



GAS STORAGE EXPANSION PROJECT

K	19-03-18	Issued for review	B.E. / E.D. / A.S.Y.	F.A. / O.A.	M.Ş.	
J	08-02-18	Issued for review	B.E. / E.D. / A.S.Y.	F.A.	M.Ş.	
I	20-12-17	Issued for review	B.E. / E.D. / A.S.Y.	F.A.	M.Ş.	
H	21-07-17	Issued for review	B.E. / E.D. / A.S.Y.	F.A.	M.Ş.	
G	06-06-17	Issued for review	B.E. / E.D. / A.S.Y.	F.A.	M.Ş.	
F	23-05-17	Issued for review	B.E. / E.D. / A.S.Y.	F.A.	M.Ş.	
E	17-04-17	Issued for review	B.E. / E.D. / A.S.Y.	F.A.	M.Ş.	
D	10-03-17	Issued for review	B.E. / E.D. / A.S.Y.	F.A.	M.Ş.	
C	15-02-17	Issued for review	B.E. / E.D. / A.S.Y.	F.A.	M.Ş.	
B	13-02-17	Inter-discipline check	B.E. / E.D. / A.S.Y.	F.A.	M.Ş.	
A	06-02-17	Discipline internal check	B.E. / E.D. / A.S.Y.	F.A.	M.Ş.	
Rev. No.	Date	Description	Prepared	Checked	Approved	BOTAŞ
SIGNATURE						
		BOTAŞ PETROLEUM PIPELINE CORPORATION				
		Document Title GAS STORAGE EXPANSION PROJECT EXECUTIVE SUMMARY				
		Document No.			Rev. No.	Total pages (without attachments)
Org. Code	Doc. Type	Disc. Code	Geog. Area	Ser. No.		
CNR	REP	ENM	EXS	17/001	0	42





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LIST OF ABBREVIATIONS AND DEFINITIONS

ATLAS	:	ATLAS Petroleum Gas Importation Exportation Marketing Trading Co.
BOD	:	Biochemical Oxygen Demand
BOTAŞ	:	BOTAŞ Petroleum Pipeline Corporation
ÇINAR	:	ÇINAR Engineering Consultancy Inc.
cm	:	Centimeter
DO	:	Dissolved Oxygen
DSİ	:	State Hydraulic Works (Devlet Su İşleri)
EC	:	Electrical Conductivity
EIA	:	Environmental Impact Assessment
EMP	:	Environmental Management Plan
EMRA	:	Energy Market Regulatory Authority
ETL	:	Energy Transmission Line
GIS	:	Geographic Information Systems
GRP	:	Glass Fiber Reinforced Plastic
GSEP	:	Gas Storage Expansion Project
Ha	:	Hectare
HAZID	:	Hazard Identification
HAZOP	:	Hazard Operability
hm ³	:	Cubic hectometer
HS	:	Health and Safety
HSE	:	Health and Safety, Environment
km	:	Kilometer
KP	:	Kilometer Point
Kw	:	Kilowatt
LNG	:	Liquefied Natural Gas
m	:	Meter
MoEU	:	Ministry of Environment and Urbanization
N/A	:	Not Applicable
NCR	:	Non-Conformance Report
NGOs	:	Non-Governmental Organizations
OHSAS	:	Occupational Health and Safety Assessment Systems
pH	:	Power of Hydrogen
PAP	:	Project Affected People
PM	:	Particulate Matter
PPE	:	Personal Protective Equipment
PS	:	Pump Station
QHSE	:	Quality, Health and Safety and Environment
RoW	:	Right of Way
SEPA	:	Special Environmental Protection Area
SIA	:	Social Impact Assessment
SS	:	Suspended Solids
ST	:	Storage Tank
TDS	:	Total Dissolved Solids
TS	:	Turkish Standard
UGS	:	Underground Gas Storage
UGS Project	:	Underground Gas Storage Project
WHO	:	World Health Organization

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1. INTRODUCTION

This Environmental and Social Impact Assessment (ESIA) report was prepared by ÇINAR Engineering Consultancy Inc. with the purposes of evaluating the possible environmental and social impacts for Gas Storage Expansion Project (GSEP). The planned project will increase the capacity of the existing storage project in the same area which was taken into operation recently. The existing project which is Underground Gas Storage Project (UGS Project) was also financed by WB resources and has an ESIA in place. In addition, ÇINAR Engineering Consultancy Inc. has been providing ESIA monitoring services for the existing project and therefore this ESIA had valuable inputs from the monitoring data. ÇINAR Engineering Consultancy Inc. also prepared an Environmental Impact Assessment report for the Gas Storage Expansion Project to fulfill the national EIA Regulation requirements and received “EIA positive” decision of Turkish Ministry of Environment and Urbanization on March 10, 2017.

1.1. Project Background

Underground natural gas storage is addressed as an important issue in Turkey and underground storage is needed in order to balance effectively the peak gas demand depending on the rapidly increasing gas consumption. In line with the increasing demand, various projects are being developed. It is aimed that seasonal fluctuations which may occur in the future based on increasing demand for natural gas in residential sector will be prevented by these planned projects. In addition to all these, it is aimed by underground natural gas storage works to;

- Ensure the safety of supply (regulating seasonal, daily and hourly changes),
- Provide system regulation (demand and supply gaps),
- Control the fluctuations in prices (regulating in peak demand periods),
- Take countermeasures for possible failures and
- Meet the storage facility liability.

Within the scope of storage facility liability mentioned above, there is a condition that 10% of imported natural gas across the country is storage by required of the Law no. 4646 on Natural Gas Market. This portion is 20% in European Union standards. In this regard, BOTAŞ, which holds 90% of natural gas market in our country, keeps its works on storing 10% of imported gas at the first stage. When the amount of natural gas consumption of Turkey and statistics regarding current storage capacity are reviewed, it is seen that Turkey is below the storage values which should be in accordance with the Law No.4646 and European Union’s standards by 2014.

In the project on Gas Storage Expansion Project (GSEP), 48 storages with 5 billion Nm³ capacity, 1 surface facility and 1 natural gas branchman line were planned within the scope of the principal units in addition to the existing facility which consists of 12 storages, in order to have a 1 billion Nm³ capacity and surface facilities, and it is planned to establish a water line, brine discharge line, connection lines between wells, pump stations, water storage tanks and concrete plants as auxiliary units. There may be increase or decrease in the numbers of the mentioned auxiliary units depending on the needs of the facility and changing conditions. The Underground Gas Storage Project (UGS Project) and planned Gas Storage Expansion Project (GSEP) areas are shown in Figure 1.1.1.

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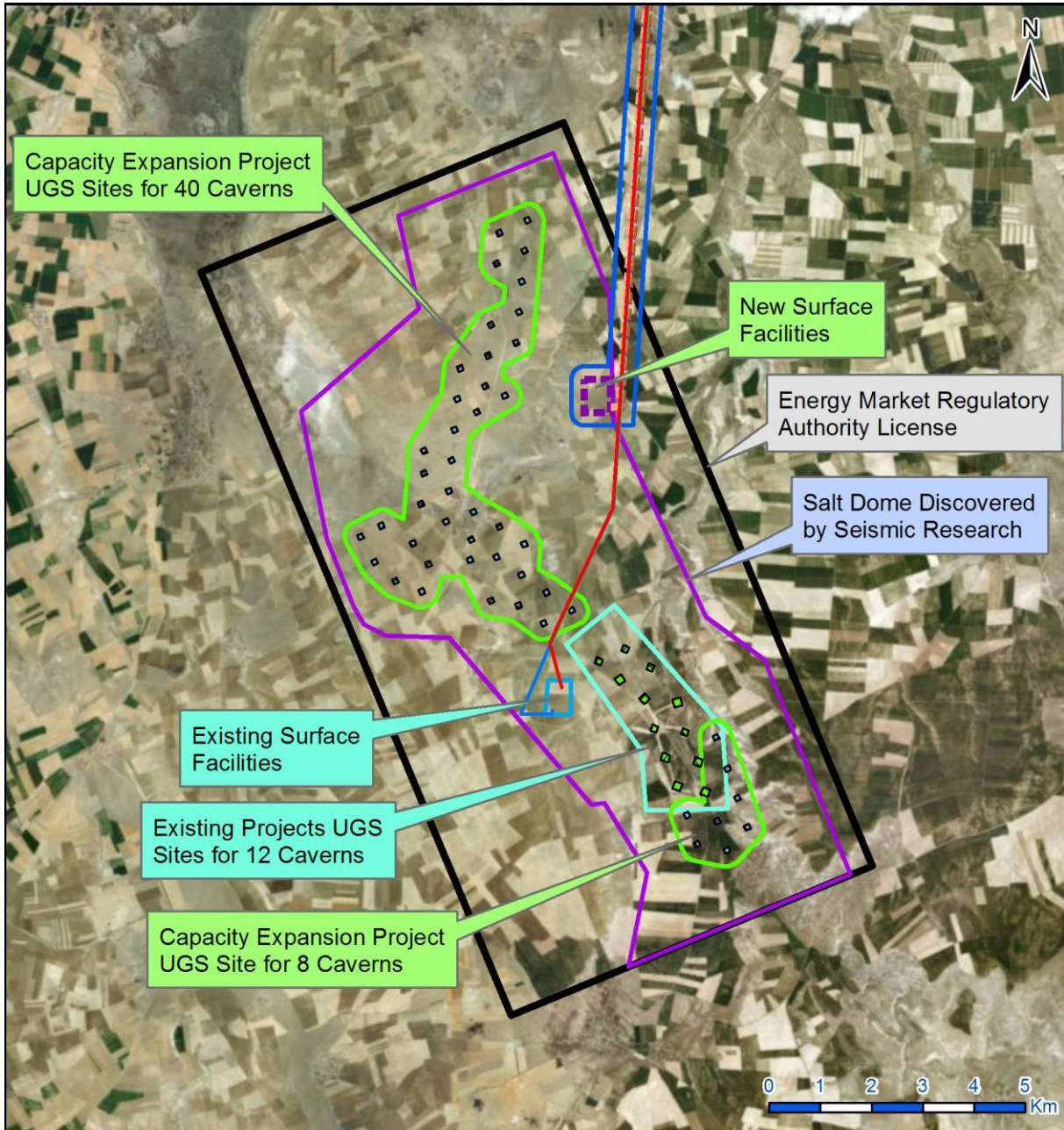
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- | | | |
|----------------------------------|--|--|
| Existing Natural Gas Branch Line | Planned Freshwater Supply Line | Planned Project Well Impact Area |
| Existing Freshwater Supply Line | Planned Surface Facilities | Salt Dome Discovered by Seismic Research |
| Existing Brine Discharge Line | Existing UGS Locations | Existing Well Area |
| Planned Natural Gas Branch Line | Planned UGS Locations | EMRA License Area |
| Planned Brine Discharge Line | Planned Pipelines and Auxiliary Surface Facilities Impact Area | Existing Surface Facilities |

Figure 1.1.1. The Project Areas of the current UGS Project and GSEP

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In addition to the Underground Gas Storage Project;

- 48 (including 8 spare) storages (caverns) with 5 billion Nm³ storage capacity,
- 1 surface facility,
- 1 natural gas branchman line,
- 1 fresh water line,
- 1 brine discharge line,
- Connection lines between wells,
- Access Roads (if it is required after the final design),
- Energy transmission lines,
- 3 pump stations,
- 5 water storage tanks

will be established within the boundaries of Sarıyahşi, Ağaçören, Ortaköy, Eskil, Central and Sultanhanı Districts of Aksaray Province; Emirgazi District of Konya Province and Evren District of Ankara Province, as the designated project area.

1.2. Aim



In this report, it is aimed to assess environmental and social impacts which will occur as a result of the construction, drilling, leaching and auxiliary activities of the units outlined above during GSEP. In addition, suggestions regarding the minimizing of these impacts and/or making the impacts positive will be made after the reviews, assessments and analyses in the report.

