BOZKÖY
EXPLORATION WELL PROJECT
ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

Revision History

Revision	Date	Detail	Name	Position


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Bozköy Geothermal Exploration Project

This environmental and social management plan was prepared for the project to be managed in line with World Bank Environmental and Social Safeguard Policies and delivered to Risk Sharing Mechanism Project Implementation Unit to be evaluated in line with the Turkey Geothermal Development Project Risk Sharing Mechanism program supported by World Bank and the Development and Investment Bank of Turkey jointly.

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Abbreviations

EBRD: The European Bank for Reconstruction and Development

EBRD PR: The European Bank for Reconstruction and Development Performance Requirements

EC: European Commission

EHS: Environmental, Health, and Safety

EIA: Environmental Impact Assessment

EMRA: Energy Market Regulatory Authority

ESMP: Environmental and Social Management Plan

ESMF: Environmental and Social Management Framework

EU: European Union

GEPP: Geothermal Power Plant

IBA: Important Bird Areas

IUCN: The International Union for Conservation of Nature

IFC: International Finance Corporation

IFC PS: International Finance Corporation Performance Standards

IPA: Important Plant Areas

KBA: Key Biodiversity Area

O.P.: Operational Policies

PIU: Project Implementation Unit

RSM: Risk Sharing Mechanism

TSKB: Industrial Development Bank of Turkey

TKYB: Development and Investment Bank of Turkey

WB: World Bank

WHO: World Health Organization

VOC: Volatile Organic Compounds

Executive Summary

Geothermal energy is a renewable, sustainable, cheap, safe, relatively environmentally friendly, and domestic energy source. Turkey has a high hydrothermal potential and has increased its installed geothermal power generation capacity greatly during the five years 2015-2020[1]. Bozköy Geothermal Energy Exploration Well Project is planned to drill an exploration well to utilize Turkey's geothermal energy potential further.

This environmental and social management plan (ESMP) reports the potential environmental and social impacts of the project and defines the mitigation measures to minimize the negative impacts of the project as well as enhance the positive impacts where possible. A Mitigation Plan summarizing the mitigation actions and a Monitoring Plan for monitoring the impacts and the effectiveness of the mitigation activities are also included at the end of this plan.

This document should be taken as a whole with its annexes of Reinstatement Plan, Biodiversity Management Plan, Cultural Heritage Management Plan, Covid19 Exposure Prevention Preparedness and Response Plan, Waste Management Plan, Preliminary Occupational Health and Safety Plan, Preliminary Emergency Response Plan, Stakeholder Management Plan, Traffic Management Plan, and Social Review Format. The Hazardous Materials Management Plan and Effluent Management Plan will be prepared specifically to the site by the Drilling Contractor before site mobilization in line with the principles set out in this document, once the contractor is selected. The contractor will also update the Occupational Health and Safety Plan, Emergency Response Plan, Stakeholder Management Plan, Traffic Management Plan, and COVID-19 Exposure Prevention, Preparedness and Response Plan.

The project includes drilling one full-size geothermal exploration well, namely Sivrihisar-4, to evaluate the feasibility of commercial geothermal energy development in the Bozköy geothermal field. The project activities will include minor civil works for further development of the previously established drilling location (the drilling location is the same as the previously drilled Sivrihisar-3 geothermal exploration well), well testing, and well abandonment and reclamation if the drilling results unsuccessfully.

The project location is within the boundaries of Sivrihisar Village in Aksaray province in the southeast of the Central Anatolia Region. The drilling site is located completely on state-owned pastureland and consists of an area of 8,736 m^2. There was no use of that pasture land before the previous well drilling activities and there were no economically displaced users. The new geothermal exploration well drilling activities will not limit access to and from neighboring lands for any purpose. The well site was already covered with concrete during previous well drilling operations. There will be **no private land acquisition**. The required **pastureland usage permit** was obtained from the Aksaray Governor's office, Provincial Directorate of Food, Agriculture and Animal Husbandry on 13.06.2018 and the permit is valid until 03.09.2022.

[1] Gerald W. Huttrer (April 26 – May 2, 2020). *Geothermal Power Generation in the World 2015-2020, Update* (PDF). World Geothermal Congress 2020.

The project location is on a previously drilled well area and was already developed in 2016 before the Risk Sharing Mechanism (RSM) application was made. Therefore, there will be only minor civil works to improve the drilling location and extend the mud pit. The small amount of excavation waste will be separately stored and used for reclamation purposes if necessary. There is already an access road to the well site and **no new road** improvement or construction is planned.

There were already waste management practices implemented at the project site during the Sivrihisar-3 well drilling process. These management practices are improved and a plan is developed to treat all kinds of possible waste streams originated project operations. **All wastes will be handled (collected, recycled, reused, transported, and disposed of) according to the Turkish regulations and World Bank Group (WBG) General and Sector-specific EHS Guidelines.**

The project region is arid, with insufficient water resources. Therefore, reusing the drilling water will be maximized with necessary technical applications. The make-up water will be provided from a previously drilled groundwater well. A water usage permit will be taken before mobilization. **All necessary technical practices and application of the latest drilling technologies will be used to prevent any groundwater aquifer contamination and necessary mitigations will be taken to avoid surface water contamination.**

The project area is located within Mount Hasan Key Biodiversity Area (KBA) and Important Bird Area (IBA). Therefore, within the scope of this management plan, a **Biodiversity Management Plan** has been **prepared**. According to the field studies and literature survey carried out so far, there are **no flag species to represent the project site**. Additionally, according to the IUCN Danger criteria; there are **no species in CR (Critical), EN (Endangered); VU (Vulnerable); NT (Near Threat) category at the project site**. Biodiversity monitoring will be continued throughout the project.

The closest cultural heritage site to the project site is the Kızılkilise 3rd-degree archeological protected site, which is approximately 1.5 km away from the drilling location. The closest protection area to the project site is the Ihlara Valley Special Environmental Protection Area, which is approximately 9 km away from the drilling location. Besides Manastır Valley Archeological and Natural Protection Area is also around 4 km away from the project site. The closest settlement to the drilling location is Sivrihisar village with a 2 km distance. The drilling activities will not affect this closest social receptor. **A Cultural Heritage Management Plan including a chance find procedure was prepared to apply necessary measures to protect cultural properties.**

Stakeholder engagement activities have been initiated by the investor company to manage the potential social impacts of the project. **A Stakeholder Management Plan including a grievance mechanism has been established for the project.**

As a conclusion, all potential environmental and social impacts will be eliminated or minimized by taking all necessary mitigation measures set out in this ESMP, and therefore it is expected that Bozköy Geothermal Drilling Project will not have any significant environmental and social impacts. Besides, the sponsor company will comply with all national legislation and WBG General and Sector-specific EHS Guidelines and/or other international guidelines.

1.0 Introduction

1.1 Purpose of Environmental and Social Management Plan

The aim of this Environmental and Social Management Plan (ESMP) for Bozköy Geothermal Energy Exploration Well Project (hereinafter 'the Project') is to meet the requirements of the Risk Sharing Mechanism Projects (RSM Projects) through:

- Description and examination of the project's potential negative and positive environmental impacts,
- Recommending measures needed to avoid, minimize, mitigate or compensate for adverse impacts,
- Improving environmental and social performance,
- Ensuring proper monitoring and response to failures of environmental and social management measures,
- Ensuring public consultation,
- Defining roles and responsibilities.

The Project is classified as Category B according to the Environmental and Social Management Framework (ESMF) of the Turkey Geothermal Development Project published by Industrial Development Bank of Turkey (TSKB).

The project is planned to be by both the European Commission (EC) and European Union (EU) legislation as well as the World Bank Operational Policies on Environment and Social Safeguards, with particular regard to the policies on Environmental Assessment (OP 4.01), Natural Habitats (OP 4.04), Physical Cultural Resources (OP 4.11), and Involuntary Resettlement (OP 4.12), which are triggered under the ESMF of the RSM Project, as well as the following:

- World Bank Group (WBG) General Environmental and Health and Safety (EHS) Guidelines;
- World Bank Group Environmental and Health and Safety Guidelines for Geothermal Power Generation;

This ESMP includes all mitigation measures and commitments specified in the "Project Information File" prepared and approved by national environmental impact assessment legislation.

2.0 Description of the Project

2.1 History of the Project

Bozköy Geothermal Power Exploration Well Project is developed in line with the license numbered 3241981 and 11. The date of entry into force of the operating license is 25.07.2017 and it has been granted by Niğde Special Provincial Administration. The license expiry date is 25.07.2047.

By the Turkish Legislation, EIA not required certificate was received on 03.08.2016 for Sivrihisar - 4 well. This ESMP includes all mitigation measures and commitments specified in the "Project Information File" prepared and approved by national environmental impact assessment legislation.

A utilization permit was obtained from the Aksaray Provincial Pasture Commission (Provincial Directorate of Agriculture and Forestry) on 13.06.2018 to produce electricity and this permit is valid until 03.09.2022. When the exploration drilling is completed, in case the project is successful, applications will be made to the relevant institutions to continue the use of pastureland permits. In the context of legal processes, the qualification of the land will be changed. In other words, the land will not be pastureland anymore in public records. It will be just public property. Since the land used for this project is pastureland, there has been no public interest decision issued for the project.

All permits are given in the Annex-A – Official Documents.

2.2 Components of the Project

This section describes the main components, auxiliary components and auxiliary facilities to be established in the Project. Some facilities/components will be newly constructed within the scope of the Project, while others were previously built. Also, although it is not within the scope of the Project, the possible components to be built in case the project is successful are summarized. All project components will be placed on the same land, and will not be located on other lands. In other words, only the permitted area will be used, no materials or components of the project will be placed on adjacent or nearby plots.

❖ Main Components

- Exploration Well

In the Project, one exploration well, called Sivrihisar - 4, will be drilled. The well is planned to be drilled to the depth of 3500 m with a maximum diameter of a 26" Conductor hole.

- Transportation Routes

There is an access road to the site. Therefore, no new transportation route will be constructed.

- Auxiliary Facilities

The well location was constructed for Sivrihisar – 3 well in early 2016 will be used for the new Sivrihisar-4 well. The well pad area was already covered with a concrete floor. Personnel units (accommodation units, office shed, guesthouse huts, etc.) will be located within this existing area. Since the well location was already completed, there will be no environmental and social impacts from the mobilization stage of the project. Additional to the other project units the mud pit was

also excavated by the project owner. The dimensions of the mud pit are 56x14.5x8.5 meters and have a volume of approximately 6900 m^3.

❖ Possible Components

The possible components in the project are the structures and facilities that are planned to be made in the future if the drilling project is successful.

A 25 MWe power plant is planned to be built if the well (and other future wells planned) are successful. It is foreseen that the facility will be able to produce an average of 200 GWh of energy annually. The plant area is estimated to be approximately 9 hectares. After the well is drilled, ten more wells are planned to be drilled, but the locations of the proposed new wells are not known at this stage and will be defined according to the results obtained from the currently planned well. A Two Fluid-Cycle (Binary) Power Plant system is planned to be used for energy production. In Binary Systems, a secondary working fluid with low boiling temperature and low vapor pressure is used to drive the turbine. This fluid is then liquefied in the condenser, allowing the Rankin cycle to be repeated, and the energy production continued. The fluid used in this closed system does not mix with geothermal fluids and there is no discharge made to the environment. Binary systems with a suitable working fluid can operate at inlet temperatures in the range of 80-170 ° C.

In the 3S Kale GEPP-3 Geothermal Power Plants project, the power plant is planned to be constructed within 3 years. It is estimated that the economic life of the project will continue during the energy production license period depending on the license to be obtained.

In case the project is successful, the methods to be applied for land acquisition are described at the end of section 2.4.5.

2.3 Technical Properties of Drilling

❖ Summary of Drilling Area

Approximately 20 workers are expected to work at the drilling site. There will be accommodation units and dining rooms within the borders of the drilling area. The accommodation units will be established in line with “EBRD/IFC Guidance Note Workers’ Accommodation: Processes and Standards”. Bozköy drilling site is approximately 10.000 m^2 .and totally on pasture land. This area was used for Sivrihisar – 3 well and it will be used for Sivrihisar - 4 well.

The drilling process will take place 24 hours/day. Drilling activities will take 55-60 days. The draft layout plan of the drilling area is given in Figure 1.

❖ Summary of Well Design

Bordrill – MR 8000 will move in and drill vertical a 26” Conductor hole to 140 m. 20” casing will then be run and cemented to the surface. Vertical drilling will continue throughout the surface in a 17-1/2” hole to 1000 m. 13-3/8” casing will then be run and cemented to the surface.

A 12-1/4” hole will be drilled to a depth of 1900 m. 9-5/8” casing will be run and hang into 13-3/8” casing. The production section will be drilled in 8-1/2” hole to a depth of 3500 +/- 200 m as vertical. 7” casing will be run with liner and set inside of 9-5/8” casing. Well test will be performed in metamorphic rocks.

❖ Summary of Drilling Stages

Drilling will start with the drill of the diameter specified in the program together with the series and diameter specified in the program.

Drilling will be done to the piping depth specified in the program.

The drilling will be controlled by measuring the deflection of the well at certain intervals or if necessary with the help of the tatco.

Logs specified in the program will be taken and the pipes will be lowered and cemented.

Drilling of the well will be carried out with a low diameter drill. The same process will be carried out to the next piping depth and a further drill will be continued.

At the target levels, the core will be extracted from the source rock and porous and visible levels. If necessary, tests will be performed.

The well will be finished at the intended depth. Drilling activities will take 55-60 days.

After the drilling activities are completed, the logs specified in the program will be taken, check shots will be made and the pipes specified in the program will be lowered to the final depth and workover operations will be carried out by cementing.

