71	72	76	76	69	58	59
Saat 14 deki Ortalama Bagil Nem (%)		31	49	47	47	49	45	40	42	43	39	37	43
Saat 21 deki Ortalama Bagil Nem (%)		31	64	62	66	71	68	65	66	68	62	57	61
Ortalama Bagil Nem (%)		31	58	58	59	63	61	60	62	62	57	51	54
En düşük Bagil Nem (%)		31	4	7	5	5	7	3	4	4	3	4	7
Istasyonun Calisma Sureesi : 1975 - 2005													

			(ADANA) KOZAN											
			Rasat S. (YIL)											
			A Y L A R											
			METEOROLOJİK ELEMANLAR											
Enlem	: 37.27		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Boylam	: 35.49													
Yukseklik	: 11 m													
			YILLIK											
S Ruzgarin Esme Sayilari Toplami	14	14	17	30	34	66	82	79	37	22	19	28	492	
S Ruzgarin Ortalama Hizi (m/s)	14	1.3	1.9	1.9	1.5	1.2	1.6	1.3	1.3	1.5	1.3	0.9	1.0	1.4
SSW Ruzgarin Esme Sayilari Toplami	14	68	68	111	164	168	176	183	111	119	103	63	60	1394
SSW Ruzgarin Ortalama Hizi (m/s)	14	1.3	2.1	2.0	2.2	1.9	2.2	2.1	1.9	1.9	1.7	1.4	1.3	1.9
SW Ruzgarin Esme Sayilari Toplami	14	14	8	15	35	22	18	20	17	14	24	16	8	211
SW Ruzgarin Ortalama Hizi (m/s)	14	1.1	1.1	1.9	1.7	1.6	1.7	2.4	1.9	1.7	1.2	1.0	0.6	1.6
WSW Ruzgarin Esme Sayilari Toplami	14	14	18	26	45	18	22	8	9	7	20	14	11	212
WSW Ruzgarin Ortalama Hizi (m/s)	14	1.6	1.2	1.5	2.4	1.4	1.3	1.9	2.0	0.8	1.1	1.2	1.0	1.6
W Ruzgarin Esme Sayilari Toplami	14	8	6	15	6	16	10	7	3	9	11	7	5	103
W Ruzgarin Ortalama Hizi (m/s)	14	1.5	1.5	1.0	1.1	1.5	1.3	2.0	1.9	0.9	1.2	0.6	0.7	1.3
NNW Ruzgarin Esme Sayilari Toplami	14	18	17	23	27	19	15	7	1	9	14	18	18	186
NNW Ruzgarin Ortalama Hizi (m/s)	14	1.5	2.0	1.9	1.5	1.9	1.4	1.4	0.3	1.8	1.4	1.3	1.6	1.6
NW Ruzgarin Esme Sayilari Toplami	14	58	40	37	34	23	19	21	17	30	38	54	52	423
NW Ruzgarin Ortalama Hizi (m/s)	14	3.0	3.3	2.6	2.3	2.3	2.5	3.7	4.0	3.1	2.9	3.3	2.8	3.0
NNW Ruzgarin Esme Sayilari Toplami	14	395	347	296	163	134	107	55	61	153	358	443	470	2962
NNW Ruzgarin Ortalama Hizi (m/s)	14	3.5	3.6	3.2	2.9	3.2	3.4	3.4	3.1	3.3	3.5	3.5	3.1	3.3
Ortalama 5 cm Toprak Sicakligi (C)	31	8.4	9.8	14.0	19.4	25.2	30.5	34.3	34.2	29.6	22.7	14.9	9.7	21.1
En dusuk 5 cm Toprak sicakligi (C)	31	0.5	1.4	3.7	8.4	15.0	19.7	24.6	23.1	19.4	12.6	5.6	1.5	0.5
Ortalama 10 cm Toprak Sicakligi (C)	31	8.8	9.9	13.7	18.9	24.4	29.3	32.7	32.9	29.1	22.9	15.6	10.3	20.7
En dusuk 10 cm Toprak sicakligi (C)	31	3.2	3.2	4.1	9.8	15.4	20.5	25.7	24.1	21.2	13.6	7.0	4.1	3.2
Ortalama 20 cm Toprak Sicakligi (C)	31	9.2	10.0	13.4	18.3	23.5	28.3	31.9	32.4	29.1	23.3	16.3	11.0	20.6
En dusuk 20 cm Toprak sicakligi (C)	31	4.8	4.5	4.6	10.4	16.0	20.4	26.2	24.9	22.9	14.7	9.0	5.7	4.5
Ortalama 50 cm Toprak Sicakligi (C)	31	10.8	10.9	13.5	17.6	22.1	26.5	30.1	31.2	29.0	24.5	18.3	13.2	20.6
En dusuk 50 cm Toprak sicakligi (C)	31	7.2	7.3	7.2	12.3	16.8	20.7	25.9	27.1	24.5	18.0	12.9	8.8	7.2
Ortalama 100 cm Toprak Sicakligi (C)	31	13.1	12.4	13.7	16.6	20.2	24.0	27.2	28.9	28.2	25.2	20.6	16.0	20.5
En dusuk 100 cm Toprak sicakligi (C)	31	9.0	8.4	10.0	12.8	16.2	20.3	23.2	26.3	24.6	20.0	15.6	11.6	8.4
Ortalama Buharlasma (mm)	14	78.6	85.2	116.3	130.6	185.4	228.2	253.7	229.9	200.9	184.7	120.4	75.1	1889.0
Gunluk En Cok Buharlasma (mm)	14	7.1	10.1	10.7	13.3	14.9	21.6	22.6	20.3	20.8	16.5	13.8	6.7	22.0
Gunluk Ort. Guneslenme Suresi (saat,dakika)	7	03:56	05:10	06:21	06:24	08:22	09:37	09:36	09:19	09:03	07:27	05:48	04:09	07:06
Gunluk Ort. Guneslenme Sidt.(cal/cm*2.dak)	7	181.23	250.75	363.24	414.44	510.98	570.41	550.46	498.56	433.49	325.85	226.97	169.32	374.64
Aylik En Yuk. Guneslenme Sidt.(cal/cm*2.dak)	7	0.97	1.15	1.33	1.57	1.47	1.44	1.38	1.34	1.36	1.17	1.05	0.87	1.57
Ortalama Deniz Suyu Sicakligi (C)														0.0
En Yuksek Deniz Suyu Sicakligi (C)														
En dusuk Deniz Suyu Sicakligi (C)														
Istasyonun Calisma Suresi : 1975 - 2005			ARASTIRMA ve BILGI ISLEM DAIRE BASKANLIGI											

Enlem Boydam Yukseklık	: 37.27 : 35.49 : 11 m	METEOROLOJİK ELEMENTLER	Rasat S. (YIL)	A Y L A R												(ADANA) KOZAN			
				I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII				
Saat 07 deki Ortalama Bulutluluk (0-10)			31	5.4	5.3	5.2	5.6	4.1	3.1	3.7	3.2	2.2	3.1	4.3	5.3				
Saat 14 deki Ortalama Bulutluluk (0-10)			31	5.4	5.6	5.8	6.3	5.5	3.9	2.6	2.2	2.3	3.5	4.5	5.4				
Saat 21 deki Ortalama Bulutluluk (0-10)			31	4.5	4.4	4.6	5.1	3.9	3.4	3.7	3.3	2.6	2.7	3.5	4.5				
Ortalama Bulutluluk (0-10)			31	5.1	5.1	5.2	5.6	4.5	3.4	3.4	2.9	2.4	3.1	4.1	5.1				
Ort. Acik Gunler Sayisi (bult. 0.0-1.9)			31	9.2	7.6	7.7	7.5	8.2	12.8	13.5	14.5	16.9	14.8	11.1	9.0				
Ort. Bulutlu Gunler Sayisi (bult. 2.0-8.0)			31	12.5	12.5	14.6	16.3	17.7	14.2	14.5	14.7	11.9	12.9	13.1	13.0				
Ort. Kapali Gunler Sayisi (bult. 8.1-10.0)			31	9.3	8.1	8.6	8.6	5.0	3.0	2.9	1.8	1.2	3.3	5.8	9.0				
Saat 07 deki Ort. Toplam Yagis Miktarı (mm)			31	44.9	33.1	31.0	33.0	16.8	9.5	1.7	2.5	4.4	21.5	33.5	43.7				
Saat 14 deki Ort. Toplam Yagis Miktarı (mm)			31	31.4	20.9	21.8	26.5	20.5	11.2	1.6	2.9	5.0	13.3	26.5	25.6				
Saat 21 deki Ort. Toplam Yagis Miktarı (mm)			31	31.7	25.3	30.9	36.3	47.3	33.2	17.7	15.8	22.8	22.9	23.3	36.1				
Ortalama Toplam Yagis Miktarı (mm)			31	109.8	80.1	95.9	96.1	87.8	59.3	22.6	21.4	33.6	57.5	83.1	109.5				
Gunluk En Cok Yagis Miktarı (mm)			31	135.1	60.1	54.6	61.0	107.9	97.0	55.1	60.9	134.2	93.8	152.5	84.0				
Yagis >= 0.1 mm Oldugu Gunler Sayisi			31	9.8	10.2	11.3	12.3	10.5	6.4	2.8	2.4	4.0	6.5	7.3	10.3				
Yagis >= 10 mm Oldugu Gunler Sayisi			31	3.4	2.8	3.1	3.3	2.7	1.8	0.8	0.7	1.0	2.1	2.8	3.6				
Yagis >= 50 mm Oldugu Gunler Sayisi			31	0.4	0.0	0.1	0.1	0.2	0.2	0.0	0.0	0.1	0.1	0.1	0.4				
Ortalama Kar Yagisli Gunler Sayisi			31	0.1	0.2										0.3				
Ortalama Kar Ortulu Gunler Sayisi			31						0.0						0.0				
En Yuksek Kar Ortusu Kalınlığı (cm)			3	4.0											4.0				
Ortalama Sisli Gunler Sayisi			30	0.1	0.1	0.1	0.4	0.5	0.8	0.2	0.2	0.0	0.0	0.0	0.0				
Ortalama Dolulu Gunler Sayisi			31	0.0	0.1	0.4	0.2	0.2	0.1	0.1	0.0	0.1	0.1	0.1	0.1				
Ortalama Kiragilli Gunler Sayisi			30	0.8	0.7	0.1									0.4				
Ortalama Oragli Gunler Sayisi			31	1.1	1.6	4.0	6.3	8.7	6.2	2.4	2.3	4.3	4.5	2.0	1.4				
Saat 07 deki Ortalama Ruzgar Hızı (m/s)			14	3.0	3.1	2.6	2.0	1.5	1.2	0.8	0.9	1.7	2.9	3.2	2.9				
Saat 14 deki Ortalama Ruzgar Hızı (m/s)			14	2.0	2.5	2.5	2.4	2.2	2.4	2.5	2.4	2.1	1.7	1.8	2.2				
Saat 21 deki Ortalama Ruzgar Hızı (m/s)			14	2.4	2.3	1.7	1.2	1.1	1.1	1.1	0.7	0.9	1.7	2.3	1.6				
Ortalama Ruzgar Hızı (m/s)			14	2.5	2.6	2.2	1.8	1.6	1.6	1.4	1.3	1.6	2.1	2.4	2.3				
En Hizli Esen Ruzgarin Yonu			30	NNW	NNW	ESE	N	NW	NNW	NNE	NW	W	SSW	NNW	NNW				
En Hizli Esen Ruzgarin Hızı (m/s)			30	23.4	20.1	17.7	18.5	19.1	19.6	17.8	21.4	21.7	21.0	23.0	19.9				
Ort. Firtinali Gun Say. (ruz.hiz>=17.2 m/s)			15	0.3	0.9	0.4	0.2	0.1	0.4	0.2	0.4	0.4	0.1	0.6	0.1				
Ort. Kuv.Ruz. Gun Say. (ruz.hiz 10.8-17.1 m/s)			15	5.8	5.6	4.3	3.2	3.7	4.6	3.8	2.9	2.9	4.1	4.2	3.9				
N Ruzgarin Esme Sayilari Toplami			14	201	186	152	148	96	71	41	69	144	231	198	201				
NNE Ruzgarin Ortalama Hizi (m/s)			14	2.6	2.9	2.4	2.2	2.4	2.4	2.6	1.9	2.1	2.3	2.6	2.4				
NNE Ruzgarin Esme Sayilari Toplami			14	151	98	124	110	122	118	77	88	128	124	140	144				
NNE Ruzgarin Ortalama Hizi (m/s)			14	2.4	2.7	2.4	1.9	1.7	1.8	1.6	1.3	1.8	2.0	2.0	2.2				
NE Ruzgarin Esme Sayilari Toplami			14	13	12	19	26	31	35	28	30	12	11	8	14				
NE Ruzgarin Ortalama Hizi (m/s)			14	1.8	2.1	2.7	1.8	1.4	1.3	0.8	0.9	1.3	1.3	1.4	1.0				
ENE Ruzgarin Esme Sayilari Toplami			14	25	23	34	17	28	34	20	12	14	13	14	18				
ENE Ruzgarin Ortalama Hizi (m/s)			14	1.5	1.5	2.5	2.2	1.2	0.9	0.8	0.8	0.7	1.0	1.1	1.7				
E Ruzgarin Esme Sayilari Toplami			14	40	42	39	30	27	42	20	14	13	19	42	50				
E Ruzgarin Ortalama Hizi (m/s)			14	2.4	2.4	2.7	2.2	1.3	1.1	1.4	0.8	1.3	1.1	2.1	2.2				
ESE Ruzgarin Esme Sayilari Toplami			14	94	74	47	51	62	107	109	86	66	61	83	923				
ESE Ruzgarin Ortalama Hizi (m/s)			14	1.8	2.1	2.4	2.0	1.2	1.1	1.4	1.6	1.3	1.3	1.6	2.0				
SE Ruzgarin Esme Sayilari Toplami			14	18	23	23	32	68	75	118	130	49	41	31	27				
SSE Ruzgarin Ortalama Hizi (m/s)			14	1.4	1.8	1.4	1.2	1.2	1.2	1.2	1.7	1.6	1.3	1.1	1.3				
SSE Ruzgarin Esme Sayilari Toplami			14	47	69	101	95	153	194	290	290	175	96	78	64				
SSE Ruzgarin Ortalama Hizi (m/s)			14	1.4	1.7	2.0	1.7	1.5	1.4	1.5	1.6	1.7	1.4	1.2	1.7				

Istasyonun Calisma Sureesi : 1975 - 2005

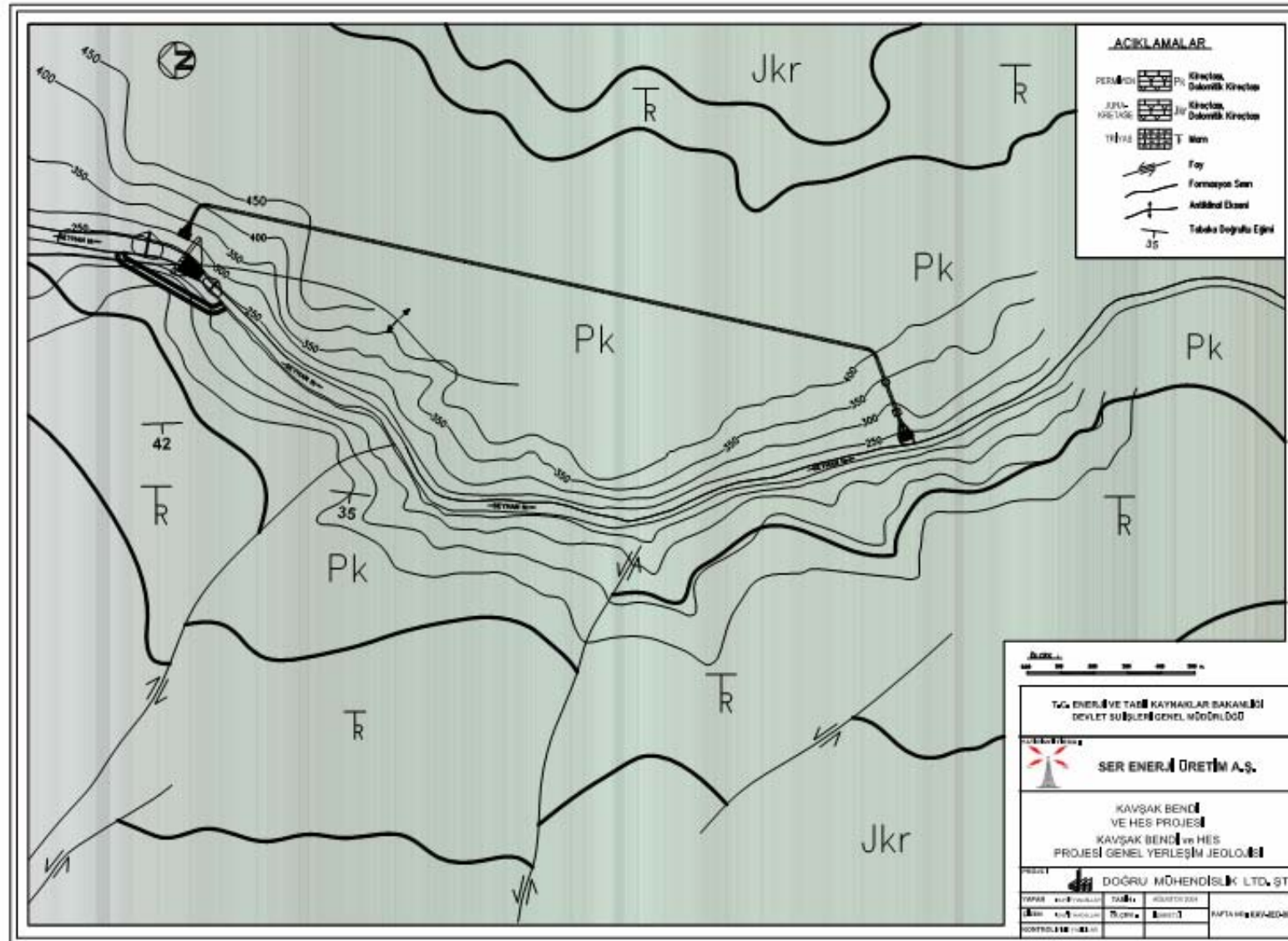
ARASTIRMA VE BILGI ISLEM DAIRE BASKANLIĞI
KAVI T.A.Ş. YATIRIMCI
KAVI T.A.Ş. YATIRIMCI

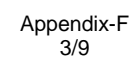
DEVLET METEOROLOJİ İŞLERİ GENEL MÜDÜRLÜĞÜ
KOZAN METEOROLOJİ İSTASYONUNDA
STANDART ZAMANLARDA GÖZLENEN EN BÜYÜK YAĞIŞ DEĞERLERİ (mm)

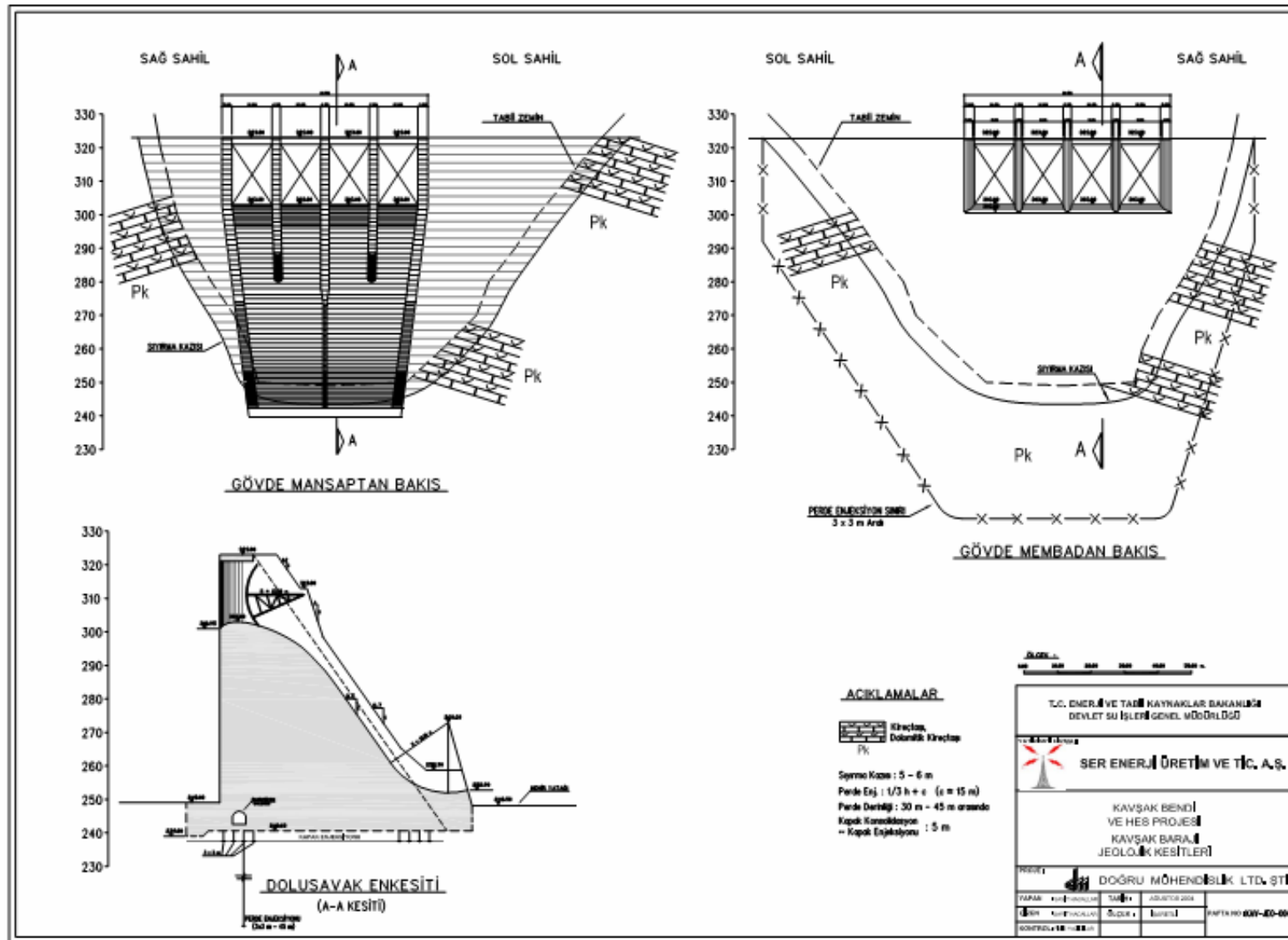
GÖZLEM	DAKİKA				S A A T											
	YILI	5	10	15	30	1	2	3	4	5	6	8	12	18	24	24 +
2005	9,3	18,6	25,5	33,6	40,0	49,9	54,4	56,4	56,5	56,5	59,9	68,5	73,7	74,1		
2004	9,5	15,1	20,5	32,6	35,0	36,1	36,1	36,1	41,8	44,6	49,5	61,9	84,4	89,2		
2003	11,6	19,0	26,8	41,0	67,6	95,2	119,8	125,7	129,5	131,0	132,4	134,0	134,2	134,2		
2002	8,3	13,3	16,9	23,3	26,6	23,9	38,0	40,8	43,2	43,2	44,0	54,0	75,8	88,1		
2001	11,9	15,5	23,7	37,4	46,5	49,4	49,4	49,4	49,4	49,5	49,5	49,5	49,5	49,5		
2000	10,7	18,8	21,8	27,7	28,4	28,6	28,6	28,7	28,7	29,0	33,9	41,3	54,8	70,4		
1999	16,5	19,3	20,9	31,2	43,3	45,3	45,5	45,5	45,5	45,6	45,6	46,7	46,7	49,2		
1998	8,6	15,4	18,3	23,6	26,8	26,8	26,9	26,9	28,4	28,9	29,1	32,4	38,8	42,4		
1997	7,8	13,5	15,9	16,4	16,4	16,4	16,9	17,2	20,4	20,7	20,8	22,6	31,2	39,8		
1996	10,0	14,4	15,7	19,9	31,9	40,9	42,6	42,8	42,9	43,0	43,2	44,4	45,2	51,0		
1995	10,2	16,3	21,5	36,3	40,0	54,7	54,9	55,7	60,9	61,0	61,0	67,2	86,0	100,0		
1994	7,9	11,4	12,9	17,4	18,1	25,1	38,1	45,2	49,8	60,4	77,4	96,6	131,1	160,5		
1993	10,5	19,9	24,1	28,8	30,5	30,5	30,5	30,5	34,9	38,3	41,7	52,2	53,9	54,0		
1992	11,6	21,2	28,6	38,0	43,7	48,0	48,7	51,3	51,5	52,8	53,8	53,8	95,7	113,2		
1991	7,5	12,6	15,7	18,3	20,0	25,5	27,0	27,8	28,2	28,2	31,3	32,6	51,0	67,5		
1990	9,0	14,4	18,2	20,8	23,4	23,9	38,7	38,7	38,7	38,7	38,8	40,3	40,3	42,3		
1989	10,7	21,1	23,5	34,1	32,5	37,5	38,8	38,8	38,8	38,8	38,8	38,8	38,8	72,3		
1988	12,2	16,3	22,5	43,5	46,6	52,0	61,9	63,4	64,2	70,3	70,6	93,2	93,8	93,8		
1987	10,7	14,9	19,6	28,5	29,1	32,7	33,0	33,6	33,8	33,8	34,1	36,0	48,2	55,2		
1986	16,4	18,7	20,9	25,5	29,2	37,5	41,6	44,9	56,2	57,5	58,0	58,0	83,0	84,0		
1985	11,3	17,3	20,4	36,3	53,0	54,9	59,5	63,4	63,4	63,4	63,4	96,5	97,0	103,6		
1984	8,6	10,9	14,6	19,6	19,6	19,6	19,6	19,6	19,6	20,3	29,5	36,3	40,0	43,1		
1983	9,7	15,9	17,6	27,3	34,4	45,9	53,1	63,6	63,7	63,7	63,7	63,7	63,7	73,5		
1982	15,6	33,1	28,0	33,6	42,9	53,5	58,1	60,3	60,3	60,3	60,3	60,8	60,9	60,9		
1981	16,6	23,6	30,6	40,1	41,6	41,8	41,8	41,8	41,8	41,9	42,0	54,9	66,5	77,4		
1980	7,3	10,1	13,6	24,0	24,4	27,7	31,4	34,0	36,5	36,5	44,4	53,1	60,6	61,0		
1979	10,0	13,7	14,5	22,3	28,3	33,1	33,4	33,4	33,4	53,3	57,8	68,0	76,7	84,0		
1978	6,1	8,1	9,3	12,8	20,4	20,7	25,7	29,4	29,9	30,1	30,4	30,4	45,8	55,1		
1977	10,2	16,2	20,4	36,2	59,2	64,1	64,1	64,1	64,1	64,1	67,5	97,4	127,0	135,1		
1976	17,7	25,2	35,0	59,1	85,9	94,5	97,9	101,8	103,8	104,2	105,4	107,4	107,9	123,6		
1975	16,6	20,7	26,0	36,9	41,7	42,0	42,0	42,0	42,0	42,0	42,0	51,5	63,6	65,6		
1974	12,8	15,7	20,2	35,3	37,9	41,9	42,7	42,7	43,4	43,4	43,4	45,1	55,4	71,3		
1973	9,8	13,8	18,5	31,3	40,8	48,1	49,8	51,8	54,4	55,1	56,3	56,3	56,3	56,6		
1972	7,0	10,0	16,0	20,8	27,0	27,0	27,0	27,0	27,0	27,0	27,0	27,0	30,3	31,0		
1971	7,1	11,6	15,3	19,9	32,2	36,1	36,8	36,8	36,8	37,0	39,5	47,7	57,5	57,6		
1970	11,6	18,0	25,8	38,7	41,0	43,1	43,8	44,1	44,1	44,1	44,1	44,1	44,1	44,1		
1969	8,7	12,9	14,2	18,8	23,4	24,3	28,7	35,4	38,5	39,1	48,2	56,6	68,2	97,5		
1968	11,4	17,8	23,4	25,9	35,4	37,2	38,8	39,5	40,3	40,3	40,3	48,6	59,4	65,7		
1967	7,0	12,1	14,6	18,0	24,1	27,9	31,7	34,9	37,1	37,4	37,4	39,2	41,4	44,9		
1966	5,0	7,0	9,8	11,8	11,8	15,3	15,3	15,3	15,3	15,3	15,3	15,3	15,3	42,9		
				</												

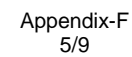
Appendix-F

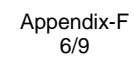
Geological Sections of Kavsakbendi Dam, HPP Units, Quarries and Storage Sites

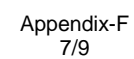


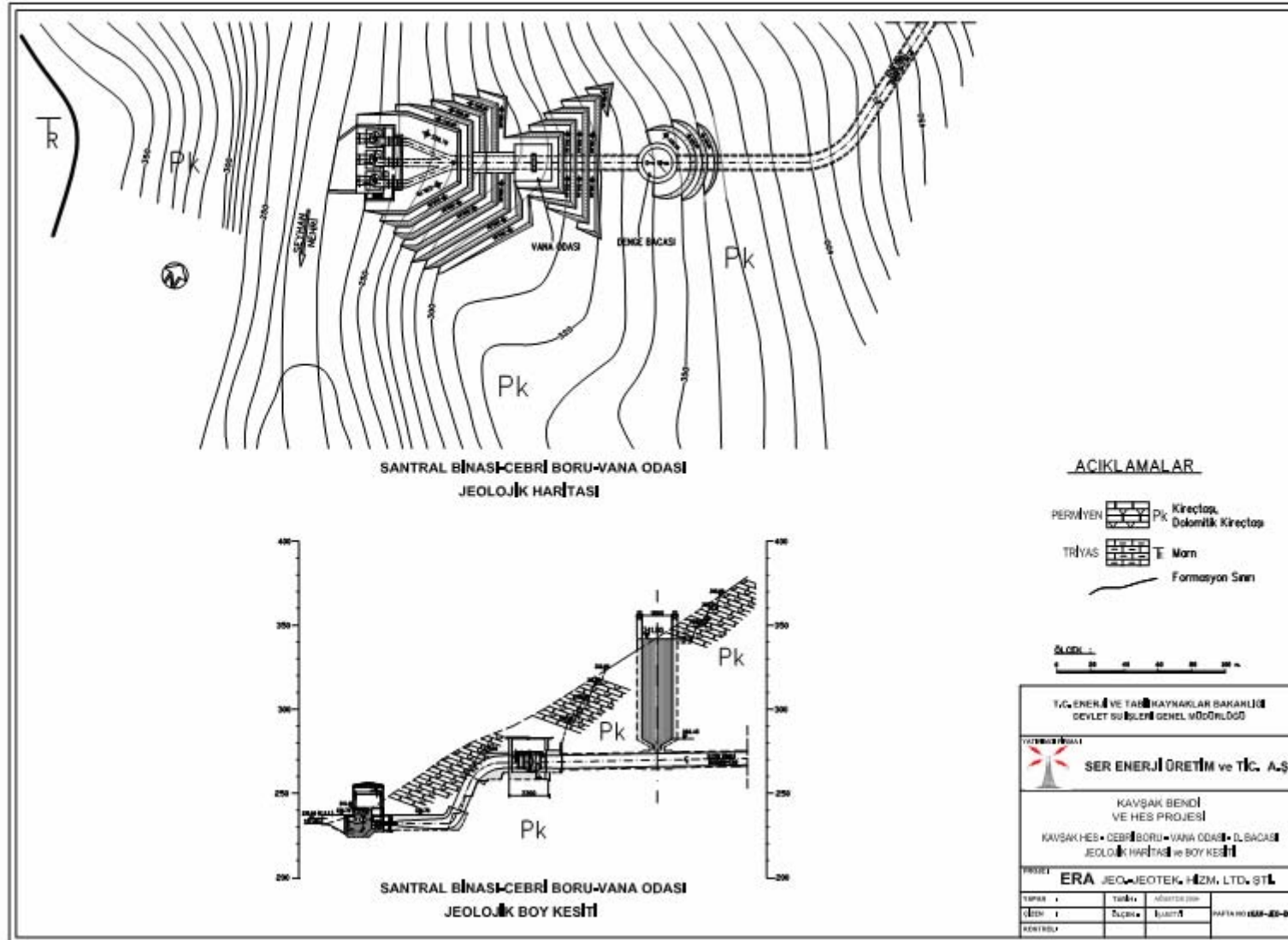


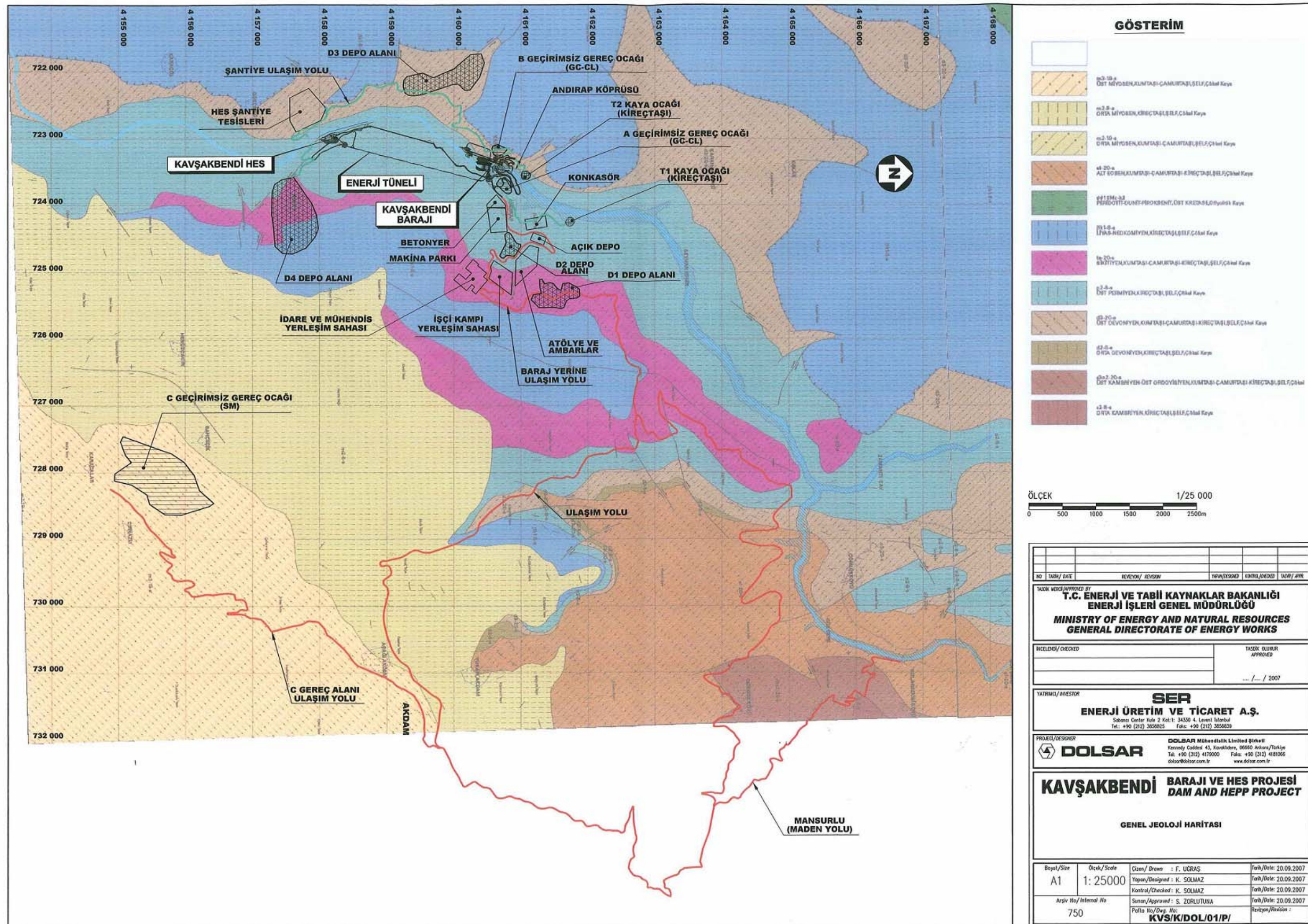






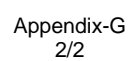






Appendix-G

Forestry Map



Appendix-H

Fauna

FAUNA INVENTORY

The fauna inventory is prepared based on a comprehensive literature review and observations of the local residents as well as the site surveys. Scientific names, habitat, population density, status according to Bern Convention and endemism status of each specie is stated clearly. Faunal inventory includes amphibies as well as other species. Kiziroglu (1993) is used for the birds under risk. IUCN (2006) and Demirsoy (1996) is the are the fererences fauna species. The scale for the risk class areas follows.

The species given in Appendix II of Bern Convention are the species that are definitely protected, whereas the ones included in Appendix III are the species that are protected for specific periods.