The aims of this report can be listed as below;

- Explanation of the capacity increase works of the Underground Natural Gas Storage Project,
- Definition of the environmental and social features at the project areas,
- Studies on probable factors which might cause environmental impacts on the project areas in parallel of the same project investigations and experienced studies,
- Explanation of the results of the probable environmental impacts and effects to the current social status around the project areas during the project works,
- Suggestions on decreasing the negative environmental and social impacts,
- Explanation of planned works on increasing the positive environmental and social impacts,
- Explanation of necessary measures to be taken on environmental and social impacts during the project works,
- Explanation of obtained and formed baseline data,
- Evaluation of the performed analysis and measurement results,
- Definition of the health and safety conditions during the project works and
- Assessment of the results of social investigation studies.

1.3. Scope

This ESIA Report covers the investigation of the activity area with regards to the Environmental and Social Impact Assessment (ESIA) approach, ensuring the compliance with national and international law (international treaties, WB Operational Policies, WBG HSE Guidelines, etc.) and also inspection, monitoring and evaluation of environmental

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effects of the construction, drilling, leaching and operation activities to be carried out at project area and its surrounding under the headings presented below;

- Soil Management,
- Air Quality Management,
- Waste/Hazardous Waste Management,
- Wastewater Management,
- Water Management,
- Noise Management,
- Chemical and Hazardous Material Management,
- Salt Water (Brine) Management,
- Formation Wastes and Drill Mud Management,
- Flora - Fauna Management,
- Public Health, Occupational Health and Safety Management,
- Ecological Restoration and Reinstatement Management and
- Social Assessment and Management.



1.4. Material and Method

While conducting the environmental and social impact assessment of the GSEP, literature review, monitoring data from ongoing supervision works of original project and field research data were used to evaluate the impacts of the projects within the ESIA study area. To be more specific, the ongoing monitoring activities involve a wide range of experts from different professional disciplines (Environmental Engineer, Flora and Fauna Experts, Geology and Hydrogeology Engineer, Agricultural Engineer, Landscape Architect and Sociologist), and extensive data collected was used in the preparation of ESIA of GSEP.

In order to identify the area that will be affected by the project, the environmental, economic and social impacts of the project must be evaluated holistically. Some of these effects are direct, while others are indirect; The "Project Impact and Research Area" was selected by taking into account following factors; air quality, noise, flora, fauna, agriculture and forest areas, etc. When both parameters are evaluated, the impact area was determined 250 meters for 48 new caverns and same as 250 meters for pipelines and surface facilities.

Impact area studies were conducted in the following areas; planned pipelines (freshwater line, brine discharge line, natural gas branchman line), within provincial boundaries on the 1/25,000 scaled topographic map presented in Appendix-2, including the facilities and units-under construction of the planned Tuz Gölü Underground Natural Gas Storage Project (TG UNGSP), surface facilities and underground gas storage (UGS) sites, pump stations and storage tanks (PS-ST).

Floristic surveys were performed in two stages, namely, office (desktop studies) and land surveys. Within the scope of the office surveys, the data on vulnerable points in this area previously surveyed by the flora specialist, obtained from the land surveys related to Tuz Gölü Basin, and plant lists containing the flora species that are mentioned in the original project's EIA Report and have importance in the project's area of influence were checked, and the lists were updated.

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In the land surveys, since the species could not be identified and the on-site verification could not be performed because it was not the vegetation period, it was attempted to observe the areas where the species in the plant species list updated in the office surveys were located as well as the intersection points of the Gas Storage Expansion Project sites mentioned in this report. Potential impacts were determined and the measures required to be taken given in the flora section of this report. A more comprehensive flora species analysis will be carried out by the Flora Specialists who will attend the monitoring surveys to be performed by ÇINAR, and will be submitted in reports to BOTAŞ at certain intervals.

In addition, the digitization of the project areas of planned GSEP has been achieved by making use of the topographic maps and the KMZ files prepared by the Geographic Information Systems (GIS) Department of ÇINAR and all of these routes have been individually marked on the topographic maps.



1.5. Rationale for the Project

Nowadays, as a result of energy demand arising from population growth and the increase in natural gas usage correspondingly, underground natural gas storage and usage has a significant importance for Turkey. In line with this demand increase, various projects have been developed. It is aimed to prevent seasonal fluctuations which will occur in the future depending on the increase in demand for natural gas in residential sector by these planned projects.

Status of the Underground Gas Storage Project

In the framework of the works identified above, construction of the pipelines (fresh water line, brine discharge line, gas lines) and surface facilities and auxiliary units were completed and the drilling works of 12 UGS sites were completed. Current status of the UGS sites is given below;

- Leaching operation completed for 5 caverns in scope of first 6 UGS sites:
 - o Gas storage completed for 3 caverns and
 - o Gas storage works ongoing for 2 caverns.
- Leaching operation ongoing for one cavern in scope of first 6 UGS sites.
- Leaching operation ongoing for 4 caverns in scope of second 6 UGS Sites.
- 2 UGS sites are preparing for leaching operation in scope of second 6 UGS Sites.

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2. LEGAL FRAMEWORK

The construction and operational phases of GSEP will be realized in strict compliance with a large number of national and international laws and regulations.

The legislative amendments and the structural changes in the Ministry that have taken place since the date when the final EIA Report was created and the interaction between these changes and the project along with the details regarding the policies and the legal framework which shall be strictly complied with during the construction and operational periods, are elaborated below.

2.1. Turkish Environmental Legislation

The Ministry of Environment and Urbanization operates in close cooperation with other ministries as well as relevant entities, governmental and non-governmental organizations (NGOs). Following the institutional restructuring in Turkey, the ministries and the governmental bodies which are in charge of environmental management are as follows:



- Ministry of Health
- Ministry of Culture and Tourism
 - General Directorate for Cultural Assets and Museums
- Ministry of Food, Agriculture and Livestock
 - General Directorate of Agricultural Research and Policy
 - General Directorate of Food and Control
 - General Directorate of Agrarian Reform
- Ministry of Energy and Natural Resources
 - General Directorate of Mining Affairs (MİGEM)
 - General Directorate of Mineral Research and Exploration (MTA)
 - Turkish Electricity Generation Company
 - Turkish Electricity Transmission Company
 - Turkish Electricity Distribution Company
- Ministry of Transport, Maritime Affairs and Communications
 - General Directorate of Highways (KGM)
- Ministry of Forestry and Water Affairs
 - General Directorate of State Hydraulic Works (DSİ)
 - General Directorate of Water Management
 - General Directorate of Nature Conservation and National Parks (DKMP)

2.1.1. The Environmental Impact Assessment (EIA) Procedure in Turkey

The First Regulation on Environmental Impact Assessment in Turkey was promulgated in the Official Gazette dated 07.02.1993 and numbered 21489. The regulation was later revised on 23.06.1997, 06.06.2002 and 16.12.2003. The latest version of the EIA Regulation was published in the Official Gazette dated 25.11.2014 and numbered 29186. The objective of this regulation is to regulate the administrative and technical procedures and principles to be complied with throughout the EIA process.

2.2. International Treaties Recognized by Turkey

Turkey has signed many international treaties and conventions in order to protect environment and biodiversity. Major international treaties in respect of which compliance

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may be required as part of this project are listed below:

- “Biodiversity Convention” ratified by Law No 4177 dated 29.08.1996 and published in the Official Gazette dated 27.12.1996 and numbered 22860,
- “Convention on the International Trade of Endangered Species of Wild Animals and Plants” published in the Official Gazette dated 20.06.1996 and numbered 22672,
- “Convention on the Protection of Wildlife and Habitats in Europe” (BERN CONVENTION) published in the Official Gazette dated 09.01.1984 and numbered 18318 after ratified by the Cabinet Decree No 84-7601,
- Convention on the Preservation of Wetlands (RAMSAR Convention) ratified by the Cabinet Decree No 94/5434 dated 15.03.1994 and published in the Official Gazette dated 17.05.1994 and numbered 21937,
- “International Convention on the Protection of Birds” ratified by Law No 797 dated 01.12.1996 and published in the Official Gazette dated 17.12.1996 and numbered 12480,
- “Convention on the Protection of World Cultural and Natural Heritage” published in the Official Gazette dated February 14, 1983 and numbered 17959.

It will be ensured to protect these species and hand down to the next generations by complying with the Biodiversity Convention, CITES, BERN, RAMSAR Conventions and International Convention on the Protection of Birds.

In addition the ESIA Report of GSEP has been prepared in the scope of environmental assessment, natural habitats, cultural resources, dam safety, involuntary resettlement, etc. policies categorized in World Bank Operational Policy / Bank Procedures. Project impacts have been explained in the report according to main policies followed by the World Bank which is given below;

- OP 4.01 – Environmental Assessment
- OP 4.04 – Natural Habitats
- OP 4.11 – Physical Cultural Resources
- OP 4.37 – Safety of Dams
- OP 4.12 – Involuntary Resettlement



During the legal framework studies, definitions of the national and international standards, comparing of these standards and project standards have been given in Section 2 of ESIA Report.

2.3. Institutional Arrangements

In order to provide an efficient co-ordination;

- BOTAŞ,
- Construction Contractors and Consultants,
- An Independent Environmental Monitoring Company to be hired by BOTAŞ and
- Ministry of Environment & Urbanization (MoEU), EIA Monitoring and Control Department and its associated units

have to work in coordination in both technical and administrative matters. Responsible parties of BOTAŞ and Contractors, and information flow are indicated in the Organization Chart given in the ESIA report.

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3. DEFINITION AND SPECIFICATIONS OF THE PROJECT

3.1. Project Site Selection

Underground gas storage activities and projects relating to such activities have been carried out successfully for the last 100 years in different parts of the world. The majority of these gas storage projects are in exhausted oil and gas reservoirs and salt formations within the scope of the alternatives pointed out in Section 3.8.2. In order to safely carry out and operate storage projects, the storage areas should be assessed, selected and designed based on the following characteristics:

- The area should be well defined and proper,
- The permeability of the storage area,
- The thickness and expansion of the formation where the storage area is located,
- The tightness of the cap rock,
- The geological structure and lithology.



An evaluation of the different alternatives in Turkey, based on their geological favorability for underground storage, reveals that the Tuz Gölü Basin, where big salt caves/caverns can be built, is the primary choice for underground storage.

The Tuz Gölü Basin is the most favorable place for gas storage in salt formations because of the following factors,

- Geographical location,
- Proximity to the Kayseri-Konya-Seydişehir Natural Gas Pipeline, 40 inches,
- Availability of pure salt masses at the proper depth in the area,
- Minimum level of seismic activities in Turkey

3.1.1. Location of the Project Area and Units of Gas Storage Expansion Project

Within the scope of the “Gas Storage Expansion Project”; surface facilities, UGS sites, pipelines, pump stations and water storage tanks will be constructed as activity/service facilities. In this regard, 48 storage units with a capacity of 5 billion Nm³, 1 surface facility and 1 natural gas branchman line will be constructed within the scope of principal units in addition to existing facility which consists of 12 storage units and a capacity of 1 billion Nm³, and 1 fresh water line, 1 brine discharge line, connection lines between wells, 3 pump stations, 5 water storage tanks and 2 mobile concrete plants will be constructed as auxiliary units (Figure 3.1.1.1.).