A schematic view of the well design is given in Figure 2.

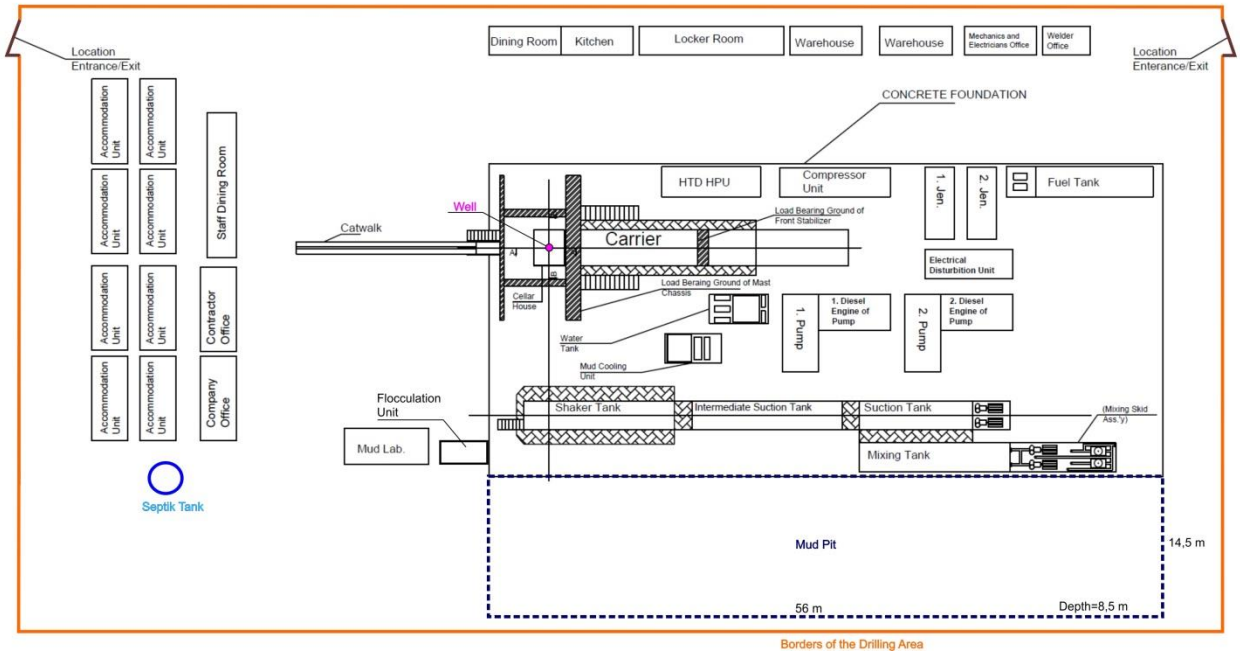


Figure 1. The Schematic View of Layout Plan of the Drilling Area

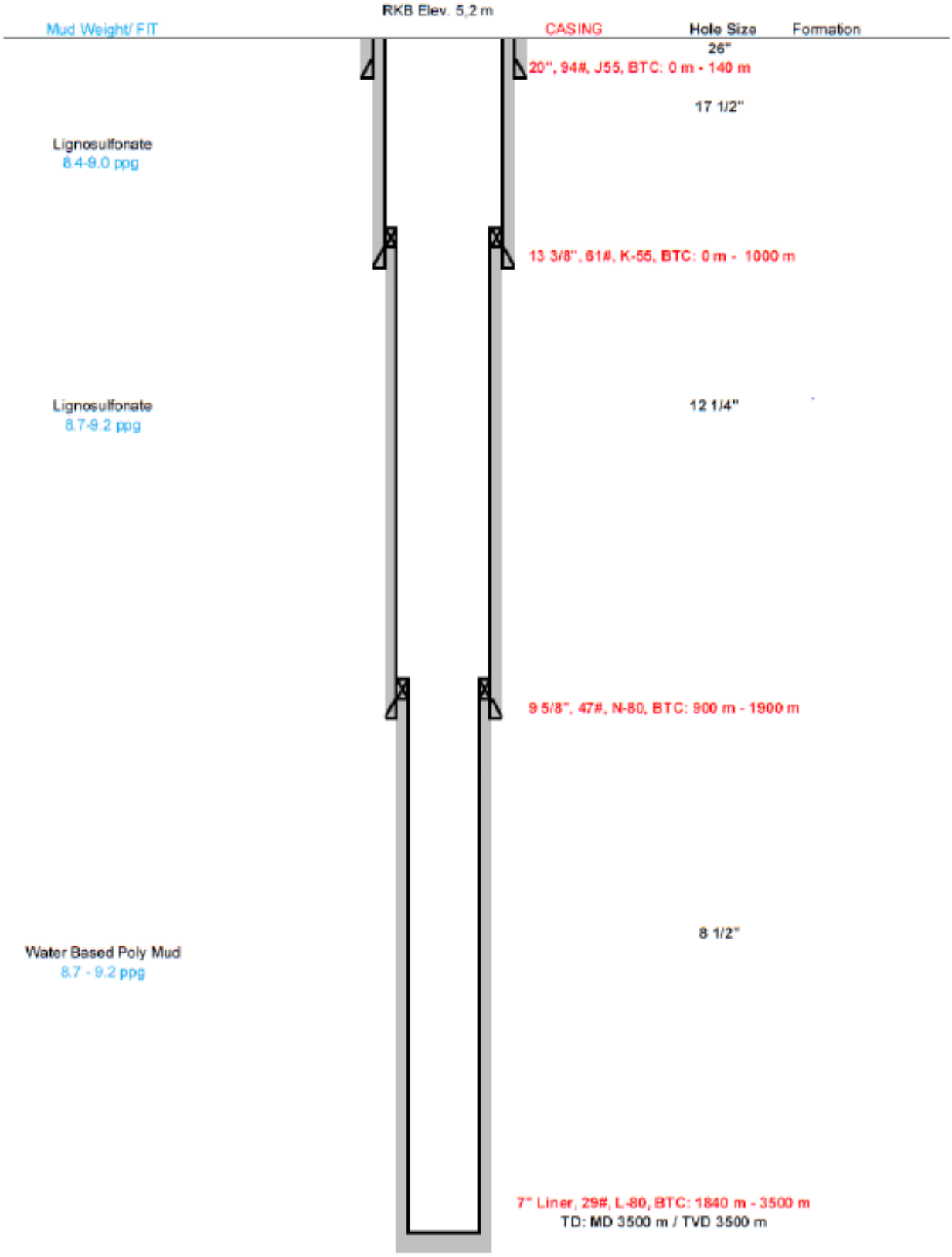


Figure 2. The Schematic View of Well Design

2.4 Location and the Characteristics of the Project

2.4.1 Geographical Location

The Project license area is within Niğde and Aksaray provinces. Niğde and Aksaray provinces are located to the southeast of the Central Anatolia Region. The average altitude is 1700 meters above sea level. The proposed well is surrounded by the provinces of Aksaray to the northwest, Nevşehir to the north, Kayseri to the northeast, Konya to west and southwest, Mersin to the south, and Mersin to the southeast and east (Figure 3).

Bozköy license area is partially located within the borders of Aksaray Province, and partially in Niğde Province (Figure 3).

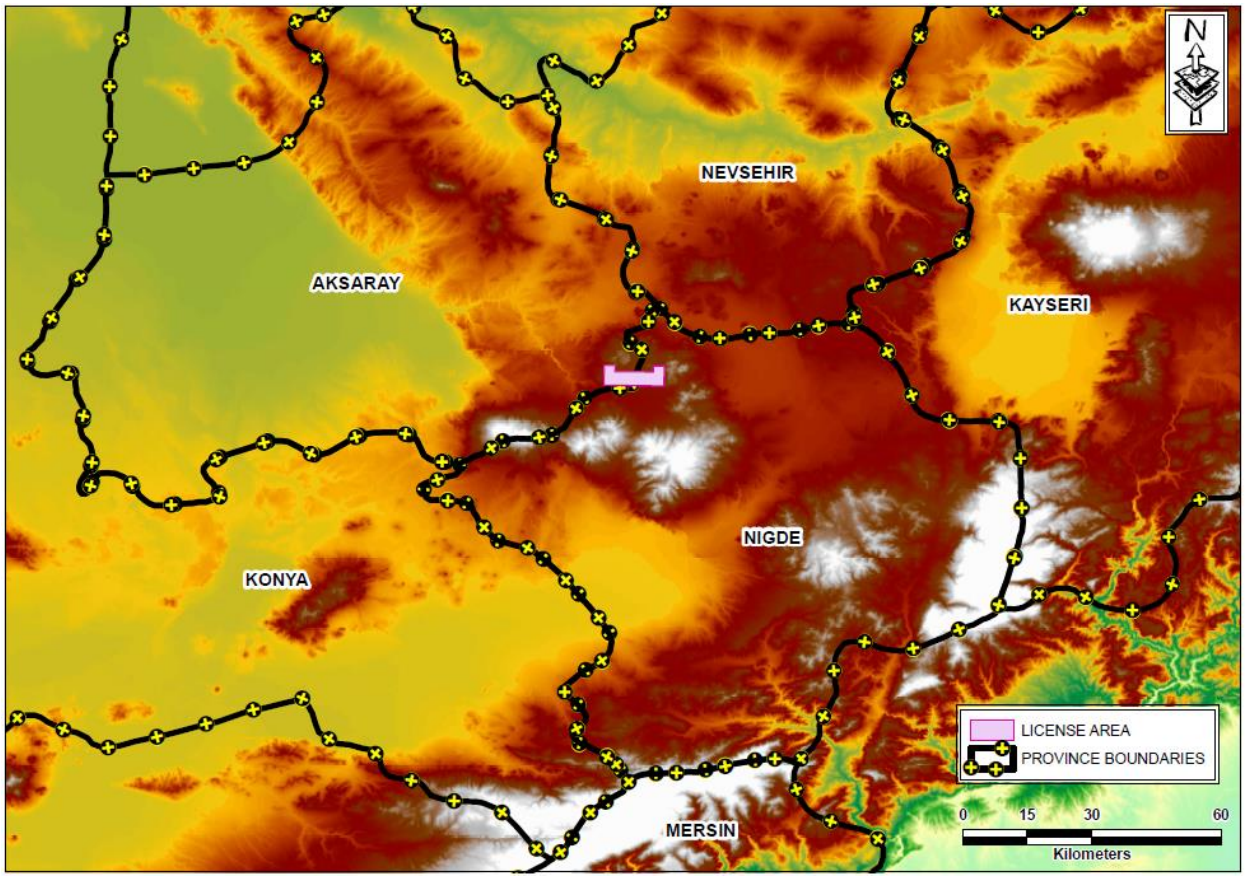


Figure 3. The Map that Shows Borders of Provinces around the License Area

The drilling location is within the boundaries of Sivrihisar Village, Güzelyurt District of Aksaray Province. To the south of the license area are the villages of Ovalıbağ, Divarlı, Çardak, and to the west are Ilısu and Ihlara. Kömürcü and Çınarlı villages are located to the east of the license area, and Kayırlı village to the north. The map showing the village borders and centers is given in Figure 4.

The closest settlement to the Sivrihisar – 4 drilling location is Sivrihisar Village, which is located in Aksaray Province and the distance to the drilling location is 2 km. This village is not within the license area. Ovalıbağ is located 5 km southeast of the project area. Çardak Village is located 6

km south of the project area. Mahmutlu Village is 8 km SW of the project area. Kitreli Village is located 11 km SW of the project area. Ilısu Village is located 8 km southwest of the project area. Ihlara village is located 11 km west of the project area. Belisırma is 12 km northwest of the project area. Kayırlı is located 10 km NE of the project area. Kömürcü is located 14 km NE of the project area. Bozköy is located 5.5 km southeast of the project area. The distances of each settlement to the project area are given in Figure 4.