In the content of the lists, the status of the fauna species according to Bern Convention and the condition of the birds and mammals according to "Central Hunting Commission Decision 2006-2007" are stated. In the column of Central hunting Commission Decision, the abbreviations KK and BZ mean always protected and hunted in defined periods (especially expect for reproduction period), respectively.

Risk Classes for the Birds Used by Kiziroglu (1993):

- 1 A1 : Extinct or have endanger of being extinct
- 2 A1.1 : Extinct species
- 3 A1.2 : Species whose population is between 1-25 pairs in entire country
- 4 A2 : Species whose population is between 26-50 pairs in entire country and under the risk of extinction.
- 5 A3 : Species whose population is between 51-200 (500) pairs in entire country and can be endangered in near future
- 6 A4 : Species high in population in entire country, but getting extincted in some particular regions
- 7 B : The species coming to Turkey tempoarily and those will be in risk by the loss of the biotops
- 8 B1 : Species that use Anatolia as sheltered place but they do not reproduce in Turkey
- 9 B2-B3 : They pass from Anatolia as transit region, they use Anatolia as shelter and these species have lower risk of extinction

Local: Always present in the region

Summer Migratory: Arrives in spring time, migrates in autumn after reproducing

Winter Migratory: Arrives in winter, and leaves in spring but not reproduce

10 Passing Birds: Pass from Anatolia as transit region or stopped off for a short period of time during migration

Risk Classes according to IUCN (2004):

EW: Extinct in the wild

A taxon is Extinct in the wild when it is known only to survive in cultivation, in captivity or as a naturalised population (or populations) well outside the past range.

CR: Critically Endangered

A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future.

EN: Endangered

A taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future.

VU: Vulnerable

A taxon is vulnerable when it is not critically endangered.

LR : Lower Risk

A taxon is Lower Risk when it has been evaluated, does not satisfy the criteria for any of the categories Critically Endangered, Endangered or Vulnerable. Taxa included in the Lower Risk category can be separated into two subcategories:

- (cd) Conservation Dependent: Taxa which are the focus of a continuing taxon- or habitat-specific conservation program targeted towards the taxon in question, the cessation of which would result in the taxon qualifying for one of the threatened categories above within a period of five years.
- (nt) Near Threatened: Taxa which do not qualify for Conservation Dependent, but which are close to qualifying for Vulnerable.
- (lc) Least Concern: A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened.

Abbreviations

FI	: population density around activity area and its surrounding
FD	: population density out of activity area and its surrounding (1: low, 2: medium, 3: high)
IUCN 2004	: Red List of Globally Threatened Species
AVL	: Central Hunting Commission Decision
END	: endemic
RDB	: Kiziroglu (1993) Risk Classes
B	: West
G	: South
K	: North
D	: East
GD	: Southeast
O	: Middle
End	: Endemic

Distribution in Turkey

Kd	: Blacksea Region
Ma	: Marmara Region
E	: Aegean Region
A	: Mediterranean Region
I	: Inner Anatolian Region
Da	: Eastern Anatolian Region
Gda	: Southeastern Region

Table 2 Fishes

LATIN NAME	COMMON NAME	IUCN 2006	BERN	SOURCE	OBSERVATORY	HABITAT	ECONOMICAL VALUE
<i>Anguilla anguilla</i>	Fresh Water Eel	-	-	G	-	Muddy zones of inner waters	2
<i>Leuciscus cephalus</i>	Chub	LR/lc	-	G	-	Clean and cold zones of streams	1
<i>Salmo trutta macrostigma</i>	Brown Trout	DD	-	G	-	Cold mountain streams with high flow, and rich in oxygen	1
<i>Acanthobrama marmid</i>	-	-	-	L	-	Deep zones of streams with low flow	3
<i>Chondrostoma regium</i>	-	-	-	L	-	Deep and clean waters	2
<i>Phoxinellus zeregii kervillei</i>	-	LR/NT	-	L	-	In clean springs and richly vegetated zones	3
<i>Garra rufa</i>	-	-	-	G	-	Zones of graveled and stony bed of high-flow streams	3
<i>Barbus capito pectoralis</i>	Bulatmai barbel	-	-	G	-	Cold and oxygen-rich zones of streams	2
<i>Hemigrammocapoeta sauvagei</i>	-	-	-	L	-	Water surfaces of streams	3
<i>Silurus glanis</i>	European cat fish	LR/LC	App-III	G	-	Low-flow zones of streams with muddy bed	1
<i>Clarias lazera</i>	-	-	-	L	-	Bottom of streams	1
<i>Gambusia affinis</i>	Western mosquitofish	-	-	L	-	Still and warm waters	3
<i>Stizastedion lucioperca</i>	Zander	-	-	G	-	Cold and oxygen-rich zones of streams	1
<i>Cyprinus carpio</i>	Common carp	DD	-	G	-	Low-flow streams with muddy and graveled bed	1
<i>Nemacheilus tschaiyssuensis</i>	-	VU	-	L	-	Sandy and graveled beds of streams and creeks with low-flow	3
<i>Capoeta capoeta angorae</i>	Transcaucasian barb	-	-	L	-	High-flow streams with zones of gravel and stone in the bottom	1
<i>Capoeta barroisi</i>	Capoeta	-	-	L	-	Low-flow streams with muddy and graveled bottom	1

Table 2 Amphibians

LATIN NAME	COMMON NAME	IUCN 2006	BERN	SOURCE	HABITAT	OBSERVATORY
Bufonidae						
<i>Bufo viridis viridis</i>	Green toad	LC	App - II	Q	Cavities under stones and inside soil	-
Pelobatidae						
<i>Pelobates syriacus</i>	Eastern spadefoot	LC	App - II	L	Inside near and soft soils of permanent or temporary ponds or small lakes	-
Hylidae						
<i>Hyla arborea</i>	Tree frog	LC	App - II	L	Top of trees and bulrushes	-
Ranidae						
<i>Rana ridibunda</i>	Marsh frog	LC	App - III	L	Defoliating forests and wet grasslands	-
Salamandridae						
<i>Salamandra salamandra</i>	Fire salamander	LC	-	L	Cavities under stones and inside soil	-
<i>Triturus vittatus cilicensis</i>	Banded newt	LC	-	L	In waters at an elevation of 200-300 m with max. 40 cm deepness and heavy vegetation	-

Observatory Observations are made in two points, where one is in the Project Site (G1), the other at close neighborhood (G2)

Habitat Properties of the area where the observed specie lives

IUCN 2006 Red List of Globally Threatened Species

Table 3 Reptiles

LATIN NAME	COMMON NAME	IUCN 2006	BERN	SOURCE	HABITAT	MAK 2006-2007	OBSERVATORY
Testudinidae	Tortoises						
<i>Testudo graeca</i>	Common tortoise	VU	App III	L	Stony, sandy and dy lands	KK	-
<i>Testudo marginata</i>	Marginated tortoise	LR/LC	App II	O	Gardens, forest, grass lands, stony places		-
<i>Mauremys caspica</i>	Stripe-necked terrapin	-	App II	O	Gardens, forest, grass lands, stony places	KK	-
Chamaeleonidae	Chamelon						
<i>Chameleo chameleon</i>	Mediterranean chameleon	-	App-II	L	Heavily vegetated stony areas	KK	-
Scincidae	Skinks						
<i>Chalcides ocellatus</i>	-	-	App-II	Q	Copses and stony areas	KK	-
Gekkonidae	-						
<i>Hemidactylus turcicus</i>	Turkish gecko	-	App III	L	Rocky, stony areas and houses	KK	-
Lacertidae	Lacertides						
<i>Lacerta trilineata</i>	Green lizard	LC	App II	L	Gardens, forest, grass lands	KK	-
<i>Ophisops elegans</i>	Snake-eyed lizard	-	App III	L	Poorly vegetated and stony, elevated steppes	KK	-
Typhlopidae	Blind Snakes						
<i>Thyplops vernicularis</i>	European blind snake		App III	Q	Under stones and inside of humid soil	KK	-
Colubridae	Colubrids						
<i>Coluber najadum</i>	Dahl's whip snake	-	App II	Q	Copses and stony areas	KK	-
<i>Coluber schmidtii</i>	-	-	App III	Q	Stony coffer sides, farmlands and slopes of hills	KK	-
<i>Coluber ravergieri</i>	Coin snake	-	App III	L	Poorly vegetated stony places	KK	-
<i>Coluber jugularis</i>	Large whip snake	-	App II	Q	Copses and stony areas	KK	-
<i>Eirenis modestus</i>	Dwarf snake	-	App III	Q	Poorly vegetated stony places	KK	-
<i>Elaphe quatuorlineata</i>	Four-lined snake	-	App II	Q	Poorly forested and stony regions with copses	KK	-
<i>Natrix tessellata</i>	Dice snake	-	App II	Q	In-water and water banks	KK	-

Observatory Observations are made in two points, where one is in the Project Site (G1), the other at close neighborhood (G2)

Habitat Properties of the area where the observed specie lives

IUCN 2006 Red List of Globally Threatened Species

Table 4 Birds

LATIN NAME	COMMON NAME	LOCATION	FI	FD	RED DATA BOOK	IUCN 2006	END.	BERN	MAK 2006-2007	SOURCE
Ardeidae	Hérons									
<i>Ardea cinerea</i>	Grey heron	Local	-	2	A3	-	-	-	KK	O
<i>Egretta garzetta</i>	Little egret	Local and Migratory	-	2	A2	LC	-	App-II	KK	O
<i>Ardeola ralloides</i>	Squacco heron	Summer Migratory	-	2	A3	LC	-	App-II	KK	O
Ciconiidae	Storks									
<i>Ciconia ciconia</i>	White stork	Summer Migratory	1	2	A3	LC	-	App-II	KK	L
<i>Ciconia nigra</i>	Black stork	Summer Migratory	1	2	A2	LC	-	App-II	KK	L
Anatidae	Ducks									
<i>Tadorna ferruginea</i>	Ruddy shelduck	Local	1	3	A2	LC	-	App-II	KK	Q
<i>Anas platyrhynchos</i>	-	Local-Winter Migratory	2	2	A4	-	-	-	BZ	L
<i>Anas strepera</i>	Gadwall	Local-Winter Migratory	2	3	A3	LC	-	-	BZ	L
<i>Anas crecca</i>	Green-winged teal	Local-Winter Migratory	1	3	A4	LC	-	-	KK	L
Accipitridae	Hawks									
<i>Haliaeetus albicilla</i>	-	Local	-	2	A2	LC	-	App-II	KK	Q
<i>Milvus migrans</i>	Black kite	Summer Migratory	-	2	A4	LC	-	App-II	KK	L
<i>Milvus milvus</i>	Red kite	Local and Passing bird	-	2	B3	NT	-	App-II	KK	Q
<i>Accipiter nisus</i>	-	Local	-	2	A4	LC	-	App-II	KK	Q
<i>Accipiter brevipes</i>	Levant sparrowhawk	Summer Migratory	-	2	A3	LC	-	App-II	KK	L
<i>Buteo rufinus</i>	Long-legged buzzard	Local	-	2	A2	LC	-	App-II	KK	Q
<i>Aquila chrysaetos</i>	Golden eagle	Summer Migratory	-	2	A3	LC	-	App-II	KK	L
<i>Aquila heliaca</i>	Imperial eagle	Local	-	2	A2	VU	-	App-II	KK	Q
<i>Aquila clanga</i>	Greater spotted eagle	Winter Migratory	-	2	B2	VU	-	App-II	KK	L
<i>Hieraaetus pennatus</i>	-	Summer Migratory	-	2	A2	LC	-	App-II	KK	L
<i>Circaetus gallicus</i>	Short-toed eagle	Summer Migratory	-	2	A1.2.	LC	-	App-II	KK	L
<i>Circus aeruginosus</i>	Marsh harrier	Local	-	2	A3	LC	-	App-II	KK	Q
<i>Circus macrourus</i>	Pallid harrier	Winter Migratory-Passing bird	-	2	A2	NT	-	App-II	KK	L
<i>Neophron percnopterus</i>	Vulture	Local-Summer Migratory	-	2	A3	LC	-	App-II	KK	Q
<i>Gypaetus barbatus</i>	Bearded vulture	Local	-	2	A2	LC	-	App-II	KK	Q
<i>Aegypius monachus</i>	Cinereous vulture	Local	-	2	A2	NT	-	App-II	KK	Q
<i>Gyps fulvus</i>	Griffon vulture	Local	-	2	A2	LC	-	App-II	KK	Q
Falconidae	Falcons									
<i>Falco peregrinus</i>	Common Falcon	Local	1	2	A2	LC	-	App-II	KK	Q

<i>Falco cherrug</i>	Saker falcon	Local	1	2	A1.2.	EN	-	App-II	KK	Q
LATIN NAME	COMMON NAME	LOCATION	FI	FD	RED DATA BOOK	IUCN 2006	END.	BERN	MAK 2006-2007	SOURCE
<i>Falco biarmicus</i>	Lanner falcon	Local	1	2	A2	LC	-	App-II	KK	Q
<i>Falco subbuteo</i>	European hobby	Summer Migratory	1	2	A3	LC	-	App-II	KK	L
<i>Falco vespertinus</i>	Red-footed falcon	Passing bird	1	2	A2	NT	-	App-II	KK	L
<i>Falco naumanni</i>	Lesser kestrel	Summer Migratory	2	3	A3	VU	-	App-II	KK	L
<i>Falco tinnunculus</i>	Common kestrel	Local	2	3	A4	LC	-	App-II	KK	Q
Phasianidae	Pheasants									
<i>Tetraogallus caspius</i>	Caspian snowcock	Local	3	3	A1.2.	LC	-	App-II	KK	Q
<i>Alectoris chukar</i>	Chukar	Local	2	3	A2	LC	-	-	BZ	Q
<i>Coturnix coturnix</i>	Quail	Summer Migratory	1	3	A4	LC	-	-	BZ	L
Scolopacidae	Sandpipers									
<i>Tringa totanus</i>	Redshank	Winter Migratory	2	2	A3	LC	-	-	KK	L
<i>Tringa glareola</i>	Wood sandpiper	Winter Migratory	1	2	B3	LC	-	App-II	KK	L
<i>Tringa ochropus</i>	Green sandpiper	Passing bird	1	2	B2	LC	-	App-II	KK	L
<i>Scolopax rusticola</i>	Woodcock	Winter Migratory	1	3	A3	LC	-	-	BZ	L
Laridae	Gulls									
<i>Larus ridibundus</i>	Black-headed gull	Winter Migratory	2	3	B3	LC	-	-	KK	L
Columbidae	Doves									
<i>Columba livia</i>	Rock dove	Local	1	3	-	LC	-	App-II	BZ	Q
<i>Columba oenas</i>	Stone dove	Local	2	2	A2	LC	-	App-II	KK	Q
<i>Columba palumbus</i>	Woodpigeon	Local	2	3	A4	LC	-	App-III	BZ	Q
<i>Streptopelia turtur</i>	Turtle dove	Summer Migratory	2	2	A2	LC	-	-	BZ	L
Cuculidae	Cuckoos									
<i>Cuculus canorus</i>	Common Cuckoo	Summer Migratory	2	2	-	LC	-	-	KK	L
Strigidae	Owls									
<i>Bubo bubo</i>	Eagle owl	Local	2	2	A1.2.	LC	-	App-II	KK	Q
<i>Ketuba zeylonensis</i>	-	Local	2	2	A1.2.	-	-	App-II	KK	Q
<i>Asio otus</i>	Long-eared owl	Local	2	2	A2	LC	-	App-II	KK	Q
<i>Otus scops</i>	Scops owl	Local	2	2	A3	LC	-	App-II	KK	Q
<i>Athene noctua</i>	-	Local	2	2	A3	LC	-	App-II	KK	Q
<i>Strix aluco</i>	Tawny owl	Local	2	2	A1.2.	LC	-	App-II	KK	Q
Caprimulgidae	Goatsuckers									
<i>Caprimulgus europaeus</i>	Nightjar	Summer Migratory	2	2	A2	LC	-	App-II	KK	L
Apodidae	Swifts									

<i>Apus apus</i>	Common Swift	Summer Migratory	2	2	A4	LC	-	-	KK	L
LATIN NAME	COMMON NAME	LOCATION	FI	FD	RED DATA BOOK	IUCN 2006	END.	BERN	MAK 2006-2007	SOURCE
<i>Apus melba</i>	Alpine swift	Summer Migratory	1	2	A4	-	-	App-II	KK	L
Meropidae	Bee-eaters									
<i>Merops apiaster</i>	Bee-eater	Summer Migratory	1	2	A4	LC	-	App-II	KK	L
Corvidae	Crows									
<i>Goracias garrulus</i>	-	Summer Migratory	2	2	A2	-	-	-	-	L
Alcedinidae	Kingfishers									
<i>Alcedo atthis</i>	Kingfisher	Local	2	2	A1.2.	LC	-	App-II	KK	Q
Upupidae	Hoopoes									
<i>Upupa epops</i>	Hoope	Summer Migratory	1	2	A2	LC	-	App-II	KK	L
Picidae	Woodpeckers									
<i>Picus viridis</i>	Green woodpecker	Local	2	2	A2	LC	-	App-II	KK	Q
<i>Dendrocopos syriacus</i>	Syrian woodpecker	Local	2	2	A3	LC	-	App-II	KK	Q
<i>Dendrocopos major</i>	Great spotted woodpecker	Local	2	3	A3	LC	-	App-II	KK	Q
<i>Dendrocopos minor</i>	Lesser spotted woodpecker	Local	2	2	A4	LC	-	App-II	KK	Q
<i>Dendrocopos leucotos</i>	White backed woodpecker	Local	2	3	A2	LC	-	App-II	KK	Q
<i>Jynx torquilla</i>	Wryneck	Passing bird	1	2	A3	LC	-	App-II	KK	O
Hirundinidae	Swallows									
<i>Hirundo daurica</i>	Red-rumped swallow	Summer Migratory	2	2	-	-	-	App-II	KK	L
<i>Ptyonoprogne rupestris</i>	Crag martin	Summer Migratory			-	-	-	App-II	KK	L
Alaudidae	Larks									
<i>Eremophila alpestris</i>	Shore lark	Local	1	2	A3	LC	-	App-II	KK	Q
<i>Melanocorypha bimaculata</i>	Bimaculated lark	Summer Migratory	1	3	-	LC	-	App-II	KK	L
<i>Alauda arvensis</i>	Common lark	Local	1	2	-	LC	-	-	-	Q
<i>Lullula arborea</i>	Woodlark	Local	2	3	-	LC	-	-	-	Q
Motacillidae	Pipits									
<i>Anthus trivialis</i>	-	Summer Migratory	2	2	-	LC	-	App-II	KK	L
<i>Motacilla alba</i>	Pied wagtail	Local	2	2	A4	LC	-	App-II	KK	Q
Pycnonotidae	-									
<i>Pycnonotus xanthopygos</i>	-	Local	1	2	A4	LC	-	-	KK	Q
Laniidae	Shrikes									
<i>Lanius minor</i>	Lesser grey shrike	Summer Migratory	2	2	-	LC	-	App-II	KK	L
<i>Lanius collurio</i>	Red-backed shrike	Summer Migratory	2	3	-	LC	-	App-II	KK	L
Prunellidae	Accentors									

<i>Prunella collaris</i>	-	Local	1	2	-	LC	-	App-II	KK	Q
LATIN NAME	COMMON NAME	LOCATION	FI	FD	RED DATA BOOK	IUCN 2006	END.	BERN	MAK 2006-2007	SOURCE
<i>Prunella ocularis</i>	-	Local	2	2	-	LC	-	App-II	KK	Q
<i>Prunella modularis</i>	Dunnock	Winter Migratory	1	2	-	LC	-	App-II	KK	O
Sylviidae	Old world warblers									
<i>Acrocephalus scirpaceus</i>	Reed warbler	Summer Migratory	1	2	-	LC	-	App-II	KK	L
<i>Cisticola juncidis</i>	Fan-tailed warbler	Local	1	2	-	LC	-	App-II	KK	Q
<i>Hippolais icterina</i>	Icterine warbler	Passing bird	2	2	A3	LC	-	App-II	KK	L
<i>Hippolais olivetorum</i>	Olive-tree warbler	Summer Migratory	2	2	-	LC	-	App-II	KK	L
<i>Sylvia communis</i>	Akgerdan	Summer Migratory	2	2	-	LC	-	App-II	KK	L
<i>Sylvia curruca</i>	Lesser whitethroat	Passing bird	2	2	-	LC	-	App-II	KK	L
<i>Sylvia borin</i>	Garden warbler	Passing bird	2	2	-	LC	-	App-II	KK	L
<i>Sylvia nisoria</i>	Barred warbler	Passing bird	2	2	-	LC	-	App-II	KK	L
<i>Sylvia atricapilla</i>	Blackcap	Passing bird	2	2	-	LC	-	App-II	KK	L
<i>Sylvia hortensis</i>	Orphean warbler	Passing bird	1	3	-	LC	-	App-II	KK	L
<i>Sylvia melanocphala</i>	Sardinian warbler	Local	2	2	-	-	-	App-II	KK	Q
<i>Sylvia rueppelli</i>	Ruppel's warbler	Summer Migratory	1	2	-	LC	-	App-II	KK	L
<i>Phylloscopus trochilus</i>	Willow warbler	Passing bird	1	3	-	LC	-	App-II	KK	L
<i>Phylloscopus collybita</i>	Chiffchaff	Winter Migratory	1	3	-	LC	-	App-II	KK	Q
<i>Phylloscopus bonelli</i>	Bonelli's warbler	Summer Migratory	1	2	-	LC	-	App-II	KK	L
<i>Phylloscopus sibilatrix</i>	Wood warbler	Passing bird	2	2	-	LC	-	App-II	KK	L
Cisticolidae										
<i>Prinia gracilis</i>	Graceful warbler	Local	2	2	-	LC	-	-	KK	Q
Regulidae	-									
<i>Regulus regulus</i>	Goldcrest	Local	1	2	-	LC	-	App-II	KK	Q
Muscicapidae	Flycatchers									
<i>Muscicapa striata</i>	Spotted flycatcher	Local	2	2	-	LC	-	App-II	KK	Q
<i>Saxicola torquata</i>	Stonechat	Local	2	3	-	-	-	App-II	KK	Q
<i>Oenanthe oenanthe</i>	Northern wheatear	Local	2	3	A3	LC	-	App-II	KK	Q
<i>Oenanthe isabellina</i>	Isabelline wheatear	Summer Migratory	2	2	-	LC	-	App-II	KK	L
<i>Oenanthe hispanica</i>	Black-eared wheatear	Summer Migratory	2	2	-	LC	-	App-II	KK	L
<i>Oenanthe finschii</i>	Finsch's wheatear	Passing bird	2	2	-	LC	-	App-II	KK	O
<i>Phoenicurus ochruros</i>	Black redstart	Summer Migratory	1	2	-	LC	-	App-II	KK	O
<i>Phoenicurus phoenicurus</i>	Redstart	Local	2	2	-	LC	-	App-II	KK	Q
<i>Erithacus rubecula</i>	Robin	Local	2	3	-	LC	-	App-II	KK	Q

<i>Luscinia megarhynchos</i>	Nightingale	Summer Migratory	2	2	A3	LC	-	App-II	KK	O
LATIN NAME	COMMON NAME	LOCATION	FI	FD	RED DATA BOOK	IUCN 2006	END.	BERN	MAK 2006-2007	SOURCE
<i>Irania gutturalis</i>	White-throated robin	Winter Migratory	2	2	-	LC	-	App-II	KK	O
<i>Cercotrichas galactotes</i>	Rufous bush robin	Summer Migratory	1	2	-	-	-	App-II	KK	L
Turdidae	Thrushes						-			
<i>Monticola solitarius</i>	Blue rock thrush	Summer Migratory	1	2	-	LC	-	App-II	KK	L
<i>Monticola saxatilis</i>	Rock thrush	Summer Migratory	1	2	-	LC	-	App-II	KK	L
<i>Turdus merula</i>	Blackbird	Local	2	2	-	LC	-			
<i>Turdus torquatus</i>	Ring ouzel	Winter Migratory	1	3	-	LC	-	App-II	KK	O
<i>Turdus pilaris</i>	Fieldfare	Winter Migratory	1	2	-	LC	-	-	KK	O
<i>Turdus iliacus</i>	Redwing	Winter Migratory	2	2	-	LC	-	-	KK	O
<i>Turdus philomelos</i>	Song thrush	Winter Migratory	1	2	-	LC	-	-	KK	O
<i>Turdus viscivorus</i>	Mistle thrush	Local	2	2	-	LC	-	-	KK	Q
Paridae	Chickadees									
<i>Aegithalos caudatus</i>	Long-tailed tit	Local	1	2	A2	LC	-	App-II	KK	Q
<i>Parus ater</i>	Coal tit	Local	2	3	-	LC	-	App-II	KK	Q
<i>Parus major</i>	Great tit	Local	2	3	-	LC	-	App-II	KK	Q
<i>Parus caeruleus</i>	Blue tit	Local	1	2	-	LC	-	App-II	KK	Q
<i>Parus lugubris</i>	Somber tit	Local	1	3	A4	LC	-	App-II	KK	Q
Sittidae	Nuthatches									
<i>Sitta krueperi</i>	Kruper's nuthatch	Local	2	2	-	NT	-	App-II	KK	Q
<i>Sitta europaea</i>	Common nuthatch	Local	2	2	-	LC	-	App-II	KK	Q
<i>Sitta neumayer</i>	Rock nuthatch	Local	2	2	-	LC	-	App-II	KK	Q
Certhiidae	Northern creepers									
<i>Certhia brachydactyla</i>	Short-toed treecreeper	Local	2	2	-	LC	-	App-II	KK	Q
Troglodytidae	Wrens									
<i>Troglodytes troglodytes</i>	Common wren	Winter Migratory	1	2	A3	LC	-	App-II	KK	O
Cinclidae	-									
<i>Cinclus cinclus</i>	-	Local	2	2	A3	LC	-	App-II	KK	Q
Emberizidae	Buntings									
<i>Emberiza cia</i>	Rock bunting	Local	2	2	-	LC	-	App-II	KK	Q
<i>Emberiza melanocephala</i>	Blac-headed bunting	Summer Migratory	1	2	A3	LC	-	App-II	KK	O
<i>Emberiza hortulana</i>	Common bunting	Summer Migratory	1	2	A3	LC	-	-	KK	O
<i>Emberiza buchanani</i>	Grey-necked bunting	Summer Migratory	1	2	-	LC	-	-	KK	O
<i>Emberiza cineracea</i>	Cinereous bunting	Summer Migratory	2	2	-	NT	-	App-II	KK	O

<i>Emberiza caesia</i>	Cretzschmar's bunting	Summer Migratory	2	2	-	LC	-	App-II	KK	O
LATIN NAME	COMMON NAME	LOCATION	FI	FD	RED DATA BOOK	IUCN 2006	END.	BERN	MAK 2006-2007	SOURCE
Fringillidae	Finches									
<i>Fringilla coelebs</i>	Chaffinch	Local	-	2	-	LC	-	App-III	KK	L
<i>Carduelis carduelis</i>	Goldfinch	Local	-	2	A4	LC	-	App-II	KK	L
<i>Carduelis spinus</i>	-	Winter Migratory	-	2	-	LC		App-II	-	L
<i>Carduelis chloris</i>	Green finch	Local	-	2	A4	LC	-	App-II	KK	L
<i>Carduelis cannabina</i>	Linnet	Local	-	2	A4	LC	-	-	KK	O
<i>Serinus serinus</i>	Serin	Local	-	2	-	LC		App-II	-	Q
Passeridae	Sparrows									
<i>Passer domestica</i>	Common sparrow	Local	3	3	-	LC	-	App-III	BZ	O
<i>Passer hispaniolensis</i>	Spanish sparrow	Local	3	3	-	LC	-	-	-	O
<i>Petronia petronia</i>	Rock sparrow	Local	2	3	-	LC	-	App-II	-	Q
Sturnidae	Starlings									
<i>Sturnus vulgaris</i>	Common starling	Local	3	3	-	LC	-	App-III	BZ	O
Oriolidae	Orioles									
<i>Oriolus oriolus</i>	Golden oriole	Summer Migratory	-	1	-	LC	-	App-II	KK	L
Corvidae	Crows									
<i>Garrulus glandarius</i>	Jay	Local	-	3	-	LC	-	App-III	KK	O
<i>Pica pica</i>	Magpie	Local	2	3	-	LC	-	App-III	BZ	O
<i>Pyrrhocorax pyrrhocorax</i>	Chough	Local	1	3		LC	-	App-II	-	O
<i>Pyrrhocorax graculus</i>	Alpine chough	Local	1	3		LC	-	App-II	-	Q
<i>Corvus corax</i>	Raven	Local	-	2	-	LC	-	App-III	BZ	Q
<i>Corvus corone</i>	Hooded crow	Local	2	3	-	LC	-	App-III	BZ	O
<i>Corvus frugilegus</i>	Rook	Local	3	3	-	LC	-	App-III	BZ	O
<i>Corvus monedula</i>	jackdaw	Local	3	3	-	LC	-	App-III	BZ	O
FI Population density in Project Site and its vicinity FD Population density outside Project Site and its vicinity (1: Low, 2: Medium, 3: High) IUCN 2006 Red List of Globally Threatened Species AVL Decision of Central Hunting Commission END Endemic RDB Kiziroglu (1993) Risk Classes Source: Q questionnaire (information obtained from local people)A O observation G H habitat suitability L literature										

Table 5 Mammals

LATINCE ADI	COMMON NAME	IUCN 2006	BERN	SOURCE	HABITAT	MAK 2006-2007	OBSERVATORY
Erinaceidae							
<i>Erinaceus concolor</i>	Eastern hedgehog	LR/lc	-	A	Houses and ruins	KK	-
Soricidae							
<i>Crocidura leucodon</i>	bicoloured white-toothed shrew	LR/lc	App-III	L	Clear lands and copses	-	-
<i>Apodemus sylvaticus</i>	Wood mouse	LC	App-III	G	Clear lands and copses	-	-
Vespertilionidae							
<i>Pipistrellus pipistrellus</i>	Common pipistrelle	LC	App III	L	Various media	-	-
<i>Plecotus auritus</i>	-	LR/lc	App-II	L	Various media	KK	-
<i>Myotis brandtii</i>	-	-	App-II	L	Woodlads, caves, cavities	KK	-
Rhinolopidae							
<i>Rhinolophus hipposideros</i>	Lesser horseshoe bat	VU	App II	L	Woodlads, caves, cavities	KK	-
Leporidae							
<i>Lepus europeus</i>	Brown hare	LR/lc	-	G	Copses, grass and gardens	BZ	-
Sciuridae							
<i>Spermophilus citellus</i>	Red squirrel	-	App-II	G	Woodlads, caves, cavities	KK	-
Muridae							
<i>Apodemus mystanicus</i>	Rock mouse	LR/lc	-		Stony – rocky places	-	-
Canidae							
<i>Canis lupus</i>	Wolf	LC	App-II	A	Forest and copses	KK	-
<i>Canis aureus</i>	Common jackal	LC	-	A	Forest and copses	BZ	-
<i>Vulpes vulpes</i>	Fox	LC	-	G	Forest and copses, grass	BZ	-
Mustellidae							
<i>Martes martes</i>	European pine marten	LR/lc	App-III	G	Creeks and streams banks, mouths of deltas, forests and copses	BZ	-
<i>Mustela nivalis</i>	Weasel	LR/lc	App III	L	Woodlands and creek sides	KK	-
<i>Meles meles</i>	Eurasian badger	LR/lc	App III	L	Forests, copses, grass and gardens	KK	-
<i>Lutra lutra</i>	Otter	NT	App II	L	Creek and river sides, mouth of delta and heavily vegetated zones	KK	-
Suidae							
<i>Sus scrofa</i>	Wild boar	LR/lc	-	L	Forests and muddy zones	BZ	-

Gözlem istasyonu Proje sahəsi sınırları içinde (G1) ve yakın çevresinde (G2) olmak üzere iki noktada gözlem yapılmıştır.

Habitat Properties of the area where the observed specie lives

IUCN 2006 Red List of Globally Threatened Species

Appendix-I

Flora

FLORA INVENTORY

The flora inventory is prepared in the light of the site surveys and literature studies. The reference named "Flora of Turkey and the East Aegean Islands, Volume 1-10, 1965-1988" of P. H. Davis is utilized in the determination of species. This book is also the reference for the authors of the taxa stated in the list. The regional flora list is prepared in alphabetic order. The habitat, flora zone, endemism and relative abundance of species as well as risk classes existing in Red Data Book of Turkey are mentioned in the list. The scale and abbreviations stated in the list are defined below.

The floral inventory list of Project Site and its vicinity is presented in Table 1. This table displays common name, distribuion over Turkey, phytogeographic origin and and habitat of the specie as well as scientific names. Abbreviations and symbols used in Table 1 is as follows:

Habitat	1 – Culture areas
	2 – Gravel slopes
	3 – Stony places
	4 – Sides of the roads
	5 – Dry grassland
	6 – Humid grass, wetland
	7 – Bushes
	8 – Forest

Distribution in Turkey

K	: North
G	: South
D	: East
B	: West
Ic	: Central
Dis	: Outer

Relative Abundance Classes

The numbers given indicate the frequency of occurence of species and based on observation.

1	– Very rare
2	– Rare
3	– Medium degree abundant
4	– Abundant
5	– Very abundant

Endemism (End.) Indicates that species is endemic.

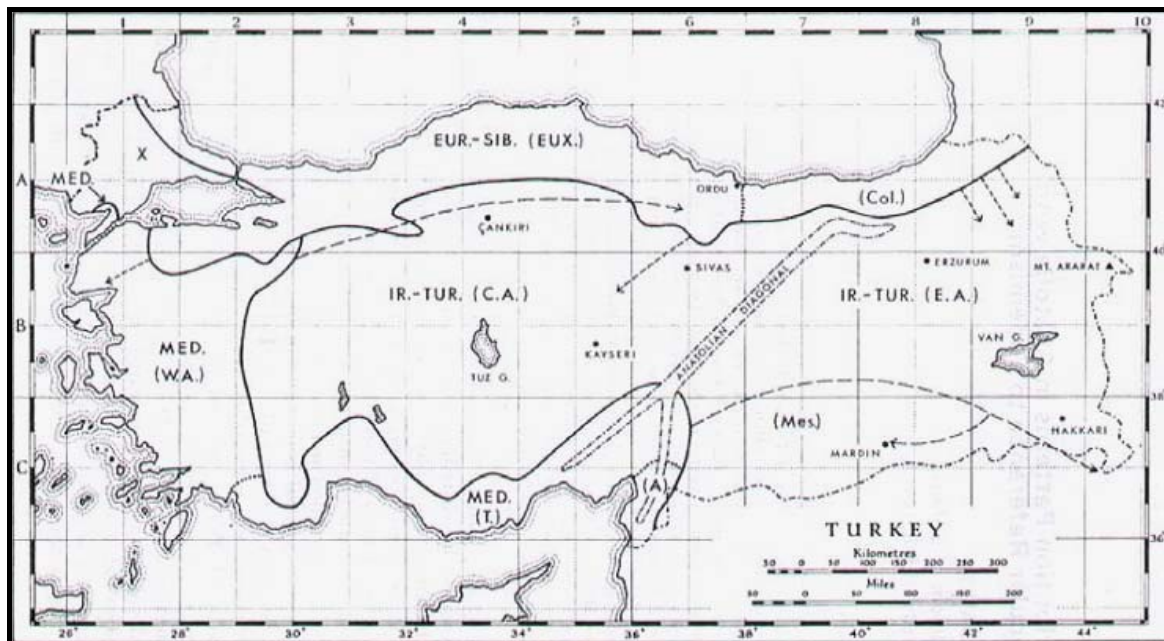
Risk Classes according to IUCN (1994)

Red Data Book of Turkey has been classified the endemic and rare species according to Red List Categories published by IUCN in 1994. Explanation of these categories are given below:

- EW :** “*Extinct in the wild*” A taxon is Extinct in the wild when it is known only to survive in cultivation, in captivity or as a naturalised population (or populations) well outside the past range.
- CR :** “*Critically Endangered*” A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future.
- EN :** “*Endangered*” A taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future.
- VU :** “*Vulnerable*” A taxon is vulnerable when it is not critically endangered.
- LR :** “*Lower risk*” A taxon is Lower Risk when it has been evaluated, does not satisfy the criteria for any of the categories Critically Endangered, Endangered or Vulnerable. Taxa included in the Lower Risk category can be separated into two subcategories:
- (cd) :** “*Conservation Dependent*” Taxa which are the focus of a continuing taxon- or habitat-specific conservation program targeted towards the taxon in question, the cessation of which would result in the taxon qualifying for one of the threatened categories above within a period of five years.
- (nt) :** “*Near Threatened*” Taxa which do not qualify for Conservation Dependent, but which are close to qualifying for Vulnerable.
- (lc) :** “*Least Concern*” A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened.