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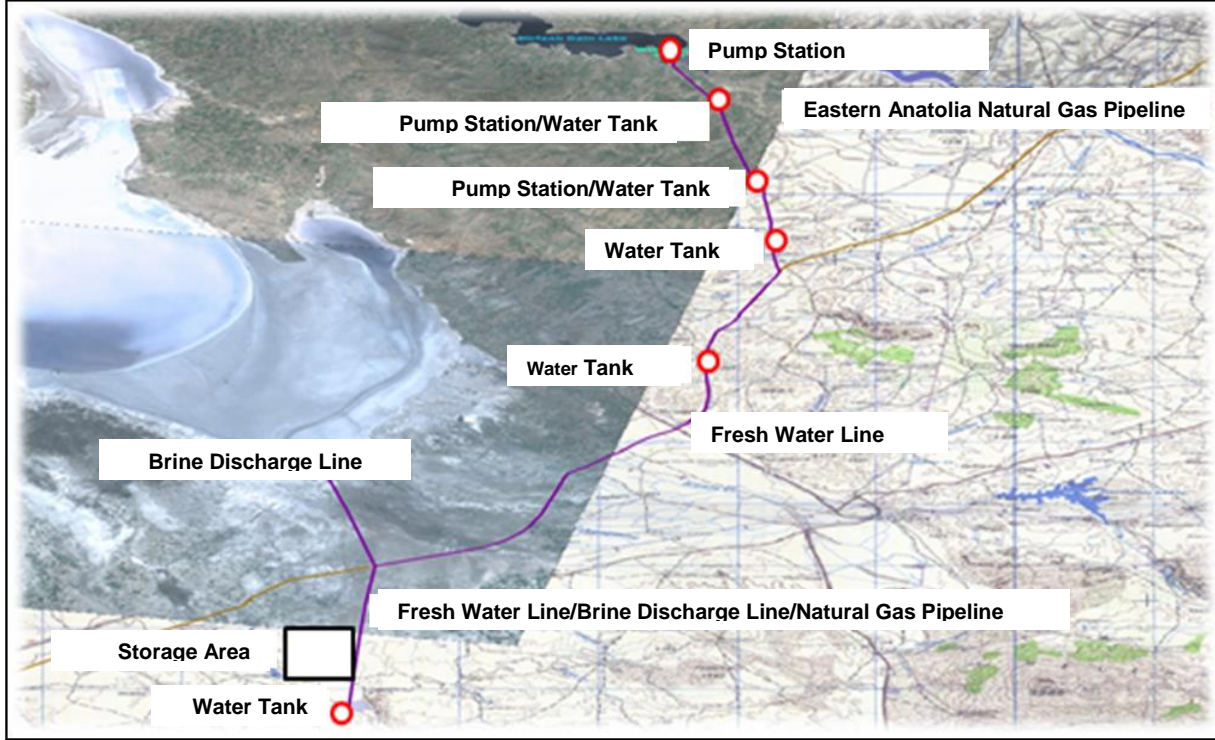




Figure 3.1.1.1. Activity Units Planned within the Scope of Gas Storage Expansion Project

The facilities and units of the planned Gas Storage Expansion Project are within the boundaries of Sarıyahşi, Ağaçören, Ortaköy, Eskil, Central and Sultanhanı Districts of Aksaray Province, Emirgazi District of Konya Province and Evren District of Ankara Province. Accordingly, locations of the units to be constructed within the scope of planned project are listed as follows:

- A part of 3 km of fresh water line will be within the boundaries of Evren District of Ankara Province, the remaining 127 km and pump stations and water storage tanks will be within the boundaries of Sarıyahşi, Ağaçören, Ortaköy, Central and Sultanhanı Districts of Aksaray Province;
- The water intake structure will be within the boundaries of Evren District of Ankara Province;
- The whole Brine Discharge Line and natural gas branchman line will be within the boundaries of Eskil and Sultanhanı Districts of Aksaray Province;
- The brine water discharge point will be within the boundaries of Eskil District of Aksaray Province;
- The surface facility will be within the boundaries of Sultanhanı District of Aksaray Province and
- 41 wells out of the 48 will be within the boundaries of Eskil and Sultanhanı Districts of Aksaray Province, and the remaining 7 wells will be within the boundaries of Emirgazi District of Konya Province.

3.2. Underground Gas Storage Project which is Under Construction

As stated in Section 3.1., in November 2000 TPAO performed a 3D seismic inspection on an area of approximately 80 square kilometers in the region selected for the project, and the

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locations of the caves where the natural gas will be stored under the scope of the Underground Gas Storage Project (UGS Project), whose construction work is ongoing, and the surface facilities that will be used for system control were identified. Accordingly, the EIA approval was obtained on 19.08.2003 for the Underground Gas Storage Project in line with the Turkish Environmental Legislation. A copy of the EIA approval No 843 of 19.08.2003 of the Ministry of Environment and Forestry of Turkish Republic is given in Appendix 1.1.

The EIA process of the Underground Gas Storage Project, whose construction work is ongoing, is summarized in Table 3.2.1.

Table 3.2.1. EIA Process of the Underground Gas Storage Project

Activity	Date
Preparation of the EIA Report of the Project, and its Approval	2003
Performance of the First Additional Study further to the EIA Report	2003 - 2004
Commencement of the Project in the second half of 2012, upon obtainment of all necessary permits	2012
Performance of the First Additional Study further to the EIA Report	2012 - 2013

The project activities are performed in three phases, which are as follows:

- Phase-I, Supply and Installation of Pipelines (Fresh water line, Brine Discharge Line, Natural Gas Branch Line, Storage Tanks and Pump Stations),
- Phase-II, Leaching of the First Group of Six Wells/Caverns, Supply and Installation of Surface Facilities, Supply and Installation of Underground Facilities, Natural Gas Storage in the First Group of Six Wells/Caverns, and
- Phase-III, Leaching of the Second Group of Six Wells/Caverns, Natural Gas Storage in the Second Group of Six Wells/Caverns.

Among the three phases of the UGS Project, Phase I was completed on December 31, 2013. The items of work performed within the scope of the Underground Gas Storage Project, whose construction activities are ongoing under Phase II, are given below.

Supply and Installation of the Pipelines:



- 123 km of fresh water pipeline (24"-10mm, 28"-14,2 mm, 30"- 10 and 11 mm)
- 44 km of brine discharge pipeline (GRP 36 " – 11,5 mm)
- 3 pump stations, 5 storage tanks, water intake structure, energy transmission lines, operation of the pipelines, Scada
- 23 km of 36" natural gas pipeline (11 mm)

Supply and Installation of Surface Facilities:

- Leaching facilities (Piping, pumps, brine ponds, gas filling and discharge equipment)
- Injection and production facilities (ultrasonic measurement unit, turbo compressors with gas tribunes, piping, cooling and heating units, filters and separators, pressure reducers, glycol regeneration unit, etc.)

Supply and Installation of Underground Facilities:

- Drilling, piping (casing) and caverns

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Solution Mining Process – Water Supply and Cavern Leaching:

- Water injection into salt formations
- Leaching of salt for cavern formation – Gas injection and brine discharge
- Replacement of brine with compressed gas

In the framework of the works identified above;



- Fresh water pipeline construction was started on April 2012 and finished on December 2013,
- Brine discharge pipeline construction was started on September 2012 and finished on December 2013,
- Surface facilities construction was started on December 2012 and almost finished (commissioning activities are ongoing),
- First fresh water injection from Hirfanlı Dam to UGS8 is on 30th of April, 2014,
- The drilling work of 12 wells was completed,
- First gas filling to UGS 8 is on 14th of January, 2017,
- Actual progress of the project 91 % including engineering, procurement and construction,
- First 3 caverns (UGS8, UGS9 and UGS7) were filled with natural gas,
- UGS 6 and UGS 4 first gas filling were started on December 2017 and January 2018 respectively and ongoing and
- First withdrawal was carried out successfully on 8th of November, 2017.

3.3. Detailed Information about Proposed Gas Storage Expansion Project

The Gas Storage Expansion Project (GSEP) will be established with a 400% larger capacity than the ongoing Underground Gas Storage Project. The project will consist of five phases, which are;

- Preparation works of the Gas Storage Expansion Project,
- Installation of the pipelines, construction of the pump stations, storage tanks and surface facilities,
- Drilling and leaching activities,
- Operation phase and
- Decommissioning phase.

During the preparation works of the project, the construction corridors of the pipelines and project areas of the principal and auxiliary units (camp sites, energy transmission lines, access roads, etc.) will be determined within the scope of the feasibility studies parallel with the Underground Gas Storage Project (1st Phase). Three main pipelines will be established - these are the fresh water line for the fresh water needs during the leaching operation, the brine discharge line for discharges of the brine which sourced from the leaching operation into Tuz Gölü Basin and the natural gas branchman line for the gas storage activities for the operation phase and also pump stations, storage tanks and surface facilities will be constructed during the pipeline works (2nd Phase) and drilling activities will be carried out before the leaching operation (3rd Phase). Operation activities will be started by BOTAŞ after the completion of the storage caverns (4th Phase) and the transportation and reinstatement works will be planned and performed at end of the project (5th Phase).

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The GSEP will be similar with the ongoing Underground Gas Storage Project (UGS Project) and can be detailed in basic terms as follows: fresh waters will be taken from the water intake structure of the first pump station established on the coast of Hirfanlı Dam and transported to the surface facilities and drilling sites within the 130 km installed length fresh water line (\varnothing : 52-56") via the pump stations and storage tanks for the leaching operation. During the leaching operation, the brines which occur will be discharged into the arid zones of Tuz Gölü via the brine discharge line (\varnothing : 52-56") and its diffusors. After the completion of the caverns, natural gas will be taken from the one of the principal gas lines of Turkey (Kayseri – Konya – Seydişehir Main Natural Gas Pipeline) from within the 21 km installed length natural gas branchman line (\varnothing : 40") to storing in the caverns. Pipes will be buried along the pipeline routes at 3 – 3.5 m depth from the surface in approximately a 28 – 40 m width construction corridor. Installations of all pipelines will be planned on a 250 m width both on sides of the existing pipelines at the acquired land sections (500 m in total). All pipeline installations will be completed in 18 months from the start of the project according to the planning.



The principal and auxiliary units which are known as the surface facilities will be used for the main distribution center for the fresh waters, brines and natural gases during the leaching and gas storing operations. Surface facilities will be constructed on an approximately 650 x 800 m rectangular area and include the pipelines, pumps, brine pools, gas circling equipment and buildings. The principal units for the leaching operation at the surface facilities will be completed in 18 months from the start of the project according to the planning and construction of the gas circling units which will be ongoing at the surface facilities for another 2 years.

Three pump stations constructed onto the fresh water line will be provided with sufficient pressure for the fresh water supply and five storage tanks will be used for the fresh water storage during the leaching operation, similar to the Underground Gas Storage Project. All constructions of the pump stations and storage tanks will be completed in 18 months from the start of the project according to the plans.

The drilling areas will be ongoing during the construction works of the pipelines and principal units. After the completion of the drilling areas, leaching operations will be performed within the scope of the solution mining techniques. One drilling operation will be completed within 2 – 3 months and the leaching operation at a drilling site will be ongoing for approximately 24 – 28 months.

Energy transmission lines and access roads of the project will be established at the commencement of construction phase of GSEP. Generally, existing access roads will be used during the construction works of the project and new access roads will be opened after the approval of the government states and also BOTAŞ, if needed. Energy transmission lines will be planned in parallel of the current transmission lines and also it is planned that existing transmission lines will be used according to the power needs of the pump stations on the fresh water line, if applicable.

All installation, construction, drilling and leaching works will be completed within 7 years in total and operating phase will be started section by section after the completion of the gas storage caverns.

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3.4. Construction Activities of Proposed Gas Storage Expansion Project

3.4.1. Construction of Pipelines

Preparation of the Construction Corridor

Unless the construction activities in planned lines show parallelism with each other, the construction corridor will have a width of 28 m in line with the reference drawings provided in Annex-3 of the Regulation on the Technical Security and Environment Related to the Construction and Operation of Crude Oil and Natural Gas Pipeline Facilities, issued by the General Directorate of the Petroleum Pipeline Corporation (BOTAŞ), which entered into force with the Official Gazette dated July 04, 2014 and numbered 29050.

Within the scope of the cleaning and preparation of the route corridor, any material that exists on the route corridor and might hinder the progress on the working site will be removed. Then, in all areas (including wetlands, swamps, side and steep slopes areas, and agricultural areas) within the construction corridor (~ 28 m), the topsoil (if any), which is the most important element for the reinstatement work, will be stripped and preserved in proper condition so that it can be used again. In addition to this,

- Permits will be obtained to cut the trees on the route,
- All necessary measures will be taken to prevent damage to any trees and bushes outside the construction corridor and the temporary working site,
- Construction equipment that is used to open the route will not be allowed outside the construction corridor,
- Only permitted access routes will be used to access to the construction corridor.