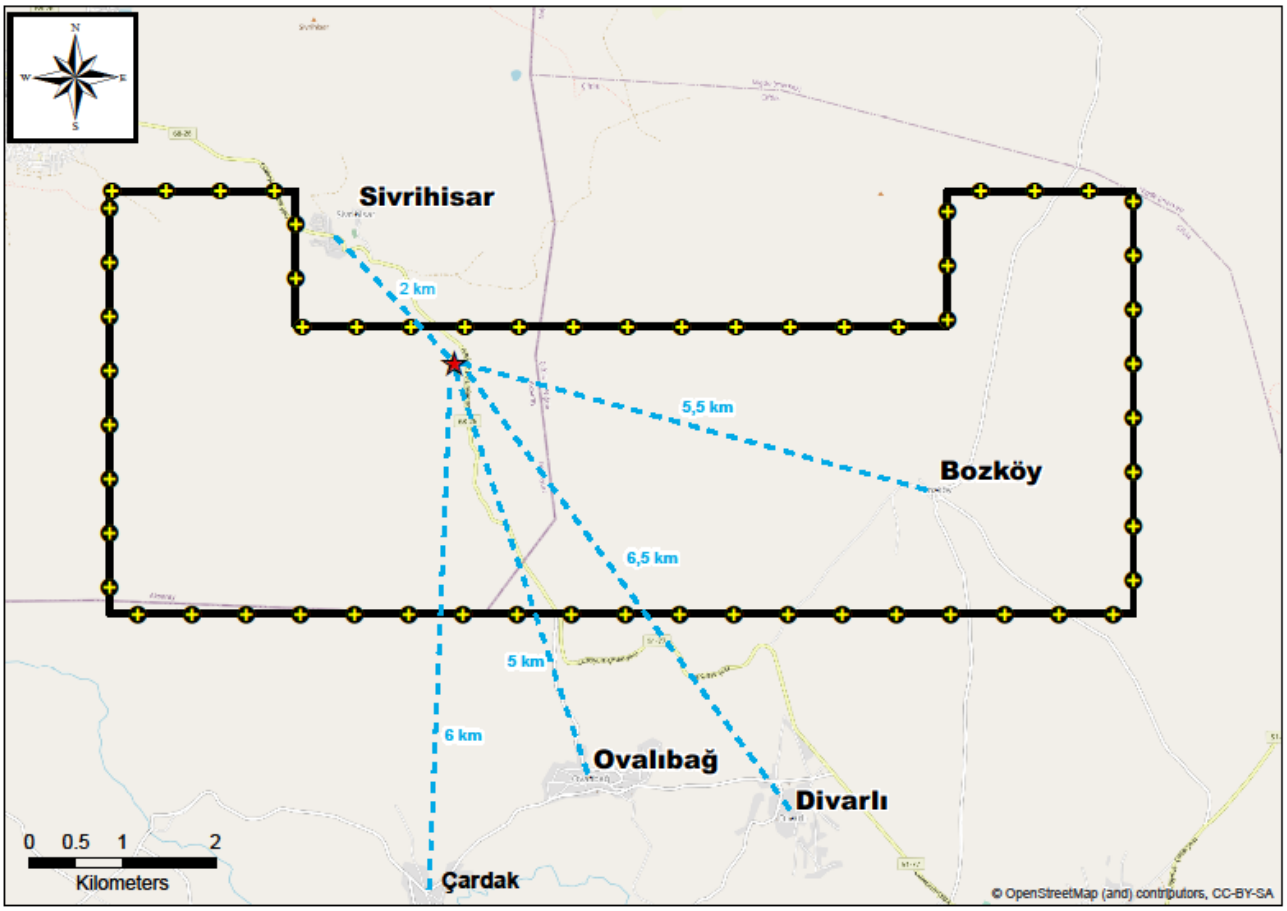


Figure 4. The Map Shows the Borders and Centers of the Villages around the Licenses and the Distances of Each Settlement to the Project Area

There is a main asphalt road (Niğde-Güzelyurt road) for transportation to the site. The satellite image, which shows the well locations and the surrounding roads, is given in Figure 5.

The location map and physical maps are given in Figure-6, Figure 7, and Figure 8.

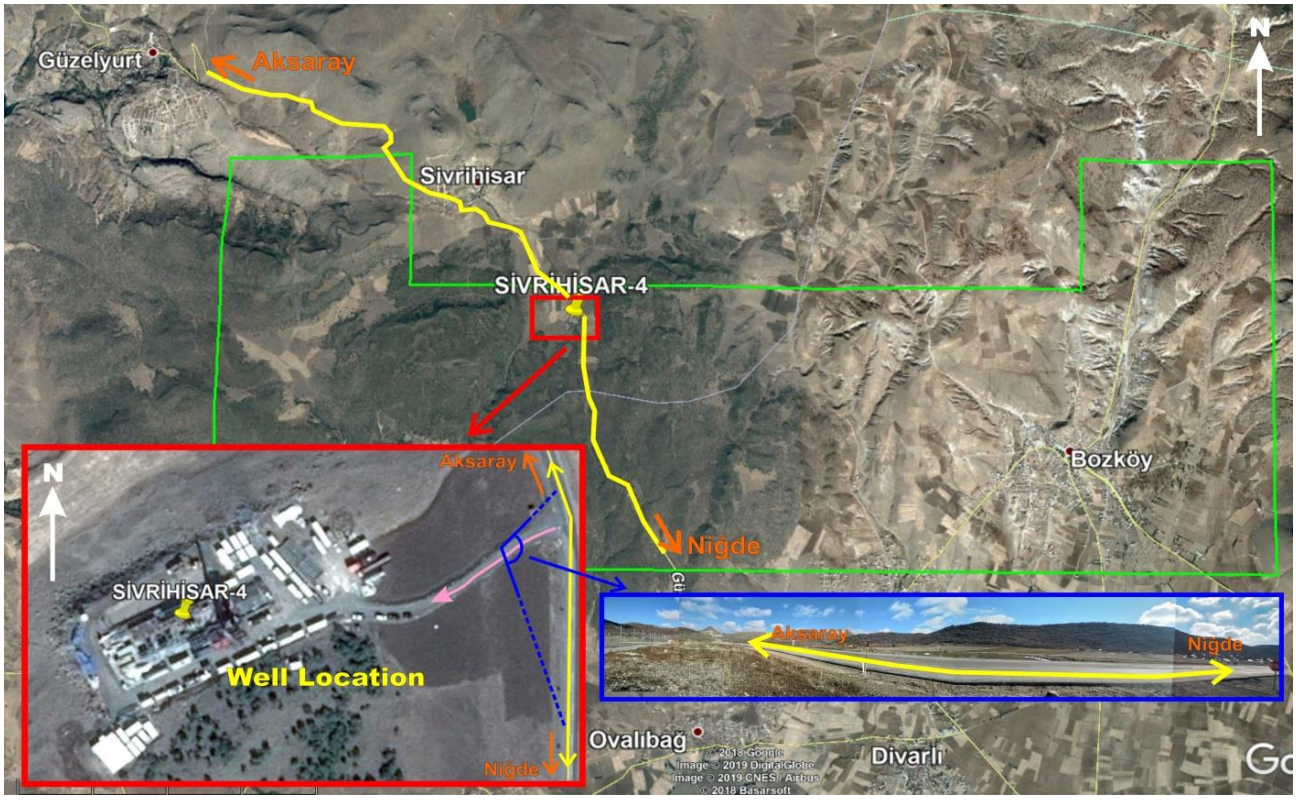


Figure 5. The Satellite View Shows Transportation to the Site and Existing Road (inserted pictures were taken when Sivrihisar-3 well was being drilled in 2016)