PHYTOGEOGRAPHICAL REGIONS OF TURKEY

[Davis P.H., Harper P.C. and Hege I.C. (eds.), 1971. Plant Life of South-West Asia. The Botanical Society of Edinburg]



EUR.-SIB.(EUX): European-Siberian Region(sub-region); Col.: Kolsik secture of Oksin sub-region

MED.: Mediterranaen Region (Eastern Mediterranaen sub-region); W.A: Western Anatolian Region; T.: Taurus Region; A.:Amanus Region

IR.-TUR.: Iran-Turanien Region; C.A.: Central Anatolia Region; E.A.: Eastern Anatolian Region (Mes: Mezsopotamia)

X: Most probably Central European/Balkan sub-region of European-Siberian Region

(mt): Mountain

Table 1 Local Flora Inventory

SCIENTIFIC NAME	Common Name	HABITAT								ENDEMISM	IUCN 2006	BERN	CITES	FLORA ZONE	DISTRIBUTION IN TURKEY	RELATIVE ABUNDANCE
		1	2	3	4	5	6	7	8							
SPERMATOPHYTA																
Gymnospermae																
Acanthaceae																
<i>Acanthus dioscoridis</i> var. <i>dioscoridis</i>	Bear's breech	+	+	+	+	+				-	-	-	-	-	D. Anatolia	2
<i>Acanthus dioscoridis</i> var. <i>peringii</i>	"	+	+	+	+	+				+	-	-	-	-	G. Anatolia	3
<i>Acanthus hirsutus</i>	"	+				+			+	-	-	-	-	-	B.,O.,G, Anatolia	2
<i>Acanthus syriacus</i>	Syrian acanthus		+	+						-	-	-	-	Med.	G. and D. Anatolia	3
Aceraceae																
<i>Acer hyrcanum</i> subsp. <i>tauricolum</i>	Caucasian maple			+					+	-	-	-	-	Med.	G. and D. Anatolia	2
<i>Acer monspessulanum</i> subsp. <i>microphyllum</i>	"		+	+						-	-	-	-	-	G. and G.D. Anatolia	2
Adiantaceae																
<i>Adiantum capillus-veneris</i>	Common maidenhair	+		+		+				-	-	-	-	-	Dis Anatolia	2
Alismataceae																
<i>Alisma lanceolatum</i>	Lanceleaf water plantain						+			-	-	-	-	-	Wide Spread	2
<i>Alisma plantago-aquatica</i>	European water plantain						+			-	-	-	-	Eur.-Sib.	K. and G.B. Anatolia	2
<i>Damasonium alisma</i>							+			-	-	-	-	-	G. and G.B. Anatolia	2
Amaranthaceae																
<i>Amaranthus blitoides</i>	Mat amaranth					+				-	-	-	-	-	K. and G. Anatolia	2
Amaryllidaceae																
<i>Ixiolirion tataricum</i> subsp. <i>montanum</i>	siberian lily	+	+	+	+					-	-	-	-	Iran-Turan	D. Anatolia	2
<i>Narcissus tazetta</i> subsp. <i>aureus</i>	Rose of sharon			+				+	+	-	-	-	-	-	K.B. Anatolia	
<i>Sternbergia clusiana</i>	Winter daffodil		+			+				-	-	-	+	Iran-Turan	B.,G. and D. Anatolia	3
<i>Sternbergia colchiciflora</i>	"			+				+		-	-	-	+	-	Dis Anatolia	2
<i>Sternbergia fischeriana</i>	"							+	+	-	-	-	+	-	G. and G.B. Anadolu	2
Anacardiaceae																
<i>Pistacia atlantica</i>	Mt. Atlas mastic tree	+			+					-	-	-	-	-	Wide Spread	2
<i>Rhus coriaria</i>	Somak							+	+	-	-	-	-	-	Wide Spread	1
Apiaceae																
<i>Ammi visnaga</i>	Visnagin	+				+				-	-	-	-	Med.	Dis and D. Anatolia	1
<i>Anthriscus kotschy</i>	Chervil			+						-	-	-	-	-	Dis and K.D. Anatolia	2
<i>Anthriscus nemorosa</i>	"			+					+	-	-	-	-	-	Wide Spread	2
<i>Apium nodiflorum</i>	European						+			-	-	-	-	-	B. G. and G.D.	1

SCIENTIFIC NAME	Common Name	HABITAT								ENDEMISM	IUCN 2006	BERN	CITES	FLORA ZONE	DISTRIBUTION IN TURKEY	RELATIVE ABUNDANCE
		1	2	3	4	5	6	7	8							
	marshwort														Anatolia	
<i>Astrantia maxima</i> subsp. <i>haradjianii</i>	-							+	+	+	-	-	-	-	B., O., G., Anatolia	2
<i>Bunium ferulaceum</i>	-	+							+	-	-	-	-	Med.	KB, B., G. Anatolia	2
<i>Bunium microcarpum</i> subsp. <i>microcarpum</i>	-		+	+				+		-	-	-	-	Med.	B. and G. Anatolia	2
<i>Bunium paucifolium</i> var. <i>paucifolium</i>	-	+		+	+	+				-	-	-	-	Iran-Turan	D. Anatolia	3
<i>Bunium pestalozzae</i>	-			+		+				-	-	-	-	Med.	G.B. and G. Anatolia	3
<i>Bupleurum intermedium</i>	Bupleurum					+				-	-	-	-	-	K.B. and B. Anatolia	3
<i>Bupleurum lophocarpum</i>	"			+					+	+	-	-	-	Med.	G. Anatolia	3
<i>Bupleurum polyactis</i>	"	+				+				+	-	-	-	Med.	G. Anatolia	3
<i>Bupleurum zoharii</i>	"	+			+					+	-	-	-	Med.	G. Anatolia	2
<i>Caucalis platycarpus</i>	Small bur-parsley	+	+		+					-	-	-	-	-	K.B. and B. Anatolia	3
<i>Chaerophyllum crinitum</i>	Chervil	+	+							-	-	-	-	Iran-Turan	D. Anatolia	2
<i>Daucus carota</i>	Carrot	+	+			+				-	-	-	-	-	Wide Spread	3
<i>Echinophora carvifolia</i>	-							+		+	-	-	-	Med.	G. Anatolia	2
<i>Eryngium falcatum</i>	Eryngo		+	+					+	-	-	-	-	Med.	G. Anatolia	2
<i>Eryngium kotschyi</i>	"		+						+	+	-	-	-	Med. (mt)	G. Anatolia	2
<i>Ferula drudeana</i>	-		+							+	-	-	-	Med.	G. Anatolia	2
<i>Ferula elaeochoytris</i>	-		+	+						-	-	-	-	Med.	G. Anatolia	2
<i>Ferulago amani</i>	-								+	-	-	-	-	Med.	G. Anatolia	3
<i>Ferulago cassia</i>	-		+	+						-	-	-	-	Med.	G. Anatolia	3
<i>Grammosciadium confertum</i>	-	+								+	-	-	-	Med.	G. Anatolia	2
<i>Heptaptera cilicica</i>	-		+							+	-	-	-	Med.	G. Anatolia	3
<i>Heracleum humile</i>	-		+	+						-	-	-	-	Med. (mt)	K., O., G. Anatolia	2
<i>Heracleum pastinaca</i>	-			+						+	-	-	-	Med. (mt)	G. Anatolia	3
<i>Johrenia silenoides</i>	-								+	+	-	-	-	Med.	G. Anatolia	2
<i>Kundmannia syriaca</i>	-		+	+						+	-	-	-	Med.	G. Anatolia	2
<i>Lecokia cretica</i>	-		+	+						-	-	-	-	-	B., G., D. Anatolia	2
<i>Malabaila secacul</i>	-		+	+						-	-	-	-	-	K., G., D. Anatolia	3
<i>Myrrhoides nodosa</i>	-							+		-	-	-	-	-	Wide Spread	2
<i>Pimpinella corymbosa</i>	burnet saxifrage		+	+		+				-	-	-	-	Iran-Turan	G. Anatolia	3
<i>Pimpinella peregrina</i>	"		+	+		+				-	-	-	-	-	K.B., G.D. Anatolia	2
<i>Prangos meliocarpoides</i> var. <i>meliocarpoides</i>	-			+						+	-	-	-	Iran-Turan	G. Anatolia	3
<i>Seseli gummiferum</i> subsp. <i>corymbosum</i>	-		+	+						+	-	-	-	Med.	G. Anatolia	2

SCIENTIFIC NAME	Common Name	HABITAT								ENDEMISM	IUCN 2006	BERN	CITES	FLORA ZONE	DISTRIBUTION IN TURKEY	RELATIVE ABUNDANCE
		1	2	3	4	5	6	7	8							
<i>Sium sisarum</i> var. <i>lancifolium</i>	skirret						+			-	-	-	-	-	Wide Spread	2
<i>Tordylium apulum</i>	Roman pimpinell		+	+	+					-	-	-	-	Med.	B., G. Anatolia	2
<i>Tordylium elegans</i>	"			+	+					+	-	-	-	Med.	G. Anatolia	2
<i>Tordylium syriacum</i>	"	+			+					-	-	-	-	Med.	G. Anatolia	1
<i>Torilis leptophylla</i>	Bristlefruit hedgeparsley		+	+						-	-	-	-	-	Wide Spread	2
<i>Trinia scabra</i>	-		+	+		+				+	-	-	-	Iran-Turan	Ic Anatolia	1
Apocynaceae																2
<i>Nerium oleander</i>	Oleander						+			-	-	-	-	Med.	B. G. Anatolia	2
Araceae																
<i>Biarum carduchorum</i>	-					+	+			-	-	-	-	Iran-Turan	G., D. Anatolia	1
<i>Biarum eximium</i>	-					+				+	-	-	-	Med.	G Anatolia	2
Aristolochiaceae																
<i>Aristolochia billardieri</i>	Dutchman's pipe							+	+	-	-	-	-	Med.	G Anatolia	2
<i>Aristolochia cilicica</i>	"	+	+					+		+	-	-	-	Med.	G Anatolia	2
Asteraceae																
<i>Achillea cappadocica</i>	Yarrow	+	+							+	-	-	-	Iran-Turan	Ic and D. Anatolia	2
<i>Achillea gonioccephala</i>	"		+	+		+				+	-	-	-	Iran-Turan	G, D Anatolia	2
<i>Achillea grandifolia</i>	"							+		-	-	-	-	-	Dis Anatolia	2
<i>Achillea kotschyi</i> subsp. <i>canescens</i>	"		+	+		+				+	-	-	-	Med.	Ic, G Anatolia	2
<i>Achillea monocephala</i>	"			+						+	-	-	-	Iran-Turan	G Anatolia	2
<i>Achillea nobilis</i> L. subsp. <i>neilreichii</i>	Noble yarrow	+		+				+	+	-	-	-	-	Eur.-Sib.	Wide Spread	1
<i>Achillea spinulifolia</i>				+					+	+	-	-	-	Med.	G. Anatolia	1
<i>Anthemis adonidifolia</i>	Chamomile							+		+	-	-	-	-	G, D Anatolia	1
<i>Anthemis altissima</i>	Tall chamomile	+			+					-	-	-	-	-	Wide Spread	1
<i>Anthemis antitaurica</i>	Chamomile		+	+						+	-	-	-	-	G Anatolia	2
<i>Anthemis arenicola</i> var. <i>arenicola</i>	"	+		+						+	-	-	-	Med.	G Anatolia	1
<i>Anthemis arenicola</i> var. <i>urosperma</i>	"	+		+						+	-	-	-	Med.	G Anatolia	2
<i>Anthemis cretica</i> subsp. <i>cassia</i>	"		+	+						-	-	-	-	-	K, Ic, D Anatolia	1
<i>Anthemis fumariifolia</i>	"	+			+					+	-	-	-	Iran-Turan	G, D Anatolia	2

SCIENTIFIC NAME	Common Name	HABITAT								ENDEMISM	IUCN 2006	BERN	CITES	FLORA ZONE	DISTRIBUTION IN TURKEY	RELATIVE ABUNDANCE
		1	2	3	4	5	6	7	8							
<i>Anthemis hyalina</i>	"		+							-	-	-	-	-	G, D Anatolia	1
<i>Anthemis pseudocotula</i>	Chamomile	+	+		+					-	-	-	-	-	B,G,D,KB Anatolia	2
<i>Anthemis pungens</i>	"	+								+	-	-	-	-	G Anatolia	1
<i>Calendula arvensis</i>	Field marigold	+	+		+					-	-	-	-	-	Dis Anatolia	2
<i>Carduus amarus</i>	Thisle			+						+	-	-	-	Med. (mt)	G Anatolia	1
<i>Carduus nutans subsp. falcato-incurvus</i>	Musk thistle			+						+	-	-	-	-	KB Anatolia	2
<i>Carduus olympicus subsp. hypoleucus</i>	"		+	+					+	+	-	-	-	-	O, G Anatolia	1
<i>Carduus pycnocephalus subsp. albidus</i>	"	+		+					+	-	-	-	-		Wide Spread	2
<i>Centaurea aggregata subsp. aggregata</i>	Centaurea		+	+					+	-	-	-	-	-	G and D Anatolia	1
<i>Centaurea aladaghensis</i>	"					+				+	-	-	-	-	G Anatolia	1
<i>Centaurea anthemifolia</i>	"		+	+						+	-	-	-	-	G Anatolia	1
<i>Centaurea antitauri</i>	"		+	+						+	-	-	-	-	G Anatolia	2
<i>Centaurea babylonica</i>	"				+				+	-	-	-	-	Med.	G Anatolia	1
<i>Centaurea calcitrapa subsp. cilicica</i>	Red star-thistle				+					+	-	-	-	Med.	G Anatolia	2
<i>Centaurea calcitrapa subsp. calcitrapa</i>	"				+					-	-	-	-	Med.	KB, G Anatolia	1
<i>Centaurea depressa</i>	Iranian knapweed				+					-	-	-	-	-	Wide Spread	2
<i>Centaurea lycopifolia</i>	"			+					+	+	-	-	-	Med.	G Anatolia	1
<i>Centaurea mucronifera</i>	"			+						+	-	-	-	Iran-Turan	G, D Anatolia	2
<i>Centaurea pichleri subsp. extrarosularis</i>	Cornflower		+							+	-	-	-	-	Ic Anatolia	1
<i>Centaurea pichleri subsp. pichleri</i>	Knapweed		+							-	-	-	-	-	Ic Anatolia	2
<i>Centaurea polypodiifolia var. polypodiifolia</i>	"	+	+	+						-	-	-	-	Iran-Turan	D Anatolia	1
<i>Centaurea polypodiifolia var. pseudobeben</i>	"	+	+	+						+	-	-	-	Iran-Turan	D Anatolia	2
<i>Centaurea ptosimopappoides</i>	"								+	+	-	-	-	Med.	G Anatolia	1
<i>Centaurea reuterana var. phrygia</i>	"		+	+						+	-	-	-	Med.	Dis, Ic Anatolia	2
<i>Centaurea solstitialis subsp. solstitialis</i>	Yellow starthistle	+							+	-	-	-	-	-	Wide Spread	2
<i>Centaurea solstitialis subsp. carneola</i>	"	+							+	+	-	-	-	Med.	G Anatolia	2

SCIENTIFIC NAME	Common Name	HABITAT								ENDEMISM	IUCN 2006	BERN	CITES	FLORA ZONE	DISTRIBUTION IN TURKEY	RELATIVE ABUNDANCE
		1	2	3	4	5	6	7	8							
<i>Centaurea triumfettii</i>	"		+	+				+	+	-	-	-	-	-	Wide Spread	2
<i>Centaurea urvillei</i> subsp. <i>armata</i>	Knapweed		+	+						-	-	-	-	Med.	Dis Anatolia	2
<i>Cicerbita brevirostis</i>	-								+	+	-	-	-	Med.	G Anatolia	1
<i>Cicerbita mulgedioides</i>	-							+	+	-	-	-	-	-	K, G Anatolia	1
<i>Cirsium amani</i>	Thisle			+						-	-	-	-	-	G, D Anatolia	1
<i>Cirsium elodes</i>	"						+			-	-	-	-	Iran-Turan	Ic, G Anatolia	1
<i>Cirsium libanoticum</i> subsp. <i>lycaonicum</i>	"						+			+	-	-	-	Med. (mt)	G, GB Anatolia	2
<i>Cousinia foliosa</i>	-		+							+	-	-	-	Iran-Turan	Ic, G Anatolia	3
<i>Crepis amanica</i>	-		+	+						+	-	-	-	-	G Anatolia	2
<i>Crepis foetida</i> subsp. <i>foetida</i>	Stinking hawk's beard			+					+	-	-	-	-	-	K, G Anatolia	1
<i>Eclipta prostrata</i>	False daisy						+			-	-	-	-	-	G Anatolia	2
<i>Gnaphalium leucopilinum</i>				+						+	-	-	-	-	G, GD Anatolia	3
<i>Gundelia tournefortii</i> var. <i>armata</i>	Tournefort's gundelia	+	+	+					+	-	-	-	-	Iran-Turan	Ic, G Anatolia	2
<i>Helichrysum armenium</i> subsp. <i>armenium</i>	Strawflower		+	+					+	-	-	-	-	Iran-Turan	D, Ic, G Anatolia	1
<i>Helichrysum chionophilum</i>	"		+	+						+	-	-	-	-	G, Ic Anatolia	2
<i>Helichrysum stoechas</i>	Stinking everlasting		+						+	-	-	-	-	-	B, G Anatolia	2
<i>Hieracium autranii</i>	Hawkweed	+								+	-	-	-	Med. (mt)	G Anatolia	2
<i>Hieracium barbeyi</i>	"	+								+	-	-	-	Med. (mt)	G Anatolia	3
<i>Hieracium bornmuelleri</i>	"			+					+	+	-	-	-	-	K, Ic, G Anatolia	2
<i>Hieracium lasiochaetum</i>	"			+				+	+	+	-	-	-	-	K, Ic, G Anatolia	3
<i>Hieracium strigosum</i>	"	+			+					+	-	-	-	-	G Anatolia	2
<i>Leontodon oxylepis</i> var. <i>oxylepis</i>	hawkbit		+	+						-	-	-	-	Med.	GB, G Anatolia	3
<i>Leucocyclus formosus</i> subsp. <i>formosus</i>	-			+						+	-	-	-	Med.	G Anatolia	2
<i>Prenanthes glareosa</i>	Rattlesnakeroot	+		+						+	-	-	-	Med.	G Anatolia	2
<i>Rhagadiolus stellatus</i> var. <i>edulis</i>	Endive daisy		+	+						-	-	-	-	Med.	Dis Anatolia	2
<i>Scorzonera boissieri</i>		+								+	-	-	-	-	G Anatolia	3
<i>Scorzonera cana</i> var. <i>alpina</i>	Hairy viperglass		+	+		+				-	-	-	-	-	Wide Spread	2
<i>Scorzonera rigida</i>				+						-	-	-	-	Iran-Turan	G, D Anatolia	3

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		1	2	3	4	5	6	7	8							
<i>Senecio jurineifolius</i>	Ragwort		+							+	-	-	-	Med.	G A Anatolia	2
<i>Senecio tauricolus</i>	"		+	+				+		+	-	-	-	Iran-Turan	G Anatolia	1
<i>Senecio viscosus</i>	"	+	+	+						-	-	-	-	-	Ic Anatolia	2
<i>Tanacetum argenteum subsp. argenteum</i>	Tansy		+	+						+	-	-	-	Iran-Turan	G, Ic Anatolia	1
<i>Tanacetum argenteum subsp. canum var. canum</i>	"		+	+						-	-	-	-	-	K, G, D Anatolia	2
<i>Tanacetum cadmeum subsp. orientale</i>	"		+	+						+	-	-	-	Iran-Turan	Ic Anatolia	1
<i>Tanacetum cadmeum subsp. cadmeum</i>	"		+	+					+	+	-	-	-	-	GB, Ic Anatolia	2
<i>Tanacetum cilicicum</i>	"								+	-	-	-	-	Med.	G, D Anatolia	1
<i>Tanacetum densum subsp. amani</i>	"		+	+						+	-	-	-	Iran-Turan	G, D Anatolia	2
<i>Tanacetum densum subsp. eginense</i>	Tansy		+	+						+	-	-	-	Iran-Turan	G, D Anatolia	1
<i>Tanacetum depauperatum</i>	"			+						+	-	-	-	Med.	G Anatolia	2
<i>Tanacetum haradjanii</i>	"		+	+						+	-	-	-	Med.	G Anatolia	2
<i>Tanacetum nitens</i>	"		+	+					+	+	-	-	-	-	G, D Anatolia	2
<i>Tripleurospermum callosum</i>	Mayweed	+								+	-	-	-	-	K, G, Ic Anatolia	3
<i>Xeranthemum inapertum</i>	-								+	-	-	-	-	-	K, G Anatolia	3
Berberidaceae																
<i>Leontice leontopetalum subsp. leontopetalum</i>	Rakaf	+								-	-	-	-	-	Wide Spread	3
Betulaceae																
<i>Alnus glutinosa subsp. antitaurica</i>	Common alder						+	+	+	+	-	-	-	Med.	G Anatolia	1
Boraginaceae																
<i>Alkanna aucherana</i>	Alkanna			+					+	+	-	-	-	Med.	G Anatolia	2
<i>Alkanna cappadocica</i>	"		+			+				+	-	-	-	Iran-Turan	Ic Anatolia	2
<i>Cynoglottis chetkiana subsp. chetkiana</i>	-		+	+					+	+	-	-	-	Med.	G Anatolia	3
<i>Myosotis ramosissima subsp. ramosissima</i>	Early forget-me-not					+				-	-	-	-	-	Wide Spread	2
<i>Myosotis speluncicola</i>	"		+	+						-	-	-	-	Med.	G Anatolia	1
<i>Nonea macrosperma</i>	Monkswort	+			+					+	-	-	-	Iran-	Ic Anatolia	2

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		1	2	3	4	5	6	7	8							
														Turan		
<i>Nonea pulla</i> subsp. <i>scabrisquamata</i>	"		+	+		+	+			-	-	-	-	Iran-Turan	D Anatolia	2
<i>Omphalodes lucilliae</i> subsp. <i>cilicica</i>	-		+	+						+	-	-	-	Med.	G Anatolia	1
<i>Onosma albo-roseum</i> subsp. <i>sanguinolentum</i>	Onosma		+	+		+			+	-	-	-	-	Iran-Turan	G Anatolia	2
<i>Onosma albo-roseum</i> subsp. <i>albo-roseum</i> var. <i>albo-roseum</i>	"		+	+						-	-	-	-	Iran-Turan	G Anatolia	1
<i>Onosma armenum</i>	"			+		+				+	-	-	-	-	K, G Anatolia	2
<i>Onosma cappadocicum</i>	"			+					+	+	-	-	-	Med.	G Anatolia	1
<i>Onosma giganteum</i>	"	+			+				+	-	-	-	-	Med.	G, Ic Anatolia	2
<i>Onosma mutabile</i>	"		+	+		+				+	-	-	-	-	KB, K, G, D Anatolia	1
<i>Onosma ovalifolium</i>	"								+	-	-	-	-	Med.	G Anatolia	2
<i>Onosma pulchrum</i>	"								+	+	-	-	-	-	G Anatolia	1
<i>Onosma tauricum</i> var. <i>tauricum</i>	"		+	+					+	-	-	-	-	-	K, B, G, Anatolia	2
<i>Onosma trachytrichum</i>	"	+	+	+	+					-	-	-	-	Iran-Turan	Ic Anatolia	2
<i>Paracaryum calycinum</i>	-			+		+				+	-	-	-	Iran-Turan	K, G Anatolia	3
<i>Paracaryum cappadocicum</i>	-		+	+						+	-	-	-	Iran-Turan	Ic Anatolia	2
<i>Paracaryum longipes</i>	-					+				+	-	-	-	Iran-Turan	Ic, G Anatolia	3
<i>Paracaryum racemosum</i> var. <i>racemosum</i>	-		+	+		+				+	-	-	-	Iran-Turan	Ic Anatolia	2
<i>Symphytum brachycalyx</i>	Comfrey						+		+	-	-	-	-	Med.	G Anatolia	2
Brassicaceae																
<i>Aethionema capitatum</i>	-		+							+	-	-	-	-	G Anatolia	3
<i>Aethionema coridifolium</i>	-		+							-	-	-	-	-	G, D Anatolia	2
<i>Aethionema eunomioides</i>	-		+	+						+	-	-	-	-	G, D, Ic Anatolia	3
<i>Aethionema heterocarpum</i>	-		+	+		+				-	-	-	-	-	G, GD Anatolia	2
<i>Aethionema huber-morathii</i>	-							+	+	+	-	-	-	Med.	G Anatolia	3
<i>Aethionema speciosum</i> subsp. <i>speciosum</i>	-		+	+						-	-	-	-	Iran-Turan	D, G Anatolia	2
<i>Alyssum anatolicum</i>	Madwort					+				+	-	-	-	Iran-Turan	D Anatolia	3

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		1	2	3	4	5	6	7	8							
<i>Alyssum baumgartnerianum</i>	"		+	+		+				-	-	-	-	-	D, G Anatolia	2
<i>Alyssum caespitosum</i>	"		+	+		+				+	-	-	-	Iran-Turan	Ic, D, G Anatolia	2
<i>Alyssum callichroum</i>	"		+							+	-	-	-	-	D, G Anatolia	2
<i>Alyssum cassium</i>	"					+				-	-	-	-	Med.	G Anatolia	1
<i>Alyssum comingii</i>	"					+				+	-	-	-	Iran-Turan	Ic Anatolia	2
<i>Alyssum desertorum</i> var. <i>desertorum</i>	"	+								-	-	-	-	-	Wide Spread	1
<i>Alyssum floribundum</i>	"		+							+	-	-	-	-	G, B Anatolia	2
<i>Alyssum giosnanum</i>	"		+						+	+	-	-	-	-	G Anatolia	3
<i>Alyssum masmenaeum</i>	"								+	+	-	-	-	-	B, G, O Anatolia	2
<i>Alyssum oxycarpum</i>	"		+	+						+	-	-	-	-	B, G Anatolia	2
<i>Alyssum propinquum</i>	"		+	+						+	-	-	-	-	B, G, D Anatolia	2
<i>Alyssum pseudo-mouradicum</i>	"		+	+		+				+	-	-	-	-	D, G Anatolia	1
<i>Alyssum strigosum</i> subsp. <i>cedrorum</i>	"			+						-	-	-	-	-	G, Ic, D Anatolia	2
<i>Alyssum trapeziforme</i>	"	+				+			+	+	-	-	-	Iran-Turan	G Anatolia	1
<i>Anchonium elichrysifolium</i> subsp. <i>elichrysifolium</i>	-			+						-	-	-	-	-	D, G Anatolia	2
<i>Arabis aubrietoides</i>	Rockcress			+						+	-	-	-	-	G Anatolia	3
<i>Arabis deflexa</i>	"		+	+						-	-	-	-	Med.	G Anatolia	2
<i>Aubrieta canescens</i> subsp. <i>macrostyla</i>	Lilac bush		+	+						-	-	-	-	-	K, G, D, Ic Anatolia	1
<i>Aubrieta canescens</i> subsp. <i>cilicica</i>	"	+			+	+				+	-	-	-	-	G Anatolia	2
<i>Barbarea minor</i> var. <i>minor</i>	Yellowrocket						+			-	-	-	-	-	D, G Anatolia	3
<i>Conringia austriaca</i>	Hare's ear mustard	+								-	-	-	-	-	KB, G Anatolia	2
<i>Conringia perfoliata</i>	"	+	+	+	+					-	-	-	-	-	KD, DG, Anatolia	2
<i>Draba acaulis</i>	Draba			+						+	-	-	-	-	G Anatolia	2
<i>Erysimum crassipes</i>	Wallflower	+	+	+						-	-	-	-	-	Wide Spread	2
<i>Erysimum goniocaulon</i>	"		+							-	-	-	-	-	G, Ic, GD Anatolia	1
<i>Erysimum kotschyianum</i>	"		+	+						+	-	-	-	-	B, Ic, GD Anatolia	2
<i>Erysimum repandum</i>	"	+	+							-	-	-	-	-	KB, G, D Anatolia	3
<i>Erysimum smyrnaeum</i>	"	+	+	+						-	-	-	-	-	Wide Spread	3

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		1	2	3	4	5	6	7	8							
<i>Erysimum thyrsoideum</i> subsp. <i>thyrsoideum</i>	"		+							+	-	-	-	-	G, D Anatolia	2
<i>Heldreichia rotundifolia</i>	-		+	+						+	-	-	-	Iran-Turan	G, D Anatolia	1
<i>Hirschfeldia incana</i>	Buchan weed	+				+				-	-	-	-	-	Dis Anatolia	2
<i>Iberis taurica</i>	Candytuft		+	+						-	-	-	-	-	Wide Spread	3
<i>Isatis aucheri</i>	Woad		+	+						+	-	-	-	Iran-Turan	G, Ic, D Anatolia	2
<i>Isatis cappadocica</i> subsp. <i>cappadocica</i>	"		+	+						-	-	-	-	Iran-Turan	Ic Anatolia	1
<i>Isatis cappadocica</i> subsp. <i>subradiata</i> var. <i>subradiata</i>	"							+		-	-	-	-	Iran-Turan	D, G Anatolia	2
<i>Isatis constricta</i>	"		+	+						+	-	-	-	Iran-Turan	D Anatolia	3
<i>Isatis floribunda</i>	"	+				+				+	-	-	-	Iran-Turan	Ic, B Anatolia	2
<i>Isatis glauca</i> subsp. <i>exauriculata</i>	"					+				-	-	-	-	Iran-Turan	Ic Anatolia	3
<i>Nasturtium officinale</i>	-						+			-	-	-	-	-	KB, G, D Anatolia	1
<i>Raphanus raphanistrum</i>	Wild radish	+								-	-	-	-	-	Dis Anatolia	2
<i>Ricotia sinuata</i>	-		+	+						+	-	-	-	Med.	G Anatolia	3
<i>Thlaspi cataonicum</i>	Pennycress			+						+	-	-	-	-	G Anatolia	2
<i>Thlaspi densiflorum</i>	"		+	+						+	-	-	-	-	G Anatolia	2
<i>Thlaspi perfoliatum</i>	"	+								-	-	-	-	-	Wide Spread	1
<i>Thlaspi syriacum</i>	"	+				+				-	-	-	-	Med.	G Anatolia	2
<i>Thlaspi violascens</i>	"		+	+						+	-	-	-	-	G, K Anatolia	3
Butomaceae																
<i>Butomus umbellatus</i>	Flowering-rush						+			-	-	-	-	Eur.-Sib.	Wide Spread	2
Buxaceae																
<i>Buxus balearica</i>	Boxwood			+			+			-	-	-	-	Med.	G Anatolia	2
Cactaceae																
<i>Opuntia ficus-indica</i>	Indian fig			+						-	-	-	-	-	G, B Anatolia	2
Campanulaceae																
<i>Asyneuma linifolium</i> subsp. <i>eximium</i>	Harebell		+	+						+	-	-	-	Med. (mt)	G Anatolia	1

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		1	2	3	4	5	6	7	8							
<i>Asyneuma rigidum</i> subsp. <i>rigidum</i>	"		+	+		+			+	-	-	-	-	Iran-Turan	K, G Anatolia	2
<i>Asyneuma rigidum</i> subsp. <i>sibthorpiatum</i>	"		+	+		+			+	+	-	-	-	Med. (mt)	KB, B, GD Anatolia	2
<i>Asyneuma virgatum</i> subsp. <i>virgatum</i>	"		+	+		+			+	-	-	-	-	-	G, Ic Anatolia	3
<i>Campanula axillaris</i>	Bellflower								+	+	-	-	-	Med.	G Andolu	2
<i>Campanula balansae</i>	"			+					+	+	-	-	-	Med. (mt)	G Andolu	1
<i>Campanula glomerata</i> subsp. <i>hispida</i>	"					+		+	+	-	-	-	-	Eur.-Sib.	K, G, Ic Anatolia	2
<i>Campanula involucrata</i>	"							+	+	-	-	-	-	Iran-Turan	K, G Anatolia	1
<i>Campanula phytidocalyx</i>	"	+				+				-	-	-	-	Iran-Turan	GD Anatolia	3
<i>Campanula propinqua</i>	"		+			+				+	-	-	-	Iran-Turan	G, D Anatolia	1
<i>Campanula psilostachya</i>	"		+	+				+	+	+	-	-	-	Med. (mt)	G Anatolia	2
<i>Campanula rapunculus</i> var. <i>rapunculus</i>	"					+		+	+	-	-	-	-	-	KB, K, G Anatolia	2
<i>Campanula reuterana</i>	"	+	+					+		-	-	-	-	Iran-Turan	G, D Anatolia	2
<i>Campanula saxonorum</i>	"	+	+	+						+	-	-	-	Iran-Turan	KD, D, G Anatolia	2
<i>Campanula stricta</i> var. <i>stricta</i>	"		+	+						-	-	-	-	Iran-Turan	Ic, G Anatolia	2
<i>Campanula stricta</i> var. <i>libanotica</i>	"		+	+						-	-	-	-	Med. (mt)	GB, G Anatolia	2
<i>Michauxia campanuloides</i>	Michauxia		+	+						-	-	-	-	Med.	G, Ic Anatolia	2
<i>Michauxia tchihatchewii</i>	"		+	+						+	-	-	-	Med.	G Anatolia	3
Capparaceae																
<i>Capparis spinosa</i> var. <i>spinosa</i>	Caper	+								-	-	-	-	-	KB, D, B Anatolia	3
<i>Cleome iberica</i>	Spiderflower		+	+						-	-	-	-	Med.	KB, G, D Anatolia	2
<i>Cleome ornithopodioides</i>	"		+	+						-	-	-	-	Med.	KB, G, D Anatolia	3
Caryophyllaceae																
<i>Arenaria uninervia</i>	Sandwort		+							+	-	-	-	-	G Anatolia	2
<i>Cerastium gnaphalodes</i>	Chickweed		+							+	-	-	-	-	K, Ic, D Anatolia	2

SCIENTIFIC NAME	Common Name	HABITAT								ENDEMISM	IUCN 2006	BERN	CITES	FLORA ZONE	DISTRIBUTION IN TURKEY	RELATIVE ABUNDANCE
		1	2	3	4	5	6	7	8							
<i>Dianthus brevicaulis</i> subsp. <i>brevicaulis</i>	Carnation pink			+						+	-	-	-	-	G, Ic Anatolia	2
<i>Dianthus crinitus</i> var. <i>crossopetalus</i>	"			+						-	-	-	-	-	D, Ic Anatolia	2
<i>Dianthus goerkii</i>	"		+	+						+	-	-	-	Med.	G Anatolia	2
<i>Dianthus masmenaeus</i> var. <i>glabrescens</i>	"		+	+						+	-	-	-	Iran-Turan	D, Ic Anatolia	2
<i>Dianthus strictus</i> var. <i>axilliflorus</i>	"	+			+					-	-	-	-	-	G, D Anatolia	2
<i>Dianthus zonatus</i> var. <i>zonatus</i>	"	+		+						-	-	-	-	-	B, Ic, G Anatolia	1
<i>Gypsophila sphaerocephala</i> var. <i>syriaca</i>	Baby's-breath			+						+	-	-	-	Iran-Turan	G Anatolia	1
<i>Minuartia leucocephala</i>	Stitchwort			+						+	-	-	-	-	G, Ic Anatolia	1
<i>Minuartia mesogitana</i> subsp. <i>mesogitana</i>	"			+						-	-	-	-	Med.	G Anatolia	1
<i>Minuartia tchihatchewii</i>	"			+						+	-	-	-	-	G, GD Anatolia	1
<i>Petrorhagia prolifera</i>	Childing pink		+	+						-	-	-	-	-	K, G Anatolia	2
<i>Saponaria glutinosa</i>	Soapwort		+	+					+	-	-	-	-	-	B, G, K Anatolia	1
<i>Saponaria kotschyi</i>	"		+	+						+	-	-	-	-	Ic, G Anatolia	2
<i>Silene aegyptiaca</i> subsp. <i>aegyptiaca</i>	Catchfly	+	+		+					-	-	-	-	-	G Anatolia	1
<i>Silene arguta</i>	"		+							-	-	-	-	Iran-Turan	K, Ic, D Anatolia	2
<i>Silene capitellata</i>	"			+		+				+	-	-	-	Iran-Turan	K, Ic, D Anatolia	1
<i>Silene inclinata</i>	"		+							+	-	-	-	Med.	G Anatolia	2
<i>Silene marschallii</i>	"		+	+		+				-	-	-	-	Iran-Turan	K, Ic, D Anatolia	1
<i>Silene montbretiana</i>	"		+							-	-	-	-	Iran-Turan	Ic, D Anatolia	2
<i>Silene nuncupanda</i>	"			+						+	-	-	-	-	Ic, G Anatolia	1
Chenopodiaceae																
<i>Beta adanensis</i>	Beet					+				+	-	App-I	-	Iran-Turan	G Anatolia	1
Cistaceae																
<i>Helianthemum antitauricum</i>	Frostweed		+	+					+	+	-	-	-	Med. (mt)	G Anatolia	1
<i>Helianthemum kotschyianum</i>	"					+				-	-	-	-	Iran-Turan	G, D Anatolia	2
<i>Helianthemum salicifolium</i>	Willowleaf							+		-	-	-	-	-	Wide Spread	1