Transportation of Pipes to the Construction Corridor and Stringing

The pipes to be used in the planned pipeline will be transferred to the construction corridor through exiting or permitted routes. During the transportation of the pipes, the necessary measures will be taken to prevent dust emission and speed limits will be adhered to, especially in settlement areas. The pipes transferred to the route will be collated properly along the line, taking the necessary safety measures (not stocking on steep slopes, supporting the pipes with sand sacks or wedges, etc.).

Pipe Bending and Welding



The pipes transferred to the area will be bent according to the topographic structure and their intersection with other lines and infrastructure projects before they are welded.

Nondestructive Testing

The welding points will be filmed for the quality control of the welding process.

Blasting and Coating in Pipe Connection Points

Following the completion of the welding process, a blasting operation will be conducted at welding points in order to achieve a smooth surface before coating. Since the pipes to be used in the project will be covered before they arrive to the site (except for the brine discharge line), no isolation process will be required for any of the pipes. Only the welding points of the pipes will be isolated. The GRP pipes, which will be used for the brine discharge line, will have seals that allow interlocking.

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Trenching

Excavators and grooving machines will be used for trenching. Before the pipes are placed in the trench, the sand obtained by sifting of the excavated material will be placed on the ground of the channel.

The waste material obtained from the trench excavation will be stored next to the trench, across the topsoil obtained from the construction corridor, taking necessary measures to prevent the material mixing with the topsoil.

The excavation material that remains after bedding, supporting and backfilling, will be used in restoration of the roads and land preparation processes. The remaining excavation soil will be stored on permitted sites on the route.

Laying Pipes in the Trench

The pipes will be laid in the channels after they are welded and the welding points are isolated. During the pipe-laying process, special construction equipment (sideboom) will be used.

Backfilling

After the pipe-laying process is completed, the channel will be backfilled with the excavation material obtained from the channel. The backfilling material will be compacted so that sitting and collapse is avoided. Furthermore, following backfilling, berms of maximum 30 cm will be rested on the pipes and necessary time will be given for the accommodation of the soil before the topsoil is laid back.



Cleaning and Reinstatement

In order for the minimization of the visual impact of the planned pipelines and restoration of the area, the topsoil that was stripped before will be laid back following the necessary leveling and cleaning (rocks, project construction wastes, etc.) activities and the plowing of the areas tightened due to vehicle movements. Picture 3.4.1.1. shows an image of the route reinstated following the construction of the fresh water line under the Underground Gas Storage Project whose construction work is ongoing.

3.4.2. Construction of UGS Sites

Within the scope of the planned Gas Storage Expansion Project and Underground Gas Storage Project, where the construction is ongoing, the storage method will involve voluminous cavities that will be created by the dissolution of salt with water. With this method, which is also defined as leaching mining, the specified salt formations will be leached.

In the scope of the Gas Storage Expansion Project, leaching processes in the caverns which will be formed within the project will be gradually carried out in phases with the method of Solution Mining Process – Water Supply and Leaching of the Cavern.

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3.5. Proposed Project Schedule of Gas Storage Expansion Project

It is estimated that the construction phase of the Gas Storage Expansion Project will last 7 years and that its economic life will be 30 years. Planned Gas Storage Expansion Project, where the first gas storage will be in last quarter of 2019, the Underground Gas Storage Project will reach a total working capacity of 6 billion Nm³ at the end of 2023.

3.6. Area of Influence of Gas Storage Expansion Project

Area of Influence is defined as the area that a project planned to be established impacts positively or negatively by means of environmental components during pre-operation, operation and decommissioning phases according to Regulation of Environmental Impact Assessment.

The Baseline Study Areas are based on the likely area of influence of the Project in which a direct or an indirect impact on the physical, biological and social components might occur. Study areas will be defined for each environmental and social component, within the general framework described below.

The Project planning, including engineering and environmental routing studies, will be completed within the 500 m Route Corridor with the intent to define the centerline for the pipeline, around which the Pipeline System will be designed. It is understood that some of the Pipeline System and Project-related facilities (e.g., ETL's, access roads and disposal areas) may be outside of the 500 m Route Corridor.

The baseline study will be mainly focused on the 500 m wide Route Corridor and within the 500 m from all of the Above Ground Infrastructures (AGIs) including temporary construction facilities defined as the Local Study Area (LSA). The LSA has been determined according to route and UGS sites selection studies of GSEP and does contain the pipelines, the construction corridor and other project related facilities.

The site baseline data collection is performed within the 500 m corridor and EMRA License Area for certain disciplines as detailed below.



Pipelines

- Within the 500m corridor along the proposed pipeline centerline (250 m wide on each side) and 250m from the border of UGS sites for Air Quality (PM₁₀/PM_{2.5}),
- Within the 500 m wide corridor along the pipeline route and 250m from the border of UGS sites for Surface Water,
- Within the 500 m wide corridor along the pipeline route and 250m from the border of UGS sites for Noise,

Within the 500 m wide "Study Corridor" along the pipeline route and 250m from the border of UGS sites for the Biological components.

Access Roads

Existing access roads of UGS Project has been re-defined and also the new access roads will be determined during the upcoming phases of the project after the final design. Access roads will be assessed and selected according to field characteristics (sensitivity, proximity to residential area, etc.) and their applicability for project use.

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Camp Sites

Existing camp sites of UGS Project will be re-used and also the new camp sites will be determined during the upcoming phases of the project after the final design. Camp sites will be assessed and selected according to:

- Within 250 m from the boundary of proposed construction camps for Air Quality (PM₁₀/PM_{2.5}).
- Within 250 m of the pipeline workers camp sites for Noise.

Within the 250 m-wide “Study Corridor” along the pipeline route for Biological components, where the construction camps are inside the 250m corridor.

Surface Facilities/Compressor Buildings

- Within 250 m from the boundary of the proposed surface facilities/compressor buildings for Air Quality (PM₁₀/PM_{2.5}),
- For Air Quality (SO₂, NO_x)

Since the impact area is the anticipated distribution area of the air polluting emissions originating from the Project, it has a conservative width to enable the estimation of impacts of the Project on the environment.

- Within 250 m to surface facilities/compressor buildings for Noise
- Within 250 m Study Corridor for Biological components

Pump Stations (PS’s) and Storage Tanks (ST’s) Stations

The PS’s and ST’s are inside the LSA of the pipeline corridor. Therefore, the environmental, socioeconomic, and the cultural heritage impacts of these are evaluated within the area of influence of the pipeline.

Pigging stations



The pigging stations are inside the LSA of the onshore pipeline corridor. Therefore, the environmental, socioeconomic, and cultural heritage impacts of the pigging stations are evaluated within the area of influence of the onshore pipeline.

For the socioeconomic studies, the same buffers were considered for the all components of GSEP. Settlements within this area were considered to be potentially affected by land acquisition, pipeline and construction activities, and also project traffic.

3.7. Existing and Future Projects around the Gas Storage Expansion Project

In the vicinity of the Gas Storage Expansion Project, there is another Gas Storage Project planned by ATLAS Petroleum Gas Co has a EIA decision.

Also, in the area between the Underground Gas Storage Project (UGS Project), under construction and the planned ATLAS Project, a high-speed train project is planned to pass the south of EMRA licensed area of UGS Project.

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3.8. Alternative Analysis of Gas Storage Expansion Project

3.8.1. Alternatives of Gas Storage Expansion Project Area and Pipelines

Alternatives of the components of GSEP are detailed in ESIA report with the main titles below:



- Hirfanlı Dam Alternative for Fresh Water Supply System
- Fresh Water Line Alternative for GSEP
- Brine Discharge Line Alternative for GSEP
- Brine Discharge Point Alternative for GSEP
- Well/Cavern Point Alternative for GSEP
- Alternatives by No-Go Areas

3.8.2. Alternatives of the Project Technology and Location

The underground storage of natural gas which is a second alternative along with the storage of natural gas in liquid or gas states in tanks above the ground is distinguished in terms of providing storage capacity in large quantities with lower cost. The underground storage of natural gas in liquid and gas states is crucial in terms of balancing seasonal gas withdrawal, meeting sudden gas withdrawals, providing continuous gas supply, reducing the number of discontinuous clients and fulfilling purchase and sale commitments.

In consequence of the researches carried out, it has been proven that underground storage activities are better and more superior than above-ground storage facilities because of the below-mentioned reasons;

- In the underground storage activities; abandoned petroleum and gas reservoirs, abandoned mines, aquifers, hard rock and salt caverns/caves are used for the purpose of storage and building and operating of underground storage facilities are much more economic than above ground storage facilities which are relatively larger than the other.
- The natural gas which will be stored by means of the underground storage activities are preserved in a safer environment against the accident risks which will occur due to operation (occupational accidents, safety faults etc.) and environmental hazards such as earthquake, bad weather conditions, fire, being blown up, explosion and sabotage.
- Underground storage facilities for natural gas provide advantage in spatial terms since storage activities are carried out underground and they are much more appropriate in environmental terms than above ground facilities (Figure 3.8.2.1.).

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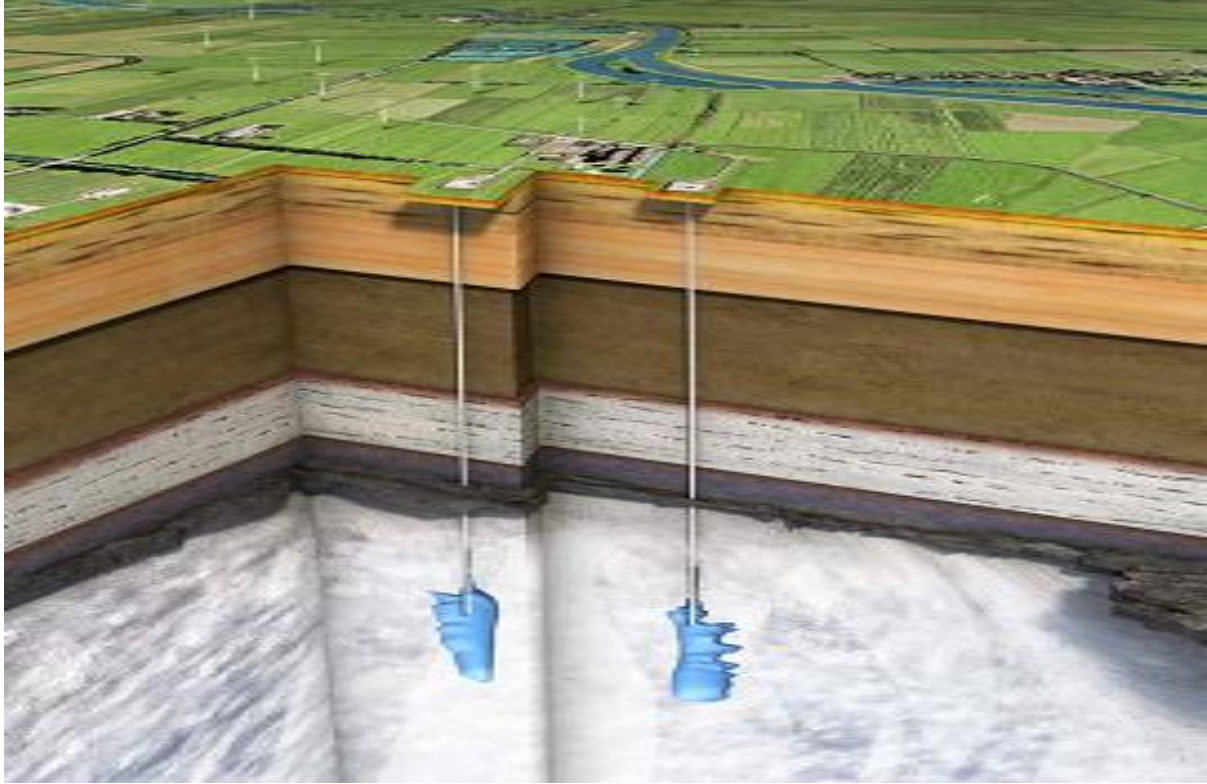




Figure 3.8.2.1. A view from The Activities of Underground Storage of Natural Gas

3.9. Closure/Decommissioning of Gas Storage Expansion Project

In the scope of GSEP; it will be ensured that the equipment are maintained regularly and that the equipment which has reached the end of their service lives are renewed and re-operated in order to ensure usability of the project throughout its economic life. Depending on the current conditions at the end of the license period, the project can be reused for storage purpose with revisions that can be made to the facility.