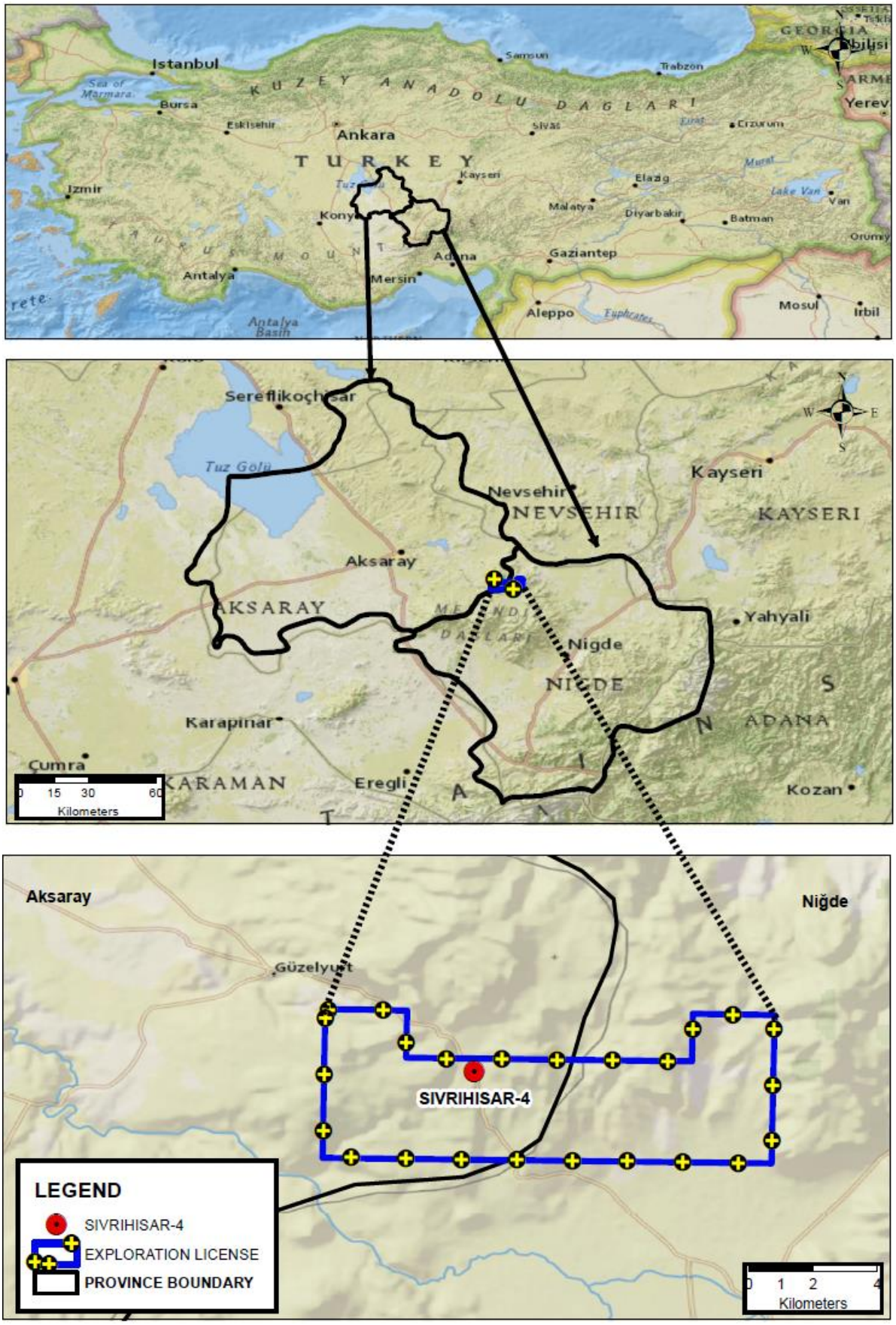


Figure 6. Location Map

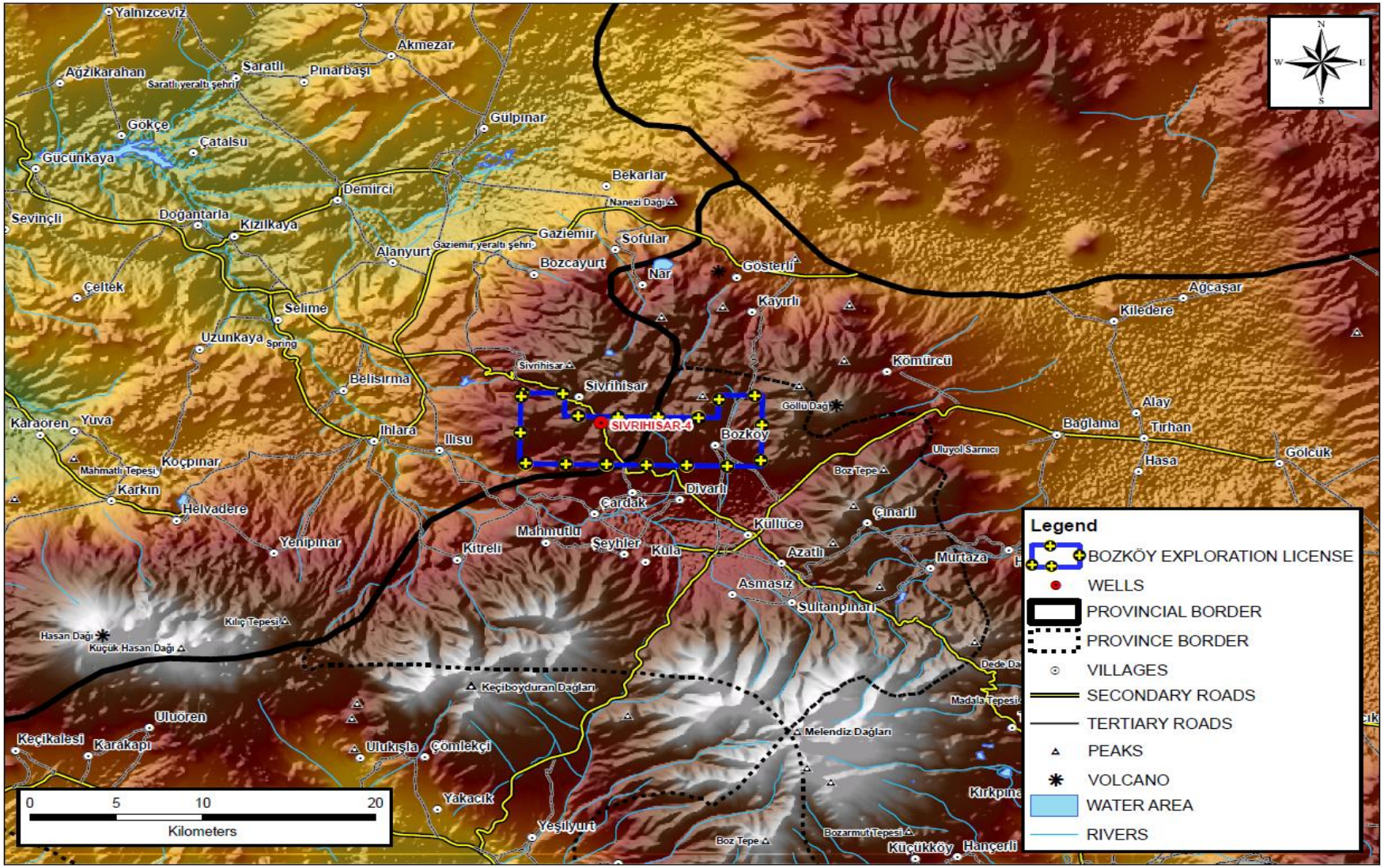


Figure 7. Physical Map Showing Settlements and Surroundings

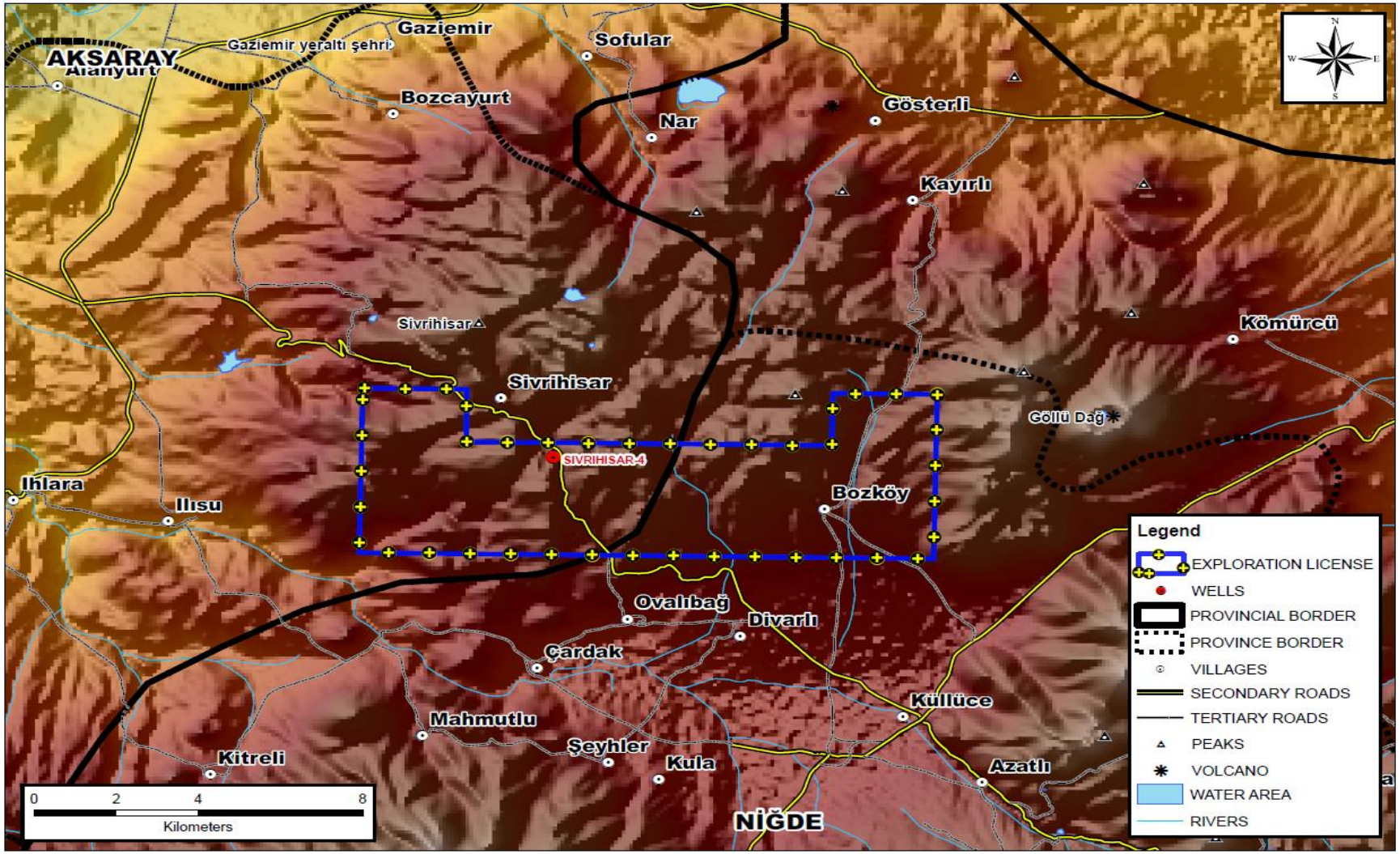


Figure 8. Physical Map Showing Near Settlements and Surroundings

2.4.2 Geographical Formations and Geology

The drilling site is located within the boundaries of Sivrihisar Village, Güzelyurt District of Aksaray Province. The well location area is relatively flat. The average height of the license area varies between 1200-1700 m, and the drilling location is at an approximate elevation of 1700 m above sea level.

To the southwest of the license, the area is Mount Hasan (3268 m), to the south of Melendiz Mountain (2889 m), and between them Keçiboyduran Mountain (2727 m) as can be seen in Figure 9 and Figure 10. The Melendiz Mountains and Mount Hasan are located in the same volcano system.

The area surrounding the mountains is the highest altitude in the region. The elevation of the land decreases with distance from the center of the area to the edges, and finally, the plains at the edges surrounding these high fields are at about 1000 m above sea level.

The majority of the license areas and the area where the exploration drilling will be conducted are located in the plain formed by collapse during the volcanism. In the vicinity of Sivrihisar, there are foothills plains. To the northwest of the license, the area is a plateau of volcanic origin. Agricultural plains are located in the south of the license area. This plain lies at 1500 m altitude in the northern part of the Melendiz and Keçiboyduran mountains.

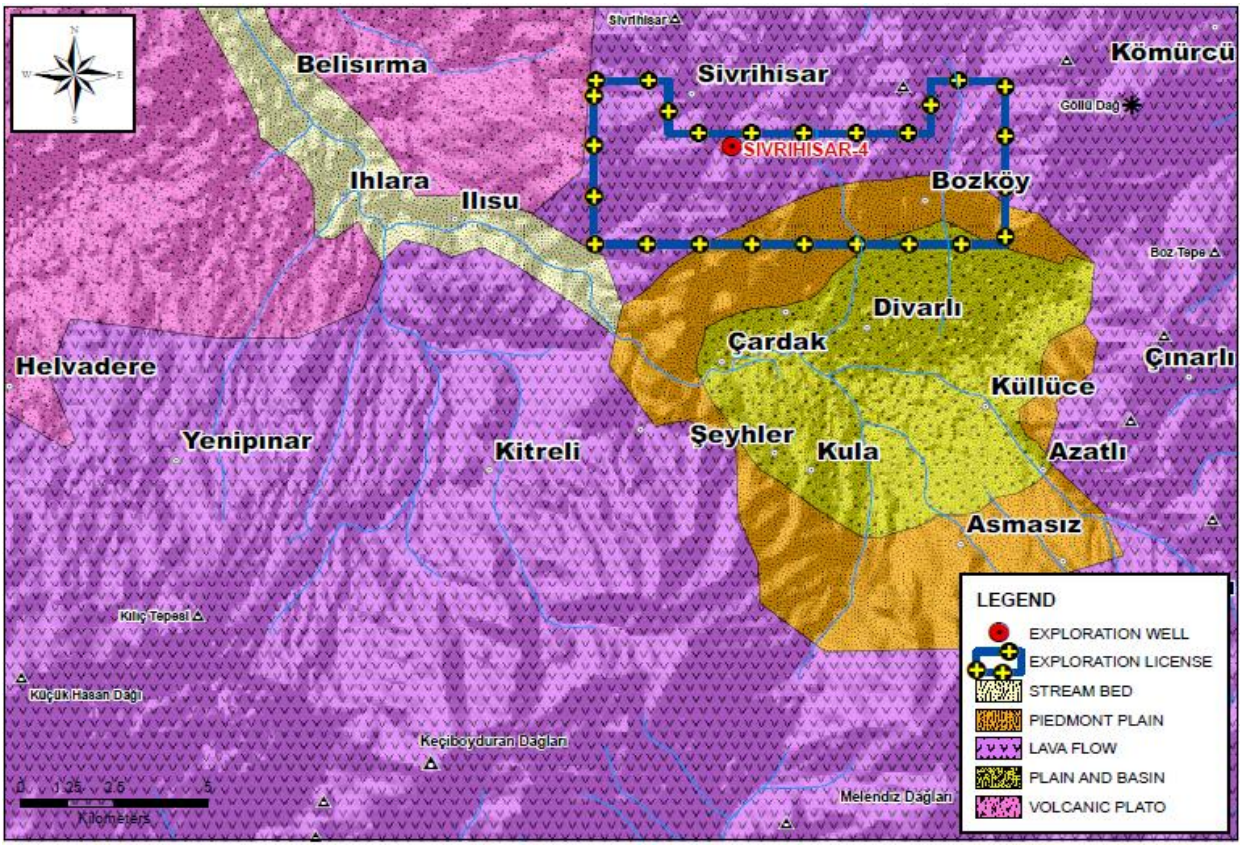


Figure 9. The Map Showing Morphological Surface Shapes of License Area

The Aksaray plain, which is an extension of the Obruk Plateau is located at 1000 m above sea level.

Another alluvial plain, Bor plain is located to the south of Keçiboyduran Mountain. Approximately elevation of this plain is 1100 m a.s.l., and it is the lowest area around Melendiz and Keçiboyduran mountains. Between the aforementioned mountainous areas and the surrounding plain areas, there is an altitude difference of 1860 m in the south and 1460 m in the north.

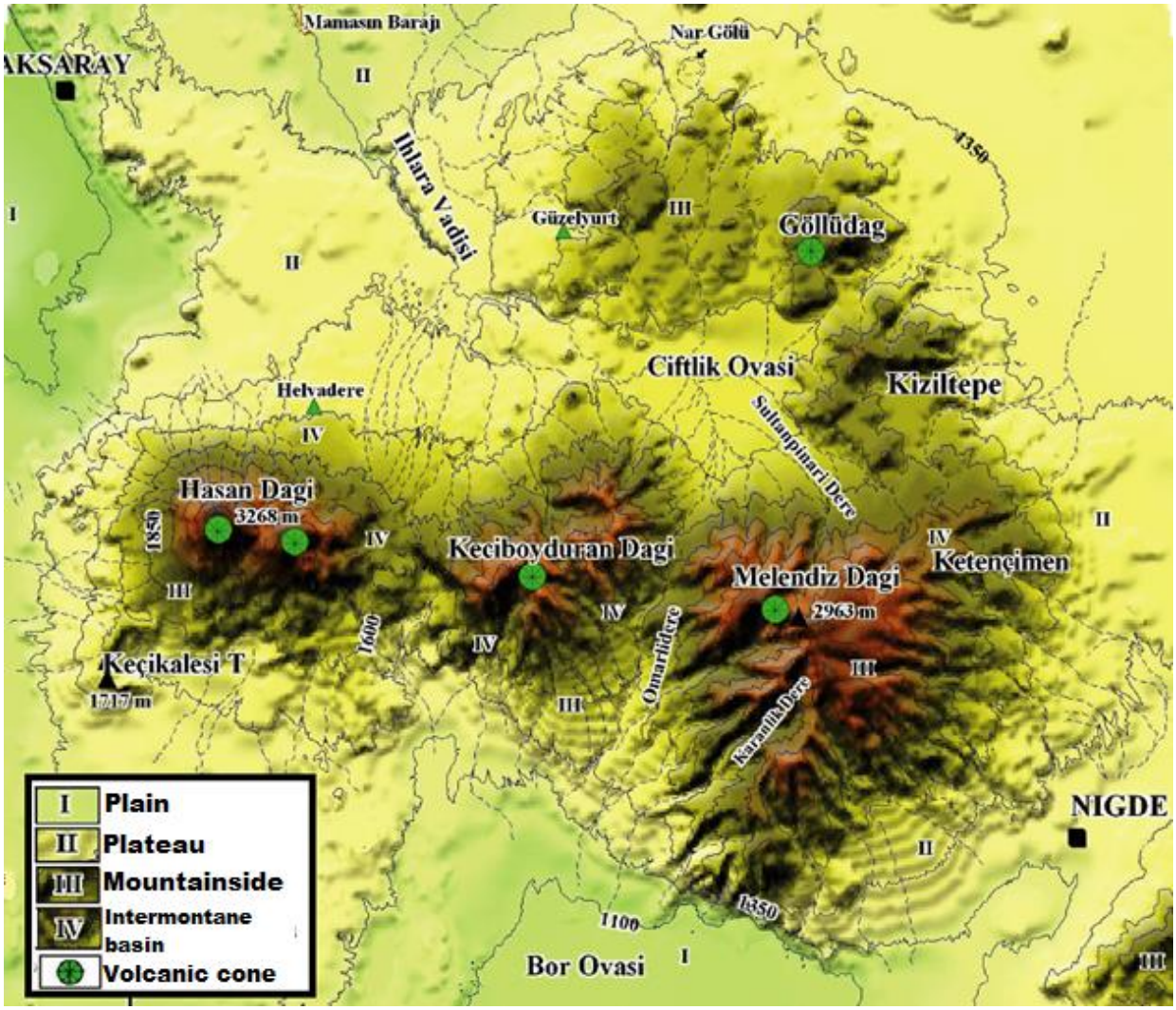


Figure 10. General Morphology Map of the Region

Geology:

There are volcanic mountains around the drilling locations. Therefore, during the volcanism, andesitic, basaltic lavas and tuffs and ignimbrites forms the dominant lithology of the site. The volcanic rocks around the project location are composed of Keçikalesi caldera, Melendiz, Keçiboyduran, and Hasandağı composite volcanoes and lava and pyroclastic materials from the parasitic cones of these volcanoes.

The 3S Kale Bozköy geothermal license area is situated within the Central Anatolia Volcanic Province (CAVP).

The most pronounced volcanic centers in the region are aligned along a NE-SW trend, and include (from NE to SW) Mt. Erciyes (Erciyes Dağı), Acıgöl-Nevşehir, Mt. Göllü (Göllü Dağ), Mt. Hasan (Hasan Dağı), Karapinar Field, and Mt. Karadağ (Karadağ Dağ).