SCIENTIFIC NAME	Common Name	HABITAT								ENDEMISM	IUCN 2006	BERN	CITES	FLORA ZONE	DISTRIBUTION IN TURKEY	RELATIVE ABUNDANCE
		1	2	3	4	5	6	7	8							
	frostweed,															
Convolvulaceae																
<i>Convolvulus assyricus</i>	Bindweed	+	+	+		+				+	-	-	-	Iran-Turan	Ic, G Anatolia	2
<i>Convolvulus aucheri</i>	"		+	+					+	-	-	-	-	Med.	G, D Anatolia	1
Cornaceae																
<i>Cornus sanguinea subsp. cilicica</i>	Dogwood		+	+					+	-	-	-	-	Med.	K, G Anatolia	3
Corylaceae																
<i>Corylus avellana var. avellana</i>	Common filbert								+	-	-	-	-	Eur.-Sib.	K, B, G, D Anatolia	3
<i>Ostrya carpinifolia</i>	Hophornbean								+	-	-	-	-	Med.	K, G Anatolia	2
Crassulaceae																
<i>Rosularia aizoon</i>	-		+	+						-	-	-	-	Iran-Turan	G, D, KD Anatolia	2
<i>Sedum pallidum var. pallidum</i>	Stonecrop			+					+	-	-	-	-	-	KB, B, Dis Anatolia	2
Cupressaceae																
<i>Juniperus excelsa</i>	Grecian juniper		+	+						-	LR/lc	-	-	-	K, B, G, D Anatolia	3
<i>Juniperus oxycedrus subsp. oxycedrus</i>	Prickly juniper							+	+	-	LR/lc	-	-	-	Wide Spread	3
Datisceae																
<i>Datisca cannabina</i>	Asiatic herb						+		+	-	-	-	-	-	Dis Anatolia	2
Dioscoreaceae																
<i>Tamus communis subsp. communis</i>	Black byrony						+	+	+	-	-	-	-	-	D, Dis Anatolia	2
Dipsacaceae																
<i>Cephalaria cilicica</i>	Cephalaria	+				+				+	-	-	-	Med.	G Anatolia	2
<i>Knautia integrifolia var. integrifolia</i>	Scabiosa	+								-	-	-	-	Med.	G Anatolia	1
Equisetaceae																
<i>Equisetum ramosissimum</i>	Branched scouringrush						+			-	-	-	-	-	Wide Spread	1
Ericaceae																
<i>Erica manipuliflora</i>	Broom heater							+	+	-	-	-	-	Med.	B, G Anatolia	2
Euphorbiaceae																
<i>Euphorbia rhytidosperra</i>	Spurge			+						+	-	-	-	Med.	G Anatolia	3

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		1	2	3	4	5	6	7	8							
<i>Euphorbia szovitsii</i> var. <i>kharputensis</i>	"			+		+		+	+	-	-	-	-	Iran-Turan	G, D Anatolia	1
<i>Euphorbia taurinensis</i>	"			+		+		+	+	-	-	-	-	-	KB, B, G Anatolia	2
<i>Euphorbia valerianifolia</i>	"	+	+					+		-	-	-	-	Med.	KB, B, G Anatolia	2
Fabaceae																
<i>Anthyllis tetraphylla</i>	Bladder vetch	+	+							-	-	-	-	Med.	KB, B, G Anatolia	2
<i>Anthyllis vulneraria</i> subsp. <i>hispidissima</i>	"	+				+				-	-	-	-	-	Ic, G Anatolia	2
<i>Anthyllis vulneraria</i> subsp. <i>variegata</i>	"		+	+						+	-	-	-	Med. (mt)	G Anatolia	2
<i>Astragalus anthylloides</i>	Milkvetch					+		+		+	-	-	-	Iran-Turan	K, G, Ic Anatolia	2
<i>Astragalus ascicalyx</i>	"			+		+				+	-	-	-	Iran-Turan	D, K, G Anatolia	3
<i>Astragalus christianus</i>	"				+	+				-	-	-	-	-	G, Ic Anatolia	3
<i>Astragalus chrysochlorus</i>	"			+		+				+	-	-	-	-	G Anatolia	3
<i>Astragalus condensatus</i>	"					+				+	-	-	-	Iran-Turan	D, G, Ic Anatolia	3
<i>Astragalus cuspidistipulatus</i>	"							+		+	-	-	-	Med.	G Anatolia	2
<i>Astragalus cymbibracteatus</i>	"					+				+	-	-	-	Iran-Turan	G, Ic Anatolia	1
<i>Astragalus distinctissimus</i>	"							+		+	-	-	-	Med.	G Anatolia	2
<i>Astragalus eriophyllus</i>	"		+	+						+	-	-	-	-	G, Ic Anatolia	1
<i>Astragalus glycyphyllos</i> subsp. <i>glycyphylloides</i>	Wild liquorice			+				+		-	-	-	-	Eur.-Sib.	K Anatolia	2
<i>Astragalus humilis</i>	Milkvetch			+				+		-	-	-	-	Iran-Turan	G, D Anatolia	1
<i>Astragalus karamasicus</i>	"					+				+	-	-	-	Iran-Turan	K, G, D, Ic Anatolia	2
<i>Astragalus lydius</i>	"					+				+	-	-	-	Iran-Turan	K, G, D, Ic Anatolia	1
<i>Astragalus macroscepus</i>	"					+		+		+	-	-	-	Iran-Turan	K, G, D, Ic Anatolia	2
<i>Astragalus nanus</i>	"							+		-	-	-	-	-	G, Ic Anatolia	1
<i>Astragalus pelliger</i>	Milkvetch					+				+	-	-	-	-	G, GB, Ic Anatolia	2
<i>Astragalus plumosus</i> var. <i>plumosus</i>	"					+		+		+	-	-	-	Iran-Turan	G, Ic Anatolia	2
<i>Astragalus pycnocephalus</i> var.	"		+							-	-	-	-	Iran-	KD, D, G Anatolia	2

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		1	2	3	4	5	6	7	8							
<i>pycnocephalus</i>														Turan		
<i>Astragalus schizopterus</i>	"								+	+	-	-	-	Med.	G Anatolia	3
<i>Astragalus sericans</i>	"							+		+	-	-	-	-	G, D Anatolia	2
<i>Astragalus setulosus</i>	"			+					+	+	-	-	-	-	K,G, Ic Anatolia	1
<i>Astragalus suberosus subsp. suberosus</i>	Milkvetch	+	+							-	-	-	-	-	G, D Anatolia	2
<i>Astragalus subuliferus</i>	"		+							+	-	-	-	Med.	G Anatolia	3
<i>Astragalus tauricolus</i>	"		+	+						+	-	-	-	Iran-Turan	G, D Anatolia	2
<i>Astragalus triradiatus</i>	"		+	+						-	-	-	-	Iran-Turan	G, GD Anatolia	2
<i>Astragalus vaginans</i>	"	+								+	-	-	-	-	D, G, Ic Anatolia	2
<i>Biserrula pelecinus</i>	Biserrula	+				+				-	-	-	-	Med.	B, G Anatolia	2
<i>Cercis siliquastrum subsp. hebecarpa</i>	Judas-tree								+	-	-	-	-	-	B, G, GD Anatolia	2
<i>Chamaecytisus drepanolobus</i>	-		+	+						+	-	-	-	Med.	G Anatolia	3
<i>Coronilla coronata</i>	Crownvetch		+	+						-	-	-	-	-	KD, G, Ic Anatolia	2
<i>Coronilla emerus subsp. emeroides</i>	"								+	-	-	-	-	-	Dis Anatolia	3
<i>Coronilla grandiflora</i>	"		+	+						+	-	-	-	Med.	G Anatolia	2
<i>Coronilla parviflora</i>	"	+	+	+						-	-	-	-	Med.	KB, Dis Anatolia	3
<i>Dorycnium rectum</i>	-						+	+		-	-	-	-	Med.	G, KB Anatolia	2
<i>Ebenus longipes</i>	-		+	+						+	-	-	-	Iran-Turan	G, Ic Anatolia	3
<i>Genista albida</i>	Needle furze		+	+					+	-	-	-	-	-	G, Ic Anatolia	2
<i>Genista anatolica</i>	Anatolian needle furze								+	-	-	-	-	Med.	KB, B, G Anatolia	2
<i>Glycyrrhiza flavescens</i>	Wild/spiny-flowered liquorice	+							+	+	-	-	-	Med.	G Anatolia	2
<i>Hammatolobium lotoides</i>	-		+						+	-	-	-	-	Med.	G Anatolia	2
<i>Hedysarum antitauricum</i>	Sweetvetch								+	+	-	-	-	Med.	G Anatolia	1
<i>Lathyrus brachypterus var. brachypterus</i>	Fodder pea		+	+						+	-	-	-	Iran-Turan	G, Ic Anatolia	2
<i>Lathyrus cassius</i>	"								+	-	-	-	-	Med.	G, D Anatolia	1
<i>Lathyrus cicera</i>	"	+	+	+					+	-	-	-	-	-	KB, Dis, Ic Anatolia	2

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		1	2	3	4	5	6	7	8							
<i>Lathyrus elongatus</i>	"							+		+	-	-	-	-	G Anatolia	2
<i>Lathyrus gorgoni</i> var. <i>pilosus</i>	"	+						+		-	-	-	-	Med.	KB, K, G Anatolia	2
<i>Lathyrus hierosolymitanus</i>	"	+								-	-	-	-	Med.	G Anatolia	1
<i>Lathyrus laxiflorus</i> subsp. <i>angustifolius</i>	"	+				+				+	-	-	-	Med.	G Anatolia	2
<i>Onobrychis beata</i>	Trefoil					+				+	-	-	-	-	G Anatolia	1
<i>Onobrychis caput-galli</i>	"	+	+	+	+					-	-	-	-	Med.	Wide Spread	2
<i>Onobrychis crista-galli</i>	"	+	+	+						-	-	-	-	Med.	G, D Anatolia	1
<i>Onobrychis galegifolia</i>	"	+				+		+	+	-	-	-	-	Iran-Turan	G, D Anatolia	2
<i>Onobrychis oxyodonta</i>	"	+	+	+	+				+	-	-	-	-	-	Wide Spread	1
<i>Onobrychis sulphurea</i> var. <i>sulphurea</i>	"	+				+				+	-	-	-	-	G, Ic Anatolia	2
<i>Sophora alopecuroides</i> var. <i>alopecuroides</i>	Liquorice Plant				+					-	-	-	-	-	Ic Anatolia	1
<i>Trifolium aintabense</i>	-				+			+		+	-	-	-	Med.	G Anatolia	2
<i>Trifolium caucasicum</i>	-			+						-	-	-	-	-	KD, G Anatolia	1
<i>Trifolium cherleri</i>	-		+	+		+				-	-	-	-	Med.	Wide Spread	2
<i>Trifolium davisii</i>	-							+		+	-	-	-	Med.	G Anatolia	2
<i>Trifolium fragiferum</i> var. <i>pulchellum</i>	-							+		-	-	-	-	-	Wide Spread	2
<i>Trifolium purpureum</i>	-	+		+	+					-	-	-	-	-	Wide Spread	2
<i>Trigonella kotschy</i>	Clover	+	+	+				+		+	-	-	-	Iran-Turan	G, D Anatolia	2
<i>Trigonella macrorrhyncha</i>	"		+			+				+	-	-	-	Med.	G, D, Ic Anatolia	2
<i>Trigonella monantha</i> subsp. <i>monantha</i>	"	+	+			+				-	-	-	-	Iran-Turan	Ic Anatolia	2
<i>Trigonella monspeliaca</i>	"	+	+					+	+	-	-	-	-	Med.	KB, D Anatolia	2
<i>Trigonella rhytidocarpa</i>	"		+							+	-	-	-	Iran-Turan	G Anatolia	2
<i>Trigonella rigida</i>	"		+				+			+	-	-	-	Med.	G Anatolia	2
<i>Trigonella spruneriana</i> var. <i>spruneriana</i>	"	+	+					+		-	-	-	-	Iran-Turan	Wide Spread	2
<i>Vicia villosa</i> subsp. <i>villosa</i>	-	+		+			+			-	-	-	-	-	Wide Spread	2
Fagaceae	-															
<i>Fagus orientalis</i>	Oriental Beech								+	-	-	-	-	Eur.-Sib.	B, G, K Anatolia	3

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		1	2	3	4	5	6	7	8							
<i>Quercus cerris</i> var. <i>cerris</i>	Turkey Oak								+	-	-	-	-	Med.	B, G, K, D Anatolia	3
<i>Quercus petraea</i> subsp. <i>pinnatifida</i>	Sessile Oak								+	+	-	-	-	-	G, D, GD Anatolia	3
Gentianaceae																
<i>Centaurea erythraea</i> subsp. <i>turcicum</i>	Gentian					+	+		+	-	-	-	-	-	Wide Spread	2
<i>Gentiana boissieri</i>	Gentians		+	+						+	-	-	-	Med. (mt)	G Anatolia	1
Geraniaceae																
<i>Erodium cicutarium</i> subsp. <i>cedrorum</i>	Long-Beaked Stork's-Bill		+	+						+	-	-	-	-	Ic, G Anatolia	1
<i>Erodium cicutarium</i> subsp. <i>cicutarium</i>	"	+				+				-	-	-	-	-	Wide Spread	1
<i>Erodium leucanthum</i>	"		+	+						+	-	-	-	Med.	G Anatolia	2
<i>Erodium malacoides</i>	"	+	+			+				-	-	-	-	Med.	B, G Anatolia	2
<i>Erodium micropetalum</i>	"		+			+				+	-	-	-	-	G Anatolia	2
<i>Geranium macrostylum</i>	Herb Robert		+						+	-	-	-	-	Med.	Wide Spread	3
Guttiferae																
<i>Hypericum confertum</i> subsp. <i>stenobotrys</i>	Common Centaury							+	+	-	-	-	-	-	Ic, G Anatolia	3
<i>Hypericum crenulatum</i>	"		+	+						+	-	-	-	-	Ic Anatolia	2
<i>Hypericum elongatum</i> subsp. <i>microcalycinum</i>	"					+			+	-	-	-	-	Iran-Turan	Ic Anatolia	3
<i>Hypericum elongatum</i>	"		+			+			+	-	-	-	-	Iran-Turan	D Anatolia	2
<i>Hypericum kotschyianum</i>	-		+	+						+	-	-	-	-	Ic Anatolia	3
<i>Hypericum lanuginosum</i> var. <i>scabellum</i>	-		+	+						+	-	-	-	Med.	B, G Anatolia	2
Gymnogrammeae																
<i>Anogramma leptophylla</i>	-		+	+						-	-	-	-	-	Dis Anatolia	3
Illecebraceae																
<i>Paronychia chionaea</i> subsp. <i>kemaliya</i>	White Nailwort			+						+	-	-	-	-	D Anatolia	3
<i>Paronychia kurdica</i> subsp. <i>kurdica</i> var. <i>kurdica</i>	"			+						-	-	-	-	-	Wide Spread	2
<i>Paronychia mughlaei</i>	"		+	+						+	-	-	-	Med.	B, G Anatolia	1
Iridaceae																

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		1	2	3	4	5	6	7	8							
<i>Crocus cancellatus</i> subsp. <i>cancellatus</i>	Colchicum		+					+		+	-	-	-	Med.	G Anatolia	1
<i>Crocus danfordiae</i>	"		+					+		+	-	-	-	-	Ic, G Anatolia	2
<i>Crocus fleischeri</i>	"		+					+	+	+	-	-	-	Med.	B, G Anatolia	2
<i>Crocus graveolens</i>	"					+		+		-	-	-	-	Med.	G Anatolia	2
<i>Crocus leichtlinii</i>	"		+	+						+	-	-	-	Iran-Turan	D Anatolia	2
<i>Crocus pallasii</i> subsp. <i>pallasi</i>	"			+				+		-	-	-	-	-	KB, Ic, G Anatolia	1
<i>Crocus sieheanus</i>	"							+	+	+	-	-	-	Iran-Turan	Ic, G Anatolia	2
<i>Gladiolus kotschyanus</i>			+				+		+	-	-	-	-	Iran-Turan	D Anatolia	3
<i>Gynandrisis sisyrinchium</i>	Iris						+		+	-	-	-	-	-	Dis Anatolia	2
<i>Iris danfordiae</i>			+	+						+	-	-	-	Iran-Turan	K, Ic, G Anatolia	1
<i>Iris junonia</i>			+	+						+	-	-	-	Med.	G Anatolia	2
<i>Iris pseudacorus</i>	Iris Susam						+			-	-	-	-	-	Wide Spread	1
Juncaceae																
<i>Juncus sphaerocarpus</i>	-					+				-	-	-	-	-	K, Ic, G Anatolia	1
Lamiaceae																
<i>Lamium eriocephalum</i> subsp. <i>eriocephalum</i>	Dead Nettle			+					+	+	-	-	-	Med.	G Anatolia	2
<i>Lamium garganicum</i> subsp. <i>reniforme</i>	"		+	+			+			-	-	-	-	-	G Anatolia	1
<i>Lamium garganicum</i>	"		+	+						+	-	-	-	Med.	G Anatolia	2
<i>Lycopus europaeus</i>	Nettle						+			-	-	-	-	Eur.-Sib.	K, G Anatolia	3
<i>Marrubium astracanicum</i>	-		+		+				+	-	-	-	-	-	K, G Anatolia	2
<i>Marrubium cephalanthum</i>	-		+							+	-	-	-	Iran-Turan	Ic Anatolia	2
<i>Marrubium heterodon</i>	-					+				+	-	-	-	Med. (mt)	G, K Anatolia	2
<i>Melissa officinalis</i> subsp. <i>inodora</i>	Lemon Balm		+				+	+	+	-	-	-	-	-	Dis Anatolia	2
<i>Micromeria cremnophila</i> subsp. <i>amana</i>	-		+	+						+	-	-	-	Med.	G Anatolia	1
<i>Micromeria cremnophila</i> subsp. <i>anatolica</i>	-		+	+						+	-	-	-	Iran-Turan	G, D Anatolia	2

SCIENTIFIC NAME	Common Name	HABITAT								ENDEMISM	IUCN 2006	BERN	CITES	FLORA ZONE	DISTRIBUTION IN TURKEY	RELATIVE ABUNDANCE
		1	2	3	4	5	6	7	8							
<i>Micromeria fruticosa</i> subsp. <i>brachycalyx</i>	Peppermint		+	+						-	-	-	-	Med.	G Anatolia	2
<i>Micromeria mollis</i>	"		+	+						-	-	-	-	Iran-Turan	GD Anatolia	3
<i>Nepeta italica</i>	-		+	+			+		+	-	-	-	-	-	Wide Spread	2
<i>Nepeta nuda</i> subsp. <i>albiflora</i>	Catmint		+			+	+			-	-	-	-	-	KB, B Anatolia	1
<i>Origanum micranthum</i>	-		+	+						+	-	-	-	Med.	G Anatolia	2
<i>Origanum syriacum</i> var. <i>bevanii</i>	Thyme		+	+						-	-	-	-	Med.	B,G Anatolia	2
<i>Phlomis armeniaca</i>	Willdenow	+	+						+	+	-	-	-	Iran-Turan	Wide Spread	3
<i>Phlomis capitata</i>	"		+	+				+		+	-	-	-	Iran-Turan	G, D Anatolia	2
<i>Phlomis linearis</i>	"		+	+						+	-	-	-	Iran-Turan	Ic Anatolia	1
<i>Phlomis viscosa</i>	"		+	+				+		-	-	-	-	Med.	G Anatolia	2
<i>Rosmarinus officinalis</i>	Rosemary		+		+				+	-	-	-	-	Med.	G Anatolia	3
<i>Salvia aucheri</i> var. <i>aucheri</i>	-		+	+					+	+	-	-	-	Med.	G Anatolia	2
<i>Salvia caespitosa</i>	Common Sage		+	+						+	-	-	-	Iran-Turan	G Anatolia	1
<i>Salvia cilicica</i>	"		+						+	+	-	-	-	-	G Anatolia	2
<i>Salvia eriophora</i>	"		+							+	-	-	-	Iran-Turan	G Anatolia	3
<i>Salvia heldreichiana</i>	"		+	+	+					+	-	-	-	Med.	G Anatolia	2
<i>Salvia hypargeia</i>	"	+	+	+					+	+	-	-	-	Iran-Turan	G, B Anatolia	1
<i>Salvia multicaulis</i>	"		+	+						-	-	-	-	Iran-Turan	G, D Anatolia	2
<i>Salvia napifolia</i>	"		+	+	+					-	-	-	-	Med.	G, B Anatolia	3
<i>Salvia recognita</i>	"		+	+				+		+	-	-	-	Iran-Turan	G, D Anatolia	2
<i>Salvia russellii</i>	"	+	+	+						-	-	-	-	Iran-Turan	KB, Ic Anatolia	1
<i>Satureja amani</i>	Savory							+		+	-	-	-	Med.	G Anatolia	2
<i>Satureja cilicica</i>	"		+	+						+	-	-	-	Med.	G Anatolia	3
<i>Satureja thymbra</i>	"							+		-	-	-	-	Med.	G, B Anatolia	2
<i>Scutellaria diffusa</i>	Common Skullcap		+					+	+	-	-	-	-	Med.	G Anatolia	2
<i>Scutellaria megalaspis</i>	"		+						+	-	-	-	-	Iran-	G, D Anatolia	2

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		1	2	3	4	5	6	7	8							
														Turan		
<i>Scutellaria orientalis</i> subsp. <i>bicolor</i>	"		+	+						+	-	-	-	Iran-Turan	D Anatolia	1
<i>Sideritis cilicica</i>	Mountain Tea		+					+	+	+	-	-	-	Med.	G Anatolia	1
<i>Sideritis libanotica</i> subsp. <i>linearis</i>	-		+	+						+	-	-	-	-	G, B Anatolia	1
<i>Sideritis perfoliata</i>	Mountain Tea			+				+	+	-	-	-	-	Med.	G, B Anatolia	2
<i>Stachys pinetorum</i>	-						+			-	-	-	-	Med.	G Anatolia	1
<i>Stachys pumila</i>	-		+	+						+	-	-	-	Med.	G Anatolia	2
<i>Stachys rupestris</i>	-		+	+					+	+	-	-	-	Med.	G Anatolia	1
<i>Stachys sparsipilosa</i>	-		+	+					+	+	-	-	-	Med.	G Anatolia	2
<i>Teucrium antitauricum</i>	Germander			+						+	-	-	-	Med.	G Anatolia	1
<i>Teucrium chamaedrys</i> subsp. <i>chamaedrys</i>	"		+						+	-	-	-	-	Eur.-Sib.	K, G, Ic Anatolia	2
<i>Teucrium chamaedrys</i> subsp. <i>tauricum</i>	"		+	+						+	-	-	-	Med.	G, GB Anatolia	1
<i>Teucrium paederotoides</i>	"		+	+					+	+	-	-	-	Med.	G Anatolia	2
<i>Teucrium scordium</i> subsp. <i>scordioides</i>	"	+					+		+	-	-	-	-	Eur.-Sib.	Wide Spread	2
<i>Thymbra spicata</i> var. <i>spicata</i>	-			+				+		-	-	-	-	Med.	KB, Dis Anatolia	2
<i>Thymus brachychilus</i>	Common Thyme			+					+	+	-	-	-	Iran-Turan	G, Ic Anatolia	3
<i>Thymus cilicicus</i>	"		+	+						-	-	-	-	Med.	G, GB Anatolia	2
<i>Thymus leucotrichus</i> var. <i>leucotrichus</i>			+	+						-	-	-	-	Med.	Ic Anatolia	2
<i>Thymus leucotrichus</i> var. <i>austroanatolicus</i>	"		+	+						-	-	-	-	-	G Anatolia	2
<i>Thymus pectinatus</i> var. <i>pectinatus</i>	"		+	+		+				+	-	-	-	Iran-Turan	Ic Anatolia	1
<i>Thymus sipyleus</i> subsp. <i>sipyleus</i> var. <i>sipyleus</i>	-		+	+						-	-	-	-	-	Wide Spread	2
<i>Ziziphora capitata</i>	-		+	+		+				-	-	-	-	Iran-Turan	Wide Spread	1
Lemnaceae																
<i>Lemna gibba</i>	Duckweed						+			-	-	-	-	-	Wide Spread	1
Liliaceae																
<i>Allium affine</i>	-		+			+			+	-	-	-	-	Iran-Turan	G, D Anatolia	2

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		1	2	3	4	5	6	7	8							
<i>Allium curtum</i>	-			+				+		-	-	-	-	Med.	G Anatolia	2
<i>Allium flavum</i> subsp. <i>tauricum</i> var. <i>tauricum</i>	-		+					+		-	-	-	-	Med.	K, D Anatolia	3
<i>Allium gayi</i>	-	+	+						+	+	-	-	-	Med.	G Anatolia	2
<i>Allium gorumsense</i>	-					+				+	-	-	-	Med.	G Anatolia	3
<i>Allium phaneranthum</i> subsp. <i>deciduum</i>	-			+				+	+	+	-	-	-	Med.	G Anatolia	2
<i>Allium robertianum</i>	-		+		+					+	-	-	-	Med.	G Anatolia	3
<i>Allium roseum</i>	-			+			+	+		-	-	-	-	Med.	G Anatolia	2
<i>Allium stenopetalum</i>	-					+				+	-	-	-	Med.	G Anatolia	3
<i>Allium tchihatschewii</i>	-		+							+	-	-	-	Iran-Turan	D Anatolia	2
<i>Allium trachycoleum</i>	-			+		+			+	-	-	-	-	Iran-Turan	G, GD Anatolia	2
<i>Anthericum liliago</i>	-					+				-	-	-	-	Med.	G Anatolia	3
<i>Asparagus officinalis</i>	Sparrowgrass		+				+			-	-	-	-	-	KD, G Anatolia	2
<i>Asparagus palaestinus</i>	"		+				+			-	-	-	-	Med.	G, GD, D Anatolia	3
<i>Asphodeline brevicaulis</i> subsp. <i>brevicaulis</i> var. <i>brevicaulis</i>	-		+						+	-	-	-	-	Med.	B, G Anatolia	2
<i>Asphodeline cilicica</i>	-								+	+	-	-	-	Med.	G Anatolia	3
<i>Asphodeline damascena</i> subsp. <i>rugosa</i>	-		+			+	+		+	+	-	-	-	Med.	G Anatolia	2
<i>Asphodeline globifera</i>	-		+						+	-	-	-	-	Med.	G Anatolia	2
<i>Asphodeline lutea</i>	-		+					+	+	-	-	-	-	Med.	Dis Anatolia	3
<i>Bellevalia tauri</i>	-					+				+	-	-	-	Med.	G, GB Anatolia	2
<i>Chionodoxa forbesii</i>	-			+					+	+	-	-	-	Med.	B, G Anatolia	3
<i>Colchicum cilicicum</i>	Colchicum		+				+		+	-	-	-	-	Med.	G Anatolia	2
<i>Colchicum triphyllum</i>	-			+	+		+			-	-	-	-	Med.	G Anatolia	3
<i>Fritillaria alfredae</i> subsp. <i>glaucoviridis</i>	-							+	+	+	-	-	-	Med.	G Anatolia	2
<i>Gagea fistulosa</i>	-						+			-	-	-	-	-	G Anatolia	3
<i>Gagea granatellii</i>	-		+					+		-	-	-	-	Med.	G Anatolia	2
<i>Gagea juliae</i>	-								+	-	-	-	-	Med.	G Anatolia	2
<i>Hyacinthella glabrescens</i>	Hyacinthaceae						+		+	+	-	-	-	Med.	G Anatolia	2

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<i>Hyacinthella hispida</i>	"		+	+				+		+	-	-	-	Med.	G Anatolia	2
<i>Hyacinthus orientalis subsp. chionophilus</i>	Common Hyacinth		+				+			+	-	-	-	Iran-Turan	Ic Anatolia	3
<i>Muscari armeniacum</i>	Grape Hyacinth		+					+	+	-	-	-	-	-	Wide Spread	1
<i>Muscari aucheri</i>	"		+				+		+	+	-	-	-	-	Dis Anatolia	2
<i>Muscari azureum</i>	Grape Hyacinth		+				+			+	-	-	-	-	Wide Spread	1
<i>Muscari comosum</i>	"	+	+				+		+	-	-	-	-	Med.	Wide Spread	2
<i>Muscari massayanum</i>	"	+							+	+	-	-	-	Iran-Turan	G, D Anatolia	1
<i>Muscari neglectum</i>	"		+			+		+		-	-	-	-	-	Wide Spread	1
<i>Ornithogalum alpigenum</i>	-								+	+	-	-	-	Med.	G,GB Anatolia	2
Linaceae																
<i>Linum hirsutum subsp. pseudoanatolicum</i>	Common Flax	+				+		+	+	+	-	-	-	Iran-Turan	G, B Anatolia	2
<i>Linum tenuifolium</i>	"		+			+		+	+	-	-	-	-	-	Wide Spread	1
Loranthaceae																
<i>Viscum album subsp. abietis</i>	Common Mistletoe							+	+	-	-	-	-	-	KB, G Anatolia	1
Lythraceae																
<i>Lythrum junceum</i>	Ransom					+	+			-	-	-	-	Med.	KB, G Anatolia	1
Malvaceae																
<i>Alcea heldreichii</i>	-		+							-	-	-	-	Med.	G Anatolia	1
<i>Malva neglecta</i>	Mallow	+			+	+				-	-	-	-	-	Wide Spread	2
Moraceae																
<i>Ficus carica subsp. carica</i>	Common Fig		+	+					+	-	-	-	-	-	Wide Spread	2
Morinaceae																
<i>Morina persica var. persica</i>	Mountain Tea		+		+					-	-	-	-	Iran-Turan	Ic Anatolia	3
Musaceae																
<i>Musa acuminata</i>	Banana	+								-	-	-	-	-	G Anatolia	1
Myrtaceae																
<i>Eucalyptus camaldulensis</i>	Eucalyptus	+								-	-	-	-	-	Dis Anatolia	3
<i>Myrtus communis subsp. communis</i>	Myrtle		+						+	-	-	-	-	-	Dis Anatolia	1
Najadaceae																

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<i>Najas graminea</i>	Waterynymph						+			-	-	-	-	-	G Anatolia	3
<i>Najas marina</i> subsp. <i>armata</i>	"						+			-	-	-	-	-	Ic, G Anatolia	2
<i>Najas minor</i>	"						+			-	-	-	-		KB, K, G Anatolia	1
Oleaceae																
<i>Fraxinus angustifolia</i> subsp. <i>angustifolia</i>	Ash Tree			+				+	+	-	-	-	-	-	B, G Anatolia	1
<i>Fraxinus angustifolia</i> subsp. <i>syriaca</i>	"			+			+			-	-	-	-	Iran-Turan	G, D Anatolia	2
<i>Fraxinus ornus</i> subsp. <i>cilicica</i>	-			+				+	+	+	-	-	-	Med.	G Anatolia	3
<i>Olea europaea</i> var. <i>sylvestris</i>	Olive Tree			+						-	-	-	-	Med.	Dis Anatolia	1
Onagraceae																
<i>Epilobium angustifolium</i>	Willowherb			+					+	-	-	-	-	-	Ic, B Anatolia	2
<i>Epilobium lanceolatum</i>	"				+			+	+	-	-	-	-	-	K, B, G Anatolia	1
<i>Epilobium tetragonum</i> subsp. <i>tetragonum</i>	"	+			+					-	-	-	-	-	K, B Anatolia	2
Orchidaceae																
<i>Anacamptis pyramidalis</i>	Pyramidal Orchid		+			+			+	-	-	-	+	-	Wide Spread	1
<i>Cephalanthera damasonium</i>	White Helleborine			+					+	-	-	-	+	Eur.-Sib.	Wide Spread	2
<i>Cephalanthera kotschyana</i>	"							+	+	+	-	-	+	-	K, D, G Anatolia	1
<i>Cephalanthera kurdica</i>	"					+			+	-	-	-	-	Iran-Turan	KD, G, D Anatolia	2
<i>Cephalanthera rubra</i>	"					+		+	+	-	-	-	+	-	Wide Spread	1
<i>Comperia comperiana</i>	-								+	-	-	App-I	+	Iran-Turan	G Anatolia	2
<i>Dactylorhiza iberica</i>	Early Purple Orchid					+	+			-	-	-	-	Med.	Wide Spread	1
<i>Dactylorhiza incarnata</i>	"					+	+			-	-	-	-	-	KB, B, G Anatolia	2
<i>Dactylorhiza osmanica</i> var. <i>osmanica</i>	-					+	+		+	+	-	-	+	Iran-Turan	K, G Anatolia	1
<i>Dactylorhiza osmanica</i> var. <i>anatolica</i>	-					+	+			+	-	-	+	Iran-Turan	G Anatolia	2
<i>Dactylorhiza romana</i> subsp. <i>romana</i>	-		+					+	+	-	-	-	+	Med.	Dis nadolu	1
<i>Epipactis condensata</i>	Helleborine					+			+	-	-	-	+	Med.	GB, K, G Anatolia	2
<i>Ophrys cilicica</i>	-					+	+			+	-	-	-	Med.	GD, G Anatolia	1

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<i>Ophrys fleischmannii</i>	-					+			+	-	-	-	-	Med.	G Anatolia	2
<i>Ophrys holoserica</i> subsp. <i>holoserica</i>	-		+						+	-	-	-	+	Med.	B, G Anatolia	3
<i>Ophrys reinholdii</i> subsp. <i>straussii</i>	-		+						+	-	-	-	-	Iran-Turan	D, G Anatolia	2
<i>Ophrys reinholdii</i> subsp. <i>leucotaenia</i>	-								+	+	-	-	+	Med.	G Anatolia	1
<i>Ophrys transhyrcana</i> subsp. <i>amanensis</i>	-								+	+	+	-	+	Med.	G Anatolia	3
<i>Ophrys umbilicata</i> subsp. <i>umbilicata</i>	-		+			+			+	+	-	-	+	Med.	B, GB Anatolia	2
<i>Orchis anatolica</i>	Anatolian Orchid								+	+	-	-	-	Med.	B, G Anatolia	1
<i>Orchis collina</i>	"			+						-	-	-	-	Med.	B, GD Anatolia	2
<i>Orchis morio</i> subsp. <i>syriaca</i>	Lesser Weasel								+	+	-	-	-	Med.	G Anatolia	3
<i>Orchis palustris</i>	-					+	+			-	-	-	-	-	Wide Spread	2
<i>Orchis spitzelii</i>	-					+			+	-	-	-	-	Med.	Dis Anatolia	2
<i>Platanthera bifolia</i>	-				+	+			+	+	-	-	-	Eur.-Sib.	Dis Anatolia	2
<i>Serapias vomeracea</i> subsp. <i>laxiflora</i>	Genista				+		+			-	-	-	+	Med.	Dis Anatolia	1
Orobanchaceae																
<i>Orobanche purpurea</i>	Broomrape					+				-	-	-	-	-	KB, G Anatolia	1
<i>Orobanche rechingeri</i>	"			+					+	-	-	-	-	-	G Anatolia	2
<i>Phelypaea coccinea</i>	"	+				+				-	-	-	-	Iran-Turan	KD, G Anatolia	1
Oxalidaceae																
<i>Oxalis corniculata</i>	Oxalis					+				-	-	-	-	-	KB, G Anatolia	1
Paeoniaceae																
<i>Paeonia mascula</i> subsp. <i>mascula</i>	-		+						+	-	-	-	-		D, G Anatolia	1
Papaveraceae																
<i>Corydalis rutifolia</i> subsp. <i>erdalii</i>	Pigweeds		+							-	-	-	-	-	K, B, G, D Anatolia	2
<i>Corydalis solida</i> subsp. <i>solida</i>	"		+						+	-	-	-	-	-	Dis Anatolia	2
<i>Corydalis solida</i> subsp. <i>tauricola</i>	"		+		+				+	+	-	-	-	Med.	G Anatolia	1
<i>Fumaria asepalata</i>	-		+			+				-	-	-	-	Iran-Turan	K, B, G, D Anatolia	1
<i>Fumaria cilicica</i>	-				+					-	-	-	-	-	Wide Spread	1