When the project site and facilities are planned to be reused for similar purposes, it will be appropriate to carry out environmental impact assessment studies again in order to examine the impacts of the Project on the ecosystem during 30 years of operation, reveal its difference from recent conditions and establish new measures.

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4. BASELINE FEATURES

4.1. Introduction

In this report, the studies which have been performed are explained in respect of their probable impacts to the air, water, soil, flora, fauna, protection zones and social activities during UGS Project. In scope of the Underground Gas Storage Project, three main areas are most impacted from the construction and operating works at the project sites given below;

- Hirfanlı Dam at Water Intake Structure,
- Project surface facilities, drilling and leaching sites and
- Tuz Gölü Basin.

In this stage, studies and analysis which have been performed will be given for probable and expected effects during the project under 3 headings, which are:

1. Underground Gas Storage Project (UGS Project) / 3rd party Monitoring Studies
2. The EIA Studies for Gas Storage Expansion Project (GSEP)
3. The ESIA Process for Gas Storage Expansion Project (GSEP)



4.1.1. On-going Monitoring Activities of Existing Project

Large parts of the baseline data given in this report have been established during the site inspection, monitoring, sampling and analysis activities in the scope of the 3rd Party Monitoring activities performed by ÇINAR Engineering. Monitoring activities are still performed in the scope of the UGS Project with the methods explained below:

- Site visits,
- Monitoring of the environmental elements,
- Monitoring of the negative impacts to environment,
- Monitoring of the health and safety conditions of the worksites,
- Daily, weekly and monthly reporting,
- Follow-up of the monthly checklist together with BOTAŞ,
- Monthly sampling and analysis at the project areas,
- Monthly noise measuring at the project areas,
- Yearly air quality measuring at the project areas in determined periods,
- Periodically comparing of the environmental status of the project areas,
- Follow-up of the improvement activities for negative impacts and
- Control of actions taken for results of the monitoring activities.

4.1.2. Scope of Baseline Studies Performed for ESIA Studies

Baseline data studies have been performed during the ESIA process of GSEP with the site walks, analyses, measurements, literature searches and desk works. On the other hands, the baseline data which has been obtained will be guidance to the baseline study of the GSEP which has not yet been completely established due to seasonal restriction at sometimes. However, the current baseline study can help to show the probable environmental impacts during the project works, such as pipelines, station, water storage tanks, surface facilities, drilling sites, etc., and all construction activities to be carried out by BOTAŞ in the scope of the GSEP.

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4.2. Climate and Meteorology

The majority of the project area and the planned main units are located within the provincial borders of Aksaray (all surface facilities and 41 wells). In this context, while defining the environmental characteristics of the project domain, Observations of General Directorate of Meteorology, Aksaray Meteorology Station between 1960 and 2015 have been taken into consideration during the design and planning phase of the project.

4.3. Ambient Air Quality

The measurements are performed according to TS EN 12341 Air quality - Determination of the PM₁₀ or PM_{2.5} fraction of suspended particulate matter.

4.4. Noise

Environmental Noise Measurements have been carried out according to TS 9315 ISO 1996-1 and TS ISO 1996-2 standards. The results of the measurements are evaluated according to Regulation on the Assessment and Management of Environmental Noise.

4.5. Geology

Geological assessment for the areas of GSEP was conducted and baseline studies are given in ESIA report of GESP.

4.6. Seismicity

In the scope of the Gas Storage Expansion Project (GSEP) seismic datas from the 2000-2001 study have been re-evaluated. According to the second study performed by Turkish Petroleum Corporation between the months March – July 2017;

- Seismic data taken from the site between the months October – November 2000 analysis and seismic explication studies has been performed.
- Seismic data analysis and explication report has been submitted in September 2017.
- Report submitted by Turkish Petroleum Corporation has been delivered to the consultant company to investigation and determination of the well locations to be opened in scope of the Gas Storage Expansion Project.



4.7. Surface Water Quality

4.7.1 Hydrology



While the new drilling areas, surface facility area, some auxiliary surface facilities (water storage tanks), brine discharge line, natural gas branchman line and a large part of the fresh water line planned within the scope of Gas Storage Expansion Project are within the Konya Closed Basin, which is reserved throughout Turkey, a small part of the fresh water line and some planned auxiliary surface facilities (pump stations, water storage tank) remain within the Kızılırmak basin.

4.7.2. Baseline Measurements and Analysis

Surface water samples have been collected by Çınar Environmental Laboratory staff who have Water and Waste Water Sampling Competency Certificate given by The Ministry of Environment and Urbanization Environmental Management General Directorate.

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- pH, electrical conductivity, temperature and dissolved oxygen of the samples will be measured on site with an instrument HACH Lange HQ40D or similar. The equipment is a portable multi-parameter instrument measuring the above stated parameters by electrochemical method. Prior to performing the measurements the equipment is calibrated and calibration is recorded in the equipment's logbook.
- For microbiology analysis, TS EN ISO 19458 "Sampling for Microbiologic Analysis" will be used. The maximum holding time for both Total Coliform Bacteria samples and BOD5 is twenty four hours. For this reason, samples will be transferred to Çınar Environmental Laboratory in Ankara and analysed within this holding time.
- Water sampling from rivers, streams and river crossings will be conducted according to TS ISO 5667-6 "Guidance on Sampling of rivers and streams." Samples will be stored, transported to the laboratory according to the TS ISO 5667-3 "Guidance on the preservation and handling of water samples". The samples are taken with appropriate protective measures for the analyses to be performed. They will be stored and transported to the laboratory in freezers between 1 °C and 5 °C.
- They will be labeled according to name of sample point. After they arrive to laboratory, sample code will be given each sample to identify.
- Properly filled labels shall be affixed to the outer surfaces of corresponding sample bottles. The information on the label shall be written with a permanent marker.
- Sample vessels suitable to the analyses are selected. In order to reduce the smudging of the samples because of the vessels or the lids used to minimum, generally plastic sample vessels are used for inorganic material analyses whereas glass sample vessels are used for organic materials and heavy metals. The vessels used are resistant to high and low temperatures, don't break easily, are easy to seal and open, do not react to the content of the sample and are for single use only.
- For the samples whose physical-chemical parameters are going to be determined, the vessel is filled with the sample and sealed in a way that no air gap is left on the top. This precaution reduces shaking while being carried to minimum and decreases the reaction with the gas phase.
- All sample bottles will be placed in iceboxes in order to provide the necessary cooling as well as the protection from external damage that may occur during shipment.
- The samples will be brought to the steady state by the addition of the chemicals suitable to their parameters which will be analysed and are put in dark refrigerators at a temperature of 1-5°C. The samples will be taken to the laboratory as soon as possible. Some of the parameters (pH, DO, conductivity etc.) will be measured while the samples are being taken. The devices and apparatus used during the taking of the samples are always hygienic and ready to be used. The reactive used for preservation are always fresh and clean.
- The samples are preserved so that there are no losses during the carriage and their impermeability is obtained in such a way that that their situation won't get worse.

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- The samples that reach the laboratory are permanently labelled in a clear way which leaves no room for doubt. Depending on the types of the desired parameters, the labelled samples are analysed by our laboratory staff using standard methods.
- The correctness of our experiment is checked using certified reference material for every sample in the analyses made and the results are recorded in our analysis records log.

4.8. Land Usage and Soils

The principal and auxiliary units to be established within the scope of the project stay within the borders of Aksaray province, Sarıyahşi, Ağaçören, Ortaköy, Eskiil and Central Districts, Konya province, Emirgazi district and Ankara province, Evren district and it is seen as the result of the environmental survey studies which have been carried out, that the facilities and structures are generally located within agricultural areas and pasture areas. Mainly beet, alfalfa and sunflower are grown in these areas.

4.9. Groundwater



When we examine the groundwater resources around Tuz Gölü (Tuz Gölü), it is observed that the mentioned resources are mainly located within the scope of the Eşmekaya reeds on the south side of Tuz Gölü and the reed-swamp areas at the southwestern side of Tuz Gölü. The Eşmekaya reeds are located at an approximate distance of 22 km to the northwest of the project area. There are also source formations as the result of the faulting within the scope of the Peçenek formation (sand-pebble) and the alluvium near the Peçenek stream located at the Tuz Gölü E-SE location. It is thought that most of the sources within Tuz Gölü's sub basin are dry.

4.10. Landscape and Visual

As a result of the field studies and literature studies conducted in the area, it was attempted to obtain key findings about the general landscape, flora, geomorphologic structure and soil properties and the state of erosion of the areas in order to determine the landscape elements that can be affected along the energy transmission lines and the routes of the access roads, to identify the effects that may occur on them and to achieve the basic data to be utilized during the landscaping repair process.

4.11. Cultural Heritage

In the scope of the Gas Storage Expansion Project, there are movable/immovable cultural assets protected in the scope of the legislation number 2863 under the supervision of the T.R. Ministry of Culture and Tourism, Cultural Heritage and Museums General Directorate, the Konya Protection of Cultural Heritage Regional Committee Directorate (for Aksaray and Konya provinces) and the Ankara 2nd Cultural Heritage Protection Regional Committee Directorate, and the planned fresh water line and the area of the well/cavern numbered 20 remains within the parcels registered in the Emirgazi Küllütepe Mound and Adalının Mound as stated in the Notice of the T.R. Ministry of Culture and Tourism, Cultural Heritage and Museums General Directorate, the Konya Cultural Assets Protection Regional Committee Directorate, dated December 29, 2016 and numbered 3236. As can be seen on the topographical map with a scale of 1/25,000, presented in Appendix-2, where these cultural assets are marked, there is no physical intersection with the cultural assets and the required permits are going to be obtained by making an application to the Konya Cultural Heritage

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Protection Regional Committee Directorate before any kind of physical and construction applications are carried out within the scope of the registered parcels.

4.12. Waste

It has been observed during the ESIA studies, there is not any waste storage or dump area at the ESIA study areas of GSEP. Municipality's garbages are collected at the waste transfer stations in the border of SEPA (Special Environmental Protection Area) and transported to the Aksaray Garbage Dump Site via the semi-trailers.

4.13. Terrestrial Biodiversity

Within the scope of the Gas Storage Expansion Project, flora and fauna species found in the project area including the pipelines routes and relevant legislations for biology are provided in detail in ESIA report of GSEP under the titles below;

- Scope and methodology
- Eco region description
- Key Biodiversity Areas
- Protected Areas
- Species of Conservation Significance
- Habitats
- Flora
- Fauna
- Habitat Impact Rates and Measures
- Invasive Species



4.14. Social Baseline

The socio-economic baseline provides a demographic and economic overview of the Project area and also describes the physical infrastructure and services available in the communities visited. The socio-economic baseline data had been collected through field survey, literature review and analysis of official statistics obtained from public institutions.

According to the latest TÜİK records (2016), the population of male population in Sultanhanı town is 5215, the number of female population is 4870 and total population is 10,085. The distribution of female and male population within the total population is generally close to each other.

It is seen that the average household number per province and district is the lowest in Konya. The average number of households in the central province of Aksaray, where Sultanhanı district is affiliated, is 3.96, slightly more than the Aksaray province (3,91). 70% of the active population in Aksaray proves its subsistence from agriculture and animal husbandry. The reason for the high percentage of population engaged in agriculture is that the industry and the service sector are less developed.

54.4% of province lands are suitable for agriculture and the remaining 45.6% are meadows, pastures, deciduous forests and non-arable forest lands. 86% of arable land is dry and 14% is irrigated. The most produced agricultural products in the region are wheat, barley, corn (silage), potato and sugar beet. Sugar beet, especially because of its high profit rate, is the most cultivated product in irrigated lands.

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Livelihood activities are majorly based on agriculture and livestock in project-affected settlements. There are no other income source except the agriculture and livestock. There is no specialization in other professions since the age average is quite high, and most of the people do not have the possibility to carry out another job.