The 3S Kale Bozköy geothermal license is located approximately 3 km west of the Göllü Dağ Acidic Complex. Göllü Dağı is an Early Quaternary volcanic dome, largely rhyolitic-rhyodacitic in composition, with the most recent activity occurring 0.9 ± 0.2 to 0.86 ± 0.1 million years (Ma) ago (Toprak and Göncüoglu, 1993).

The Pleistocene pyroclastic of the Göllü Dağ ash and tuff are distributed radially (at the surface) from Göllü Dağ, in a narrow band to the south-southeast of Sivrihisar village and again more extensively to the west and southwest toward the Hasan Dağı volcano.

The detailed study of the CAVP area, based on gravity surveys, remote sensing data (SPOT and ESRI images), and digital elevation models (DEM) is reported by Froger et al. (1998) to provide evidence of two major caldera complexes in the Bozkoy region:

- The older Nevşehir-Acıgöl Caldera Complex (NACC), located between the towns of Acıgöl, Nevşehir and Çardak, having an approximate age of 8.6-11.2 Ma.

- The younger Derinkuyu Caldera Complex (DCC), over which the Bozkoy license is situated, is located between the Erdas stratovolcano and the Çiftlik basin, having an age of 8.5-5.0 Ma.

These volcanic centers are noted by Froger et al. (1998) to be at least of Late Miocene age (5.0 Ma and older) and therefore are unlikely to provide a latent source of heat associated with the emplaced cooling magma. In general, volcanic centers with the eruptive activity of Quaternary age (2.6 Ma and younger) are considered young enough to generate heat anomalies of potential use for geothermal development (Sanyal et al., 2002)

Two dominant fault systems are recognized in the CAVP area. The first is the product of north-south compression. This system is represented by the conjugate right-lateral Tuzgölü and left-lateral Ecemiş strike-slip fault zones. The second fault system is characterized by normal faults that are parallel to the alignment of major volcanic centers (N60^{o}-70^{o}E) (Toprak and Göncüoglu, 1993).

The main tectonic structure in the vicinity of the 3S Kale Bozkoy geothermal license area is the ~N-S trending Ovalibağ Fault Zone. The Ovalıbağ has been mapped as forming an E-W pull apart (and therefore normally faulted) graben, within which the Sivrihisar–3 well has been drilled. This fault system is considered by MTA (Emre et al. 2011) to be of Quaternary age and to possibly have experienced movement during the Holocene.

Also within the area (approximately 20 km east of the Bozkoy license) is the NNW-SSE trending Derinkuyu fault. The Derinkuyu fault is a right-lateral normal fault, oriented N10^{o}W, cutting Quaternary sediments. This fault is part of the Tuzgölü fault system (Froger et al., 1998).

2.4.3 Climatic Properties

In general, the terrestrial climate of Central Anatolia is dominant in Güzelyurt and its surroundings. Summers are hot and dry and winters are cold and wet. The difference in temperature between the seasons and the temperature difference between day and night is the most prominent feature of the continental climate. In the Ihlara Valley, microclimate climate conditions prevail. In the basin, summers are generally hot and dry and winters are cold and wet. Most of the precipitation in the region takes place between December and June. Winter precipitation is generally in the form of snow. On average, 38% precipitation takes place in spring, 11% in summer, 21% in autumn, and 30% in winter. Precipitation in the area is formed by the humid air masses coming in the direction of NNE-SSW.

According to the Güzelyurt meteorological station located in the Güzelyurt district, where the project site is located, the average annual temperature is 11.7 ° C. According to the monthly average temperature curve, the coldest month is January (0.7 Cº) and the warmest month is July (23.2 Cº). There is also a continuous increase in average temperature from January to July and a continuous decrease from July onwards.

2.4.4 Hydrological Properties

The license area is scarce concerning water sources. There is no surface water in the project area.

There is no surface water around the project areas and in the license areas. There are some intermittent streams (dry river bed) around the project site. These river beds are usually dry. In some of them, short-term flows are observed after the snow melts. The hydrological map of the project site is given in Figure 11 below.

The closest intermittent streams are around 200 meters west and north of the drilling location Project activities will not impact the intermittent streams.

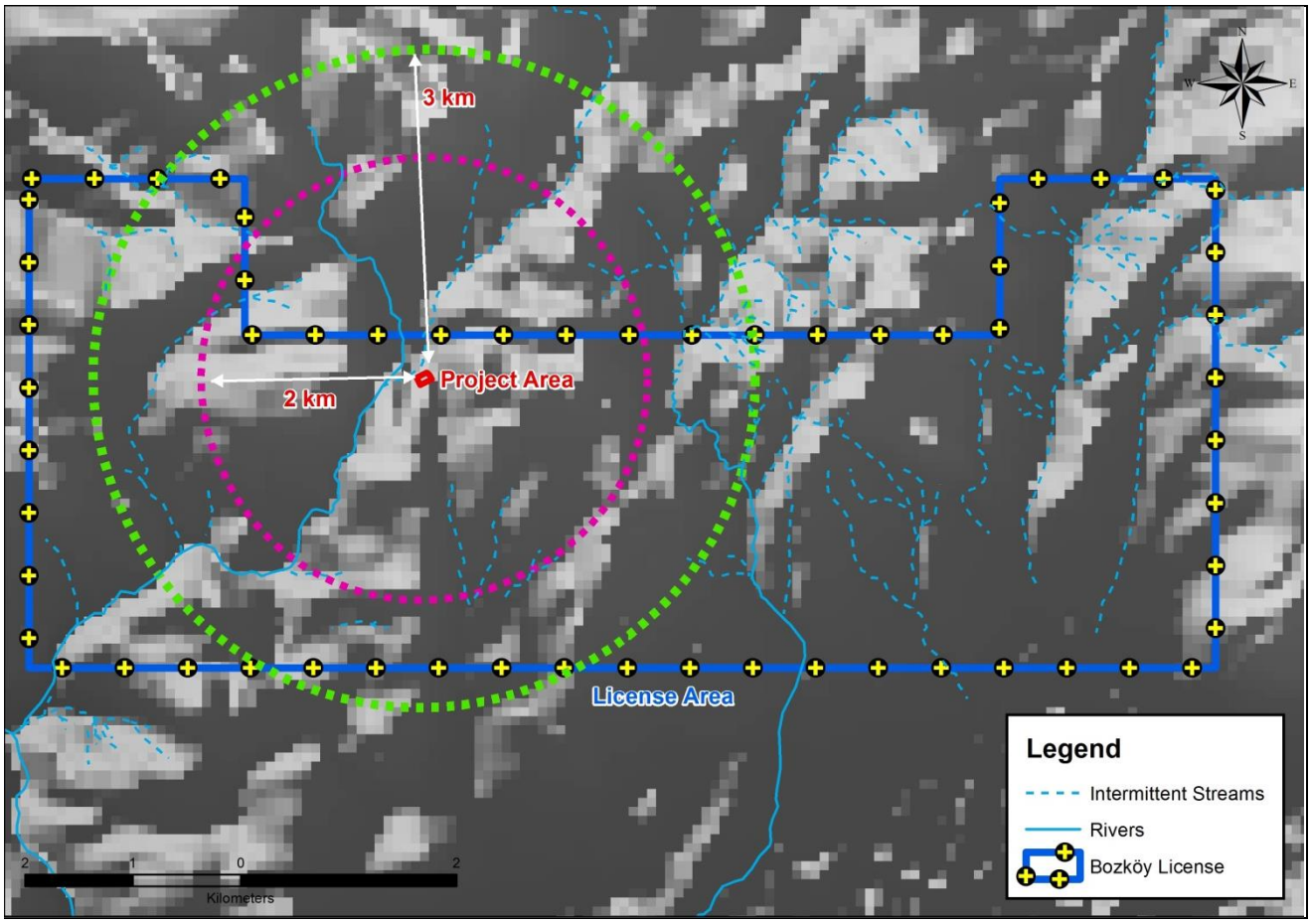


Figure 11. Hydrological Map of the Region

2.4.5 Land and Land Features

In the region, the appearance of the steppe is dominant. Forest areas are extremely limited. Only dwarf trees and shrubs are seen. To the south of the site, there is a wooded area consisting of shrubs and maquis. Güzelyurt-Niğde highway is located to the east of the site.

The proposed well location is on a designated pasture area. No new land will be purchased or leased for the drilling location. Although the well location is on the pasture land, this area is not used by anyone including the locals. Utilization permit required according to the Turkish regulations for the well location was obtained from the Aksaray Governor's office, Provincial Directorate of Food, Agriculture and Animal Husbandry on 13.06.2018.

According to the laws and regulations in Turkey, (Pastures Law dated 25/02/1998 no 4342, modified on 11/06/1998 with law number 4368, and Pastures Regulation dated 31.07.1998 published in Official Gazette number 23419, modified on 29/11/2013 published in Official Gazette number 28836), pasture use permits for geothermal facilities are obtained in the following way:

- ♣ Conditions of permitting are defined on Implementation Regulation of the Geothermal Resources and Natural Mineral Waters Act and Regulation on Pasture Areas.
- ♣ A pasture utilization permit is received from the Provincial Directorate of Agriculture or Directorate of Forestry, depending on the province.

- ♣ Pasture areas cannot be purchased
- ♣ A guarantee fee is paid when obtaining permission. Permission is provided on the condition that the land is restored to its former quality and capacity at the end of work. If the land is not restored by the sponsor, the guarantee is not paid back to the sponsor. This guarantee is used by the Provincial Directorate to restore the site.
- ♣ The amount of guarantee fee is defined by Pasture Commission in the Provincial Directorate of Agriculture and Forestry
- ♣ According to the Regulation, the purpose of the allocation of the areas for the activities of the geothermal production resource whose reserves are determined at the end of the exploration activities can be changed by the submission of the requested information and documents to the relevant Government Agencies (i.e. exploration allocation may be converted to operation allocation).
- ♣ This information and documents (required for changing the purpose of allocation) are specified in the Implementing Regulation on Geothermal Resources and Natural Mineral Waters Law and the Regulation on Pasture Areas.
- ♣ With these documents, according to Article 14 of the Pasture Law, EMRA applies to the Presidency of Provincial Pasture Commission, with a request for change of purpose. The change of allocation is made at the end of the process that operates according to the above-mentioned Laws and Regulations

According to the laws and regulations:

- ➢ When the exploration drilling is completed, **if the project fails**, the site will be closed and converted into its former qualification and capacity. The land will be delivered to the Provincial Directorate of Agriculture and Forestry.

- ➢ When the exploration drilling is completed, **in case the project is successful**, applications will be made to the relevant institutions to continue the use of pastureland permits. (In the context of legal processes, the qualification of the land will be changed and converted to Treasury.)

The drilling area will be 8,736 m^2 including all necessary units (well pad, personnel units, mud pit, etc.) and there will be no expansion of that area. This area is on pasture land and property rights of the well site belong to the state. The sponsor plans to reinstate the area if the project fails according to the reinstatement plan (see Annex-B) and returns to the state (Provincial Directorate of Agriculture and Forestry).

Pasture areas are widespread in this region and the planned drilling will not negatively affect grazing activities in the region.

Further consultations will be held (considering also COVID19 pandemic limitations) with the animal owners in the region to improve and discuss the socio-economic impacts arising from the project, before the start of the drilling activity. Opportunities will be created for these people to make livestock with more modern facilities. Modern shepherd houses and modern sheepfolds will be built by the project company.

There are nearby agricultural areas, however, the well location is not suitable for agriculture purpose because of soil quality according to the land use maps published by the General Directorate of Agriculture and Forestry. The land class of the well location is 6^{th} Class and means

it is not suitable for cultivated agriculture (Figure 12). There is no orchard on the land or in close vicinity. Fruit cultivation is not done in the region. There are some wild pear trees in the vicinity of the land sparsely. However, these trees are not utilized by the local people, as they are considered to be unhealthy. In the agricultural lands near the drilling location, the most prominent product is potatoes.

Also according to the Forest Map of the General Directorate of Agriculture and Forestry, the composition of the proposed well sites and their surroundings are cutover (unwooded) areas and agricultural areas (Figure 13).

Looking at the structure of the land before drilling in 2016, a barren land can be seen (Figures 14 - 15 – and 16) as mentioned above. Although there is a wooded area consisting of shrubs and maquis to the south of the site, the drilling location is barren steppe terrain. The final satellite map of the site is given in Figure 17.

The satellite images of the drilling location in 2011-2013, 2014, and 2020 are given through Figure 14 and Figure 17 and the photographs taken in the past years are given through Figure 18 and Figure 21.