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<i>Fumaria kralikii</i>	-		+							-	-	-	-	Med.	B, G Anatolia	2
<i>Glaucium corniculatum</i> subsp. <i>corniculatum</i>	-		+							-	-	-	-	-	Wide Spread	1
<i>Papaver hybridum</i>	Lesser Weasel	+								-	-	-	-	-	Wide Spread	2
<i>Papaver minus</i>	"			+		+				-	-	-	-	Med.	D, Dis Anatolia	1
<i>Papaver persicum</i> subsp. <i>persicum</i>	"		+	+						-	-	-	-	-	D,G Anatolia	2
<i>Papaver polychaetum</i>	"		+							+	-	-	-	-	G Anatolia	1
<i>Papaver rhoeas</i>	"	+				+				-	-	-	-	-	Wide Spread	2
<i>Papaver stylatum</i>	"		+			+				-	-	-	-	Med.	G Anatolia	1
<i>Papaver syriacum</i>	"	+								-	-	-	-	-	G Anatolia	2
Pinaceae	"															
<i>Cedrus libani</i>	Cedar Of Lebanon								+	-	LR/lc	-	-	Med.(m t)	G Anatolia	3
<i>Pinus brutia</i>	Turkish Pine								+	-	LR/lc	-	-	Med.	KB Anatolia	4
<i>Pinus halepensis</i>	Aleppo Pine								+	-	LR/lc	-	-	Med.	G Anatolia	3
<i>Pinus nigra</i> subsp. <i>pallasiana</i>	Torch Pine								+	-	-	-	-	-	Wide Spread	2
Plantaginaceae																
<i>Plantago afra</i>	Common Plantain	+				+				-	-	-	-	-	KB,B, G Anatolia	2
<i>Plantago coronopus</i> subsp. <i>coronopus</i>	"	+	+			+	+			-	-	-	-	Eur.-Sib.	K, B, G Anatolia	3
<i>Plantago cretica</i>	"		+	+		+				-	-	-	-	Med.	B, G Anatolia	2
Platanaceae																
<i>Platanus orientalis</i>	Oriental Plane						+		+	-	LR/lc	-	-	-	Wide Spread	2
Plumbaginaceae																
<i>Acantholimon glumaceum</i>	Prickly Thrift		+	+						-	-	-	-	Iran-Turan	Ic Anatolia	2
<i>Acantholimon libanoticum</i>	"		+	+						-	-	-	-	Med.	G Anatolia	1
<i>Acantholimon venustum</i> var. <i>venustum</i>	"		+	+					+	-	-	-	-	Iran-Turan	G Anatolia	2
Poaceae																
<i>Alopecurus gerardii</i> var. <i>gerardii</i>	Foxtail Grass			+					+	-	-	-	-	Med.	Wide Spread	1
<i>Alopecurus lanatus</i>	"		+	+						+	-	-	-	Med.	KB, G Anatolia	2
<i>Alopecurus myosuroides</i> var. <i>myosuroides</i>	"	+			+		+		+	-	-	-	-	Eur.-Sib.	Wide Spread	3

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<i>Alopecurus myosuroides</i> var. <i>latialatus</i>	"						+			+	-	-	-	Med.	G Anatolia	2
<i>Alopecurus utricularis</i> subsp. <i>anthoxanthoides</i>	"		+	+		+				-	-	-	-	Med.	G Anatolia	1
<i>Alopecurus utricularis</i> subsp. <i>utricularis</i>	"			+		+				-	-	-	-	Iran-Turan	GB, G Anatolia	2
<i>Alopecurus vaginatus</i>	"		+	+						-	-	-	-	-	K Anatolia	3
<i>Amblyopyrum muticum</i> var. <i>loliaceum</i>	-		+	+		+				+	-	-	-	-	Ic Anatolia	2
<i>Bothriochloa ischaemum</i>	-		+		+		+			-	-	-	-	-	KB, G, GD Anatolia	1
<i>Brachypodium kotschy</i>	-			+						+	-	-	-	Iran-Turan	G Anatolia	1
<i>Eremopoa capillaris</i>	-		+				+		+	-	-	-	-	Med.	G Anatolia	1
<i>Festuca adanensis</i>	-			+						+	-	-	-	-	G, D Anatolia	2
<i>Festuca anatolica</i> subsp. <i>anatolica</i>	-			+		+				+	-	-	-	-	G Anatolia	3
<i>Festuca pinifolia</i> var. <i>phrygia</i>	-		+	+						+	-	-	-	-	Ic Anatolia	2
<i>Poa annua</i>	Meadow-Grass			+		+				-	-	-	-	-	Wide Spread	2
<i>Poa pratensis</i>	"						+		+	-	-	-	-	-	Wide Spread	3
<i>Polypogon viridis</i>	"					+	+			-	-	-	-	Eur.-Sib.	Wide Spread	2
Polygalaceae																
<i>Polygala pruinosa</i> subsp. <i>pruinosa</i>	Milkwort		+							-	-	-	-	-	Wide Spread	2
Polygonaceae																
<i>Rumex scutatus</i>	Sorrel		+		+					-	-	-	-	-	Wide Spread	2
<i>Rumex tuberosus</i> subsp. <i>tuberosus</i>	"					+			+	-	-	-	-	-	K, B, G Anatolia	3
Potamogetonaceae																
<i>Potamogeton perfoliatus</i>	-						+			-	-	-	-	-	Wide Spread	3
Primulaceae																
<i>Androsace multiscapa</i>	-			+						-	-	-	-	-	G Anatolia	3
<i>Cyclamen cilicium</i> var. <i>cilicium</i>	Cyclamen		+					+	+	+	-	-	+	Med. (mt)	G Anatolia	3
<i>Cyclamen cilicium</i> var. <i>intaminatum</i>	"		+					+	+	+	-	-	+	Med. (mt)	G Anatolia	2
<i>Cyclamen persicum</i>	"		+					+	+	-	-	-	+	Med.	B, G Anatolia	1
<i>Cyclamen pseud-ibericum</i>	"		+					+	+	+	-	-	+	Med.	G Anatolia	2

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Pteridaceae																
<i>Pteris vittata</i>	-			+						-	-	-	-	-	G Anatolia	2
Ranunculaceae																
<i>Adonis microcarpa</i>	Yellow Pheasant's Eye	+				+	+			-	-	-	-	-	G, GD Anatolia	2
<i>Delphinium cilicicum</i>	Larkspur					+				+	-	-	-	Med.	G Anatolia	3
<i>Ranunculus ficaria subsp. ficariiformis</i>	Buttercup		+		+					-	-	-	-	-	Dis Anatolia	2
<i>Thalictrum lucidum</i>	Meadow Rue						+			-	-	-	-	-	Wide Spread	1
<i>Thalictrum orientale</i>	"		+							-	-	-	-	Med.	G Anatolia	2
Resedaceae																
<i>Reseda orientalis</i>	Milkweed			+						-	-	-	-	-	G Anatolia	3
Rhamnaceae																
<i>Paliurus spina-christi</i>	Jerusalem Thorn					+	+			-	-	-	-	-	Wide Spread	1
<i>Zizyphus lotus</i>	Jujube							+		-	-	-	-	-	G Anatolia	1
Rosaceae																
<i>Cerasus mahaleb var. alpina</i>	Mahaleb Cherry			+						-	-	-	-	-	G Anatolia	1
<i>Potentilla calycina</i>	Cinquefoil		+					+		+	-	-	-	Med.	G Anatolia	2
<i>Potentilla kotschyana</i>	"		+							-	-	-	-	Med.	Wide Spread	2
<i>Potentilla pulvinaris subsp. argentea</i>	"			+		+				+	-	-	-	Med.	G Anatolia	2
<i>Sarcopoterium spinosum</i>	Great Burnet		+							-	-	-	-	Med.	KB Anatolia	3
Rubiaceae																
<i>Asperula setosa</i>	-	+	+							-	-	-	-	Iran-Turan	G, D Anatolia	2
<i>Galium adhaerens</i>	Bedstraw				+			+		+	-	-	-	Med.	G Anatolia	2
<i>Galium aparine</i>	"	+				+		+		-	-	-	-	-	KB Anatolia	1
<i>Galium cilicicum</i>	"			+						+	-	-	-	Med. (mt)	G Anatolia	2
<i>Galium davisii</i>	"			+						+	-	-	-	Med. (mt)	G Anatolia	3
<i>Galium incanum subsp. psedocornigerum</i>	"		+	+						+	-	-	-	Iran-Turan	G, D Anatolia	2
<i>Galium penicillatum</i>	"			+						-	-	-	-	Med.	G Anatolia	2
<i>Galium pterocarpum</i>	"			+				+		+	-	-	-	Med.	G Anatolia	2

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<i>Galium shepardii</i>	"			+		+		+	+	+	-	-	-	Med.	G Anatolia	1
<i>Galium sieheanum</i>	"	+				+				+	-	-	-	-	G Anatolia	2
Ruppiaceae																
<i>Ruppia maritima</i>	-	+				+	+			-	-	-	-	-	Wide Spread	3
Rutaceae																
<i>Haplophyllum myrtifolium</i>	Common Rue		+			+				+	-	-	-	Iran-Turan	Wide Spread	2
<i>Haplophyllum suaveolens</i> var. <i>cilicicum</i>	"		+						+	+	-	-	-	-	G Anatolia	3
<i>Ruta chalepensis</i>	-		+			+				-	-	-	-	-	K, G Anatolia	2
Salicaceae																
<i>Salix alba</i>	White Willow						+			-	-	-	-	Eur.-Sib.	Wide Spread	3
<i>Salix excelsa</i>	-						+			-	-	-	-	Iran-Turan	KB Anatolia	3
Santalaceae																
<i>Thesium bergeri</i>	-		+					+	+	-	-	-	-	Med.	KB Anatolia	3
<i>Thesium cilicicum</i>	-		+	+						+	-	-	-	Med. (mt)	G Anatolia	2
Scrophulariaceae																
<i>Anarrhinum orientale</i>	Snapdragons		+			+				-	-	-	-	Iran-Turan	G Anatolia	1
<i>Chaenorhinum litorale</i> subsp. <i>pterosporum</i>	-					+				+	-	-	-	Med.	Dis Anatolia	1
<i>Chaenorhinum minus</i> subsp. <i>minus</i>	-	+		+					+	-	-	-	-	-	KB Anatolia	2
<i>Digitalis ferruginea</i> subsp. <i>ferruginea</i>	Meadow Foxtail		+		+				+	-	-	-	-	Eur.-Sib.	K Anatolia	2
<i>Linaria genistifolia</i> subsp. <i>praealta</i>	-		+				+	+		+	-	-	-	Med.	G, GD Anatolia	3
<i>Linaria iconia</i>	-	+	+							+	-	-	-	Iran-Turan	Ic Anatolia	2
<i>Rhinanthus angustifolius</i> subsp. <i>grandiflorus</i>	-					+	+		+	-	-	-	-	-	K, G, D Anatolia	2
<i>Scrophularia bitlisica</i>	Figworts		+						+	+	-	-	-	Iran-Turan	GD Anatolia	2
<i>Scrophularia canina</i> subsp. <i>bicolor</i>	"		+				+			-	-	-	-	Med.	KB Anatolia	1
<i>Scrophularia xanthoglossa</i> var. <i>decipiens</i>	"	+	+		+					-	-	-	-	Iran-Turan	Ic Anatolia	1

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<i>Verbascum antitauricum</i>	Mullein		+						+	+	-	-	-	Med.	G Anatolia	1
<i>Verbascum cheiranthifolium</i> var. <i>cataonicum</i>	"			+		+				-	-	-	-	-	G, D Anatolia	1
<i>Verbascum cheiranthifolium</i> var. <i>cheiranthifolium</i>	"			+				+	+	-	-	-	-	-	Wide Spread	2
<i>Verbascum cilicicum</i>	"		+	+					+	+	-	-	-	Med.	G Anatolia	2
<i>Verbascum cilicium</i>	"		+	+						+	-	-	-	Iran-Turan	G Anatolia	2
<i>Verbascum galilaeum</i>	"	+			+				+	-	-	-	-	Med.	G Anatolia	2
<i>Verbascum glomeratum</i>	"			+				+	+	-	-	-	-	Iran-Turan	Wide Spread	1
<i>Verbascum hadschinense</i>	"		+	+						+	-	-	-	Iran-Turan	G Anatolia	2
<i>Verbascum lasianthum</i>	"			+				+	+	-	-	-	-	Med.	G, GB Anatolia	1
<i>Verbascum leianthum</i>	"		+		+			+		+	-	-	-	Med.	G Anatolia	2
<i>Verbascum linearilobum</i>	"		+	+						+	-	-	-	Med.	G Anatolia	1
<i>Verbascum luridiflorum</i>	"		+	+						+	-	-	-	Iran-Turan	G Anatolia	2
<i>Verbascum lyratifolium</i>	"		+	+					+	+	-	-	-	Med.	G Anatolia	1
<i>Verbascum nudiusculum</i>	"								+	+	-	-	-	Med.	G Anatolia	2
<i>Verbascum petiolare</i>	"							+	+	+	-	-	-	Med.	G Anatolia	1
<i>Verbascum pinetorum</i>	"							+	+	+	-	-	-	Med.	G Anatolia	2
<i>Verbascum pycnostachyum</i>	"	+				+				-	-	-	-	Med.	G, B Anatolia	2
<i>Verbascum serratifolium</i>	"		+	+	+				+	+	-	-	-	Iran-Turan	Ic Anatolia	2
<i>Verbascum splendidum</i>	"	+						+	+	-	-	-	-	Med.	GB, B Anatolia	3
<i>Veronica anagallis-aquatica</i> subsp. <i>lysimachioides</i>	Common Lantana						+			+	-	-	-	-	Wide Spread	2
<i>Veronica balansae</i>	"			+			+			+	-	-	-	Med.	G Anatolia	3
<i>Veronica beccabunga</i> subsp. <i>abscondita</i>	"						+			-	-	-	-	Iran-Turan	Ic Anatolia	2
<i>Veronica bombycina</i> subsp. <i>bolkardaghensis</i>	"			+						+	-	-	-	Iran-Turan	G Anatolia	3
<i>Veronica bornmuelleri</i>	"					+				-	-	-	-	Iran-Turan	G Anatolia	2
<i>Veronica bozakmanii</i>	"						+		+	-	-	-	-	Iran-Turan	Wide Spread	3

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<i>Veronica cinerea</i>	"			+					+	+	-	-	-	Med.	G Anatolia	2
<i>Veronica officinalis</i>	"				+				+	-	-	-	-	Eur.-Sib.	K, G Anatolia	3
<i>Veronica polium</i>	"					+				+	-	-	-	Iran-Turan	GD Anatolia	2
<i>Veronica scardica</i>	"		+	+			+			-	-	-	-	-	Wide Spread	3
<i>Veronica syriaca</i>	"	+	+	+					+	-	-	-	-	Med.	G Anatolia	2
<i>Veronica thymoides subsp. thymoides</i>	"							+	+	+	-	-	-	Iran-Turan	GD Anatolia	3
<i>Veronica triloba</i>	"			+					+	-	-	-	-	-	KB Anatolia	3
<i>Veronica triphyllus</i>	"		+	+					+	-	-	-	-	-	Wide Spread	3
Solanaceae													-			
<i>Atropa belladonna</i>	Deadly Nightshade								+	-	-	-	-	Eur.-Sib.	K, B, G Anatolia	2
Sparganiaceae																
<i>Sparganium erectum subsp. neglectum</i>	-					+				-	-	-	-	Eur.-Sib.	K, B, G Anatolia	2
Tamaricaceae																
<i>Tamarix smyrnensis</i>	Tamarisk						+			-	-	-	-	-	K, B, G, D Anatolia	2
Thymelaeaceae																
<i>Daphne sericea</i>	-							+	+	-	-	-	-	Med.	KB, B, G Anatolia	1
<i>Thymelaea aucheri</i>	-		+				+		+	-	-	-	-	Med.	K, G Anatolia	2
<i>Thymelaea passerina</i>	-	+	+							-	-	-	-	-	Wide Spread	2
Typhaceae																
<i>Typha minima var. gracilis</i>	Cattail						+			-	-	App-I	-	Eur.-Sib.	GB, G Anatolia	2
Ulmaceae																
<i>Ulmus glabra</i>	Elm								+	-	-	-	-	Eur.-Sib.	K, B, G Anatolia	2
<i>Ulmus minor subsp. canescens</i>	"		+				+	+	+	-	-	-	-	Med.	B, G Anatolia	1
Urticaceae																
<i>Parietaria lusitanica</i>	-		+	+		+				-	-	-	-	Med.	KB Anatolia	1
Valerianaceae																
<i>Valerianella pumila</i>	European Wild Ginger	+	+							-	-	-	-	-	Ic Anatolia	1

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<i>Valerianella vesicaria</i>	"	+	+							-	-	-	-	-	Wide Spread	1
Verbenaceae																
<i>Phyla canescens</i>	-						+			-	-	-	-	-	Wide Spread	2
<i>Phyla nodiflora</i>	-						+			-	-	-	-	-	K, G Anatolia	1
<i>Verbena officinalis</i>	Common Vervain			+		+	+	+	+	-	-	-	-	-	Wide Spread	2
Violaceae																
<i>Viola alba subsp. dehnhardtii</i>	Violet							+		-	-	-	-	-	Dis Anatolia	2
<i>Viola cilicica</i>	"								+	+	-	-	-	Med.	G Anatolia	1
<i>Viola modesta</i>	"		+	+						-	-	-	-	-	D, G, GD Anatolia	2
<i>Viola sandrasea subsp. cilicica</i>	"			+						+	-	-	-	-	G Anatolia	2
Vitaceae																
<i>Vitis sylvestris</i>	Grape								+	-	-	-	-	-	Wide Spread	2
Zygophyllaceae																
<i>Tribulus terrestris</i>	Common Starthistle	+				+				-	-	-	-	-	Wide Spread	2

Appendix-J

Acoustic Report

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Kavsakbendi Dam, HPP and Quarries Project

ACOUSTIC REPORT



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JUNE 2007
ANKARA



Ser Power Generation and Trade Inc.

**KAVSAKBENDI DAM, HPP AND QUARRIES
PROJECT
ACOUSTIC REPORT**

PROJECT NO: 058.02.01

JUNE 2007

REVISION LOG

Rev. No.		0	1
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<u>Rapor Tanımı</u> Report Description	Acoustic Report		
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<u>Kontrol Eden</u> Reviewed by	Prof. Dr. Coskun Yurteri		
<u>Onaylayan</u> Approved by	Prof. Dr. Coskun Yurteri		

CONTENTS

Table of Contents	i
Table of Tables	iii
Table of Figures	iii
Abbreviations	iv
1. GENERAL INFORMATION	1
1.1. The commercial title of the facility	1
1.2. Address of the Facility	1
1.3. Production of Facility/Service Matter	2
1.4. The location of the Facility (Industrial District, Industrial Zone, Settling Area, Rural Area)	2
1.5. Characteristics of the area that the facility will be established (Present Flora, topographical structure, meteorological factors (average wind direction, wind speed, values of heat and relative humidity variation as of the terms when the report will be prepared), the location and height of buildings that are on the environment, Amount of its floors, whether they have reflecting surfaces and the distance of closet building that is sensitivity to noise)	3
1.6. The process units of Planned facility and settling plan of the area where is used for the social purpose	6
1.7. Production flow diagram of Planned facility and place of noise sources	6
1.8. Distance of Health protection band	6
1.9. The information about working period of facility. (Total working time, the working condition of constant or intermittent, number of shift)	7
2. NOISE LEVELS DURING CONSTRUCTION	8
2.1. Area Where Construction Activities Take Place and Duration of Construction	8
2.2. Type and Number of Machines Used	8
2.3. Working At the Same Time Situations and Positions	8
2.4. Calculation of the Total Noise Level Resulting From Activities in the Construction Site	8
2.5. The values that obtained result of calculation compare to ÇGDYY article 26 (which distance limit values are	12
3. THE INFORMATION REGARDING TO BACKGROUND VOICE LEVEL	13
3.1. Present Voice Level in Buildings that is sensitivity to noise and close to Project Site according to TS 9315 ve TS 9798 standarts	13
3.2. Equipment that is used for measurements, measurement method, calibration certificate of measurement equipment and acoustic background of person who makes measure (certificate and training condition within the context of certificate that is brought by ÇGDYY regulation article 50)	13
3.3. The Evaluation and Analysis of the Measured Level of Back Yard Noise according to the 30 th and 31 st Articles of CGDY Regulation	14
4. THE INFORMATION ABOUT THE LEVEL OF NOISE AND RESONANCE THAT COULD BE FORMED DURING THE OPERATION PHASE	15
4.1. The Sources of Noise in the Facility , Their Places Information about the sound if any and the character of the sound	15
4.2. The information about the power of the noise sources depending upon the full. Capacity functioning of the facility. The Calculation of the Total Level of Noise that will be on the process units depending upon the functioning periods and conditions	

	of the Facility	15
4.3.	The Noise Level in the Power Plant	15
4.4.	The Calculation of the Noise Level of Impermeable Quarry	16
4.5.	The calculation of the Noise Level of C Impermeable Material Quarry	20
5.	MEASUREMENTS THAT WILL HAVE TAKEN FOR CONTROL OF NOISE LEVEL DURING THE OPERATING	25
5.1.	Technical content of measurements that will be taken, if environmental noise for construction and operating stage goes beyond to limit value.(determination of isolation ratio that will be applied on buildings for voice isolation in the frame of ISO 12354-(1-5) standards, determination of barrier standards for environmental barrier that will be applied in the frame of TS EN 1793 (1-3).	25
5.2.	Environmental Noise Management purposed Administrative Precaution	25

TABLE OF TABLES

Table 1.1 Distances of Buildings that is closet sensitivity to noise.....	6
Table 2.1. Noise Power Levels of Construction Machines Used in Construction Phase	8
Table 2-2 Calculated Noise Levels Used in the Graph	10
Table 2.3 Environmental Noise Limit Values for construction site. (ÇGDYY Table 5)	11
Table 2-4 Noise Power Levels Of The Machines That May Be Used In Construction	11
Table 2-5. Variation of crush sift facility voice level according to distance	12
Table 3.1 Noise Measurement Results	13
Table 4.1. The Sound Power Levels that is formed the construction machines that may be utilized in the B impermeable material quarry	16
Table 4.2 The Limit Values of the Environmental Noise for the Industrial Facilities.....	17
Table 4.3. The table showing the change in the noise level depending upon the distance In B Impermeable Material Quarry	18
Table 4.4. The Level of the Noise that will be formed during the burstings in B impermeable material quarry.....	18
Table 4.5 The Change of the Noise Level that will be formed after the bursting in B-Impermeable Material Quarry depending upon the distance.....	20
Table 4.6. The Sound Power Levels that is formed the construction machines that may be utilized in the C impermeable material quarry	21
Table 4.7 The table showing the change in the noise level depending upon the distance In C Impermeable Material Quarry	22
Table 4.8. The Level of the Noise that will be formed during the burstings in C impermeable material quarry.....	22
Table 4.9 The Change of the Noise Level that will be formed after the bursting in C-Impermeable Material Quarry depending upon the distance.....	24
Table 4.11 The limit values vibrations that will be created by the machines and equipments in the buildings	24

TABLE OF FIGURES

Figure 1-1 Location and place of the Project Site in Turkey.	2
Figure 1-2 General Layout and Locations of Measurement Points.....	4
Figure 2-1 Variation of voice that emerge from Machine / Equipments according to distance	10
Figure 4-1. The graphic showing the change in the noise level depending upon the distance In B Impermeable Material Quarry	17
Figure 4-2. The Distribution of the Noise that will be formed after the bursting in B Impermeable Material Quarry according to the Distance	19
Figure 4-3. The graphic showing the change in the noise level depending upon the distance In C Impermeable Material Quarry.....	21
Figure 4-4 The Distribution of the Noise that will be formed after the bursting in C Impermeable Material Quarry according to the Distance	23

ABBREVIATIONS

ADC	Atmospheric Data Centre
EIA	Environmental Impact Assessment
ÇGDYY	Regulation on Assessment of Environmental Noise
dBA	A Weighted Decibel
dBC	C Weighted Decibel
DMI	State Meteorological Works
DOKAY	DOKAY Engineering and Consultancy
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
L_{eq}	Equivalent Noise Level
L_{max}	Maximum Noise Level
L_{min}	Minimum Noise Level
L_{day}	Equivalent Noise Level in the Day (07:00-19:00)
L_{night}	Equivalent Noise Level at Night (23:00-07:00)
L_w	Noise Power Level
L_p	Level of Noise Pressure
L_{AFmin}	Min Value of A Weighted Noise Level in Measurement Period
L_{AFmax}	Max. Value of A Weighted Noise Level in Measurement Period
m	Meter
METU	Middle East Technical University
TUBITAK	The Scientific and Technological Research Council of Turkey

1. GENERAL INFORMATION

1.1. The commercial title of the facility

Ser Power Generation and Trade Inc.

1.2. Address of the Facility

Kavsakbendi Dam, HPP and Quarries Project is located on below Seyhan reservoir, approximately 8 km downstream from the connection of Zamanti and Goksu rivers that are two main bodies of Seyhan River. The installed power of Kavsakbendi Dam, HPP and Quarries Project is 145, 40 MW, the annual energy production is 650, 78 GWh. Its rentability is 2, 28 and internal rate of profitability is %20.45. The economic lifespan of the project is forecasted as 50 years but if the electro-mechanical equipment is renewed in every 35 years and if the necessary rehabilitation activities are made on the hydraulic buildings, the lifespan of the project raises up to 100 years. It is foreseen that the project will be completed in 4 years.



Figure 1-1 Location and place of the Project Site in Turkey.

1.3. Production of Facility/Service Matter

The electric power that will be produced with planned project on Seyhan River will provide to be evaluated hydroelectric capacity of lower Seyhan basin and serve all Turkey by being included in the interconnected system.

1.4. The location of the Facility (Industrial District, Industrial Zone, Settling Area, Rural Area)

Kavsakbendi Dam, HPP and Quarries Project is within the borders of Adana Province, Kozan and Aladağ districts. The 1/25000 scaled residential plan is given in Figure 1-2.

- 1.5. Characteristics of the area that the facility will be established (Present Flora, topographical structure, meteorological factors (average wind direction, wind speed, values of heat and relative humidity variation as of the terms when the report will be prepared), the location and height of buildings that are on the environment, Amount of its floors, whether they have reflecting surfaces and the distance of closet building that is sensitivity to noise)**

1.5.1. Characteristics of the Proposed Region

Kavsakbendi Dam, HPP and Quarries Project is a power generation purposed project located on lower Seyhan basin, approximately 8 km downstream from the junction of Rivers Zamanti and Goksu which are two main tributaries of Seyhan River. The project area is within the borders of Adana province, Kozan and Aladag districts. The Project Site is on a 7 km distance from the center of Aladag and 27 km distance from the center of Kozan. The coordinates of Kavsakbendi Dam axe are 4160250 N – 723350 E. Kavsakbendi Dam is on Seyhan River on a 249 m talveg elevation and it lies on the side of Somakli ridge where is on the right shore. Karasivri hill on the left coast and Karasivri ridge are on the dam axe on the right shore.

1.5.2. Present Flora

The Project Site is within the boundaries of Akdam office of chiefs and Pos enterprises that are in Kozan district. In the project field, there's a forest area with the size of 1759,5 ha.

1.5.3. Topographic Structure

The topographic map of the region is presented in Figure 1-2. The Project Site and its around have generally a pitched character, they are composed of craggy rocks.

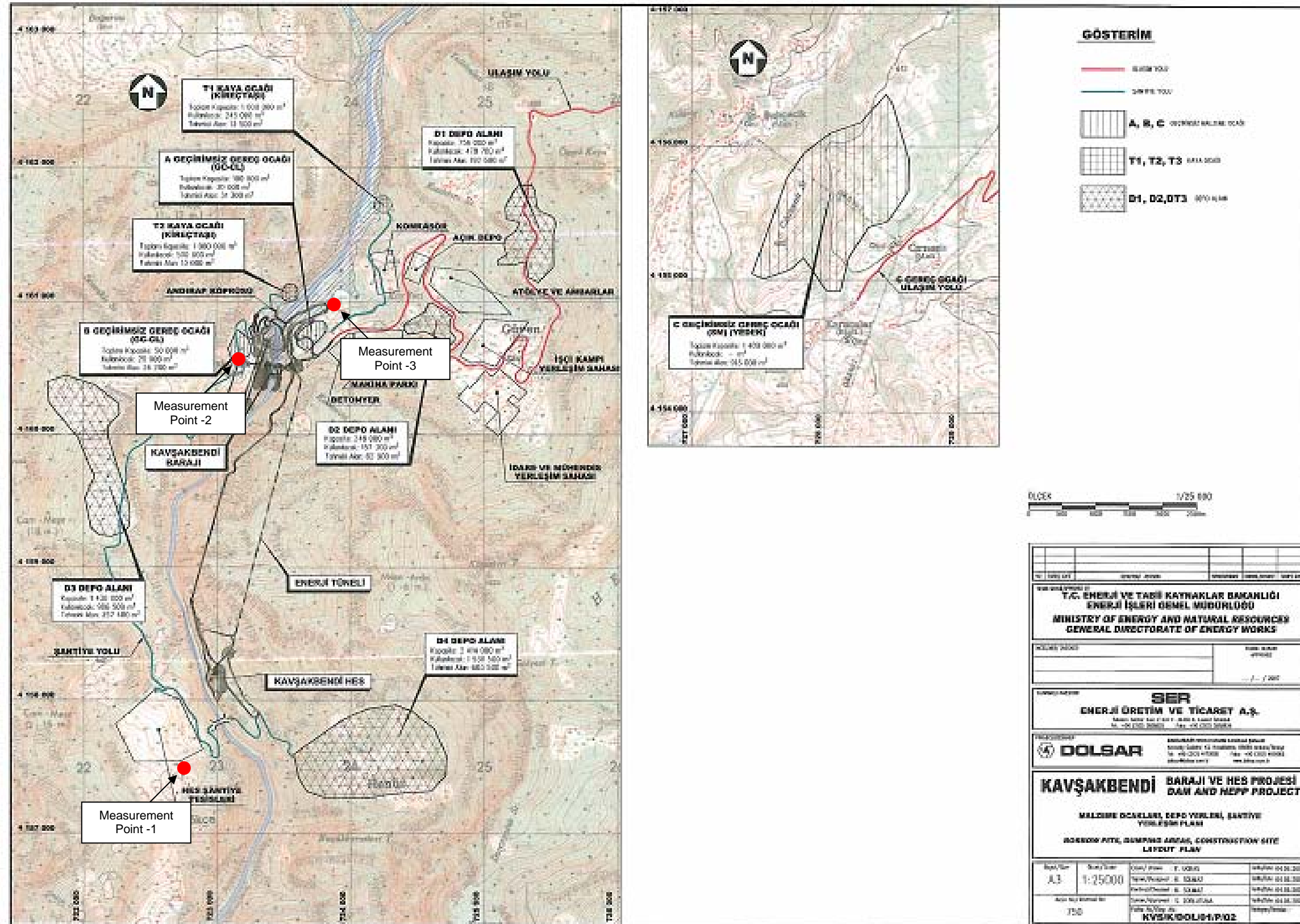


Figure 1-2 General Layout and Locations of Measurement Points

1.5.4. Meteorological factors (average wind direction, wind speed, values of heat and relative humidity variation as of the terms when the report will be prepared)

Proposed Area for Power Plant has typical meteorological conditions of Mediterranean Region where it is located on as geographically. The weather is hot and dry in summers but rainy and cool in winters. In the district, frost does not happen at all. While the region of Adana has lower annual average relative humidity ratio than Adana, it is rainier than Adana during the year.

The annual average wind is 2,0 m/s, the average number of the stormy days in the city 4.1 and the average number of the windy days is 49. The winds blows the fastest from the north-northwest region at a rate of 23,4 m/s. The dominant direction of the wind is north-northwest and the annual speed of the wind is 3,3 m/s, the total number of blowings per year is 2982. North follows this with a 2,4 m/s average wind speed and with a 1783 total blowing number.

The 30 years data recorded by Kozan meteorology station about the amount of rain shows that the average rain amount is 851,7 mm in the region. It rains the most in winter. When it is taken in to consideration monthly average total rain, the most rainy month is January with a number of 109,8 mm while August is the less rainy month with a rate of 21,4. The average of snowy days is 0,3 per year.

Kozan Meteorological Station Long-Term Meteorological Bulletin (1975-2005) taken from the General Directorship of the State Meteorological Affairs is given in Appendix-1.

1.5.5. The location and height of buildings that are on the environment, amount of its floors, whether they have reflecting surfaces and the distance of closet building that is sensitivity to noise

The distances of the buildings that are sensitive to the nearest noise are given in Table 1.1. The buildings in village are made out of mud bricks and they are generally single floored. The noise in the area arises out of the typical field activities in the region.

Table 1.1 Distances of Buildings that is closet sensitivity to noise

Measurement Point	Measurement Location	The Closet Receiver Point	≈ Distance (m)
1	To B impermeable material quarry	The closet building to Karakoyak Quarter	200 m
2	To C impermeable material quarry	The closet building to Cirnazli Quarter	500 m
3	To Dam construction site	The closet building to Gokçe Village	750 m
4	To Crush sift facility	The closet building to Karakoyak Quarter	350 m

Planned Usage Facility

Anticipated general plan belonging to facility is presented in Figure 1-2.

1.6. The process units of Planned facility and settling plan of the area where is used for the social purpose

The main units that should be present in the Project Site are shown on below, settling plan is given in Figure 1-2.

- Field Offices of Contractor and control personel
- Equipment and substitute depot
- Workshops and machine park site
- Stone crusher facilities
- Concrete preparation facilities
- Compressed air and Water getting systems

1.7. Production flow diagram of Planned facility and place of noise sources

Noise sources of proposed Project on the operating stage are presented on belowe, predicted noise levels that will be emerged from activities as mentioned before are given in Section 4.

- Mining area operating activities
- Operating of Power Plant

1.8. Distance of Health protection band

Environmental Impact Assessment (EIA) studies are still continueing for the project. For this reason, at the present situation, usage borders of fields of activity are offered as health protection band. But, after the EIA process, whitin the context of the regulation

published and came into effect on official gazete 10.08.2005 date and no. 25902 relating to opening work place and working licence, by applied to R.C. Adana govenorship, it will have health protection band determination made by means of a commission that will be constituted its in.

1.9. The information about working period of facilitiy. (Total working time, the working condition of constant or intermittent, number of shift)

715 people will work on construction stage and 20 will work on operating stage. It is anticipated that facility will work as tree shifts for 24 hours on operating stage. Since the operating processes are not completed yet, there is no responsible authotority relating to noise that will be emerge from facility. But after the facility goes into action, a person in charge will be determined relating to topic and communication information will be transmitted to regarding authorities.

2. NOISE LEVELS DURING CONSTRUCTION

2.1. Area Where Construction Activities Take Place and Duration of Construction

Areas where the construction activities will take place is given in Figure 1-2. Duration of the construction is approximately 5 years.

2.2. Type and Number of Machines Used

Types and numbers of machines, which are employed for excavation, filling, tunnel opening, scraping, transportation and cement works, in the scope of Project's construction works are given in Table 2-1.

Table I.5. Noise Power Levels of Construction Machines Used in Construction Phase

Machine	Number	Noise Power Level (Lw) (dB)
Roller	1	101
Vibratory Roller	1	105
Crawler Dozer	1	103
Crawler Excavator	1	103
Wheel Loader	2	101
Dump Truck	10	101
Compressor	1	99
Portable Compressor	1	97
Generator	1	96
Concrete Pump Truck	2	115
Concrete Truckl	2	115
Injection Machine	1	100
Hole Drilling Machine	1	99
Diesel-powered Generator	1	96
Backhoe-type Loaders	1	103

2.3. Working At the Same Time Situations and Positions

All the calculations have been based on the worst-case scenario, in which all the machines and equipments are working at the same time. However the actual noise level will surely be much lower than the value obtained by calculations. It is impossible for now to give exact information about the locations of the construction machines and equipments.

2.4. Calculation of the Total Noise Level Resulting From Activities in the Construction Site

The total equivalent noise level which all the noise sources contribute to can be calculated by the fomula (1) given below¹. In this formula, it is assumed that all the noise sources are on the same plane.

$$L_{eq} = 10 \times \log \sum_{i=1}^n 10^{L_i/10} \dots\dots\dots (1)$$

In this formula;

n = Number of noise sources

¹ Assessment and Management of Environmental Noise, Type A Certificate Program Seminar Notes- METU Continuing Education Center, Ankara, 2007

L_i = Voice power level for each source (dB(A))

L_{eq} = Total equivalent noise level

= 122 dB

Level of voice power (L_p) that emerges from Machine / Equipment and reach to specific distance can be calculated with the help of (2) numbered formula given on below;

$$L_p = L_{eq} + 10 \times \log \left[\frac{Q}{4} \right] r^2 \quad (2)$$

L_p : Level of voice power (noise) (dBA)

Q : Reduction factor chosen as flat or rugged of area are taken as 2 since it is rugged middle flat.

r : Distance (m)

Due to worked open environment, it can be taken into consideration decrease of voice pressure level emerge from atmospheric absorbed of air. In order to be evaluated the most pessimistic approach, it is supposed that it will not any decrease on voice pressure level due to atmospheric absorbed on calculations.