In some of the project-affected settlements (Besci Village, Sapmaz village, Bucak and Büyükekeşi plateau), only rainfed agriculture is performed and in other settlements both irrigated and rainfed agriculture are performed. The most frequently planted crops are alfalfa, sugar beet, corn, wheat and barley. Agricultural products grown with rainfed agriculture are generally used as animal feed.



Most of the land affected by the multiple components of the Project is owned by individuals and mostly used for agricultural production.

About 76% of the lands affected by the Project are arable lands, followed by pasture lands (14%) and vineyards (2%). Grain production is predominant in arable lands in the region. Wheat and barley are the mostly cultivated products in the region. 14% of project-affected lands are pasture land which is used for grazing activities of local settlements. A total of 240 parcels which are registered as pasture land are affected by the multiple components of the Project (fresh water, brine water, gas pipeline, Above Ground Facilities and well areas). 91% of affected pasture lands are located within the license area boundaries of Sultanhanı District and used for grazing activities by project-affected rural settlements where livestock is one of the main sources of income.

All project-affected settlements have water supply network and quality of water was stated to be good in 75% of surveyed settlements. 91% of surveyed settlements have no sewerage system and cesspools are used instead. Incineration method is commonly used (58%) as a method of waste disposal in the settlements where wastes are not collected by Municipality. All project-affected settlements have available and continuous electricity infrastructure and telephone landline. However, 75% of surveyed settlements have no access to mobile phone network and internet. Different heating sources are used by affected settlements like wood, coal, dried dung or solar energy.

Vulnerable groups have been identified and assessed through consultation with key stakeholders in the study area and the definition is informed by an understanding of the study area. Vulnerable groups are defined as:

- ✓ Women, in particular female-headed households;
- ✓ Informal users;
- ✓ Elderly;
- ✓ People with disabilities
- ✓ Seasonal workers
- ✓ PAPs whose land will be expropriated for the second time

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5. POTENTIAL IMPACTS OF THE PROJECT AND MEASURES TO BE TAKEN

Potential environmental and social impacts of GSEP can be evaluated in 5 phases;

1. Pre-Construction Phase,
2. Construction Phase,
3. Drilling and leaching Phase,
4. Operation Phase,
5. Decommissioning Phase.

5.1. Pre-Construction Phase

Preparation works will be performed at this phase before the start of the capacity expansion project in parallel with the feasibility studies at the project areas. Pipeline routes, pump and storage tank stations, main and auxiliary units, drilling areas, new energy transmission routes and access roads will be determined at the project sites in parallel with the office works of the project. Temporary camp sites can be established during the preparation works and the project's start-up works such as equipment transportation and storages, infrastructure and superstructure works, route marking works, fuel and oil station works, top soil stripping works, etc. can be started in part. As a result of those activities, some environmental impacts are envisaged to occur at the beginning of the preparation works as listed below:



- Dust emission sourced from the vehicles movements,
- Organic, recyclable and probable hazardous waste production,
- Wastewater accumulation in sewage tanks and
- Noise impacts,

The listed environmental impacts will be minimized together with the measures taken at the project sites. Vehicle movements will be minimized if not necessary, the current energy transmission lines and access roads will be used, organic and recyclable wastes will be transported to the waste collection points of the municipalities, wastewaters will be taken by the municipality's septic trucks and potential noise pollution will be prevented at the project sites.

In addition, all contracts will be made between BOTAŞ, the contractors and licensed companies on consulting and monitoring activities, waste/wastewater disposal, air/noise measurements, fuel/oil supply, etc. and these will be completed. However, the environmental and social assessment and requirements of the project will be started at this stage.

5.2. Construction Phase

The principal environmental and social impacts will be expected to occur once the entire pipeline and construction works are carried out by the contractors at this phase of the project. Excavation and installation of the pipelines, preparation works of the project areas, the establishment of the camp sites, installation of the energy transmission lines and main access road establishment will be performed at this section of the project. Negative environmental and social impacts should be minimized and the positive impacts of these should be improved at this phase of the project. Therefore, the main environmental works and social studies will be carried out by BOTAŞ, the contractors and subcontractors.

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5.3. Drilling and Leaching Phase

At this stage; all environmental and social impacts and solution methods for these will be same as the construction phase of the project, except the generation of some special wastes such as drilling mud and formation wastes as a result of the drilling and leaching operations and probable impacts at Hirfanlı Dam and Tuz Gölü due to the fresh water intake and brine discharge activities explained in ESIA Report. In addition, it has been experienced during the monitoring activities of the UGS Project that effluents which consist of mud water, insoluble effluents, brine (salt water) and insoluble sludge of brines etc., will be generated during this phase. The environmental impacts of these types of special wastes and effluents, as well as the measures to be taken to decrease the negative impacts at this stage have been explained below. Portable toilets will be used for the hygienic needs of the workers during the drilling and leaching works and the wastewaters which have been generated will be disposed of by the municipality's septic trucks.

And more impacts are expected to occur at Hirfanlı Dam and Tuz Gölü due the fresh water intake and brine discharge activities, respectively. Possible impacts on the Hirfanlı Dam and Salt Lake have been explained in below and also ESIA report under the title of "Specific Environmental Impacts".

5.4. Operation Phase

The possible dust emissions occurring at the operation phase will arise from vehicle movements in small amounts on the permanent access roads of the project and these routes will be regularly watered by sprinkler trucks to fight against possible dust pollution. In additional, dust, flue gas and exhaust emissions will be regularly checked via air quality measurements by the licensed companies.



Compressors shall be used in order to compress the natural gas to be stores underground and to store into the underground wells within the project and natural gas shall be used in the compressor as fuel (26,000 m³/day). It is anticipated that the emissions of nitrogen oxide (NO_x) and carbon monoxide (CO) shall occur after the combustion from the natural gas to be used as fuel in the compressors planned to be used.

However, due to the fact that within the project compressors shall work only 40-50 days in a year and 25 ppm (0.025 kg/m³) emission amount is at low level, formation of greenhouse gas within the project is at insignificant levels. Compressors to be used within the scope of GSEP will be selected in accordance with all national and international standards.

Probable high environmental noise problems occurring during the operation phase will arise from the gas circling equipment such as compressors, generators, etc. and checked the periodically with noise measurements in the vicinity of the facilities. Noise shields and isolators will be used by BOTAŞ if needed, to fight against noise pollution.

The waste produced during the operation phase will be temporarily accumulated in the portable waste containers at the facility and;

- Organic wastes will be carried to the waste collection point of the municipalities in daily basis.

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- Recyclable and non-hazardous wastes will be sent to the contracted and licensed companies,
- Hazardous wastes, waste oils, waste vegetable oils and medical wastes will be disposed by the contracted and licensed disposal companies.

100 people will work in operation phase and according to the information received from the official website of TUIK, the amount of water withdrawn per person will be 180 lt / day-person. Assuming that the water to be used shall be transformed into wastewater by 80%;

It is calculated that $100 \text{ people} \times (180 \text{ lt/day-person} \times 80/100) = 14.4 \text{ m}^3/\text{day}$ for operation phase.

For the domestic wastewaters to be generated at the facility during the operation phase, the wastewater treatment plant based on a biological treatment system will be installed.

Along with the project construction activities and operation periods, the rain waters falling into project sites and being drained shall be moved away from the construction area with rain water collection channels to be established on and around the construction area. They will be discharged from the balancing and settling pools to natural drainages to be set up at the end of collection and accumulation channels for preventing possible sediment carriage from the construction areas to the surrounding areas of the project.



5.5. Decommissioning Phase

In the scope GSEP; it will be ensured that the equipment are maintained regularly and that the equipment which has reached the end of their service lives are renewed and re-operated in order to ensure usability of the project throughout its economic life. Depending on the current conditions at the end of the license period, the project can be reused for storage purpose with revisions that can be made to the facility.

When the project site and facilities are planned to be reused for similar purposes, it will be appropriate to carry out environmental impact assessment studies again in order to examine the impacts of the Project on the ecosystem during 30 years of operation, reveal its difference from recent conditions and establish new measures.

If the facility is completely shut down and is not used for any other purposes, the units will be disassembled and the opened wells will be closed before land reclamation. In this context, all surface facilities will be disassembled and the caverns where all of the stored gas inside has been withdrawn will be filled with water or salt water (brine), and inlet ports will be closed with concrete after being filled with the filler material. Natural landscaping will be performed in the areas covered by the facilities using reinstatement, revegetation and restoration applications. These applications will be carried out according to the restoration and rehabilitation projects and plans which will be prepared considering the conditions of the period after operation (land, climate, geomorphological conditions, etc.).

All equipment and material transportation works will be started at the end of the operation phase and reinstatement works will be conducted at the same time. The environmental impacts at this phase will be similar to the pre-construction phase of the project.

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Social impacts will be similar to those in the operation phase and the social team of BOTAŞ will continue managing these impacts of the project during the abandoning and reinstatement works.

5.6. Social Impact Assessment

Social baseline studies were conducted to obtain updated and sound socio-economic data about Project-affected settlements (directly or indirectly) as well as to identify any possible concerns and feedbacks of the local communities regarding the Project. These activities represented an important opportunity to collect baseline information from stakeholders as well as to inform them on the Project, allowing them to express opinions and comments. Both qualitative and quantitative instruments were used for primary data collection which is listed below:



- Questionnaires (at settlement level) – A total of 9 settlement questionnaires with 12 attendees
- Focus Group Discussions – A total of 7 focus group discussions with 52 attendees
- In-depth Interviews with Key Informants – A total of 2 in-depth interviews with 7 attendees

Settlement level questionnaires were conducted in Bucak, Mağrul, Tömü, Enver Kara and Cülcülü Plateaus, Bezirci, Sapmaz, Besci villages and Gazi Quarter. Focus group discussions were conducted in Bucak, Mağrul, Tömü Plateaus, Sapmaz, Bezirci, Besci villages and Gazi Quarter. In-depth interviews were held with Sultanhanı Municipality. An additional quantitative survey was also conducted to understand the impacts of the water intake process of BOTAŞ from the Hirfanlı Dam on irrigation activities. For this purpose, 11 questionnaires were conducted in Acıkuyu, Şanlıkişla, Büyükbıyık, Küçükbiyık, Büyükcamili, Kesikköprü, Büğüz, Kargınyenice, Savcıkurutlu, Hirfanlı and Töklümen settlements.

The socio-economic baseline demonstrates a demographic and economic overview of the Project area along with land use and livelihood information of affected PAPs which provided an important basis upon which the impact assessment conducted.

Livelihood activities are majorly based on agriculture and livestock in project-affected settlements. There are no other income source except the agriculture and livestock. The percentages of engagement in agriculture and livestock are high especially in directly-affected settlements. Livestock and agriculture is sustained for not only household consumption but also as a market-oriented and income generating activity. 14% of project-affected lands are pasture land which is used for grazing activities of local settlements.

Most of the land affected by the multiple components of the Project is owned by individuals and mostly used for agricultural production. About 76% of the lands affected by the Project are arable lands, followed by pasture lands (14%) and vineyards (2%). Grain production is predominant in arable lands. Wheat and barley are the mostly cultivated products in the region. Irrigated agriculture has been observed to increase along the pipeline route and within the license area; products such as corn, beet, and clover are produced commonly in the irrigated lands. There are titles of affected agricultural lands, but illegal uses are especially common on the pasture or public lands within license area for the purposes of building residential area or livelihood stocks.

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The Project will require both permanent and temporary acquisition of land and thus it is anticipated to have land based impacts. While the lines (gas, brine and freshwater pipelines) will require temporary easement rights to be established, lands for well locations and other above ground facilities will be permanently acquired. Total of 1502 parcels will be affected by the land acquisition of fresh water, brine water, gas pipeline and surface facilities. 1209 parcels in total are private land and remaining 293 parcels are registered as public land according to the results of the land identification studies carried out by sub-contractor firm (Anakent). The total number of parcels to be expropriated within the scope of the GSEP is not yet known since the exact locations of well areas are not determined yet.