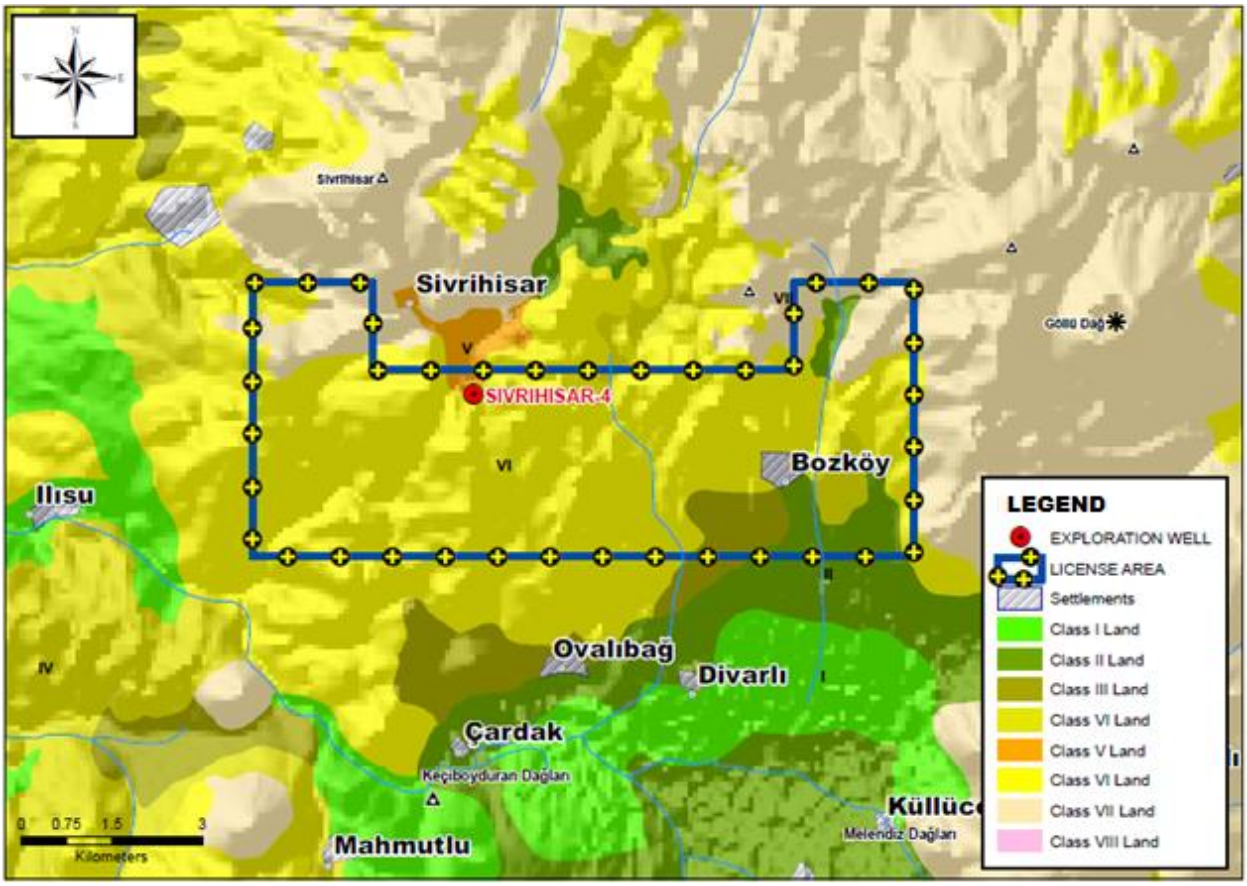


Figure 12. The Map Shows Land Use Classes of License Area and Surrounding Area

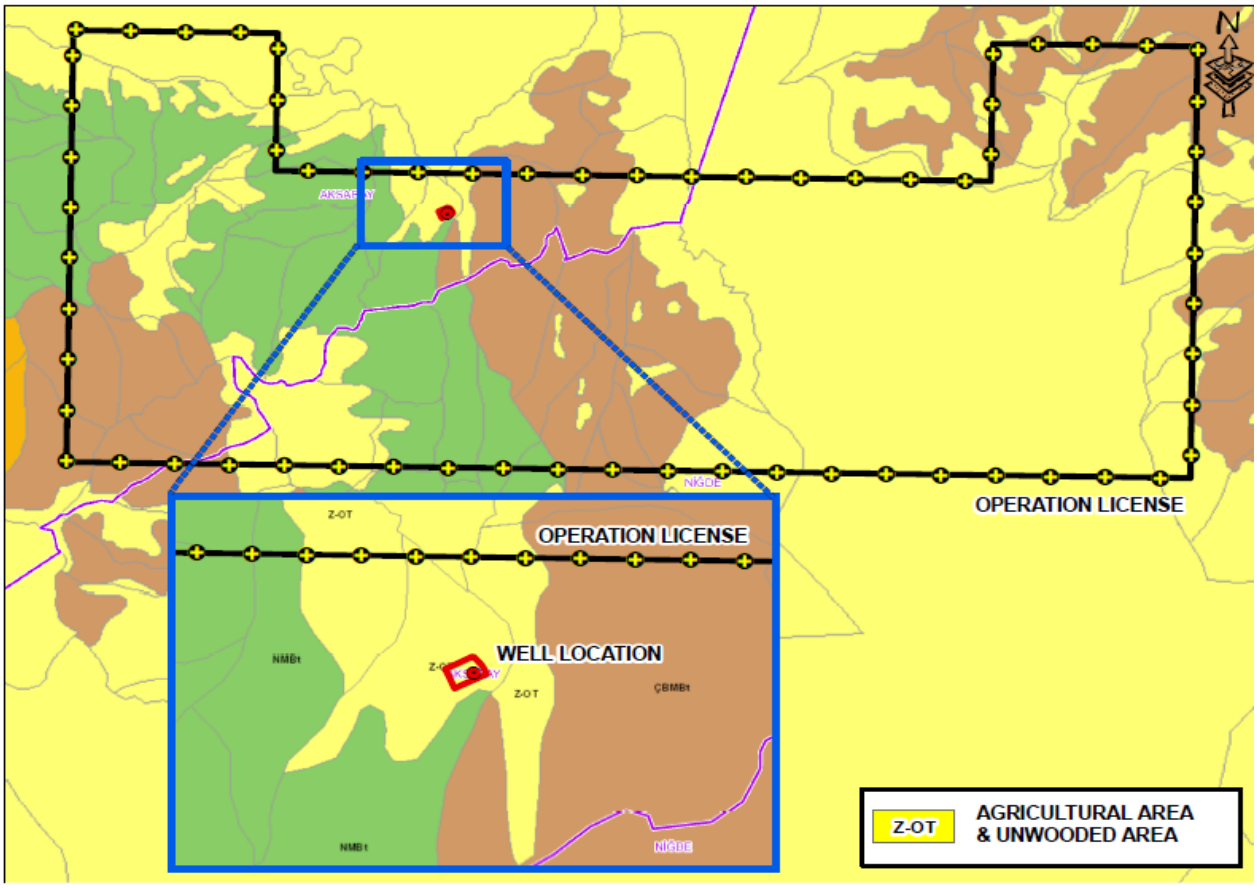


Figure 13. Forest Map shows License Area and Surrounding Area

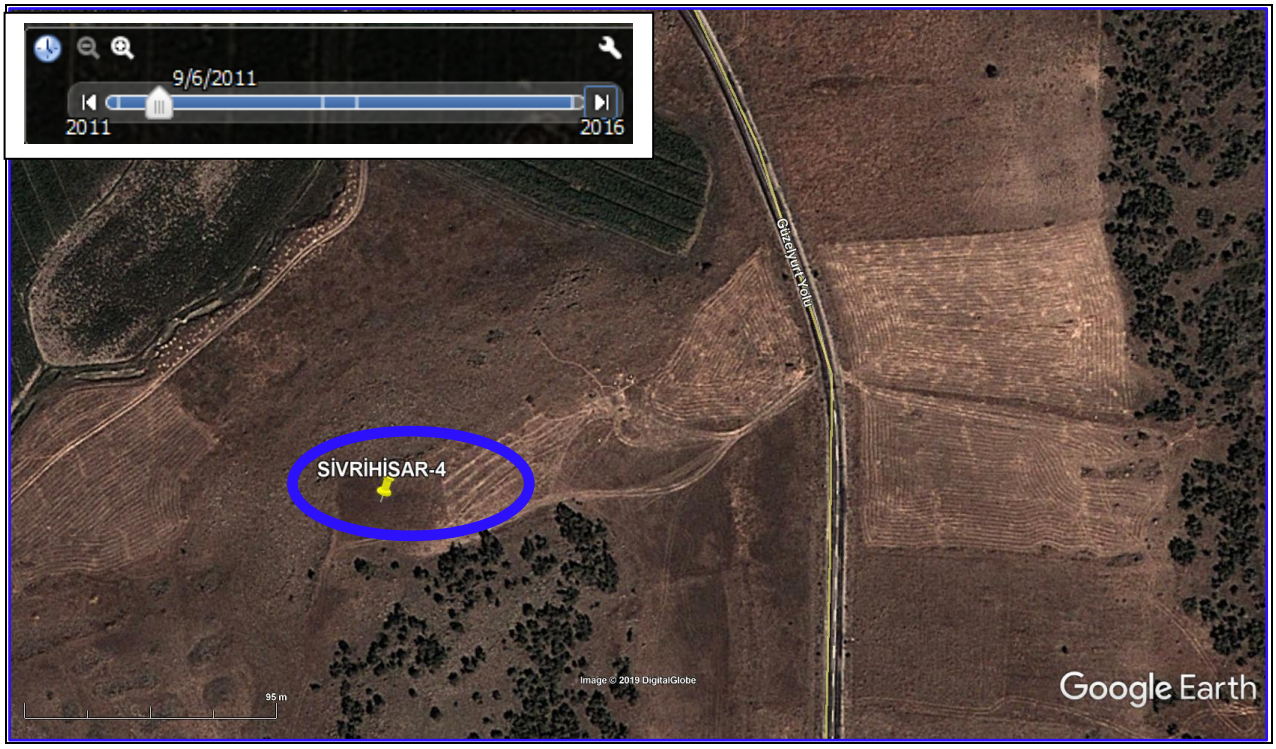


Figure 14. Drilling Location Satellite View from 2011

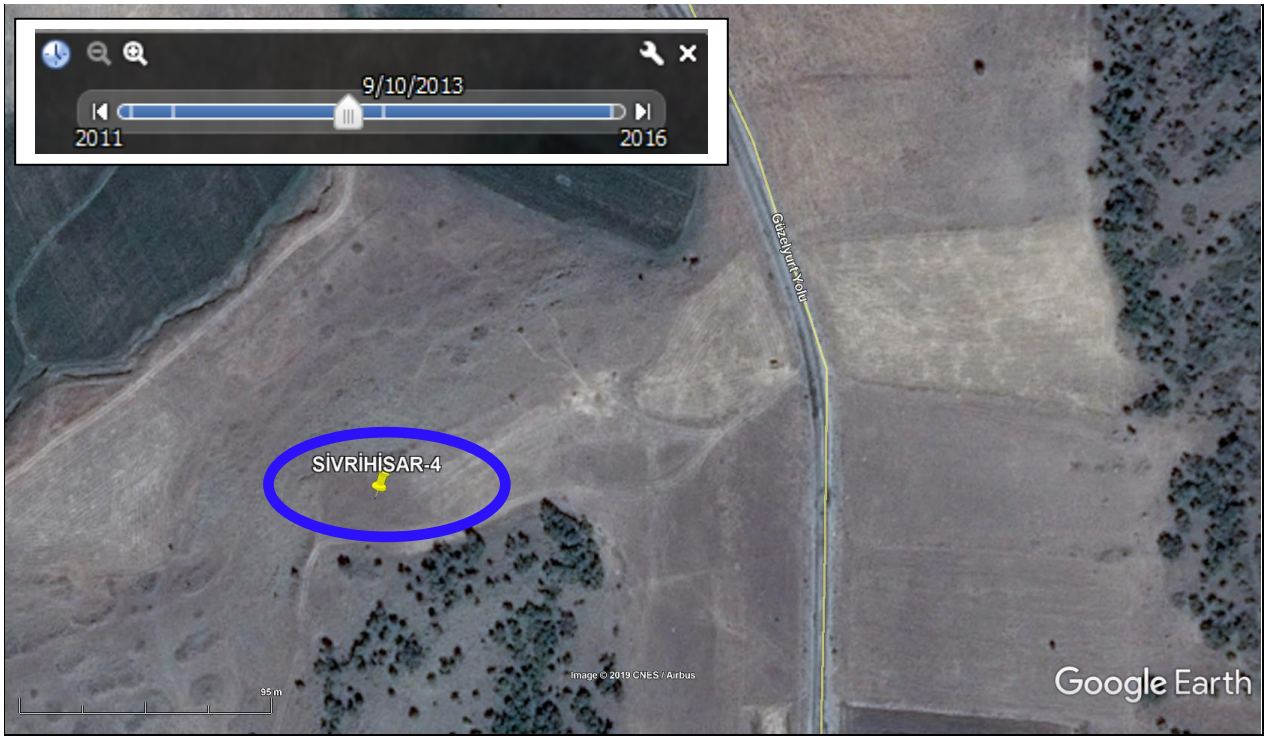


Figure 15. Drilling Location Satellite View from 2013

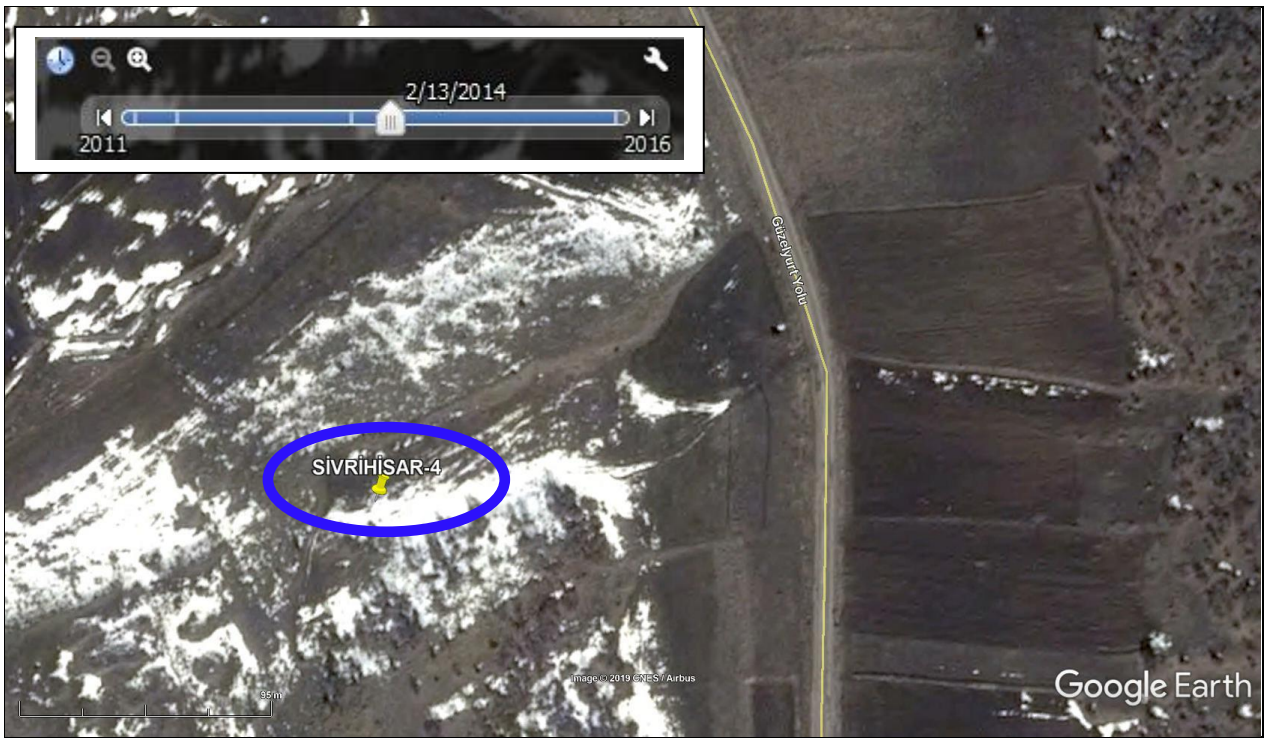


Figure 16. Drilling Location Satellite View from 2014

Figure 17. Drilling Location Satellite View from 2020

The observations made in the field studies at the site and the photographs taken are also in line with the satellite images. Photos taken in the field in 2016 are given below.