Voice levels in various distance were calculated by means of this formula, it is summarized in Figure 2-1. Variation of voice level depending on distance is presented in Table 2-2. As a Result of calculations, noise limit value emerged from construction works on receiver point given in ÇGDYY is 70 Dba. The closet sensitive receiver point to construction site is the closet building distance from 750 m on Gokçe village. As a result of calculations, noise level that will be made up on 750 m distance is 56,4 dBA. The graphic that shows variation of voice level depending on distance is presented Figure 2-1, and values relating to the variation is presented in Tabel 2-3. Limit values that noise emerge from construction activities should not go beyond on the closet point are given in ÇGDYY Table-5 (See Tabel 2.3). In this context, it will be complied with limit values that are given in ÇGDYY Table- 5 during the construction activity. During the construction activity, the measurements stated in article 22 of statute published and came into effect on official gazete 11.01.1974 date and no. 14765 relating to workers health and work security will be taken, and the equipments that protect against noise like special helmet, headset or ear plugs will be given to workers. In addition, it will be complied with the regulation published and came into effect on official gazete 09.12.2003 date and no. 25311 relating to working health and work security.

² Valuated of Environmental noise and managed, A type certificate program seminar notes- METU constant education centre, Ankara, 2007.

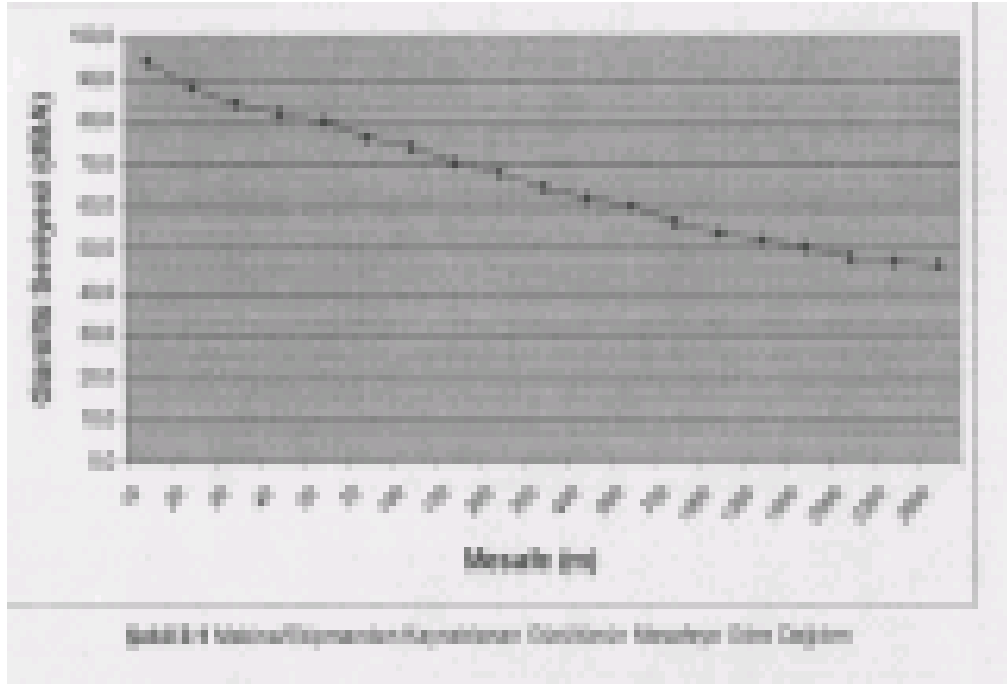


Figure 2-1 Variation of voice that emerge from Machine / Equipments according to distance

Table 2-2 Calculated Noise Levels Used in the Graph

r (m)	Lp (dBA)
10	94,0
20	87,9
30	84,4
40	81,9
50	80,0
75	76,4
100	74,0
150	70,4
200	67,9
300	64,4
400	61,9
500	60,0
750	56,4
1.000	54,0
1.250	52,0
1.500	50,4
2.000	47,9
2.250	46,9
2.500	46,0

Not: Since working frequency band of construction machine is between 500-4000 Hz, voice pressure level of each point is equivalent to noise level.

Table 2.3 Environmental Noise Limit Values for construction site. (ÇGDYY Table 5)

TYPE OF ACTIVITY (Construction, destruction and repair)	Lday (dBA)
Build	70
Road	75
Diger kaynaklar	70

In addition to this calculations, voice power level belonging to two cursh sift facilities activities that is anticipated to be used in the project are given in Table 2-4.

Table 2-4 Noise Power Levels Of The Machines That May Be Used In Construction

Machine	Item	Voice Pover Level (Lw) (dB)
Konkasor	2	119

According as this, voice level that will be expected on consturction term was calculated by means of formula 1 given in Section 2. Location of the arer that is anticipated for stone crusher facilitiy is given in Figure 1-2.

Calculation was realized with the acception of 122 dB voice power level (Lw) for crusher in this formula that will be occurred on the closet receiver as a result of storne crusher working and given on above. The values that were obtained from result of calculations are presentedn in Table 2-5. Expected Construction stage voice level on Karakoyak quarter where is the closet receiver point to crush sift facility (approximately 350 m) is 63,1 dBA.

Table 2-5. Variation of crush sift facility voice level according to distance

r (m)	Lp (dBA)
10	94,0
20	88,0
30	84,5
40	82,0
50	80,1
75	76,5
100	74,0
150	70,5
200	68,0
300	64,5
350	63,1
500	60,1
750	56,5
1.000	54,0
1.250	52,1
1.500	50,5
2.000	48,0
2.250	47,0
2.500	46,1

Note: Since working frequency band of construction machine is between 500-4000 Hz, voice pressure level of each point is equivalent to noise level.

2.5. The values that obtained result of calculation compare to ÇGDYY article 26 (which distance limit values are

According to the evaluation that is made whitening the context of ÇGDYY article 26, there is no sensitivity receiver points like school, hospital, house in around the construction site by 250 m that is under limit value. In Karakoyak quarter (approximately 750 m) where is the closet sensitivity receiver environment to construction site, expected to be felt voice level will be 56,4 level (see. Table 2-3). Depending on the used equipments, impact voice emerged from construction activity will not be also go beyond 100 dBC'lik (LCmax) limit values that is given in ÇGDYY. In the similar way, construction stage noise level that will be expected to be made up in Karakoyak quarter where is the closet point to crush and sift facility (distance from 350 m) will be around 63,1 dBA. The value provides limit values.

Construction activity carried out near around of house is prohibited to be made between evening (19.00-23.00) and night (23.00-07.00) except in day (07.00-19.00) time when is given by ÇGDYY Table 5. Contractor will show the information regarding to dates of starting and finishing, working periods and the permission taken from district municipality on table that can be seen as easy.

3. THE INFORMATION REGARDING TO BACKGROUND VOICE LEVEL

3.1. Present Voice Level in Buildings that is sensitivity to noise and close to Project Site according to TS 9315 ve TS 9798 standards

Background Voice measurements in offered Project Site were realized in Gökçe Village, Karakoyak Village and Cirmazlı quarter where the closest points to power plant for acoustic report preparation are. Measurements were realized in front of the closest house to Project Site where is in the sensitive environments.

3.1.1. Measurement Points that will be made in order to be determined present voice level

Chosen measurement locations were preferred since they were the closest sensitive receiver points to Project Site. In this study, as a result of measurement studies that were carried out for 24 hour according to ÇGDYY, L_{AFmax} , L_{day} , L_{AFmin} values were determined in sensitive points (See. Table 3.1).

Table 3.1 Noise Measurement Results

Measurement Points	Measurement Date	Measurement Area	L_{AFmax}	L_{AFmin}	L_{day}
1	12.12.2007	Karakoyak Quarter	73,4	40,6	49,4
2	12.12.2007	Gökçe Village	69,3	38,4	50,1
3	12.12.2007	Cirmazlı Quarter	77,2	44,3	53,6

Before measurement, wind speed was controlled with Silva ADC (“Atmospheric Data Centre”) marked anemometer in area, and it is determined that wind speed was under 5 m/s, it was decided that there is no disadvantage for wind speed measurement.

3.2. Equipment that is used for measurements, measurement method, calibration certificate of measurement equipment and acoustic background of person who makes measure (certificate and training condition within the context of certificate that is brought by ÇGDYY regulation article 50)

The device which used for voice measurements is SVAN 949 Model Noise and Vibration measurement device. Aspects of it is presented on belowe.

- It has voice measurement device with International Electronic Commission (IEC) approved.
- True voice measurement indicator called as profile, working parallel measures acoustic signal with combination of A, C, LIN filters and slow, fast or effective detector time constant.

- Real time 1/1 octave and 1/3 octave analyses including statistical calculation can be realized on voice measurement by means of calculation capacity of digital signal process.
- USB 1.1 can connect every kind computer easily by means of its interface and SvanPC software, and data can be transferred. Moreover, results of measurement can be stored in device memory that is not volatile.
- It is used in all days even difficult environment çalışma suresi 8 saati geçen, dayanikli ve degistirilebilir bataryasi ve hafif yapisi sayesinde zor çevre kosullarinda bile butun gun kullanilabilir.
- The calibration has been made by the manufacturing firm and the calibration document is given in Appendix-E
- The measurement elevation is 1,5m

The calibration of the device has been effected by using a calibrator before and the after the measurement

Expert chemist Yesim Asti and expert environmental engineer Gunal Ozenirler who are executing the measurement and evaluation studies has joined a "A-Certificate" programme that has been organized with the collaboration of TR Ministry of Environment and Forests and Middle East Technical University and that has been held in the Continuous Education Center of Middle East Technical University. They have completed the course with success and their education certificates are provided in Appendix 2

3.3. The Evaluation and Analysis of the Measured Level of Back Yard Noise according to the 30th and 31st Articles of CGDY Regulation

The measured Lafternoon in all of the measurement points is below 55 dBA. The measurement place and the level can be considered as "Category A" (in terms of Lafternoon below 55 dBA according to the 30th article of EIAR). The Environmental Noise factor is not significant while the permission for setting up the facility and the planning decision are given

4. THE INFORMATION ABOUT THE LEVEL OF NOISE AND RESONANCE THAT COULD BE FORMED DURING THE OPERATION PHASE

4.1. The Sources of Noise in the Facility , Their Places Information about the sound if any and the character of the sound

The sources of the noise in the operation phase of the proposed project are listed below and the forecasted levels of noise that will be formed by the mentioned activities are calculated in the following headings

- Power Plant Building
- Material Quarries
 - The activities executed by the work machines
 - Bursting activities that will be made during the mining activities

4.2. The information about the power of the noise sources depending upon the full. Capacity functioning of the facility. The Calculation of the Total Level of Noise that will be on the process units depending upon the functioning periods and conditions of the Facility

The level of the noise arising from the turbines and generators in the power plant is explained in Part 4.1 and the level of noise that will occur during the operation of the material quarries is explained in Part 4.2 and 4.3

Within the scope of the 17th Article of EAIR, the determination of the maximum sound power that is let to be spanned from the machines and equipment ,will be done according to the Machine Security Regulation that has been published in the 25325 Official Gazette on 05.06.2002 by TR Ministry of Industry and Commerce

For the levels of noise and vibration that the workers in the facility will face , the points in Noise and Vibrations Regulation that has been prepared by the Ministry of Work and Security and published in the 25325 numbered Official Gazette on 23/12/2003 will be provided. When the operation noise is evaluated from the worker health point of view, warning tables will be placed for them the workers will be provided safety equipment (i.e. earplugs) that has been specified in the 1475 numbered Work Law

4.3. The Noise Level in the Power Plant

Turbines and generators that are the sources of noise in the operation phase will be built in the underground. The approximate sound power levels of the turbines and generators in this project will be 100 dB3 These equipment will be in a closed area within the power plant and in an isolated room. The transmission of the noise within the power plant will be in 2 ways

- Through fibre way

- Throught Sound Waves

The isolation will be 3 sided; at floor, at ceiling and in the sideway walls. Bowl Wool (At a 150 concentration) will be utilized as the isolation material. Also as the most sound permeable spaces in the isolated rooms are key holes and underdoors, a special designed sound isolating door will be utilized for sound isolation. Through that way maximum sound isolation is aimed. The sound pressure is dropped approximately upto 40 dBA as a result of effective sound isolation. In the operation phase of Kavsakbendi, HPP and Quarries Project, a sound formation that will arise out of the projet units and that will reach to the most sensitive receptor is not a point at issue

4.4. The Calcuation of the Noise Level of Impermeable Quarry

The noise calcuations in the operation of the Quarry will be analzed in two steps; the burstings in the quarry and after the taking the essence off and sending it to the construction site by loading into the trucks. A separate noise calculation has been made by assuming that the production activities will stop on the days that the bursting activities will be conducted

4.4.1. The Calculation of the Noise formed by the Construction Machines

Within the scope of the 15th article of EIAR, The Sound Power Levels that is formed the construction machines that may be utilized in the B impermeable material quarry has been calculated by benefiting from the regulation about the “Emission of Sound in the Environment that is formed by the Equipment utilized in Open Spaces published in 26392 numbered Official Gazette on 30.12.2006 by the Ministry of Industry and Commerce

Table 4.1. The Sound Power Levels that is formed the construction machines that may be utilized in the B impermeable material quarry

Machine	Number	The Level of Sound Power (Lw) (dB)
Truck	2	101
Loader	1	101
Driller	1	105
Dozer	1	101
Water Tanker	1	105

For the estimation of the sound pressure levels that will be formed from each source, the formula number 1 given in Part 2 has been used.

Out of the legal noise levels in Table 4 the values given for the “suburban areas and living spaces” should be maintained (Table 4-2). This value is 60 dBA and the noise level that is expected to be felt in the nearest house (Approximately 200 meters) in Karakoyak District that is the nearest living space to the B impermeable Material Quarry will be 56,5dBA. The

graphic that shows the change in the sound levels depending upon the distance is shown in Figure 4-1 and the values for the change is presented in Table 4-3.

Table 4.2 The Limit Values of the Environmental Noise for the Industrial Facilities

Areas	Lafternoon (dBA)	Lnight (dBA)
Industrial regions	70	60
Regions with Industrial Activities and Living Spaces (More Industrial Activities)	68	58
Regions with Industrial Activities and Living Spaces (More Living Spaces)	65	55
Suburban Areas and Living Spaces	60	50

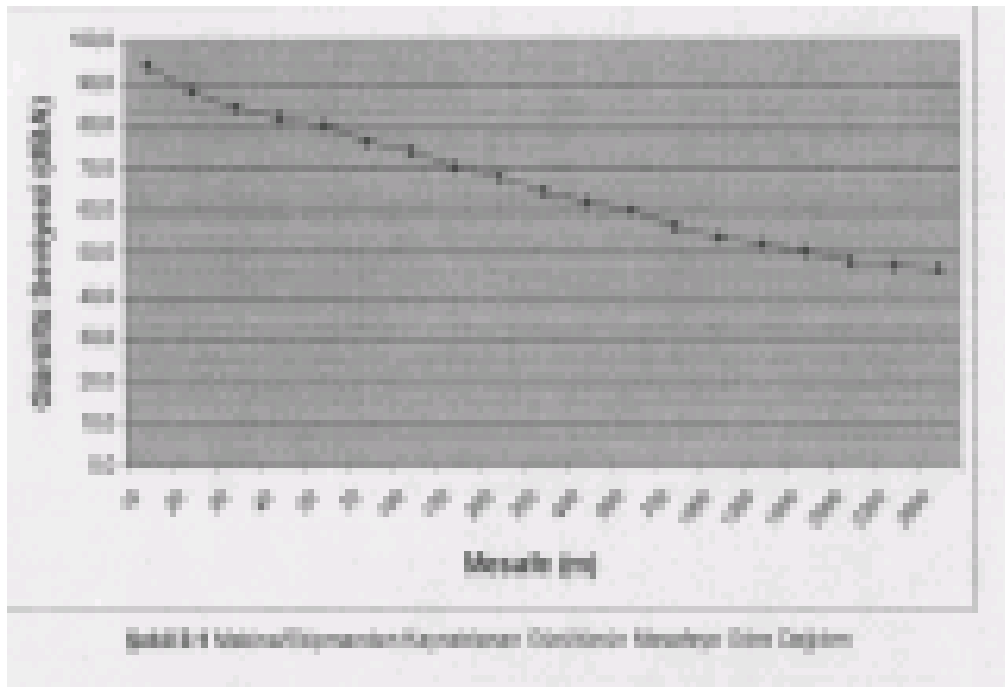


Figure 4-1.The graphic showing the change in the noise level depending upon the distance In B Impermeable Material Quarry

Table 4.3. The table showing the change in the noise level depending upon the distance In B Impermeable Material Quarry

r (m)	Lp (dBA)
10	82,5
20	76,5
30	73,0
40	70,5
50	68,5
75	65,0
100	62,5
150	59,0
200	56,5
300	53,0
400	50,5
500	48,5
750	45,0
1.000	42,5
1.250	40,6
1.500	39,0
2.000	36,5
2.250	35,5
2.500	34,6

4.4.2. The Calculations for the Level of the Noise that will emerge during the burstings

As the activities will stop on the day of the burstings the noise level during the burstings have been calculated seperately. The noise level that will emerge during the bursting is given in Table 4.4

Table 4.4. The Level of the Noise that will be formed during the burstings in B impermeable material quarry

Noise Sources	Number	The Level of Noise (dBC)
Bursting	1	100

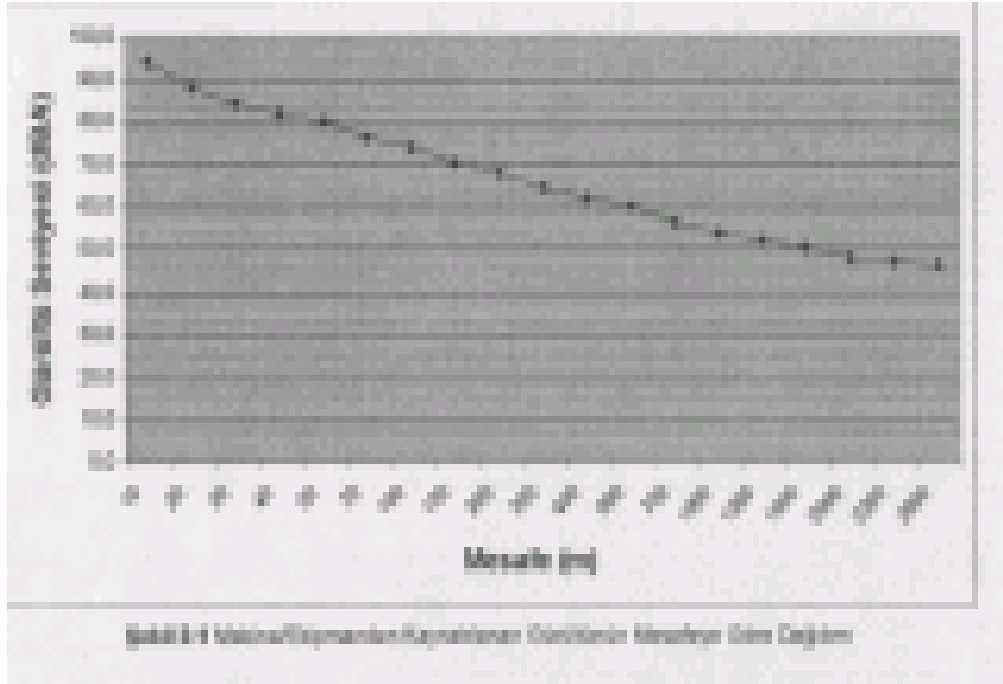


Figure 4-2. The Distribution of the Noise that will be formed after the bursting in B Impermeable Material Quarry according to the Distance

The distance of the Karakoyak District, the nearest residential area to the quarry, is 200m. According to the calculations, because of the burstings the noise in the house that is the nearest to the quarry remains at a level of 46 dBC Therefore, no entity will be negatively effected from the noise that will be formed during the burstings. The graphic for the change in the noise level of B Impermeable Material Quarry according to the distance is presented in Figure 4-2 and the values are provided in Table 4-5.

Table 4.5 The Change of the Noise Level that will be formed after the bursting in B-Impermeable Material Quarry depending upon the distance

r (m)	Lp (dBA)
10	72,0
20	66,0
30	62,5
40	60,0
50	58,0
75	54,5
100	52,0
160	47,9
200	46,0
300	42,5
400	40,0
500	38,0
1.000	32,0
1.250	30,1
1.500	28,5
2.000	26,0
2.250	25,0
2.500	24,1

As the activities are executed in open areas, the fall in the level of the sound pressure resulting from the atmospheric swallow of the air could also be considered. However, to evaluate the worst case scenario, it has been assumed that such a fall will not happen

4.5. The calculation of the Noise Level of C Impermeable Material Quarry

C Impermeable Material Quarry will start to function if needed. The noise calculations in the operation of the Quarry will be analyzed in two steps; the burstings in the quarry and after the taking the essence off and sending it to the construction site by loading into the trucks. A separate noise calculation has been made by assuming that the production activities will stop on the days that the bursting activities will be conducted

4.5.1. The Calculation of the Noise Arising out of the Construction Machines

Within the scope of the 15th article of EIAR, The Sound Power Levels that is formed the construction machines that may be utilized in the C impermeable material quarry has been calculated by benefiting from the regulation about the “Emission of Sound in the Environment that is formed by the Equipment utilized in Open Spaces published in 26392 numbered Official Gazette on 30.12.2006 by the Ministry of Industry and Commerce

Table 4.6. The Sound Power Levels that is formed the construction machines that may be utilized in the C impermeable material quarry

Machine	Number	The Noise Level (Lw) (dB)
Truck	2	101
Loader	2	101
Driller	1	105
Dozer	1	101
Water Tanker	1	105

For the estimation of the sound pressure levels that will be formed from each source, the formula number 1 given in Part 2 has been used.

Out of the legal noise levels in Table 4 the values given for the “suburban areas and living spaces” should be maintained (Table 4-2). This value is 60 dBA and the noise level that is expected to be felt in the nearest house (Approximately 500 meters) in Cirnazli District that is the nearest living space to the C impermeable Material Quarry will be 48,2 dBA. The graphic that shows the change in the sound levels depending upon the distance is shown in Figure 4-3 and the values for the change are presented in Table 4-7.

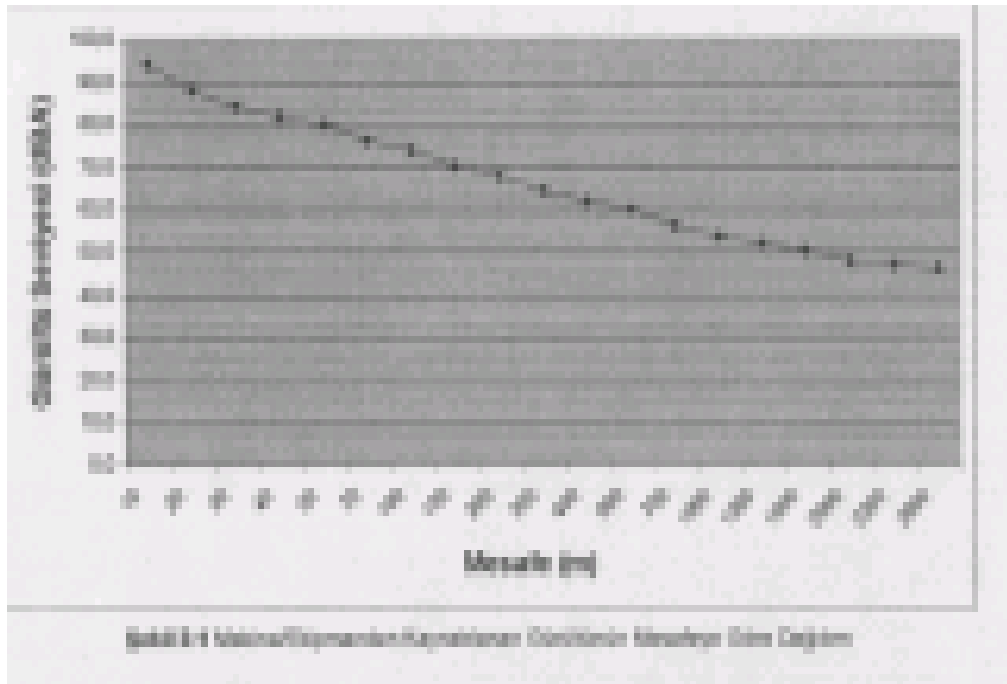


Figure 4-3. The graphic showing the change in the noise level depending upon the distance In C Impermeable Material Quarry

Table 4.7 The table showing the change in the noise level depending upon the distance In C Impermeable Material Quarry

r (m)	Lp (dBA)
10	83,0
20	77,0
30	73,5
40	71,0
50	69,1
75	65,5
100	63,0
150	59,5
200	57,0
300	53,5
400	51,0
500	49,1
1.000	45,5
1.250	43,0
1.500	41,1
2.000	39,5
2.250	37,0
2.500	36,0

4.5.2. The Calculations for the Level of the Noise that will emerge during the burstings

As the activities will stop on the day of the burstings the noise level during the burstings has been calculated separately. The noise level that will emerge during the bursting is given in Table 4.8

Table 4.8. The Level of the Noise that will be formed during the burstings in C impermeable material quarry

Noise Sources	Number	The Noise Level (dBC)
Bursting	1	100

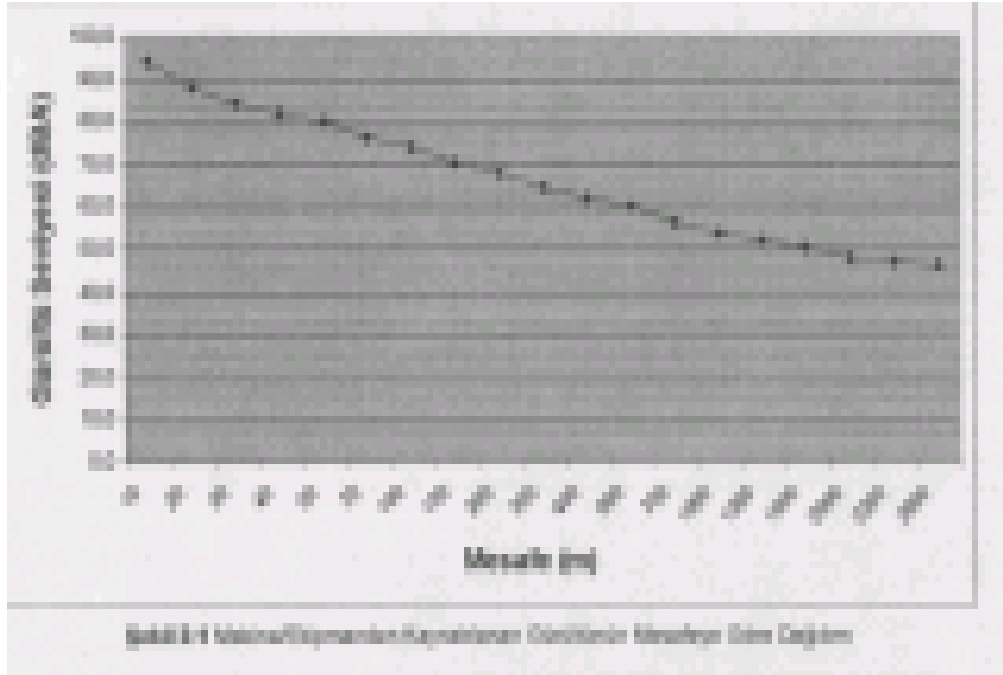


Figure 4-4 The Distribution of the Noise that will be formed after the bursting in C Impermeable Material Quarry according to the Distance

The distance of the Cırnazlı District, the nearest residential area to the quarry, is 500m. According to the calculations, because of the burstings the noise in the house that is the nearest to the quarry remains at a level of 38 dBC Therefore, no entity will be negatively effected from the noise that will be formed during the burstings. The graphic for the change in the noise level of C Impermeable Material Quarry according to the distance is presented in Figure 4-4 and the values are provided in Table 4-9.

Table 4.9 The Change of the Noise Level that will be formed after the bursting in C-Impermeable Material Quarry depending upon the distance

r (m)	Lp (dBA)
10	72,0
20	66,0
30	62,5
40	60,0
50	58,0
75	54,5
100	52,0
200	46,0
300	42,5
400	40,0
500	38,0
1.000	32,0
1.250	30,1
1.500	28,5
2.000	26,0
2.250	25,0
2.500	24,1

For the burstings in the mine quarries and in areas similar to that not to damage surroundings near them, the measured vibration levels in the ground should not be more than the values given in Table 4.11. These values will be maintained during the burstings in that will take place in limestone quarries

Table 4.11 The limit values vibrations that will be created by the machines and equipments in the buildings

Vibration-Frequency (Hz)	Maximum Vibration Speed Allowed
1	5
4-10	19
30-100	50

Source:EIAR Table 9.

As dealing with noise while evaluating the vibrations the vibrations that will arise out of the facility must be taken into consideration. The points in article 29 of EIAR talk about the vibrations formed by the equipment (electric motor, pipe,etc.) utilized in buildings that are used as office, house,etc. To follow this issue, related measurements will be made

For the vibration that will be created in the operation phase of the facility, it is guaranteed by the owner of the facility that the limits in Table 11 will be provided. Whether these limits are obeyed or not must be followed in the operation phase of the project. The frequency and the period of these checks will be implemented in line with the decisions taken in the

meeting of EIA Report Analysis and Implementation Commission for the project that has been made by the The Ministry of Environment and Forests.

5. MEASUREMENTS THAT WILL HAVE TAKEN FOR CONTROL OF NOISE LEVEL DURING THE OPERATING

5.1. Technical content of measurements that will be taken, if environmental noise for construction and operating stage goes beyond to limit value.(determination of isolation ratio that will be applied on buildings for voice isolation in the frame of ISO 12354-(1-5) standards, determination of barrier standards for environmental barrier that will be applied in the frame of TS EN 1793 (1-3).

During the facility activity, voice will emerge from tribunals located in operating building. But, since inside of the building will be isolated with every kind of isolation material, there is no any noise that will be emerge from anticipated power plant structure and that will reach to sensitive receiver.

According to ÇGDYY article 17, on used of device, equipment and machines. it will be complied with "The Regulation of Machine Security (98/37/AT)" "5/6/2002 date and no. 24776 official gazette) published by ministry of industry and commercial. The arrangements regarding voice power of used device, equipment and machines are in the license of ministry of industry and commerce according to 3143 numbered law about the organization and tasks of ministry of industry and commercial.

The values from legal noise in ÇGDYY Table 4 given for "rural area and settling area" should be provided (see. Table 4-2). Environmental noise that will emerge during the operating phase of project will be observed and reported by project owner.

5.2. Environmental Noise Management purposed Administrative Precaution

For ear health and comfort of workers, and exposed noise and vibration levels, it will be complied with noise regulation and vibration regulation (23/12/2003 date and no.25325 official gazette) prepared by ministry of labor and social security.

Project owner will take necessary precautions to keep the noise emerge during activity in specific level and to keep the noise under the environmental noise limit value determined for industrial facilities stated in 01.07.2005 date and number 25862 Official Gazzette. for industrial activities. If any kind of precaution is to be taken , they could be choosen from the three categories listed below

- The precautions that will be taken at the source
- The precautions that will be taken between the receiver and the source
- The precautions that will be taken at the environment of the receiver

➤ The precaution that will be taken at the source

Preventing noise at its source is one of the most effective sound control techniques. The main aim is to prefer the source that has less sound diffusing capacity. In the facility established, production devices that have high end technology (turbines) will be utilized.

➤ **The precautions that will be taken between the receiver and the source**

In this method, sound curtains, barriers and developing some natural barriers are among the techniques to be utilized. The flora and the bushes could be considered as natural barriers. Some closed cabins that will be built to keep the noise level diffused by the turbines in the power plant low in the environment of the receiver are also included in this group.