Accumulated total number of workers in the existing project was 1004, 591 of them were Turkish and 413 were Chinese workers. There are currently 350 workers at site working for existing project including BOTAŞ, Contractor and subcontractors' workers. During the construction phase of GSEP which is expected to last approximately 7 years, a total of 500 people are planned to be employed, with approximately 400 workers, 30 managers, 50 experts / engineers and 20 office workers. During the operation phase of GSEP, a total of 100 people are planned to be employed, with approximately 60 workers, 20 managers, 10 experts / engineers and 10 office workers. Duration of operation phase is planned to be 30 years. The Project's need for skilled workers is expected to increase since the local workforce is not sufficient to meet the Project demands and the Project's sub-contractors may be national or international firms/companies.

The following Project activities can potentially affect land ownership, land use and livelihoods in PACs;

- The construction, commissioning and operation of natural gas pipeline, energy transmission lines, fresh water lines, brine water lines
- Construction, commissioning and operation of surface facilities and well areas.

These two types of facilities entail different modalities of land access and different types and durations of impacts as a result. The social impacts expected to occur within the scope of the project and their mitigation measures are summarized in Table 7.1.

Table 7.1. The Social Impacts Expected to Occur Within the Scope of the Project and Their Mitigation Measures

Potential Social Impacts	Proposed Mitigation Measures
The Project will cause the existence of temporary jobs; arrival of people looking for a job from various places is likely expected to the Project-affected area.	BOTAŞ will minimize the number of newcomers by trying to maximize local employment, which includes setting standards and guidelines for local employment among its contractors, although in-migration is not expected to occur in rural settlements. Prioritizing the recruitment of young population from the affected rural settlements will contribute to the reducing of out-migration caused by the lack of job opportunities in the rural area.

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Potential Social Impacts	Proposed Mitigation Measures
<p>The labor influx caused by bringing workers to work for Project is expected to occur during the construction and operation phases of Project.</p>	<ul style="list-style-type: none"> - Labor Influx Management Guideline has been prepared by BOTAŞ in order to identify, assess and manage the risks of adverse social and environmental impacts that are associated with the temporary labor influx. - The Project will prioritize the recruitment of labor, particularly for temporary contracts, and low skilled workforce, from candidates who are identified as 'local', i.e. from project affected settlements, districts and provinces - Providing mandatory cultural sensitization trainings to workers in order to introduce the cultures and social habits of the region and to prevent possible conflicts between local people and workers - The employees will not start work before completing mandatory trainings - BOTAŞ will implement regular community meetings in settlements surrounding campsites, to ensure that the presence of workers does not create situations of conflict and tension - Code of Conduct will be prepared by the Contractors and workers will be informed about the Code of Conduct at the moment of the signing the employment contract and during social induction trainings - The Grievance Mechanism established by BOTAŞ will provide easy access for local communities to raise their complaints and concerns. - Mandatory and repeated training will be provided for the workforce about refraining from unacceptable conduct toward local community members, specifically women - The Project will introduce sanctions (e.g., dismissal) for workers involved in criminal activities - Areas and activities that workers can spend their leisure time within the camp site will be created and adequate salaries for workers will be paid to reduce incentive for theft and salaries shall be paid into workers' bank accounts rather than in cash
<p>The Project will prioritize the recruitment of labor, particularly for temporary contracts, and low skilled workforce, from candidates who are identified as 'local', i.e. from project affected settlements, districts and provinces.</p>	<p>Enhancement Measures are proposed in Section 6.6.7.3</p>
<p>Noise, dust emissions and transportation activities during construction may cause adverse impacts on Community Health and Safety.</p>	<ul style="list-style-type: none"> - Within the context of the project, the units will operate between times 07.00-19.00 as a single shift in works to be performed in an open field during the land preparation and construction phases. Attention will be paid for equipment that emits noise not to be used outside of hours from 07.00-19.00. - The machinery and equipment indicated in the table will operate in a certain order; while based on the most negative scenario in the noise measurements made, it has been assumed that all the vehicles to operate at the project sites will function at the same time. - Modeling results provide limit values, filling and emptying in emission source without watering or spinning, improvement of the roads, covering the vehicles with canvas during transportation of the materials and keeping top of the material in 10% moisture shall be taken in order to minimize the dusting which could occur in the land - Dust emissions will also be reduced through the regular watering of roads, especially unpaved ones - Traffic Management Plan is prepared to adequately manage traffic in the access roads used by communities - Contractors will also prepare and implement a site specific Traffic Management Plan - In case of disturbing access roads, the BOTAŞ and its contractors will be responsible to improve the roads back to their original status - Communities will be informed about schedules of transportation and also on safety and security measures to be taken at the level of individuals - The Project will implement an awareness raising information disclosure with local stakeholders regarding the risks related to the movement of heavy vehicles and increased traffic in the area
<p>The risks that pose a threat to workers' health and safety that may occur during the construction works in scope of the Project are related to the possible accidents during construction and operation phases.</p>	<ul style="list-style-type: none"> - Contractors will develop an Occupational Health and Safety Plan before the implementation of the project - The construction work will be conducted in accordance with the provisions of the Regulation on Occupational Health and Safety in Constructional Work, which came into force on October 05, 2013 (O.G. No. 28786) by the Ministry of Labor and Social Security, including the minimum health and safety conditions to be provided in construction sites. - The project will be in compliance with the Law No. 1593 on Public Health in Turkey, and the Law No. 6331 on Occupational Health and Safety, and the regulation, regulations and relevant legislation made or to be made by virtue of these laws will be complied with. - The General Public Health Law No. 1593, and any by-laws, regulations and directives enacted and to be enacted as per the Laws mentioned herein shall be obeyed
<p>The Project will require both permanent and temporary acquisition of land and thus it is anticipated to have land based impacts such as temporary loss of land for agricultural cultivation, temporary disruption to grazing activities and/or reduced access to agricultural land and</p>	<ul style="list-style-type: none"> - Land acquisition for BOTAŞ shall be carried out in compliance with Turkish law and will be guided by Involuntary Resettlement for Social Policies of WB (OP 4.12). - Cash compensation at full replacement cost will be provided to private land owners for loss of land due to permanent land acquisition in surface facilities and well areas - Cash compensation at full replacement cost will be provided to private land owners, legal and illegal users for loss of structures - Easement value for permanent and temporary easement right which is determined in accordance

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Potential Social Impacts	Proposed Mitigation Measures
<p>pastures, physical displacement of house; movement of livestock pen(s), loss of land and agricultural income, loss of grazing and pasture lands etc.</p>	<p>with criteria specified by national law will be paid to land owners</p> <ul style="list-style-type: none"> - Cash compensation for lost annual/perennial crops or plants (based on the market value of the crops and trees after valuation by a specialized committee) will be provided to private land owners, legal and illegal users - If small remaining plot parts are made uneconomic as a result of the purchase or occupation, they will be eligible to compensation as "orphan land" subject to conditions. The crop payments will be paid for orphan lands under the RAP Fund. - If any physical resettlement is required, transportation costs (up to 1000 TL, with submission of invoice) will be paid by RAP Fund to PAPs who are physically resettled due to the Project activities. - Livelihood losses due to the inability to use pasture lands will be compensated by RAP Fund. - Cash subsistence support will be paid from RAP Fund in the amount of 6 minimum wages for illegal users who do not have a regular income over 1 year and whose livelihood is based entirely on agriculture. - Cash subsistence support will be paid from RAP Fund in the amount of 6 minimum wages for land owners whose land is expropriated more than 20%, who do not have a regular income over 1 year and whose livelihood is majorly based on expropriated lands. - Residential areas will be avoided to the extent possible in determining the locations of well areas. The no-go-areas specified in the following section will be considered during the location determining. - Gaps will be left in pipe strings where safe to do so and necessary to allow people, wildlife and livestock to cross the ROW. - The Project will consult with local government authorities, landowners and land users, including grazers, before restricting access to land. - The Project will seek to identify whether any herders use the construction areas and aim to consult with them on potential restrictions during construction. - The Project will provide a substitute for watering holes used by livestock that cannot be used due to Project-related actions. The substitute will be of a type, and in a location, to be agreed with herders or livestock owners - Vehicle movements will be restricted to defined access routes and demarcated working areas in order to prevent possible damages to the lands outside the ROW and working areas. - The Contractor will aim to maintain the integrity and viability of functional irrigation and drainage systems will be maintained throughout construction. Any disrupted irrigation or drainage system will be reinstated on completion of construction to a standard at least equal to their original condition. - Agricultural land will be reinstated before handover to the landowner in accordance with the Reinstatement Plan - Contractor will identify any beekeepers whose hives are within 300m of the pipeline and facility construction, camp and pipe storage areas or access routes before the start of the honey production season. These beekeepers will be asked to move their hives (both mobile hives and stationary hives) a suitable distance (at least 300 meters) from the route for the season. - Seasonal losses of beekeepers will be compensated by the RAP Fund. - Vulnerable people will be identified during the negotiation and land acquisition process using interviews with Muhtars in communities which will include questions specifically addressing vulnerability categories identified in Section 5.4.5. - Grievance Mechanisms will be put in place that allow individuals to express grievances about project related activities and employees. The mechanism is described in details in the RPF and SEP documents. - BOTAŞ will employ qualified company staff supported by external experts to ensure that unavoidable economic and physical impacts on PAPs are assessed in advance and mitigated in line with the RPF

5.7. Residual Impacts

Residual impacts arise due to uncontrolled environmental and social management, seasonal restrictions, incomplete works, heavy damages to environment, etc. Basically, residual impacts may be occurred during the Gas Storage Expansion Project due the reasons that are given below;

- Lack of training,
- Lack of the environmental and social management,
- Insufficient amount of waste disposal,
- Uncontrolled and continuous drainage,
- Uncontrolled interference in natural resources,
- Improper effluent discharges,

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- Accident, explosion, sabotage, etc. incidents and
- Tough seasonal conditions.

Potential residual impacts and mitigation measures to be taken to these are given below;

Table 5.6.1. Residual Impact Assessment Table

Argument	Potential Impact	Impact Intensity	Impact Duration	Residual Impact	Risk Factor After Corrections
Dust Emission	Dust Pollution	High	Continuously	Probable	Minimum
Flue/Exhaust Gases	Pollutant Gas Emission	Average	Continuously	None	-
Hazardous Wastes	Severe Pollution	High	Continuously	Strongly Probable	Minimum
Construction, Demolition and Excavated Wastes	Visual Pollution	Average	Continuously	Probable	None
Mud and Formation Wastes	Soil and Groundwater Pollution	Average	Temporarily	Probable	None
Domestic Wastes	Visual Pollution	Minimum	Continuously	None	-
Recyclable Wastes	Visual Pollution	Minimum	Continuously	None	-
Inert Wastes	Visual Pollution	Minimum	Periodically	None	
Washing Waters	Severe Pollution	High	Instantly	Probable	Minimum
Oily Waters	Severe Pollution	High	Instantly	Probable	Minimum
Mud Waters	Severe Pollution	High	Periodically	Probable	Minimum
Brine	Pollution	Average	Continuously	Probable	None
Insoluble Effluents	Pollution	Average	Periodically	None	-
Domestic Wastewaters	Visual Pollution	Minimum	Continuously	None	-
Loud Noise	Stress	Average	Periodically	Probable	None
Top Soil Management	Erosion	Average	Continuously	Probable	None
Sub Soil Management	Erosion, Land Invasion	High	Continuously	Probable	Minimum

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As an aim of the Gas Storage Expansion Project, mitigation measures should definitely be applied with the support of plans and procedures to be prepared by the project owner and its contractors for the minimization of the residual impacts given above during the Gas Storage Expansion Project works. Residual impacts will be discussed and handled in a plan and procedures prepared by BOTAŞ and the Contractors. Residual impacts will be minimal at all project phases, provided that recommended risk mitigation measures are taken.

5.8. Cumulative Impact Assessment

The cumulative impacts arise from adding the impacts of the project on to the impacts of the current or planned projects. While each and every project causes major and minor impacts, the cumulative impacts imply the overall direct and indirect impacts resulting from two or more projects in the same locality. The cumulative impacts of the planned activities need to be taken into consideration. The impacts that occur due to each and every project may not seem important in themselves, but the total damage, in other words, the cumulative impacts can be extremely important.