Figure 18. Drilling Location Photo (1) View from 2016

Figure 19. Drilling Location Photo (2) View from 2016

WELL LOCATION

Figure 20. Drilling Location Photo (3) View from 2016

Figure 21. Drilling Location Photo (4) View from 2016

The photos below show the current situation of the area and its surrounding (Figure 22 and Figure 23). The area is surrounded by a wire fence. At the south of the site, there are shrubs and maquis. Those areas will not be interfered with. On the hills to the north of the site, some bushes are observed.

Figure 22. The Photo Shows the Current Status of Drilling Location (1)

Figure 23. The Photo Shows the Current Status of Drilling Location (2)

As seen in the pictures given above, the drilling location is already constructed (in 2016) and there was no usage of that area before the drilling activities. Drilling activities and the site will not limit access to and from neighboring lands for any purpose (grazing, commute, etc.). The utilization permit of the area where the drilling location is located was taken on 13.06.2018 for the Sivrihisar-4 well location (Annex-A) and is valid until 2022.

These permissions require that the environment would not be harmed during the geothermal resource exploration works and that the sites would be brought to their original condition after the

end of the work. When the exploration drilling is completed, if enough geothermal resources cannot be found, the sites will be closed and converted into their original condition

Aksaray Provincial Pasture Commission received a 200,000 TL (two hundred thousand Turkish Lira) guarantee from the project owner for the proposed well site as a guarantee fee to be used to restore the sites to their previous quality in case the site is not restored by the project owner.

The Authorization Letter is given in Annex-A.

No physical or economical displacement is expected for the proposed project. No stakeholders' access to pastures is expected to be negatively impacted by the land use of the project. On the contrary, the project is expected to revive the socio-economic life of the region.

When the exploration drilling is completed, **in case the project is successful, additional wells will be drilled. Locations were not determined yet, they** will be defined according to the results obtained from the currently planned well.

The size of the license areas is around 4000 hectares. There are public lands (pasture, treasury, and forest), private lands, and non-cadastral lands. Pasture areas are widespread in the license site.

In case the project has found a promising geothermal reservoir, the future well locations will be firstly selected on public land. If this is not possible, the investor will acquire land on a willing buyer-seller basis. If it is obligatory, a public interest decision will be taken and expropriation will be made for land acquisition.

2.4.6 Flora - Fauna

In Turkey, there are sensitive areas that are not defined as protected areas by legal regulations but are determined as a result of the work of national and international NGOs with a nature conservation strategy, such as, Key Biodiversity Area (KBA), Important Bird Areas (IBA), and Important Plant Areas (IPA), etc.

The KBA approach is used to identify sensitive and unique natural areas by investigating the threatened and vulnerable species.

KBAs are defined employing standard criteria that are based on the distribution and populations of species requiring space protection, applicable on a global scale, and concrete criteria based on thresholds.

As one of the World's first KBA inventories on a national scale, the "Key Biodiversity Areas of Turkey" book was completed in 2006 with Doğa Derneği's coordination and the contributions of many organizations and scientists. In this work, the data regarding eight different groups of living creatures (plants, dragonflies, butterflies, inland water fishes, amphibians, reptiles, birds, and mammals) were compiled to identify 305 KBAs. Important Bird Areas, Important Plant Areas, the sea turtle, and the Mediterranean monk seal areas, identified previously by other experts and organizations, provided important bases for this work of Doğa Derneği (https://www.dogadernegi.org/en/turkeys-kbas/).

Among the eight different groups of living creatures mentioned above, the groups listed in Mount Hasan KBA are as follows:

- Plant species that are endangered worldwide and located in Mount Hasan KBA are *Astragalus simonii, Astragalus victoriae,* and *Trigonella isthmocarpa.*

- *Plecotus macrobullaris* is an important species of bat living in alpine areas in Mount Hasan KBA. Another species of bat found in Mount Hasan KBA is *Rhinolophus ferrumequinum*. (*Rhinolophus ferrumequinum is classified as Least Concern (LC) category according to IUCN).*

- The Melendiz Stream has global importance for the endemic *Capoeta pestai* inland fish.

- Mount Hasan KBA is also home to *Coenagrion ornatum,* a species of dragonfly.

Due to the species whose names are given above, Mount Hasan and its environs are identified as KBA.

The project area is located within Mount Hasan Key Biodiversity Area (KBA) and Important Bird Area (IBA). Therefore, within the scope of this Environmental and Social Management Plan, a Biodiversity Assessment Study (consisting of literature and field studies) was conducted for the project and the findings of this study were used to prepare a **Biodiversity Management Plan** to better manage the potential biodiversity impacts of the project. The Biodiversity Management Plan is given in Annex-C. Being a living document, studies to monitor the biodiversity of the project area will be continued within the scope of this plan. Field studies will be continued during mobilization and drilling operations and the plan will be updated if necessary as new information becomes available.

Flora

The determination of the floristic composition in the project area and its vicinity (area of influence) is based on field observations, a detailed literature study on the floristic and ecological composition of the region, and a survey of the existing population living in the region. Field studies were carried out by Özcan ŞİMŞEK (Flora Specialist) in March 2019 for one day and repeated in September 2019 for another day during the vegetation period.

The project site has already been leveled and partially cemented in preparation for drilling activities in early 2016, new studies (conducted in 2019 for RSM) confirm and update the information that was generated previously in the area at the close vicinity of the project site.

According to studies conducted, plant taxa detected in the project area and its vicinity are not classified as CR (Critical), EN (Endangered), VU (Sensitive), or NT (Near Threatened) according to the IUCN criteria. Also, within the identified plant taxa, there is no flag type to represent the Niğde-Aksaray region and area, and the key species to be used for monitoring the ecosystem. Therefore, no plant taxon needs to be monitored according to these criteria. Details of these studies can be found in the Biodiversity Management Plan in Annex-C.

The following endangered species listed in Hasandağı KBA were not observed in the project area and the identified impact area: *Astragalus simonii, Astragalus victoriae,* and *Trigonella isthmocarpa.*

Even though no critical flora species were identified at or near the project area that requires monitoring, monitoring of the flora was planned for the duration of the drilling activities due to the project site being located in the Hasandağı KBA. A flora monitoring will be done during late spring/early summer depending on the mobilization schedule. During this site survey, flora/fauna training will be given to the all site team including site managers. Details of the monitoring plan can be found in the Biodiversity Management Plan in Annex C.

Fauna

The determination of fauna (amphibia, reptiles, birds, and mammals) that can be found in the project area and its vicinity (area of influence) was based on field observations, a detailed literature study on the faunistic and ecological structure of the area, and a survey of the population living in the region.

The literature on previously studied wildlife and fauna studies in the vicinity of Mount Hasan, Keçiboyduran Village, and Sivrihisar Village were examined. Information about the distribution of taxa was obtained from the literature surveys and this information was used as a basis of the field studies.

Field surveys were carried out by Mehmet GÜL (Expert Biologist / Ecologist) in March 2019 for one day and repeated on another day in September 2019. The details of these surveys can be found in the Biodiversity Management Plan in Annex C.

According to the (field and literature) studies, the fauna taxa that may be found in the project area and its immediate vicinity was identified to include the species that need to be protected by conventions such as, Bern Convention, Cites Convention, Central Hunting Commission Decisions, etc. However, **there are no endemic species** in these taxa, all these species are found all over Turkey and their presence is not limited to the project area. Besides, among the fauna taxa identified, there is no flag type representing the Niğde-Aksaray region and the area and the key species to be used for monitoring the ecosystem. Therefore, there is not any type of fauna taxa that should be monitored.

The species that need to be protected are listed in the Biodiversity Management Plan and are also given below:

- **Amphibians**: *Bufo bufo, Bufotes variabilis.*
- **Reptiles**: *Stellagama stellio, Dolichophis jugularis, Mediodactylus kotschyi, Ophisops elegans, Parvilacerta parva, Testudo graeca, Dolichophis caspius, Eirenis modestus, Elaphe sauromates, Platyceps najadum, Telescopus fallax, Apathya cappadocica, Lacerta media, Heremites auratus.*
- **Aves**: *Accipiter nisus, Aquila chrysaetos, Buteo buteo, Buteo rufinus, Circus pygargus, Milvus migrans, Neophron percnopterus, Iduna pallida, Aegithalos caudatus, Calandrella brachydactyla, Galerida cristata, Lullula arborea, Melanocorypha calandra, Apus apus, Ciconia ciconia, Ciconia nigra, Columba livia, Streptopelia decaocto, Corvus corax, Corvus cornix, Pyrrhocorax pyrrhocorax, Clamator glandarius, Emberiza cia, Emberiza*

hortulana, Falco ubbuteo, Falco tinnunculus, Carduelis carduelis, Chloris chloris, Coccothraustes coccothraustes, Fringilla coelebs, Linaria cannabina, Serinus pusillus, Serinus serinus, Hirundo rustica, Ptyonoprogne rupestris, Riparia riparia, Motacilla alba, Motacilla cinerea, Erithacus rubecula, Luscinia megarhynchos, Monticola saxatilis, Monticola solitaries, Muscicapa striata, Oenanthe finschii, Oenanthe hispanica, Oenanthe oenanthe, Phoenicurus ochruros, Phoenicurus phoenicurus, Cyanistes caeruleus, Parus major, Periparus ater, Poecile lugubris, Petronia petronia, Dendrocopos major, Dendrocopos syriacus, Prunella modularis, Regulus regulus, Sitta europaea, Sitta krueperi, Sitta neumayer, Athene noctua, Otus scops, Sylvia atricapilla, Troglodytes troglodytes, Turdus merula, Upupa epops.

- **Mammalia:** *Canis lupus, Rhinolophus ferrumequinum, Rhinolophus hipposideros, Sciurus anomalus, Lepus Europaeus, Martes foina, Meles meles, Mustela nivalis*

These species that need to be protected are not listed among the species for Key Biodiversity Area (KBA) and Important Bird Area (IBA), meaning they are not found in these areas, except *Rhinolophus ferrumequinum. Rhinolophus ferrumequinumis* is classified as LC according to IUCN. Widespread and abundant taxa are included in this (LC) category.

Rhinolophus ferrumequinumis dwells in caves and in densely wooded areas. Although they do not emerge during the day, they also avoid noisy and lively environments at night. Therefore, they are not expected to be seen and damaged during drilling activities. However, during periodic monitoring, the site and its immediate surroundings will be controlled by biologists.

In other words, these species are not classified as Critically Endangered, Endangered, Vulnerable, or Near Threatened in Turkey, however, they are important globally in the World. Since, they are not classified as Critically Endangered, Endangered, Vulnerable, Endemic, or Near Threatened in Turkey, there are no animal species that need to be monitored in terms of biological importance.

However, as the project site is located in Hasandağı KBA, monitoring studies for animal taxons, and the species described above, will be carried out in line with the plan described in the Biodiversity Management Plan, to determine the potential impact of the proposed project on these species in or around the project site. A fauna monitoring will be done during late spring/early summer depending on the mobilization schedule. During this site survey, flora/fauna training will be given to the all site team including site managers. Besides, the mitigation measures to minimize the impact on the local habitat are also given in Biodiversity Management Plan and Mitigation Plan in Chapter 5.

2.4.7 Sensitive Areas (Protected Areas)

In the Turkish legislation, the definition of Sensitive Regions is given in the Regulation on Environmental Impact Assessment. According to this regulation, the definition of the sensitive area is as follows:

Areas that are sensitive to environmental impacts through their biological, physical, economic, social, and cultural characteristics or where the current pollution burden has been found to reach a level that can be harmful to environmental and public health are called Sensible Areas which are deemed necessary to be protected under national legislation and international conventions. The list of sensitive areas is given in Annex-V of the Regulation on Environmental Impact Assessment.