The precautions that will be taken at the environment of the receiver

➤ **The precautions that will be taken at the environment of the receiver**

The most crucial of one among them is the isolation systems that will be built in line with the relevant standards

APPENDICES

APPENDIX – 1 Meteorological Data

		(ADANA) KOZAN													
		A Y I L A R													
		Rasat S. (YIL)													
		I II III IV V VI VII VIII IX X XI XII YILLIK													
		METEOROLOJİK ELEMANLAR													
Enlem	: 37.27														
Boylam	: 35.49														
Yükseklik	: 11 m														
Ortalama Yerel Basıncı (hPa)		31	1004.0	1003.5	1001.0	999.5	997.9	995.4	992.2	993.6	997.5	1001.4	1004.0	1005.4	999.6
En Yüksek Yerel Basıncı (hPa)		31	1015.1	1017.1	1013.5	1011.9	1006.7	1002.3	998.9	998.2	1003.0	1010.9	1015.9	1018.4	1018.0
En Düşük Yerel Basıncı (hPa)		31	981.7	984.4	980.1	986.8	986.1	985.7	985.1	989.1	988.9	989.4	989.1	985.1	980.1
Saat 07 deki Ortalama Sıcaklık (C)		31	7.3	7.6	10.3	14.8	19.0	22.6	25.3	25.0	22.0	18.3	12.9	8.9	16.2
Saat 14 deki Ortalama Sıcaklık (C)		31	13.4	14.2	17.8	22.2	27.1	31.7	34.6	34.7	32.3	27.7	20.6	15.1	24.3
Saat 21 deki Ortalama Sıcaklık (C)		31	8.6	9.5	12.6	16.6	20.7	24.8	27.9	27.9	25.2	20.4	14.1	10.0	18.2
Ortalama Sıcaklık (C)		31	9.5	10.2	13.3	17.5	21.9	26.0	28.9	28.9	26.2	21.7	15.4	11.0	19.2
Ort. Sıcaklık >= 5 C Old. Gunler Sayisi		31	29.6	26.3	30.8	30.0	31.0	30.0	31.0	31.0	30.0	31.0	30.0	30.3	361.0
Ort. Sıcaklık >= 10 C Old. Gunler Sayisi		31	13.8	15.9	26.0	29.7	31.0	30.0	31.0	31.0	30.0	31.0	27.5	20.3	317.2
Ortalama Yüksek Sıcaklık		31	14.4	15.4	19.0	23.6	28.5	33.0	35.8	35.6	33.4	28.7	21.6	16.0	25.4
Ortalama Düşük Sıcaklık		31	5.9	6.3	8.8	12.4	15.9	19.5	22.7	22.9	20.2	16.8	11.5	7.4	14.2
En Yüksek Sıcaklık Günü		31	18	21	19	30	31	10	8	7	7	11	11	11	7
En Yüksek Sıcaklık Yılı		31	1987	1977	1981	1979	1980	2002	1978	1987	1981	1978	1976	2005	1987
En Yüksek Sıcaklık (C)		31	25.0	26.9	31.2	37.3	41.5	42.1	44.4	44.8	43.4	39.5	32.4	26.7	44.8
Yük. Sıcaklık >=30 C Old. Ort. Gunler Sayisi		31			0.2	3.4	11.6	24.9	30.7	30.8	26.7	12.9	0.6		141.8
Yük. Sıcaklık >=25 C Old. Ort. Gunler Sayisi		31	0.0	0.2	3.0	10.8	24.7	29.8	31.0	31.0	29.8	25.2	8.1	0.3	193.9
Yük. Sıcaklık >=20 C Old. Ort. Gunler Sayisi		31	0.9	3.9	13.4	23.5	29.9	30.0	31.0	31.0	30.0	30.1	20.0	4.5	248.2
Yük. Sıcaklık <=0.1 C Old. Ort. Gunler Sayisi		31													0.0
Gunluk En Yüksek Sıcaklık Farkı															
En Düşük Sıcaklık Günü		31	28	21	7	10	8	1	1	23	22	30	14	25	21
En Düşük Sıcaklık Yılı		31	1983	1985	1983	1997	1978	1978	1978	1978	1976	2003	1988	1992	1985
En Düşük Sıcaklık (C)		31	-4.0	-5.0	-3.6	2.0	5.3	11.0	15.0	14.8	13.0	3.60	0.7	-2.2	-5.0
Düş. Sıcaklık <=-0.1 C Old. Ort. Gunler Sayisi		31	0.7	1.0	0.2									0.3	2.2
Düş. Sıcaklık <=-3 C Old. Ort. Gunler Sayisi		31	0.1	0.1	0.0									0.2	0.2
Düş. Sıcaklık <=-5 C Old. Ort. Gunler Sayisi		31												0.0	0.0
Düş. Sıcaklık <=-10 C Old. Ort. Gunler Sayisi		31												0.0	0.0
Düş. Sıcaklık <=-15 C Old. Ort. Gunler Sayisi		31												0.0	0.0
Düş. Sıcaklık <=-20 C Old. Ort. Gunler Sayisi		31												0.0	0.0
Düş. Sıcaklık >=20 C Old. Ort. Gunler Sayisi		31			0.8	3.4	13.0	28.4	28.7	28.7	16.5	4.7	0.2		95.7
Düş. Sıcaklık >=15 C Old. Ort. Gunler Sayisi		31			5.2	18.6	29.0	31.0	31.0	31.0	29.4	22.0	4.4	0.2	171.7
Düş. Sıcaklık >=10 C Old. Ort. Gunler Sayisi		31	2.4	3.0	10.7	23.6	30.2	30.0	31.0	31.0	30.0	30.5	20.1	7.0	249.5
Düş. Sıcaklık >=5 C Old. Ort. Gunler Sayisi		31	19.7	19.4	27.7	29.6	31.0	30.0	31.0	31.0	30.0	31.0	28.9	24.1	333.4
Ortalama Topraküstü Minimum Sıcaklık		31	4.1	4.5	6.8	10.5	14.0	17.7	20.9	21.1	18.2	14.7	9.6	5.6	12.3
En düşük Topraküstü Minimum Sıcaklık		31	-6.0	-8.6	-4.4	1.2	3.8	10.0	13.0	14.0	10.4	0.6	-3.0	-4.7	-8.6
Top. us. min. sic. <=-0.1 C Old. Gunler Sayisi		31	2.3	2.6	0.5								0.2	1.5	7.1
Top. us. min. sic. <=-3 C Old. Gunler Sayisi		31	0.4	0.6	0.1								0.0	0.3	1.4
Top. us. min. sic. <=-5 C Old. Gunler Sayisi		31	0.0	0.2									0.0	0.2	0.2
Top. us. min. sic. <=-10 C Old. Gunler Sayisi		31												0.0	0.0
Ortalama Buhar Basıncı (hPa)		31	7.1	7.4	9.2	12.6	15.8	19.4	23.9	24.3	18.9	13.1	9.8	8.1	14.1
Saat 07 deki Ortalama Bagil Nem (%)		31	61	61	65	72	71	72	76	76	69	58	59	63	66
Saat 14 deki Ortalama Bagil Nem (%)		31	49	47	47	49	45	40	42	43	39	37	43	50	44
Saat 21 deki Ortalama Bagil Nem (%)		31	64	62	66	71	68	65	66	68	62	57	61	66	64
Ortalama Bagil Nem (%)		31	58	58	61	63	61	60	62	62	57	51	54	59	58
En düşük Bagil Nem (%)		31	4	7	5	5	7	3	4	4	3	4	7	11	3

ARASTIRMA VE BİLGİ İŞLEM DAİRE BAŞKANLIĞI

KATILIMCI ÜNİVERSİTESİ

İstasyonun Çalışma Suresi : 1975 - 2005

İstasyonun Çalışma Süresi : 1975 - 2005

ARASTIRMA VE BİLGİ İŞLEM DAİRESİ BAŞKANLIĞI

(ADANA) KOZAN													
METEOROLOJİK ELEMANLAR													
Rasat S. (YIL)													
Enlem : 37.27	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	YILLIK
Boylam : 35.49	14	17	30	34	66	64	82	79	37	22	19	28	492
Yükseklik : 11 m	14	1.3	1.9	1.5	1.2	1.6	1.3	1.3	1.5	1.3	0.9	1.0	1.4
	14	68	111	164	168	176	183	111	119	103	63	60	1394
	14	1.3	2.1	2.0	2.2	1.9	2.2	1.9	1.9	1.7	1.4	1.3	1.9
	14	8	15	35	22	18	20	17	14	24	16	8	211
	14	1.1	1.9	1.7	1.6	1.7	2.4	1.9	1.7	1.2	1.0	0.6	1.6
	14	18	26	45	18	22	8	9	7	20	14	11	212
	14	1.6	1.2	1.5	2.4	1.4	1.3	1.9	0.8	1.1	1.2	1.0	1.6
	14	8	15	6	16	10	7	3	9	11	7	5	103
	14	1.5	1.5	1.0	1.1	1.5	1.3	2.0	0.9	1.2	0.6	0.7	1.3
	14	18	17	23	27	19	15	7	9	14	18	18	186
	14	1.5	2.0	1.9	1.5	1.9	1.4	0.3	1.8	1.4	1.3	1.6	1.6
	14	58	40	37	34	23	19	21	30	38	54	52	423
	14	3.0	3.3	2.6	2.3	2.3	2.5	3.7	4.0	3.1	2.9	3.3	3.0
	14	395	347	296	163	134	107	55	61	153	358	443	2982
	14	3.5	3.6	3.2	2.9	3.2	3.4	3.4	3.1	3.3	3.5	3.1	3.3
Ortalama 5 cm Toprak Sıcaklığı (C)	31	8.4	9.8	14.0	19.4	25.2	30.5	34.3	34.2	29.6	22.7	14.9	9.7
En düşük 5 cm Toprak Sıcaklığı (C)	31	0.5	1.4	3.7	8.4	15.0	19.7	24.6	23.1	19.4	12.6	5.6	1.5
Ortalama 10 cm Toprak Sıcaklığı (C)	31	8.8	9.9	13.7	18.9	24.4	29.3	32.7	32.9	29.1	22.9	15.6	10.3
En düşük 10 cm Toprak Sıcaklığı (C)	31	3.2	3.2	4.1	9.8	15.4	20.5	25.7	24.1	21.2	13.6	7.0	4.1
Ortalama 20 cm Toprak Sıcaklığı (C)	31	9.2	10.0	13.4	18.3	23.5	28.3	31.9	32.4	29.1	23.3	16.3	11.0
En düşük 20 cm Toprak Sıcaklığı (C)	31	4.8	4.5	4.6	10.4	16.0	20.4	26.2	24.9	22.9	14.7	9.0	5.7
Ortalama 50 cm Toprak Sıcaklığı (C)	31	10.8	10.9	13.5	17.6	22.1	26.5	30.1	31.2	29.0	24.5	18.3	13.2
En düşük 50 cm Toprak Sıcaklığı (C)	31	7.2	7.3	7.2	12.3	16.8	20.7	25.9	27.1	24.5	18.0	12.9	8.8
Ortalama 100 cm Toprak Sıcaklığı (C)	31	13.1	12.4	13.7	16.6	20.2	24.0	27.2	28.9	28.2	25.2	20.6	16.0
En düşük 100 cm Toprak Sıcaklığı (C)	31	9.0	8.4	10.0	12.8	16.2	20.3	23.2	26.3	24.6	20.0	15.6	11.6
Ortalama Buharlaşma (mm)	14	78.6	85.2	116.3	130.6	185.4	228.2	253.7	229.9	200.9	184.7	120.4	75.1
Günlük En Çok Buharlaşma (mm)	14	7.1	10.1	10.7	13.3	14.9	21.6	22.6	20.5	20.8	16.5	13.8	6.7
Günlük Ort. Guneslenme Süresi (saat,dakika)	7	03:56	05:10	06:21	06:24	08:22	09:37	09:36	09:19	09:03	07:27	05:48	04:09
Günlük Ort. Guneslenme Sıdt.(cal/cm².dak)	7	181.23	250.75	363.24	414.44	510.98	570.41	550.46	498.56	433.49	325.85	226.97	169.32
Aylık En Yuk. Guneslenme Sıdt.(cal/cm².dak)	7	0.97	1.15	1.33	1.57	1.47	1.44	1.38	1.34	1.26	1.17	1.05	0.87
Ortalama Deniz Suyu Sıcaklığı (C)													0.0
En Yüksek Deniz Suyu Sıcaklığı (C)													
En düşük Deniz Suyu Sıcaklığı (C)													
Istasyonun Çalışma Süresi : 1975 - 2005													
ARASTIRMA ve BİLGİ İŞLEM DAİRE BAŞKANLIĞI													



Rasat S. (YIL)										(ADANA) KOZAN									
A Y L A R																			
I										II									
III										IV									
V										VI									
VII										VIII									
IX										X									
XI										XII									
YILLIK																			
Enlem : 37.27																			
Boylam : 35.49																			
Yükseklik : 11 m																			
METEOROLOJİK ELEMANLAR																			
Rasat S. (YIL)																			
Saat 07 deki Ortalama Bulutluluk (0-10)	31	5.4	5.3	5.2	5.6	4.1	3.1	3.7	3.2	2.2	3.1	4.3	5.3	4.2					
Saat 14 deki Ortalama Bulutluluk (0-10)	31	5.4	5.6	5.8	6.3	5.5	3.9	2.6	2.2	2.3	3.5	4.5	5.4	4.4					
Saat 21 deki Ortalama Bulutluluk (0-10)	31	4.5	4.4	4.6	5.1	3.9	3.4	3.7	3.3	2.6	2.7	3.5	4.5	3.9					
Ortalama Bulutluluk (0-10)	31	5.1	5.1	5.2	5.6	4.5	3.4	3.4	2.9	2.4	3.1	4.1	5.1	4.2					
Ort. Acik Gunler Sayisi (bult. 0.0-1.9)	31	9.2	7.6	7.7	5.1	8.2	12.8	13.5	14.5	16.9	14.8	11.1	9.0	130.4					
Ort. Bulutlu Gunler Sayisi (bult. 2.0-8.0)	31	12.5	12.5	14.6	16.3	17.7	14.2	14.2	14.7	11.9	12.9	13.1	13.0	167.9					
Ort. Kapali Gunler Sayisi (bult. 8.1-10.0)	31	9.3	8.1	8.6	8.6	5.0	3.0	2.9	1.8	1.2	3.3	5.8	9.0	66.6					
Saat 07 deki Ort. Toplam Yagis Miktarı (mm)	31	44.9	33.1	31.0	33.0	16.8	9.5	1.7	2.5	4.4	21.5	33.5	43.7	275.6					
Saat 14 deki Ort. Toplam Yagis Miktarı (mm)	31	31.4	20.9	21.8	26.5	20.5	11.2	1.6	2.9	5.0	13.3	26.5	25.6	207.2					
Saat 21 deki Ort. Toplam Yagis Miktarı (mm)	31	31.7	25.3	35.9	36.3	47.3	33.2	17.7	15.8	22.8	22.9	23.3	36.1	348.3					
Ortalama Toplam Yagis Miktarı (mm)	31	103.8	80.1	90.9	96.1	87.8	59.3	22.6	21.4	33.6	57.5	83.1	109.5	851.7					
Gunluk En Cok Yagis Miktarı (mm)	31	135.1	60.1	54.6	61.0	107.9	97.0	55.1	60.9	134.2	93.8	152.5	84.0	152.5					
Yagis >= 0.1 mm Oldugu Gunler Sayisi	31	9.8	10.2	11.3	12.3	10.5	6.4	2.8	2.4	4.0	6.5	7.3	10.3	93.8					
Yagis >= 10 mm Oldugu Gunler Sayisi	31	3.4	2.8	3.1	3.3	2.7	1.8	0.8	0.7	1.0	2.1	2.8	3.6	28.1					
Yagis >= 50 mm Oldugu Gunler Sayisi	31	0.4	0.0	0.1	0.1	0.2	0.2	0.0	0.0	0.1	0.1	0.1	0.4	1.7					
Ortalama Kar Yagisli Gunler Sayisi	31	0.1	0.2										0.0	0.3					
Ortalama Kar Ortulu Gunler Sayisi	31																		
En Yuksek Kar Ortusu Kalinligi (cm)	3	4.0																	
Ortalama Sisli Gunler Sayisi	30	0.1	0.1	0.1	0.4	0.5	0.8	0.2	0.2	0.0	0.0	0.0	0.0	2.5					
Ortalama Dolulu Gunler Sayisi	31	0.0	0.1	0.4	0.2	0.2	0.1	0.1	0.0	0.1	0.1	0.1	0.1	1.3					
Ortalama Kiragilli Gunler Sayisi	30	0.8	0.7	0.1										2.1					
Ortalama Oranli Gunler Sayisi	31	1.1	1.6	4.0	6.3	8.7	6.2	2.4	2.3	4.3	4.5	2.0	1.4	44.8					
Saat 07 deki Ortalama Ruzgar hizi (m/s)	14	3.0	3.1	2.6	2.0	1.5	1.2	0.8	0.9	1.7	2.9	3.2	2.9	2.1					
Saat 14 deki Ortalama Ruzgar hizi (m/s)	14	2.0	2.5	2.5	2.4	2.2	2.4	2.5	2.4	2.1	1.7	1.8	1.8	2.2					
Saat 21 deki Ortalama Ruzgar hizi (m/s)	14	2.4	2.3	1.7	1.2	1.1	1.1	1.0	0.7	0.9	1.7	2.3	2.3	1.6					
Ortalama Ruzgar Hizi (m/s)	14	2.5	2.6	2.2	1.8	1.6	1.6	1.4	1.3	1.6	2.1	2.4	2.3	2.0					
En Hizli Esen Ruzgarin Yonu	30	NNW	NNW	ENE	N	NN	NNW	NNE	NW	W	SSW	NNW	SSW	NNW					
En Hizli Esen Ruzgarin Hizi (m/s)	30	23.4	20.1	17.7	18.5	19.1	19.6	17.8	21.4	21.7	21.0	23.0	19.9	23.4					
Ort. Firtinali Gun Say. (ruz.hiz>=17.2 m/s)	15	0.3	0.9	0.4	0.2	0.1	0.4	0.2	0.4	0.4	0.1	0.6	0.1	4.1					
Ort. Kuv.Ruz. Gun Say. (ruz.hiz 10.8-17.1 m/s)	15	5.8	5.6	4.3	3.2	3.7	4.6	3.8	2.9	2.9	4.1	4.2	3.9	49.0					
N Ruzgarin Esme Sayilari Toplami	14	201	186	152	148	96	71	41	69	144	231	198	201	1738					
NNE Ruzgarin Ortalama Hizi (m/s)	14	2.6	2.9	2.4	2.2	2.4	2.4	2.6	1.9	2.1	2.3	2.6	2.6	2.4					
NNE Ruzgarin Esme Sayilari Toplami	14	151	98	124	110	122	118	77	88	128	124	140	144	1424					
NNE Ruzgarin Ortalama Hizi (m/s)	14	2.4	2.7	2.4	1.9	1.7	1.8	1.6	1.3	1.8	2.0	2.0	2.2	2.0					
NE Ruzgarin Esme Sayilari Toplami	14	13	12	19	26	31	35	28	30	12	11	8	14	239					
NE Ruzgarin Ortalama Hizi (m/s)	14	1.8	2.1	2.7	1.8	1.4	1.3	0.8	0.9	1.3	1.3	1.4	1.0	1.4					
ENE Ruzgarin Esme Sayilari Toplami	14	25	23	34	17	28	34	20	12	14	13	14	18	252					
ENE Ruzgarin Ortalama Hizi (m/s)	14	1.5	1.5	2.5	2.2	1.2	0.9	0.8	0.8	0.7	1.0	1.1	1.7	1.4					
E Ruzgarin Esme Sayilari Toplami	14	40	42	39	30	27	42	20	14	13	19	42	50	378					
E Ruzgarin Ortalama Hizi (m/s)	14	2.4	2.4	2.7	2.2	1.3	1.1	1.4	0.8	1.3	1.1	2.1	2.2	1.9					
ESE Ruzgarin Esme Sayilari Toplami	14	94	74	47	51	62	107	109	86	66	61	83	83	923					
ESE Ruzgarin Ortalama Hizi (m/s)	14	1.8	2.1	2.4	2.0	1.2	1.1	1.4	1.6	1.3	1.3	1.6	2.0	1.6					
SE Ruzgarin Esme Sayilari Toplami	14	18	23	23	32	68	75	118	130	49	41	31	27	635					
SE Ruzgarin Ortalama Hizi (m/s)	14	1.4	1.6	1.4	1.2	1.2	1.2	1.2	1.7	1.6	1.3	1.1	1.3	1.4					
SSE Ruzgarin Esme Sayilari Toplami	14	47	69	101	95	153	194	290	230	175	96	78	64	1652					
SSE Ruzgarin Ortalama Hizi (m/s)	14	1.4	1.7	2.0	1.7	1.5	1.4	1.5	1.6	1.7	1.4	1.2	1.7	1.5					

Istasyonun Calisma Suresi : 1975 - 2005

ARASTIRMA ve BILGI ISLEM DAIRE BASKANLIĞI

KAYITLARI YERLENDIR

DEVLET METEOROLOJİ İŞLERİ GENEL MÜDÜRLÜĞÜ
KOZAN METEOROLOJİ İSTASYONUNDA
STANDART ZAMANLARDA GÖZLENEN EN BÜYÜK YAĞIŞ DEĞERLERİ (mm)

GOZLEM	DAKİKA				SAAT															
YILI	5	10	15	30	1	2	3	4	5	6	8	12	18	24	24 +					
2005	9,3	18,6	25,5	33,6	40,0	49,9	54,4	56,4	56,5	56,5	59,9	68,5	73,7	74,1						
2004	9,5	15,1	20,5	32,6	35,0	36,1	36,1	36,1	41,8	44,6	49,5	61,9	84,4	89,2						
2003	11,6	19,0	26,8	41,0	67,6	95,2	119,8	125,7	129,5	131,0	132,4	134,0	134,2	134,2						
2002	8,3	13,3	16,9	23,3	26,6	23,9	38,0	40,8	43,2	43,2	44,0	54,0	75,8	88,1						
2001	11,9	15,5	23,7	37,4	46,5	49,4	49,4	49,4	49,4	49,5	49,5	49,5	49,5	49,5						
2000	10,7	18,8	21,8	27,7	28,4	28,6	28,6	28,7	28,7	29,0	33,9	41,3	54,8	70,4						
1999	16,5	19,3	20,9	31,2	43,3	45,3	45,5	45,5	45,5	45,6	45,6	46,7	46,7	49,2						
1998	8,6	15,4	18,3	23,6	26,8	26,8	26,9	26,9	28,4	28,9	29,1	32,4	38,8	42,4						
1997	7,8	13,5	15,9	16,4	16,4	16,4	16,9	17,2	20,4	20,7	20,8	22,6	31,2	39,8						
1996	10,0	14,4	15,7	19,9	31,9	40,9	42,6	42,8	42,9	43,0	43,2	44,4	45,2	51,0						
1995	10,2	16,3	21,5	36,3	40,0	54,7	54,9	55,7	60,9	61,0	61,0	67,2	86,0	100,0						
1994	7,9	11,4	12,9	17,4	18,1	25,1	38,1	45,2	49,8	60,4	77,4	96,6	131,1	160,5						
1993	10,5	19,9	24,1	28,8	30,5	30,5	30,5	30,5	34,9	38,3	41,7	52,2	53,9	54,0						
1992	11,6	21,2	28,6	38,0	43,7	48,0	48,7	51,3	51,5	52,8	53,8	53,8	95,7	113,2						
1991	7,5	12,6	15,7	18,3	20,0	25,5	27,0	27,8	28,2	28,2	31,3	32,6	51,0	67,5						
1990	9,0	14,4	18,2	20,8	23,4	23,9	38,7	38,7	38,7	38,7	38,8	40,3	40,3	42,3						
1989	10,7	21,1	23,5	34,1	32,5	37,5	38,8	38,8	38,8	38,8	38,8	38,8	38,8	72,3						
1988	12,2	16,3	22,5	43,5	46,6	52,0	61,9	63,4	64,2	70,3	70,6	93,2	93,8	93,8						
1987	10,7	14,9	19,6	28,5	29,1	32,7	33,0	33,6	33,8	33,8	34,1	36,0	48,2	55,2						
1986	16,4	18,7	20,9	25,5	29,2	37,5	41,6	44,9	56,2	57,5	58,0	58,0	83,0	84,0						
1985	11,3	17,3	20,4	36,3	53,0	54,9	59,5	63,4	63,4	63,4	63,4	96,5	97,0	103,6						
1984	8,6	10,9	14,6	19,6	19,6	19,6	19,6	19,6	19,6	20,3	29,5	36,3	40,0	43,1						
1983	9,7	15,9	17,6	27,3	34,4	45,9	53,1	63,6	63,7	63,7	63,7	63,7	63,7	73,5						
1982	15,6	33,1	28,0	33,6	42,9	53,5	58,1	60,3	60,3	60,3	60,3	60,8	60,9	60,9						
1981	16,6	23,6	30,6	40,1	41,6	41,8	41,8	41,8	41,8	41,9	42,0	54,9	66,5	77,4						
1980	7,3	10,1	13,6	24,0	24,4	27,7	31,4	34,0	36,5	36,5	44,4	53,1	60,6	61,0						
1979	10,0	13,7	14,5	22,3	28,3	33,1	33,4	33,4	33,4	53,3	57,8	68,0	76,7	84,0						
1978	6,1	8,1	9,3	12,8	20,4	20,7	25,7	29,4	29,9	30,1	30,4	30,4	45,8	55,1						
1977	10,2	16,2	20,4	36,2	59,2	64,1	64,1	64,1	64,1	64,1	67,5	97,4	127,0	135,1						
1976	17,7	25,2	35,0	59,1	85,9	94,5	97,9	101,8	103,8	104,2	105,4	107,4	107,9	123,6						
1975	16,6	20,7	26,0	36,9	41,7	42,0	42,0	42,0	42,0	42,0	42,0	51,5	63,6	65,6						
1974	12,8	15,7	20,2	35,3	37,9	41,9	42,7	42,7	43,4	43,4	43,4	45,1	55,4	71,3						
1973	9,8	13,8	18,5	31,3	40,8	48,1	49,8	51,8	54,4	55,1	56,3	56,3	56,3	56,6						
1972	7,0	10,0	16,0	20,8	27,0	27,0	27,0	27,0	27,0	27,0	27,0	27,0	30,3	31,0						
1971	7,1	11,6	15,3	19,9	32,2	36,1	36,8	36,8	36,8	37,0	39,5	47,7	57,5	57,6						
1970	11,6	18,0	25,8	38,7	41,0	43,1	43,8	44,1	44,1	44,1	44,1	44,1	44,1	44,1						
1969	8,7	12,9	14,2	18,8	23,4	24,3	28,7	35,4	38,5	39,1	48,2	56,6	68,2	97,5						
1968	11,4	17,8	23,4	25,9	35,4	37,2	38,8	39,5	40,3	40,3	40,3	48,6	59,4	65,7						
1967	7,0	12,1	14,6	18,0	24,1	27,9	31,7	34,9	37,1	37,4	37,4	39,2	41,4	44,9						
1966	5,0	7,0	9,8	11,8	11,8	15,3	15,3	15,3	15,3	15,3	15,3	15,3	15,3	42,9	*					

Certificates



KALİBRASYON SERTİFİKASI
CERTIFICATE OF CALIBRATION

Sertifika No : 2006.FAK.013
Certificate Number

Sayfa No : 1 / 6
Page Number

Konu : Ses Düzeyi Ölçer Kalibrasyonu
Referring to *Calibration of Sound Level Meter*

Cihaz / Ekipman : Ses Düzeyi Ölçer
Device / Equipment *Sound Level Meter*

Üretici Firma : Cel Instruments Ltd.
Manufactured by

Model / Sınıf : CEL-440 / 2
Model / Class

Seri No : 069602
Serial Number

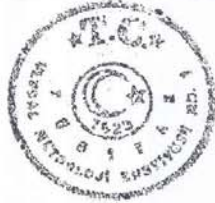
Cihaz Kodu : DOKM0-FAK-001
Device Code

Talep Eden : DOKAY MÜHENDİSLİK VE DANIŞMANLIK LTD. ŞTİ.
Issued for *Öveçler 4. Cad. 140/A 06460*
Dikmen - ANKARA

Kalibrasyon Tarihi : 23.01.2006
Date of Calibration

Tarih
Date of Issue

24.01.2006



Enstitü Müdür Vekili
Acting Director

M. Sermet SÜERY
M. Sermet SÜERY

Bu kalibrasyon sertifikası, UME'deki ulusal standartlara veya UME tarafından kabul edilen diğer bir ülkenin metroloji enstitüsündeki ulusal standartlara ya da BIPM'deki uluslararası standartlara izlenebilirliği belgeler ve ancak bütünlüğü bozulmamak kaydıyla çoğaltılabilir. UME'nin yazılı izni olmaksızın sertifikanın bütününde veya bir kısmında herhangi bir değişiklik yapılamaz ve kısmen çoğaltılamaz. Damgasız ve imzasız kalibrasyon sertifikaları geçerli değildir.

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P.K. 54, 41470 GEBZE - KOCAELİ / TURKEY Tel: +90 (262) 646 63 60 Fax: +90 (262) 646 59 14 e-mail: ume@ume.tubitak.gov.tr http://www.ume.tubitak.gov.tr



TÜBİTAK
ULUSAL METROLOJİ ENSTİTÜSÜ



KALİBRASYON SERTİFİKASI
CERTIFICATE OF CALIBRATION

Sertifika No : 2006.FAK.015
Certificate Number

Sayfa No : 1 / 4
Page Number

Konu : Ses Düzeyi Kalibratörü Kalibrasyonu
Referring to *Calibration of Sound Level Calibrator*

Cihaz / Ekipman : Akustik Kalibratör
Device / Equipment *Acoustical Calibrator*

Üretici Firma : Cel Instruments Ltd.
Manufactured by

Model / Sınıf : CEL-282 / 2
Model / Class

Seri No : 3/06920756
Serial Number

Cihaz Kodu : DOKM0-FAK-002
Device Code

Talep Eden : DOKAY MÜHENDİSLİK ve DANIŞMANLIK LTD. ŞTİ.
Issued for *Öveçler 4. Cad. 140/A 06460*
Dikmen - ANKARA

Kalibrasyon Tarihi : 23.01.2006
Date of Calibration

Tarih
Date of Issue

24.01.2006



Enstitü Müdür Vekili
Acting Director

[Signature]
M. Sermet SÜERY

Bu kalibrasyon sertifikası, UME'deki ulusal standartlara veya UME tarafından kabul edilen diğer bir ülkenin metroloji enstitüsündeki ulusal standartlara ya da BIPM'deki uluslararası standartlara izlenebilirliği belgeler ve ancak bütünlüğü bozulmamak kaydıyla çoğaltılabilir. UME'nin yazılı izni olmaksızın sertifikanın bütününde veya bir kısmında herhangi bir değişiklik yapılamaz ve kısmen çoğaltılamaz. Damgasız ve imzasız kalibrasyon sertifikaları geçerli değildir.

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ODTÜ-SEM

ORTA DOĞU TEKNİK ÜNİVERSİTESİ SÜREKLİ EĞİTİM MERKEZİ

Sayın Günel Özenirler

MERKEZİMİZCE 16 - 20 OCAK 2006 TARİHLERİ ARASINDA

*“Çevre Gürültüsüne İlişkin Şikayetlerin Değerlendirilmesi, Ölçümü, Denetimi
ve İzlenmesine İlişkin A Tipi Sertifikaya Yönelik Eğitim”*

PROGRAMININ 30 SAATİNİN ~~30~~ SAATİNE KATILARAK VE 100 PUAN ÜZERİNDEN ~~15~~ PUAN ALARAK
BU BELGEYİ ALMAYA HAK KAZANMIŞTIR.

Altan Özenir

Eğitmen
Prof. Dr. Nevzat ÖZGÜVEN

Mehmet Çalıkan

Eğitmen
Prof. Dr. Mehmet ÇALIŞKAN

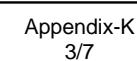
Hüseyin Vural

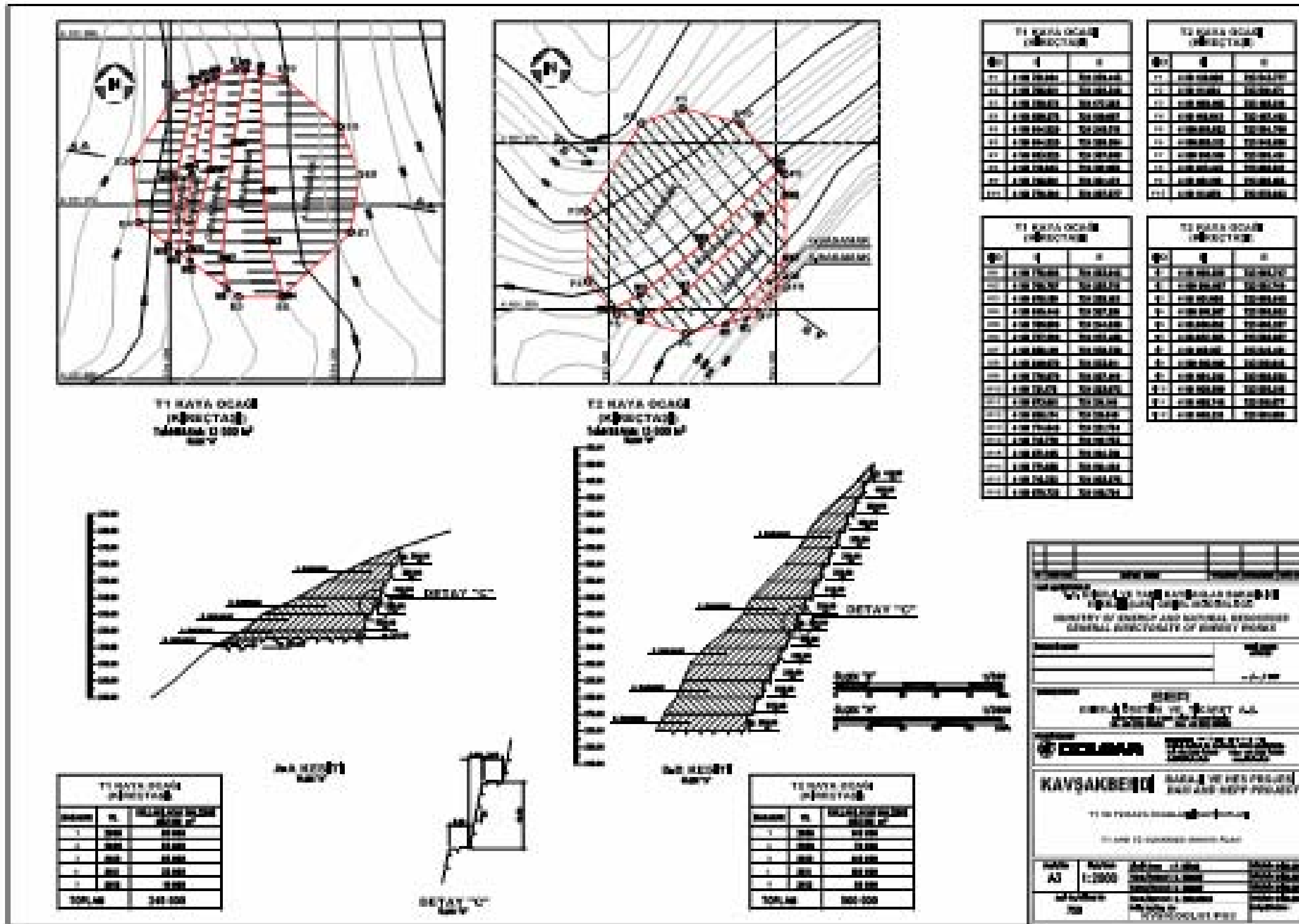
SEM Başkanı
Prof. Dr. Hüseyin VURAL

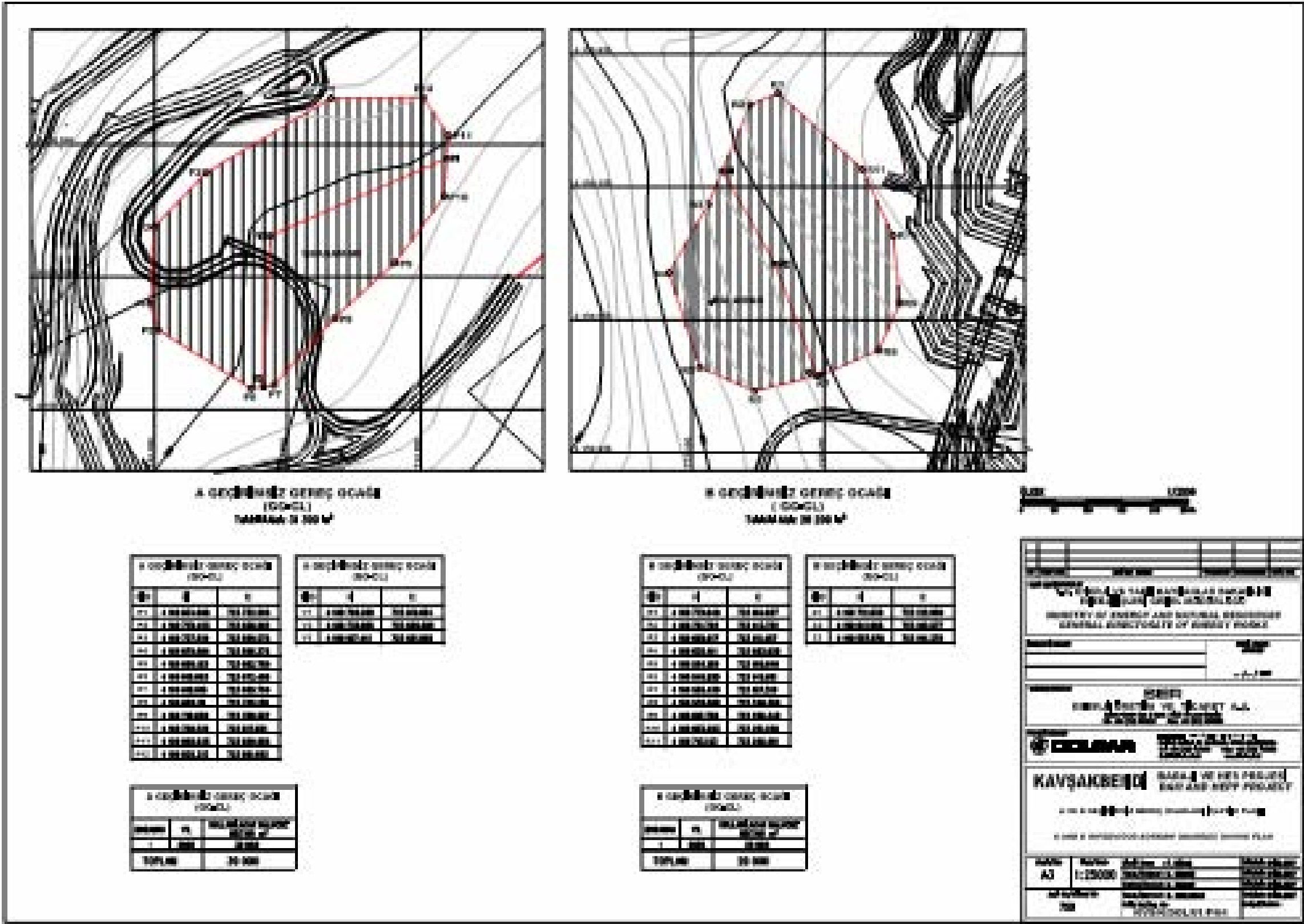
Appendix-K

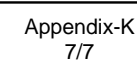
Quarries

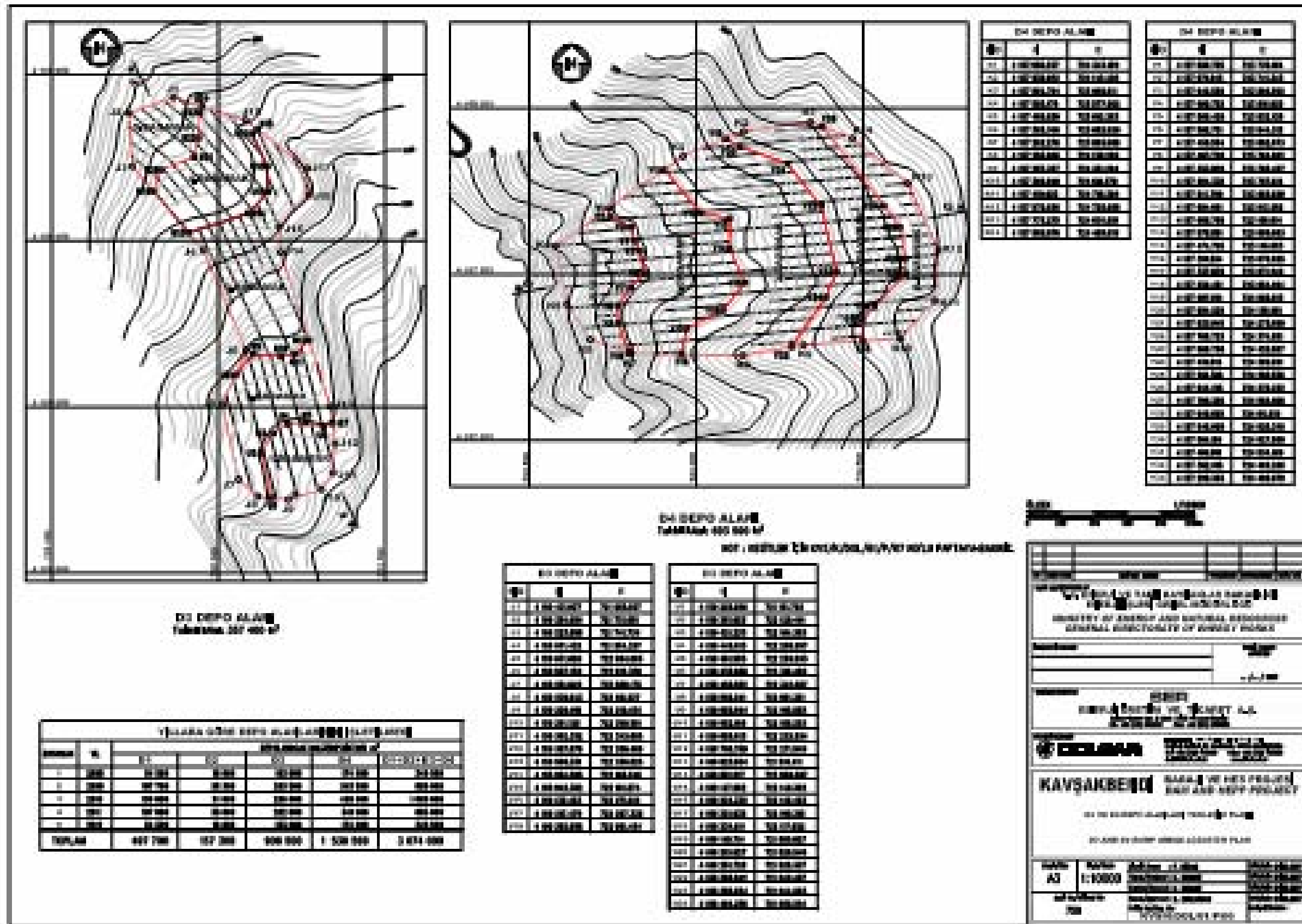


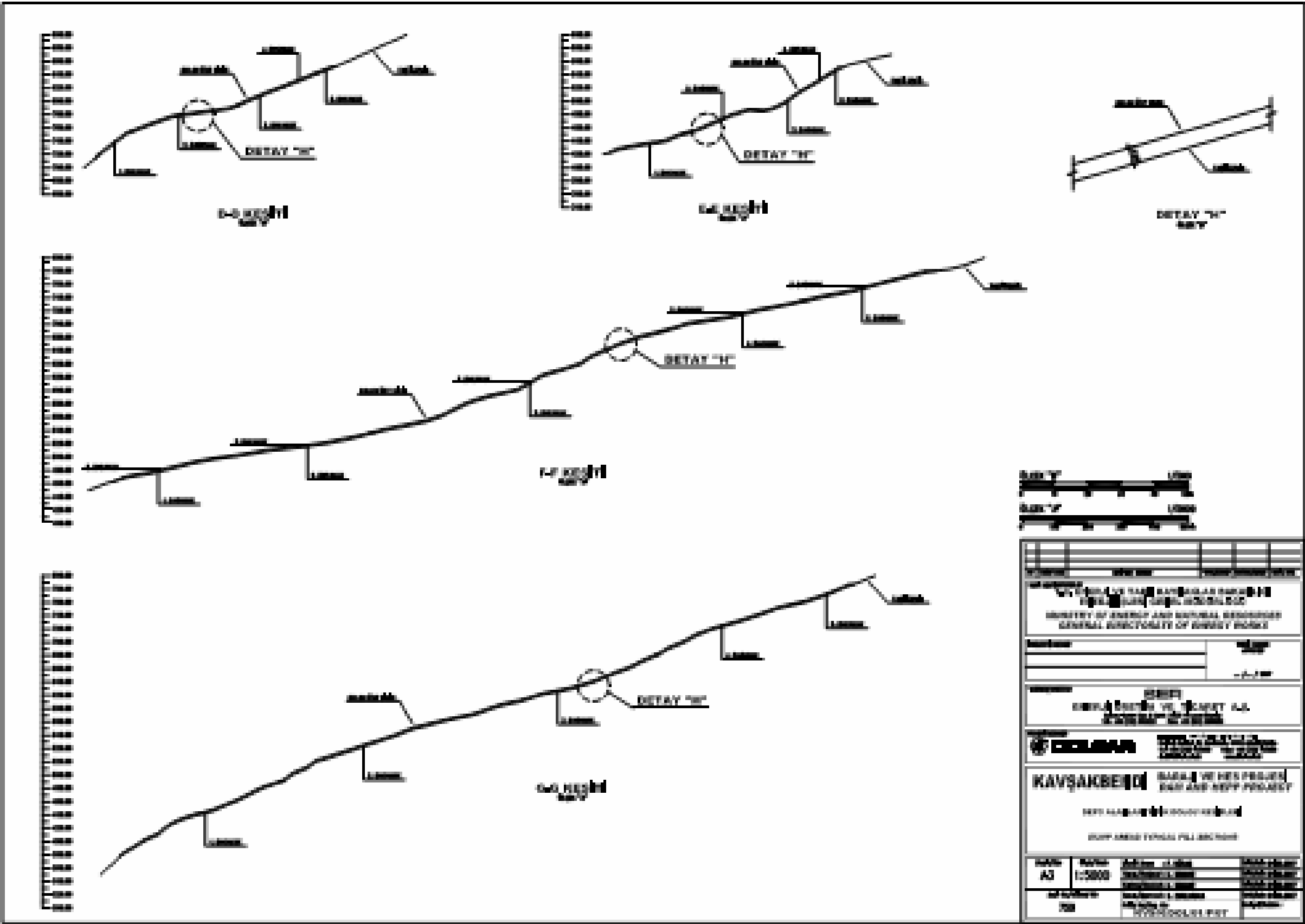












The EIA Project Team

PERSONNEL TABLE COMMITTED IN THE SCOPE OF THE PROFICIENCY CERTIFICATE

Project Owner : Ser Power Generation and Trade Inc.
Location of the Project : Adana Province, Kozan ve Aladag Districts
Name of the Project : Kavsakbendi Dam, HPP and Quarries Project
Submission Date of The Report: September 2007
**Name of Company Prepared
the Report** : DOKAY-CED Environmental Engineering Ltd.
No of Proficiency Certificate : 82