Within the context of GSEP, the cumulative impacts of the underground natural gas storage projects are set out in this cumulative impact assessment as below:



- The Tuz Gölü Underground Natural Gas Storage Project: **UGS Project**
- Gas Storage Expansion Project: **GSEP**
- The ATLAS Petroleum Gas Co. Natural Gas Storage Project: **Private Project**

In this context, the physical characteristics of the underground natural gas storage projects are given Table 5.7.1.

Table 5.7.1. The physical characteristics of the underground natural gas storage projects being implemented in the Tuz Gölü Basin by BOTAŞ and ATLAS

Physical Characteristics	BOTAŞ		ATLAS
	UGS Project	GSEP	Private Project
The Time required to Create Caverns (month)	77	66	96
The No. of Caverns to be Leached	12 caverns (In groups of 6)	48 caverns (In groups of 6)	12 caverns (In groups of 2)
The Volume of Each Cavern (m ³)	630,000	630,000 – 750,000	630,000
The Point of Fresh Water Withdrawal	Hirfanlı Dam Lake (via pipeline was constructed)	Hirfanlı Dam Lake (via pipeline to be constructed)	Hirfanlı Dam Lake (via pipeline to be constructed)
The Quantity of the Fresh Water Required (million m ³ /year)	15	45	10.8
The Point of Discharge	Tuz Gölü arid zone (via a constructed pipeline)	Tuz Gölü arid zone (via pipeline to be constructed)	Tuz Gölü arid zone (via pipeline to be constructed)
The Volume of the Salt Water to be Discharged (million m ³ /year)	Tuz Gölü 15 (contains ~1,760,000 m ³ of salt)	Tuz Gölü 45 (contains ~5,300,000 m ³ of salt)	Tuz Gölü 10.8 (contains ~1,260,000 m ³ of salt)

Reference: The EIA Report of the above mentioned project by ATLAS and the EIA Reports of the UGS Project and GSEP of BOTAŞ

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In an effort to estimate the maximum potential impacts as part of the Cumulative Impact Assessment studies, the construction activities (the leaching and the discharge operations) of all projects are considered to be undertaken simultaneously and the impacts that might arise consequently are listed below;

- The impacts of the simultaneous fresh water withdrawal from the Hirfanlı Dam Lake throughout the leaching operations within the scope of either of the projects on the dam lake and the other users (villagers and farmers),
- The impacts of the simultaneous discharge of the salt water on the receiving environment which is Tuz Gölü,
- The impacts that might occur during the fresh water withdrawal and the brine discharge operations on the flora and fauna species found in the project sites and their surroundings,
- The impacts that might occur due to labor influx in means of incoming workers to the area affected by three Projects and
- The impacts on livelihood losses that might occur due to close proximity of components of UGS Project and GSEP of BOTAŞ.

Furthermore, the associated principles described in the Tuz Gölü Special Environmental Protection Area Water Resources Management Plan Project / Section 9 Water Resources Management Plan and its Principles also suggest that the external supplements to Tuz Gölü contribute significantly to the sustainability of Tuz Gölü. The respective principles are;



- Keeping the water level in the lake under control through the controlled release of the water from the Mamasın Dam. Water of Melendiz Brook which is one of the most important rivers feeding Tuz Gölü with its surface flow has to be released from Mamasın Dam and the water level in the lake will be kept under control ⁽¹⁾.
- As provided in Section 4.1., (the volume of Tuz Gölü varies between 565,906,140 m³ and 3,595,040,084 m³, and assuming the average water level of Tuz Gölü where evaporation will take place, the total amount of the water to be discharged during the leaching phase is calculated to cause 1-5 cm increase in the level of the lake. The salt water discharged into Tuz Gölü is expected to result in a very small increase in the water level of the lake which is assumed not to cause any negative impacts on Tuz Gölü⁽²⁾.

In accordance with the issues specified above, it is foreseen that the discharge of the salt water arising from the leaching operations into Tuz Gölü as part of all projects either at the same time or at different times during the construction works will not create negative impacts and in case the negative impacts occur, they will be prevented by taking mitigative majors through monitoring and auditing practices.

As part of the cumulative impact assessment studies, the last issue to be addressed is the overall impacts that might occur on the flora and fauna species found on the project routes and their surroundings during the construction of the facilities associated with the fresh water procurement and the salt water discharge operations. In Part 4.1 entitled "The Flora and

¹ Tuz Gölü Special Environmental Protection Area Water Resources Management Plan, May 2010, Ankara.

² Tuz Gölü Special Environmental Protection Area Water Resources Management Plan, May 2010, Ankara.

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Fauna” of the ESIA Report of GSEP, the possible impacts that might arise during the establishment of the project units within the scope of GSEP and UGS Project and the measures to be taken have been described. Through these measures, the temporary impacts on the flora and fauna species will be minimized.



The fact that the three Projects are realized in close proximity to each other can also lead to social cumulative impacts. Since the Private Project does not take place in the same area as the other two projects of BOTAŞ, a cumulative impact is not expected in terms of land expropriation and livelihood losses. However, due to the close proximity of components of the GSEP and On-going project, PAPs whose lands are expropriated second time may experience additional livelihood losses since the residual lands may not be economically viable anymore. Therefore they are considered as vulnerable group in Section 4.10.4 of ESIA. Although the parcels to be affected by GSEP components are known, it is not yet defined how much of these parcels will be expropriated. Therefore the persons whose land have been expropriated within the scope of UGS project, and will be expropriated for the second time in GSEP could not be identified. Those PAPs will be precisely found out to evaluate their losses in terms of livelihood restoration during the negotiation and land acquisition process. Livelihood impacts on these vulnerable groups will be assessed and compensation will be provided by RAP Fund where necessary.

As a cumulative impact arising from the three projects, will be the labor influx resulting from the project workers coming to the region. The labor influx impacts, assessed in detail in Section 5.6.7.2 of ESIA, may be further increased by the fact that the Private Project is in close proximity and probably will cause similar impacts in terms of incoming workers. The technical workforce will also be required under the Private Project and the arrival of workers from other provinces or countries is likely to occur.

The most important aspect to mitigating the negative impact of influx is related to the management of workers in BOTAŞ and those in contractors. How and where people are housed, how they behave and how they treat current residents will all influence how the change affects community cohesion.

Labor Influx Management Guideline has been prepared by BOTAŞ in order to identify, assess and manage the risks of adverse social and environmental impacts that are associated with the temporary labor influx. The Contractor will also prepare their own Labor Influx Management Plan based on the Labor Influx Management Guideline.

The Labor Influx Management Plan should assess in detail what impacts may arise due to the presence of foreign workers in the local region and what measures should be taken to mitigate these impacts. If a different impact occurs, which is not identified in the Plan and caused by the cumulative impact of all three Projects, the Plan will be updated by the Contractor and additional measures will be identified as soon as possible.

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6. ENVIRONMENTAL & SOCIAL MANAGEMENT



BOTAŞ and its contractors are responsible for development of their own internal environmental and social management systems (ESMS). The systems ultimately have the same aim ensuring that:

- The Project meets its legal and other Project requirements;
- The Project Environmental and Social aspects are identified and potential impacts are controlled (or enhanced in the case of positive impacts) as far as possible and as per Project commitments; and
- The Project demonstrates continual improvement in its environmental and social management.

To assure appropriate management of environmental and social risks that could compromise the efficiency of project development and execution, BOTAŞ is establishing an environmental and social management system (ESMS) which is required to meet national and international standards and best practices. This ESMS will be planned and implemented throughout the different project phases as described in Table 6.1. This will include the design of the ESMS to conform to the requirements of the last version of ISO 14001 Standard.

Table 6.1. Project Phases Relevant to the Environmental and Social Management System

Phases of the Project	Development and Implementation of ESMS
Appraisal Phase	Initiate Environmental and Social Impact Assessment (ESIA) process Scoping of Project Environmental and Social Impacts (in parallel with Project Definition) Environmental and Social Baseline Studies in Area of Influence to Support ESIA Assessment of Aspects and Determination of Mitigation Measures Development of draft final ESIA Report Development of RPF Development of Environmental and Social Management Plans Disclosure of draft final ESIA Report, RPF and the plans Establish GRM Establish RAP Fund Final ESIA Report, RPF and its supporting EMS Plans Obtaining required approvals, e.g. from Lenders
Pre-Construction Phase	Preparation of RAPs
Engineering, Procurement and Construction Phase Commissioning & Operation Phases	Preparation of Contractor's Plans and Procedures in line with the ESIA and other project requirements Implementation and monitoring of the commitments of ESIA and the management plans Implementation and monitoring of RAPs (Management of RAP Fund) Social and Environmental investment to assure that positive impacts result in the Project Affected Communities
Decommissioning Phase	Implementation and monitoring of the commitments of ESIA and the management plans

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7. STAKEHOLDER ENGAGEMENT

As a part of the social safeguard policies of World Bank, the Project will adopt a stakeholder engagement approach that will be implemented as of project design and continue throughout the project cycle. GSEP has already initiated consultations with local stakeholders including local authorities and local community under the national EIA requirements. BOTAŞ will continue to engage and involve all stakeholders during project planning, implementation and monitoring stages. Social Team of BOTAŞ will administer stakeholder engagement activities along with the implementation and ensure that its Consultants and Contractors also adopt this approach which is outlined in detail in the Stakeholder Engagement Plan developed as a part of this ESIA report.



Social management together with the stakeholder engagement within the GSEP should include major principals as given below;

- Establishing the positive, non-dependent relationships between the project and local public,
- Bringing of the potential benefits of the project to the best possible state and
- Reducing the most negative social impacts caused by the project.

Some stakeholder engagement activities have been already carried out and the continuity of these activities will be ensured in construction, operation and closure phases. Public Participation Meetings in accordance with national EIA Regulations were held on 21st and 22nd of November 2016. Three separate Public Participation Meetings were held in Ankara, Konya and Aksaray since the project is within the boundaries of these three provinces. National and local institutions / organizations, local authorities, BOTAŞ officials and PAPs participated in the meetings. Also, focus group discussions and interviews were conducted with PAPs during the baseline and impact assessment studies of ESIA on December 2016. The main issues/concerns raised during the Public Participation Meetings were as follows;

- How the expropriation procedures within the scope of the project will be carried out,
- Whether the areas to be expropriated have been determined or not,
- How construction and excavation works will be carried out in project area,
- Possible damages to dry and irrigated farming lands,
- Present damages to private lands due to the vehicles used during construction,
- Water conveyance line to be used within the scope of the project will serve local community,
- Whether the project will have impact on groundwater, and
- How top soil will be protected during construction works.

Considering that most of the issues raised at the meeting are concerned about the impacts on the livelihoods, it is important that the project activities are planned in such a way as to minimize the livelihoods in the region and the negative impacts on the settlements. All subjects discussed, as stated above, in public participation meetings were addressed in ESIA Report, and also social impacts of the project are explained in detail in the relevant chapters.

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Besides the consultations below, focus group interviews were conducted with local people in the project-affected settlement during the field visit for baseline data collection and social impact assessment studies, and semi-structured in-depth interviews were also conducted with Mukhtar's on December 2016. Both women and men in the settlements are participated in focus group meetings, since no specific disadvantaged group have been identified. Among the issues/concerns emerged from consultations, the most important ones that should be taken into consideration were;

- Whether the settlements within the license border will be removed or not
- Worries about the removing of their houses by the project since most of them have no title deed of houses
- Concerns that the expropriation prices will not be enough to cover the debts they have received for their current agricultural activities

The raised concerns and issues will be detailed in relevant chapters. It is clearly seen that PAPs have worries about the resettlement and livelihood issues. Mitigation measures determined for each social impact in the report will be implemented and monitored regularly to ensure that no adverse impact is occurred on living standards of local people. Also, Stakeholder Engagement activities will continue throughout the life of the Project starting from the scoping stage until decommissioning. BOTAS has prepared a SEP to clearly determine the methods and materials that will be used within the scope of the engagement starting from the scoping stage of the project until the operation and closure stages.