Personnel Work for Related Item of the Announce	Name, Surname	Occupation	Responsibl e From	Signature
Environmental Engineer (5-a)	Gunul OZENIRLER	Environmental Engineer, M.Sc.	All report	
Personnel Graduated from Engineering and Architecture Faculty (5-b)	Prof. Dr. Coskun YURTERI	Chemical Engineer, M.Sc. Environmental Engineer, PhD.	All report	
	Yesim ASTI	Chemist, MSc.	All report	
	Hakan Abbas OKUMUSOGLU	Mining Engineer	Section V.1	
Report Coordinator (5-c)	D. Emre KAYA	Environmental Engineer	All report	
Personnel determined by Scoping Commission	Esra YILMAZ	Geological Engineer	Section IV.2.2, Section V	
	M. Cenk TOPLAR	Biologist	Section IV.2.10, App.-H,I	

T.C.
ÇEVRE VE ORMAN BAKANLIĞI
Çevresel Etki Değerlendirmesi ve Planlama Genel Müdürlüğü

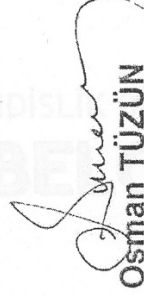


YETERLİK BELGESİ

Bu belge, 16/12/2003 tarih ve 25318 sayılı Resmi Gazete'de yayımlanarak yürürlüğe giren Çevresel Etki Değerlendirmesi (ÇED) Yönetmeliği'nin 27. Maddesi uyarınca ÇED Raporu hazırlamaya yetkili olmak üzere verilmiştir.

Belge No : -82-
Veriliş Tarihi : 10.08.2006
Kuruluş Adı : DOKAY-ÇED ÇEVRE MÜH. LTD.ŞTİ.

Bu belge verildiği tarihten itibaren üç yıl geçerlidir.


Osman TÜZÜN
Bakan a.





**TMMOB
ÇEVRE MÜHENDİSLERİ
ODASI**

SERBEST MÜŞAVİRLİK MÜHENDİSLİK BÜROSU
BÜRO TESCİL BELGESİ

ÜNVANI: **DOKAY-ÇED ÇEVRE MÜHENDİSLİĞİ LTD. ŞTİ.**

TESCİL NO: **06-333**

TESCİLE ESAS SMM'LERİN

1) ODA SİCİL NO
1162

ADI SOYADI
Günel ÖZENİRLER

ÇMO "Serbest Çevre Mühendisliği Hizmetleri Uygulama, Tescil, Denetim ve Asgari Ücret Yönetmeliği"ne uygun koşulları taşıyan **Dokay-Çed Çevre Mühendisliği Ltd. Şti.**'nin Büro Tescili yapılmıştır.

31 Aralık 2007
tarihine kadar geçerlidir.


07.05.2007
Burçak KARAMAN UYSAL
Genel Sekreter

Bu belge soğuk mühür ve ıslak imzayla geçerlidir.

Republic of Turkey ID No : 10084184534

Name, Surname : Coskun Yurteri

Father's Name : Erol

Date of Place and Birth : Karsiyaka / 1954

Occupation : Chemical Engineer, M.Sc., Environmental Engineer, PhD.

Foreign Language : English (very good)

University and Department of Graduation :

1984-1988	PhD, Drexel University, Environmental Engineering Department, Philadelphia, PA, USA.
1982-1983	Master of Science, Rensselaer Polytechnic Institute, Environmental Engineering Department, Troy, NY, ABD
1979-1981	Master of Science, Middle East Technical University, Environmental Engineering Department, Ankara
1971-1977	Master of Science, Bachelor of Science, Ankara University, Chemical Engineering Department, Ankara

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Work Phone : +90 (312) 475 71 31

e-mail : cyurteri@dokay.info.tr

Brief CV : Prof.Dr. Yurteri, who is a specialist in Environmental Engineering and Environmental Management, has been giving consultancy services for the public bodies, municipalities, and industrial establishments. He has either worked as manager or contributed to over 100 projects. Furthermore, he has been involved in project studies at North America, Europe, Australia, Japan, Middle East, and Caucasia.

He has executed many application projects in environmental engineering field during his membership of TUBITAK Execution Commiitte. Furthermore, he executed the EIA study for the 1000 MW Aliaga Coal-Fired Thermal Power Plant between 1990-1992 , which is the the first comprehensive and noteworthy EIA study in Turkey. He has contributed in the preparation of Turkish EIA Legislation between 1992-1993.

The results of his numerous studies have been published in more than 100 publications, international and national journals. His studies have been presented in national and international meetings as well.

He is a member of Association of Environmental Engineering Professors (USA), Sigma-Xi, Alche, Chamber of Chemical Engineers, Turkish National Committee on Water Pollution Control, Turkish National Committee on Solid Waste Management.

Contribution to the Report : Prof. Dr. Yurteri, has been involved in Kavsakbendi Dam, HPP and Quarries Project as, report controller.

V. G.
ANKARA 18. NOTERLİĞİ
Fazl M. Kemal Bulvarı No: 73/3
Maltepe - ANKARA 06570
Tel: 229 22 22 - 227 51 51

(Tescil ve İlan İçin)

24562
26 HAZ 2006

İMZA BEYANNAMESİ

Ankara 18. Noterliğince 23 Haziran 2006 tarih ve 24464 y.no ile tastikli DOKAY - ÇED ÇEVRE MÜHENDİSLİĞİ LİMİTED ŞİRKETİ'ne ait anasözleşmenin 8. Maddesinde, MADDE-8 ŞİRKETİN İDARESİ:
Şirketin idaresi ortaklar kurulunca seçilecek bir veya birkaç müdür ile yürütülür. Şirket müdürü ortaklar arasından veya dışarıdan seçilebilir. İlk 10 yıl için Şirket ortağı T.C. Uyraklı COŞKUN YURTERİ Şirket müdürü seçilmiştir. " denildiğinden bilumum muamelatta aşağıya örneğini vaaz eylediğim tatbik imzama kullanacağımı, işbu imzama tastikini talep ederim.

DOKAY - ÇED ÇEVRE MÜHENDİSLİĞİ LİMİTED ŞİRKETİ

Şirket Müdürü COŞKUN YURTERİ

COŞKUN YURTERİ *COŞKUN YURTERİ* *COŞKUN YURTERİ*

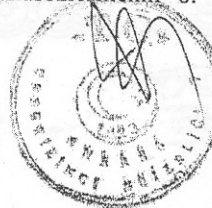
İşbu imza beyannamesi altındaki imzanın sahibi ibraz ettiği Çankaya nüfus müdürlüğünce 28.01.2005 tarih ve 2827 cüzdan kayıt no ile yenileme olarak verilen nüfus hüviyet cüzdamına nazaran Ankara, Çankaya, Cumhuriyet Mah.0018 cilt, 00115 aile sıra, 0014 sıra no da kayıtlı, Erol ile Asuman oğlu, Karşıyaka 1954 doğumlu COŞKUN YURTERİ'ye ait olup, Noterliğimizde imzaladığını onaylarım. İkibinaltıyılı haziran ayının yirmialtınıcı günü 26.06.2006

ANKARA 18. NOTERİ-VEKİLİ
BAŞKATİP MEHMET ALİ KOÇER



*
Müstenid

Noterliğimizce 23 Haziran 2006 tarih ve 24464 y.no ile tastikli DOKAY - ÇED ÇEVRE MÜHENDİSLİĞİ LİMİTED ŞİRKETİ'ne ait anasözleşmenin 8. Maddesi imza beyanı halinde aynen yazılmıştır.



14

T.C. **.435 7 1**
ANKARA ÜNİVERSİTESİ
FEN FAKÜLTESİ

27 EYLÜL 2001

Adı ve Soyadı : *Coşkun Gürbüz*
Doğum yeri : *Hamur - Elazığ*
Doğum yılı : *1954*
Babasının Adı : *Erol*
Anasının Adı : *Olumaz*
Tabiiyeti : *T.C*
Diploma No. : *617*

17865

YÜKSEK MÜHENDİSLİK DİPLOMASI

15 NİSAN 2002

Ankara Üniversitesi Fen Fakültesi öğretim ve
imtihan yönetmeliği uyarınca yönetmelikte gös-
terilen derslerin sınavlarını *44* derece ile veren,
pratik uygulamaları ve stajları başarılı olarak
bitiren *7155* numaralı *Coşkun Gürbüz*
Elazığ Yüksek Mühendisliği diploması verilmiştir.

Dekan : *A. Bülent*
Prof. Dr. *Adnan Özalp*

Rektör : *Prof. Dr. Coşkun Dursun*

ANKARA ÜNİVERSİTESİ
FEN FAKÜLTESİ
Mühendislik Bölümü

ANKARA 25. Noter
Mehmet Ünal Vekilli Başkath
YUSUF UYGURTAS

ANKARA ÜNİVERSİTESİ
FEN FAKÜLTESİ
Mühendislik Bölümü

436 67

Benzeleier Polytechnic Institute

Founded Eighteen Hundred Twenty Four

28 FYLÖL 2001

Having completed the prescribed curriculum and satisfactorily
passed the examinations as set forth by the Faculty in
Environmental Engineering
the President and the Board of Trustees confer upon
Coskun Vurteri
the degree of
Master of Science
with all of the rights, honors and privileges pertaining thereto.
Given in the city of Troy in the state of New York on this
thirtieth day of December, one thousand nine hundred and eighty-three.

SÖNMEZ TERCÜME GRUBU
Abdi İpekçi İleri Tesisler Merkezi
İhşaniye 12/01 Şişli/Beşiktaş/İSTANBUL
Tel : 229 78 00 00
Fax : 229 78 00 00

ISSU BELGE TARAFINDAN
İmza: **den Nizce**
CEVRİLİMİŞTİR **Doim Beyazbaki**
FENİMLİ HÜNERLER
Doim Beyazbaki
Mühür

Benzeleier Polytechnic Institute

George C. Schickman
President of the Board

Benzeleier Polytechnic Institute

DREXEL UNIVERSITY

436 66

*upon the recommendation of the Faculty and under authority vested
in the Board of Trustees by the Commonwealth of Pennsylvania
hereby confers on*

COSKUN YURTERI

28 EYLÜL 2007

the degree of

DOCTOR OF PHILOSOPHY

with all the Honors, Rights and Privileges appertaining thereto.

*In witness whereof, the Seal of the University is hereunto
affixed at Philadelphia on the twelfth day of June, in the year of our
Lord, Nineteen hundred and eighty-eight.*



A. McLean Jr.
Chairman, Board of Trustees

İSBU BELGE TARAFINDAN

İmza dan Nöbetçi
ÇEVREBİLİMLERİŞTİRME R.Ş.İ. Yönetim Kurulu

SÖNMEZ YERÇİME GRUBU

Abdül İpekiği I. sınıfı Kurum Müdürü
İşhanı 12/31 - Sakaşlı-ANKARA

Tel : 229 78 01 - 230 56 06

Fax : 230 47 93

Harold M. Myers
President

Republic of Turkey ID No	:	40834213948
Name, Surname	:	Dundar Emre KAYA
Father's Name	:	Ilham
Date of Place and Birth	:	Erzurum / 1971
Occupation	:	Environmental Engineer
Foreign Language	:	English (very good)
University and Department of Graduation	:	1988-1995 Bachelor of Science, Middle East Technical University, Faculty of Engineering, Environmental Engineering Department, Ankara
Work Address	:	DOKAY-CED Environmental Engineering Ltd. Ovecler 4. Cadde No: 140/A 06460 Dikmen Ankara
Work Phone	:	+ 90 (312) 475 71 31
e-mail	:	ekaya@dokay.info.tr
Brief CV	:	D. Emre Kaya, who is an environmental engineer, has taken part in EIA studies of numerous projects in various positions ranging from field engineer to deputy project coordinator and his participation in such projects is ongoing. During his 12 year long occupational experience, he has worked in numerous EIA studies, including Hydroelectric Power Plants, Thermal and Natural Gas Combined Plants, Pipeline Projects, Open Pit Mines, etc. He has also taken part in Dust and Air Quality modeling studies and basic and detailed engineering studies
Contribution to the Report	:	He is a member of Chamber of Environmental Engineers. D. Emre Kaya, has been involved in the Kavsakbendi Dam, HPP and Quarries Project as report coordinator.

ANKARA ÇİREKÖYÜ
Karantlı Sokak No:14/5 Kızılay/ANKARA
Tel:(0.312)425 46 40 - 419 59 30
T.C. İMZA BEYANNAMESİ
ANKARA 34. NOTERİ
Karantlı Sokak No: 14/5 Kızılay/ANKARA
Tel: (0312) 425 46 40 - 419 59 30

05480
20 ŞUBAT 2007

08078

Aşağıda örneği konulan tatbik imzama T.C. resmi dairelerinde, müesseselerinde, hakiki ve hükmi şahıslarla, bilumum bankalarda yapılacak her türlü işlemlerde kullanacağımı, imzama beni her bakımdan sorumlu kılacağımı beyan eder, onaylanmasını dilerim.

19 MART 2007

Beyan eden : Dündar Emre KAYA

Adres : DOKAY Mühendislik ve Danışmanlık Ltd. Şti.
Öveçler 4. Cadde No:140/A 06460 Dikmen – Ankara

İmza

İmza

İmza

İşbu imza beyannamesi altındaki imzanın kimliği gösterdiği, Marmaris Nüfus İdaresinden Kayıp nedeniyle 21.04.1995 Tarih, 35/718 Kayıt No'lu ve G05 Seri, 031668 Sicil No ile verilme fotoğrafı tasdikli nüfus hüviyet cüzdanına göre 40834213948 T.C. Kimlik, Erzurum, Merkez, Gülpınar Mahallesi, 122/01 Cilt, 06 Aile Sıra No, 25 Sıra No'larında kayıtlı bulunan Nuvit ile İlham oğlu, Erzurum 08.01.1971 doğumlu Dündar Emre KAYA'ya ait olup işlerinin yoğunluğu nedeniyle mahallinde imzaladığını onaylarım.

İş bu suret aslına
uygundur.

ANKARA 34. NOTERİ

AKİF HIZAL

Yetkili İmza Yetkili Memur

ANKARA 34. NOTERİ

Yetkili İmza Yetkili Memur

AKİF SANAL

RECEIVED
JAN 10 1968

Republic of Turkey ID No	:	50725741832
Name, Surname	:	Gunal Ozenirler
Father's Name	:	Vural
Date of Place and Birth	:	Ankara / 1970
Occupation	:	Environmental Engineer, MSc.
Foreign Language	:	English (very good)
University and Department of Graduation	:	1994-1997 Master of Science, Middle East Technical University, Institute of Sciences, Environmental Engineering Department, Ankara 1988-1993 Bachelor of Science, Middle East Technical University, Faculty of Engineering, Environmental Engineering Department, Ankara
Work Address	:	DOKAY-CED Environmental Engineering Ltd. Ovecler 4. Cadde No: 140/A 06460 Dikmen Ankara
Work Phone	:	+ 90 (312) 475 71 31
e-mail	:	gozenirler@dokay.info.tr
Brief CV	:	Gunal Ozenirler, who is an environmental engineer, has taken part in EIA studies of numerous projects developed by ENVY in various positions ranging from field engineer to deputy project coordinator and his participation in such projects is ongoing. During his 10 year long occupational experience, he has worked as the group leader of EIA studies executed within the scope of Baku-Tbilisi-Ceyhan Crude Oil Pipeline Project; and he has also taken part in EIA studies of five power plants (4 natural gas, 1 coal-fired) erected on Build-Operate model basis, Public Disclosure and Consultation Studies, two gold mine studies, preparation of the EIA reports of three hydroelectric power plant projects of private sector and two power plant projects of public sector based on turn-key model.
Contribution to the Report	:	He is a member of Chamber of Environmental Engineers. Gunal Ozenirler, has been involved in the Kavsakbendi Dam, HPP and Quarries Project as project engineer.

T.C.
ANKARA OTUZ DÖRÜNCÜ NOTERLİĞİ
Kararlı Sokak No:14/5 Kızılay/ANKARA
Tef:(0.312)425 46 40-419 59 30

19057

İMZA BEYANNAMESİ

03 TEM 2006


Aşağıda örneği konulan tatbik imzama T.C. resmi dairelerinde, müesseselerinde, hakiki ve hükmi şahıslarla, bilumum bankalarda yapılacak her türlü işlemlerde kullanacağımı, imzama beni her bakımdan sorumlu kılacağını beyan eder, onaylanmasını dilerim.

Beyan eden : Günel ÖZENİRLER

Adres : DOKAY-ÇED ÇEVRE MÜHENDİSLİĞİ LTD. ŞTİ.
Öveçler 4. Cadde No:140/A 06460 Dikmen – Ankara



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İmza

İşbu imza beyannamesi altındaki imzama kimliği gösterdiği, Çankaya Nüfus İdaresinden Yenileme nedeniyle 06.09.1994 Tarih, 24133 Kayıt No.lu ve S05 Seri, 707150 Sicil No ile verilme fotoğrafı tasdikli nüfus hüviyet cüzdanına göre 50725741832 T.C. Kimlik, Uşak, Merkez, Kemalöz 010-01 Cilt, 38 Aile Sıra No, 34 Sıra No.larında kayıtlı bulunan Vural ile Sema oğlu, Ankara 13.06.1970 doğumlu Günel ÖZENİRLER'e ait olup işlerinin yoğunluğu nedeniyle mahallinde imzaladığını onaylarım. İkibinaltı yılı Temmuz ayının üçüncü günü 03.07.2006

ANKARA OTUZ DÖRÜNCÜ NOTERİ
AYRILMAZ
Yerine İmza Yetkili Memur
YASİN SANAT

Değerli Kağıt Bedeli
Makbuz Karşılığı
Tahsil Edilmiş

Republic of Turkey ID No	:	32359749316
Name, Surname	:	Yesim Asti
Father's Name	:	Ahmet Gunay
Date of Place and Birth	:	Ankara / 1976
Occupation	:	Chemist MSc.
Foreign Language	:	English (very good)
University and Department of Graduation	:	1999-2001 Master of Science, Middle East Technical University, Department of Chemistry, Ankara 1994-1998 Bachelor of Science, Middle East Technical University, Department of Chemistry, Ankara
Work Address	:	DOKAY-CED Environmental Engineering Ltd. Ovecler 4. Cadde No: 140/A 06460 Dikmen Ankara
Work Phone	:	+ 90 (312) 475 71 31
e-mail	:	yasti@dokay.info.tr
Brief CV	:	As an expert chemist, she has engaged in the preparation of solid and fluid samples for analysis by microwave pre-processor in Environmental Reference Laboratory, in the analyses of heavy metals by Atomic Absorbtion Spectrometer and of phospor by UV visible equipment. Good laboratory practices and accreditation studies. Active participation in Mogan Lake Project (sampling and analysis etc). Training of the staff of Provincial Directorate of Environment on solid waste sampling.
Contribution to the Report	:	Yesim Asti, has been involved in the Kavsakbendi Dam, HPP and Quarries Project as chemist.

T.C.
ANKARA OTUZ DÖRDÜNCÜ NOTERLİĞİ
Karanfil Sokak No:14/5 Kızılay/ANKARA
Tel:0312/425 46 40-419 59 30

40 19054

İMZA BEYANNAMESİ

03 TEM 2006

Aşağıda örneği konulan tatbik imzayı T.C. resmi dairelerinde, müesseselerinde, hakiki ve hükmi şahıslarla, bilumum bankalarda yapılacak her türlü işlemlerde kullanacağımı, imzamın beni her bakımdan sorumlu kılacağını beyan eder, onaylanmasını dilerim.

Beyan eden : Yeşim AŞTI

Adres : DOKAY-ÇED ÇEVRE MÜHENDİSLİĞİ LTD. ŞTİ.
Öveçler 4. Cadde No:140/A 06460 Dikmen – Ankara





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İşbu imza beyannamesi altındaki imzanın kimliği gösterdiği, Keçiören Nüfus İdaresinden Yenileme nedeniyle 05.03.2003 Tarih, 7328 Kayıt No.lu ve D08 Seri, 383654 Sicil No ile verilme fotoğrafı tasdikli nüfus hüviyet cüzdanına göre 32359749316 T.C. Kimlik, Ankara, Keçiören, Kavacıksubayevleri Mah. 0022 Cilt 00109 Aile Sıra No, 0004 Sıra No.larında kayıtlı bulunan Ahmet Günay ile Mukadder kızı, Ankara 01.04.1976 doğumlu Yeşim AŞTI'ya ait olup işlerinin yoğunluğu nedeniyle mahallinde imzaladığını onaylarım. İkibinaltı yılı Temmuz ayının üçüncü günü 03.07.2006

ANKARA 34-İCİLERİ
AKİF HIZAL
Yerine İmza Yetkili Memur
VASİF SANAL

<p>TÜRKİYE CUMHURİYETİ ORTA DOĞU TEKNİK ÜNİVERSİTESİ ANKARA</p>	<p>REPUBLIC OF TURKEY MIDDLE EAST TECHNICAL UNIVERSITY ANKARA</p>
<p>№28806</p>	<p>№ 21748</p>
<p>Yeşim Özdemir</p>	<p>Yeşim Özdemir</p>
<p>10 TEMMUZ 2003</p>	<p>10 TEMMUZ 2003</p>
<p>FEN BİLİMLERİ ENSTİTÜSÜ</p>	<p>HAVING SATISFACTORILY COMPLETED ALL REQUIREMENTS OF THE MASTER'S PROGRAMME IN THE DEPARTMENT OF</p>
<p>KİMYA</p>	<p>CHEMISTRY MAYIS 2001</p>
<p>ENSTİTÜ ANABİLİM DALI YÜKSEK LİSANS PROGRAMINDA GEREKLİ ÇALIŞMALARI BAŞARI İLE TAMAMLAYARAK</p>	<p>IN THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES</p>
<p>YÜKSEK KİMYAGER ÜNVANINI VE YÜKSEK LİSANS DERECESİNİ TANINAN BÜTÜN YETKİLERİYLE BİRLİKTE ALMAYA HAK KAZANMIŞTIR</p>	<p>HAS BEEN AWARDED THE DEGREE OF MASTER OF SCIENCE IN CHEMISTRY WITH ALL THE PRIVILEGES CONNECTED THEREUNTO</p>
<p>13 Aralık 2001</p>	<p>December 13, 2001</p>
<p><i>V. Akar</i> RECTOR PRESIDENT</p>	<p><i>Yeşim Özdemir</i> GRADUATE DEPARTMENT</p>
<p></p>	<p></p>
<p></p>	<p></p>

Republic of Turkey ID No	:	64693013822
Name, Surname	:	Hakan Abbas Okumusoglu
Father's Name	:	Nazmi Turan
Date of Place and Birth	:	Samsun / 1971
Occupation	:	Mining Engineer
Foreign Language	:	English (intermediate)
University and Department of Graduation	:	1998-2002 Bachelor of Science, Hacettepe University Department of Mining Engineering, Ankara
Work Address	:	DOKAY-CED Environmental Engineering Ltd. Ovecler 4. Cadde No: 140/A 06460 Dikmen Ankara
Work Phone	:	+ 90 (312) 475 71 31
e-mail	:	hokumsoglu@dokay.info.tr
Brief CV	:	Hakan Abas Okumusoglu, who is a Mining Engineer, had worked for Nitromak A.S. as blasting engineer and for BOTAS GM in Nazilli-Izmir DGBH Engineering Project as project engineer.
Contribution to the Report	:	Hakan Abbas Okumusoglu, has been involved in the Kavsakbendi Dam, HPP and Quarries Project as project engineer.

T.C.
ANKARA OTUZ DÖRDÜNCÜ NOTERLİĞİ
Karanfil Sokak No:14/5 Kızılay/ANKARA
Tel:(0.312)25 46 40-419 59 30

İMZA BEYANNAMESİ

№08075

19 MART 2007

Aşağıda örneği konulan tatbik imzama T.C. resmi dairelerinde, müesseselerinde, hakiki ve hükmi şahıslarla, bilumum bankalarda yapılacak her türlü işlemlerde kullanacağımı, imzama beni her bakımdan sorumlu kılacağımı beyan eder, onaylanmasını dilerim.

Beyan eden : Hakan Abbas OKUMUŞOĞLU

Adres : DOKAY-ÇED Çevre Mühendisliği Limited Şirketi
Öveçler 4. Cadde No:140/A 06460 Dikmen – Ankara

İmza

İmza

İmza

İşbu imza beyannamesi altındaki imzanın kimliği gösterdiği, Çankaya Nüfus İdaresinden Yenileme nedeniyle 22.07.2005 Tarih, 24784 Kayıt No'lu ve R09 Seri, 885594 Sicil No ile verilme fotoğrafı tasdikli nüfus hüviyet cüzdanına göre 64693013822 T.C. Kimlik, Rize, Çamlıhemşin, Aşağışimşirli Köyü, 0007 Cilt, 00016 Aile Sıra No, 0086 Sıra No'larında kayıtlı bulunan Türkan ile Nazmi Turan oğlu, Samsun 25.04.1971 doğumlu Hakan Abbas OKUMUŞOĞLU'na ait olup işlerinin yoğunluğu nedeniyle mahallinde imzaladığını onaylarım. İkibinyedi yılı Mart ayının ondokukuncu günü 19.03.2007.

ANKARA 34. NOTERİ
AKİF HIZAL
Yerine İmza Yetkili İmza
VASİF SANAL



Republic of Turkey ID No	:	21992238028
Name, Surname	:	Esra Yilmaz
Father's Name	:	Oner
Date of Place and Birth	:	Ankara / 1979
Occupation	:	Geological Engineer
Foreign Language	:	English (poor)
University and Department of Graduation	:	1998-2002 Bachelor of Science, Ankara University, Faculty of Engineering, Department of Geological Engineering, Ankara.
Work Address	:	DOKAY-CED Environmental Engineering Ltd. Oveciler 4. Cadde No: 140/A 06460 Dikmen Ankara
Work Phone	:	+90 (312) 475 71 31
e-mail	:	eyilmaz@dokay.info.tr
Brief CV	:	Esra Yilmaz, who is a geological engineer, has prepared a project and thesis study on the analysis of Tuz Lake and Cankiri – Corum Basins and comparison of their oil potentials.
Contribution to the Report	:	Mrs. Yilmaz has been involved in the Yedigoze Dam, HPP and Quarries Project as project engineer.

ANKARA NOTERLİĞİ
Karanfil Sokak No:14/5 Kızılay/ANKARA
Tel:(0.312)425 46 40-419 59 30

İMZA BEYANNAMESİ

19056

03 TEM 2006

Aşağıda örneği konulan tatbik imzama T.C. resmi dairelerinde, müesseselerinde, hakiki ve hükmi şahıslarla, bilumum bankalarda yapılacak her türlü işlemlerde kullanacağımı, imzama beni her bakımdan sorumlu kılacağını beyan eder, onaylanmasını dilerim.

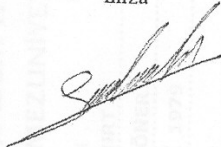
Beyan eden : Esra YILMAZ

Adres : DOKAY-ÇED ÇEVRE MÜHENDİSLİĞİ LTD. ŞTİ.
Öveçler 4. Cadde No:140/A 06460 Dikmen - Ankara

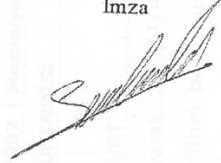
İmza



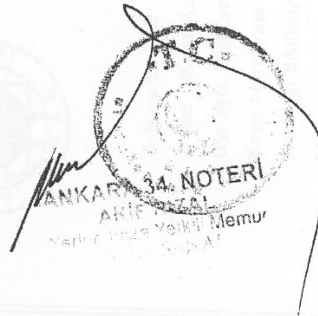
İmza



İmza



İşbu imza beyannamesi altındaki imzanın kimliği gösterdiği, Keçiören Nüfus İdaresinden Yenileme nedeniyle 28.02.2006 Tarih, 6764 Kayıt No.lu ve S08 Seri, 996795 Sicil No ile verilme fotoğrafı tasdikli nüfus hüviyet cüzdanına göre 21992238028 T.C. Kimlik, Artvin, Şavşat, Balıklı Köyü 0008 Cilt, 00057 Aile Sıra No, 0033 Sıra No.larında kayıtlı bulunan Öner ile Nazmiye kızı, Ankara 23.09.1979 doğumlu Esra YILMAZ'a ait olup işlerinin yoğunluğu nedeniyle mahallinde imzaladığını onaylarım. İkibinaltı yılı Temmuz ayının üçüncü günü 03.07.2006



ÖRNEKTİR

DIPLOMA NO: **ANKARA OTUZ DÖRÜNCÜ NOTERLİĞİ**
Karanfil Sokak No: 1415 Kızılay/ANKARA
Tel: (0312) 425 46 40 - 419 59 30

ANKARA ÜNİVERSİTESİ
1946

TÜRKİYE CUMHURİYETİ
ANKARA ÜNİVERSİTESİ
MÜHENDİSLİK FAKÜLTESİ
LİSANS DİPLOMASI

№ 19073
03 TEM 2006

Esra Bozkurt

Mühendislik Fakültesi Jeoloji Mühendisliği Bölümünde dört yıllık öğrenimini
..... **2002 Haziran** döneminde başarı ile tamamlayarak
Jeoloji Mühendisi unvanı almaya hak kazanmıştır.

Prof. Dr. Ridvan BERBER
Dekan

İş bu suret asline uygundur.

ANKARA 34. NOTERLİK
Yerine imza Yetkili Mühür
VASİF SANLI

Dr. Mustafa ARAS
Rektör

Republic of Turkey ID No	:	20440075956
Name, Surname	:	M. Cenk Toplar
Father's Name	:	Ugur
Date of Place and Birth	:	Adana / 1980
Occupation	:	Biologist
Foreign Language	:	English (good)
University and Department of Graduation	:	2005 Bachelor of Science, Uludag University, Department of Biology, Bursa
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Brief CV	:	M. Cenk Toplar, has worked for Atas Refinery (Mersin) as Field Technician between December1997- November 1998. He has worked for a number of sectors mostly focused on food and health industries, as biologist. He has been working for DOKAY since October 2006. He has involved in EIA studies of Hydroelectric Plant, Industrial Zone and Solid Waste Disposal Site projects.
Contribution to the Report	:	C. Toplar, has been involved in the Kavsakbendi Dam, HPP and Quarries Project as biologist.

T.C.
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12 EYLÜL 2006

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Beyan eden : Mahmut Cenk TOPLAR

Adres : DOKAY-ÇED ÇEVRE MÜHENDİSLİĞİ LTD. ŞTİ.
Öveçler 4. Cadde No:140/A 06460 Dikmen – Ankara

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İşbu imza beyannamesi altındaki imzanın kimliği gösterdiği, Adana Nüfus İdaresinden Yenileme nedeniyle 20.03.1997 Tarih, 8585 Kayıt No.lu ve C07 Seri, 429685 Sicil No ile verilme fotoğrafı tasdikli nüfus hüviyet cüzdanına göre 20440075956 T.C. Kimlik, Adana, Seyhan, İstikbal 022-10 Cilt, 367 Aile Sıra No, 197 Sıra No.larında kayıtlı bulunan Uğur ile Solmaz oğlu, Adana 25.05.1980 doğumlu Mahmut Cenk TOPLAR'a ait olup işlerinin yoğunluğu nedeniyle mahallinde imzaladığımı onaylarım. İkibinaltı yılı Eylül ayının onikinci günü 12.09.2006

ANKARA 34 NO
AKIF HIZAL
Yerine İmza Yetkili M
VASİF SANAL