According to the national legislation (article 3 of the Law on the Protection of Cultural and Natural Property dated 21.07.1983 and numbered 2863), the definition of protected area concept is given as follows:

Managed following the relevant legislation for conservation and continuity of biological diversity, natural and related cultural resources, national parks, natural parks, natural monuments, nature conservation areas, natural protected areas, wetlands, special environmental protection zones and similar protection status of the land, water or sea areas are protected areas.

While evaluating the project's proximity to sensitive areas and protected areas within the license area and drilling location, the list in Annex-V of the Environmental Impact Assessment Regulation was taken into consideration. Accordingly, in the location and the drilling site:

a) There are **no** "**National Parks", "Nature Parks", "Natural Monuments" and "Nature Protected Areas**" defined in Article 2 of the National Parks Law No: 2873 dated 09.08.1983.

b) According to the Land Hunting Law No. 4915 dated 01.07.2003, there are **no** "**Wildlife Protection Areas and Wild Animal Settlement Areas"** determined by the Ministry of Environment and Forestry.

c) There are **no** such areas as "**Cultural Property", "Natural Assets", "Site" and "Protection Area**" defined in the relevant articles of Law No. 3386 dated 17.06.1987 and the Law on Protection of Cultural and Natural Assets

d) There are **no Aquaculture and Fertility** Areas defined within the scope of Fisheries Law numbered 1380 and dated 22.03.1971.

e) Regarding the areas defined in the Articles 17, 18, 19, and 20 of the Regulation on Control of Water Pollution, which was published in the Official Gazette dated 31.12.2004 and numbered 25687,

The project area is **not within the absolute protection area, short-distance protection area, medium-range protection area, and long-distance protection area** defined in the 17, 18, 19, and 20 articles of the Regulation on Control of Water Pollution. Furthermore, Articles 16, 17, 18, 19, and 20 of the Regulation have been abolished with the Regulation Amending the Regulation on Control of Water Pollution, which was published in the Official Gazette dated 14.02.2018 and numbered 30332.

f) There are **no Sensitive Pollution Zones** as defined in Article 49 of the Regulation on Protection of Air Quality published in the Official Gazette No: 19269 dated 02.11.1986.

g) In the field of activity, there are **not any** areas identified and declared as **"Special Environmental Protection Zones"** by the Council of Ministers per Article 9 of the Environmental Law dated 09.08.1983 and numbered 2872 (last change numbered 5491 dated 26.04.2006).

h) There are no protected areas as described in Bosphorus Law no. 2960 dated 18.11.1983.

i) There are **no forest areas** as described according to the Forest Law no. 6831 dated 31.08.1956,

j) There are no areas that have been prohibited according to the Coastal Law no. 3621 dated 04.04.1990,

k) There are no areas as defined in Law on the Improvement of the Olive Cultivation and Wild Grafting No. 3573 dated 26.01.1939.

l) Areas specified in the Pasture Law No. 4342 dated 25.02.1998:

The proposed drilling location is a pasture specified in the national legislation. To generate electricity until the date of 03.09.2022, a permit was obtained from the Aksaray Provincial Pasture Commission on 13.06.2018 (operating under Provincial Directorate of Agriculture and Forestry) for geothermal resource exploration.

When the exploration drilling is completed, if sufficient geothermal resources cannot be found, the site will be closed and the area will be reclaimed and recultivated as much as possible.

Aksaray Provincial Pasture Commission received 200,000 TL (two hundred thousand Turkish lira) guarantees from the investor of the project to be used to restore the pasture to its previous quality of the site is not restored by the project owner at the end of the project.

Pasture Authorization Letter is given in Annex-A.

m) It is **not** included in the areas specified in the Regulation on the **Protection of Wetlands**, which came into force after being published in the Official Gazette dated 04.04.2014 and numbered 28962.

The areas required to be Protected under International Conventions of which Turkey is also a party

In and around Drilling Locations:

a) There are **no protected areas under the BERN Convention** published in the Official Gazette dated 20.02.1984 and numbered 18318.

b) There are **no protected areas** per the Convention on the Protection of the Mediterranean Against Pollution (**Barcelona Convention**) published in the Official Gazette dated 12.06.1981 and numbered 17368.

i) According to the Protocol on the Protection of Private Protected Areas in the Mediterranean, published in the Official Gazette dated 23.10.1988 and numbered 19968, there are no areas designated as Special Protection Areas in our country.

ii) There are no 100 coastal history sites with common importance in the Mediterranean, published by the United Nations Environment Program, as per the Genoa Declaration dated 13.09.1985.

iii) There are no coastal areas which are, the living and feeding ecology of the endangered species of the Mediterranean in article 17 of the Geneva Declaration.

c) There are **no cultural, historical, and natural areas** granted Cultural and Natural Heritage status protected by the Ministry of Culture according to Articles 1 and 2 of the Convention on the Protection of World Cultural and Natural Heritage, which was published in the Official Gazette dated 14.02.1983 and numbered 17959.

d) There are **no protected areas per the International Convention on the Protection of Wetlands**, which was published in the Official Gazette dated 17.05.1994 and numbered 21937.

e) According to the European Landscape Convention published in the Official Gazette dated 27.07.2003 and numbered 25181, there is no significant area.

Areas to be Protected:

a) Areas where the existing features are determined as protected areas and the construction ban is approved in the Approved Environmental Plans (The course will be protected area, biogenetic reserve areas, geothermal fields, etc.)

According to the environmental plan, there are no above-mentioned areas in the project region.

b) Agricultural Areas: Areas of agricultural development, irrigated and areas which have land use capability classes I, II, III, IV and I, II class areas used in agriculture depending on precipitation and special crop plantation areas

The field of activity is not included in the above-mentioned areas.

c) Wetlands: These waters are natural or artificial, continuous or temporary, stagnant or flowing of water, sweet, bitter or salty, the seas of the tidal movement of the withdrawal period not exceeding 6 meters in depth, especially water birds, including the living environment as important as all living water. They also include marshy reeds and peatlands and ecologically wet areas from the coastal line of these areas towards the land side,

The field of activity is not included in the above-mentioned areas.

d) Lakes, rivers, groundwater operation sites

The field of activity is not included in the above-mentioned areas.

e) There are no areas where there are geological and geomorphological formations with unique characteristics, biosphere reserve, biotope, biogenetic reserve areas, species that are important for scientific research, and/or species that are endangered or may be endangered for our country and which are endemic to our country.

The closest cultural heritage site to the project site is the Kızılkilise 3rd-degree archeological protected site. The distance between the license site and Kızılkilise is 785 m and the distance of well location to the Kızılkilise is 1.5 km. The satellite image showing the project site and Kızılkilise is given in Figure 24. Project activities will not impact Kızılkilise during the exploration period.

There is an official letter obtained from the Provincial Directorate of Culture and Tourism of Aksaray for Kızılkilise for Kitreli and Çömlekçi Geothermal exploration sites, which are around

20 km away from the project site. In the official letter of this institution, it was stated that the Kızılkilise was in the 3rd degree archeological protected area. Besides, it was stated that neither drilling area was not within the site and protection area of Kızılkilise. Besides, it was stated that the areas where the drilling works are within the responsibility area of Niğde Province and if any cultural assets are found in future exploration studies for Kitreli and Çömlekçi Geothermal exploration sites, it is obligatory to inform Niğde Provincial Directorate of Culture and Tourism per the legislation (Article 4 of the Law on Protection of Cultural and Natural Heritage Numbered 2863).

Likewise, if any historical, cultural, or archaeological assets are encountered in the excavations for Bozköy geothermal exploration site, according to Article 4 of the Law on Protection of Cultural and Natural Heritage Numbered 2863, the work on the site will be stopped and the related Museum Directorates will be notified immediately. No one shall be allowed to remove or enter the historical monuments.

An official letter was written to the Provincial Directorate of Culture and Tourism of Aksaray for Kızılkilise about this drilling location and the official answer from the institution is awaited (see Annex A). This plan and cultural heritage management plan will be updated according to the official answer.

The closest protection area to the project site is the Ihlara Valley Special Environmental Protection Area, which is 3.8 km northwest of the license area. No intervention will be made to this area during the project activities. Project activities will have no adverse impacts on the Ihlara Valley Special Environmental Protection Area.

Besides Manastır Valley Archeological and Natural Protection Area is also one of the closest protection areas to the Project. The area is around 100 m apart from the license area and 4km northwest of the well location. Project activities will have no adverse impacts on the Manastır Valley Archeological and Natural Protection Area.

A cultural heritage management training will be given to all site teams including site managers during induction training before the drilling work starts.

A Cultural Heritage Management Plan (see Annex-D) including a chance find procedure was prepared to apply necessary measures to protect cultural properties.

The maps showing the “Protected Areas” and “Natural Protected Areas” around the license are shown in Figures 25 and 26 respectively.

Intangible Cultural Heritage

At the 32nd General Conference of UNESCO, “Convention for the Safeguarding of the Intangible Cultural Heritage” was acknowledged. Turkey has completed the process of becoming a party to the Convention on March 27, 2006.

There are three ICH lists formed due to the 16th, 17th, and the 18th articles of the Convention which are:

- Representative List of the Intangible Cultural Heritage of Humanity

- List of Intangible Cultural Heritage in Need of Urgent Safeguarding
- Register of Good Safeguarding Practices

There are 16 heritages of Turkey in the Representative List of the Intangible Cultural Heritage of Humanity, such as Arts of the Meddah, public storytellers, Mevlevi Sema Ceremony.

Project activities will not impact the “Intangible Cultural Heritage” of people. Both of the project areas are far from the settlements. In the observations made so far, no activity about intangible cultural heritage has been observed near the sites. Therefore, projects are not expected to have an impact on intangible cultural heritage.

If an activity is observed about intangible cultural heritage in the period of the project or the coming years, these cultural values will be protected. Measures will be taken to ensure that the project does not harm these values.

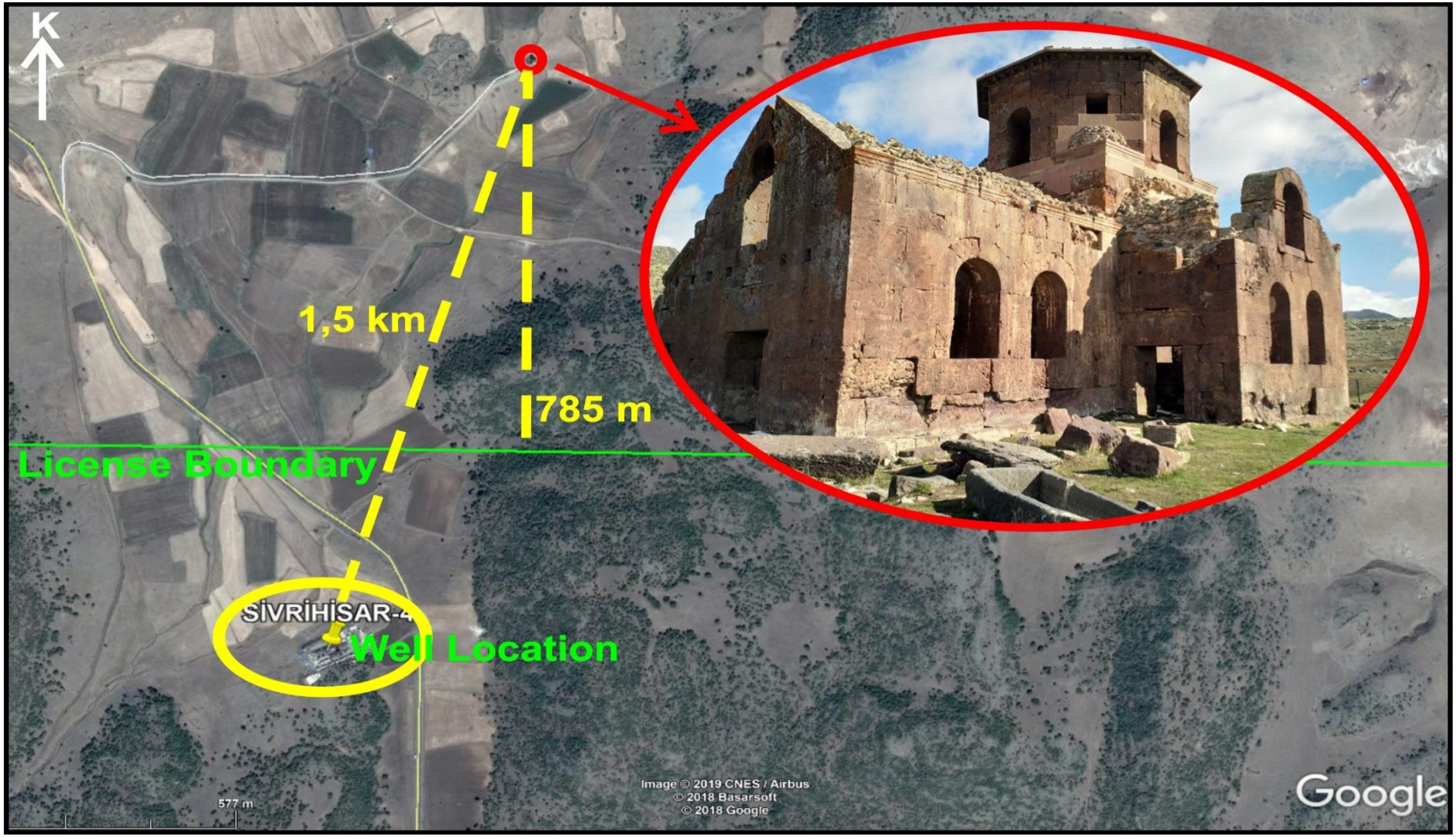


Figure 24. Satellite View and the Photo Shows Kızılkilise Location

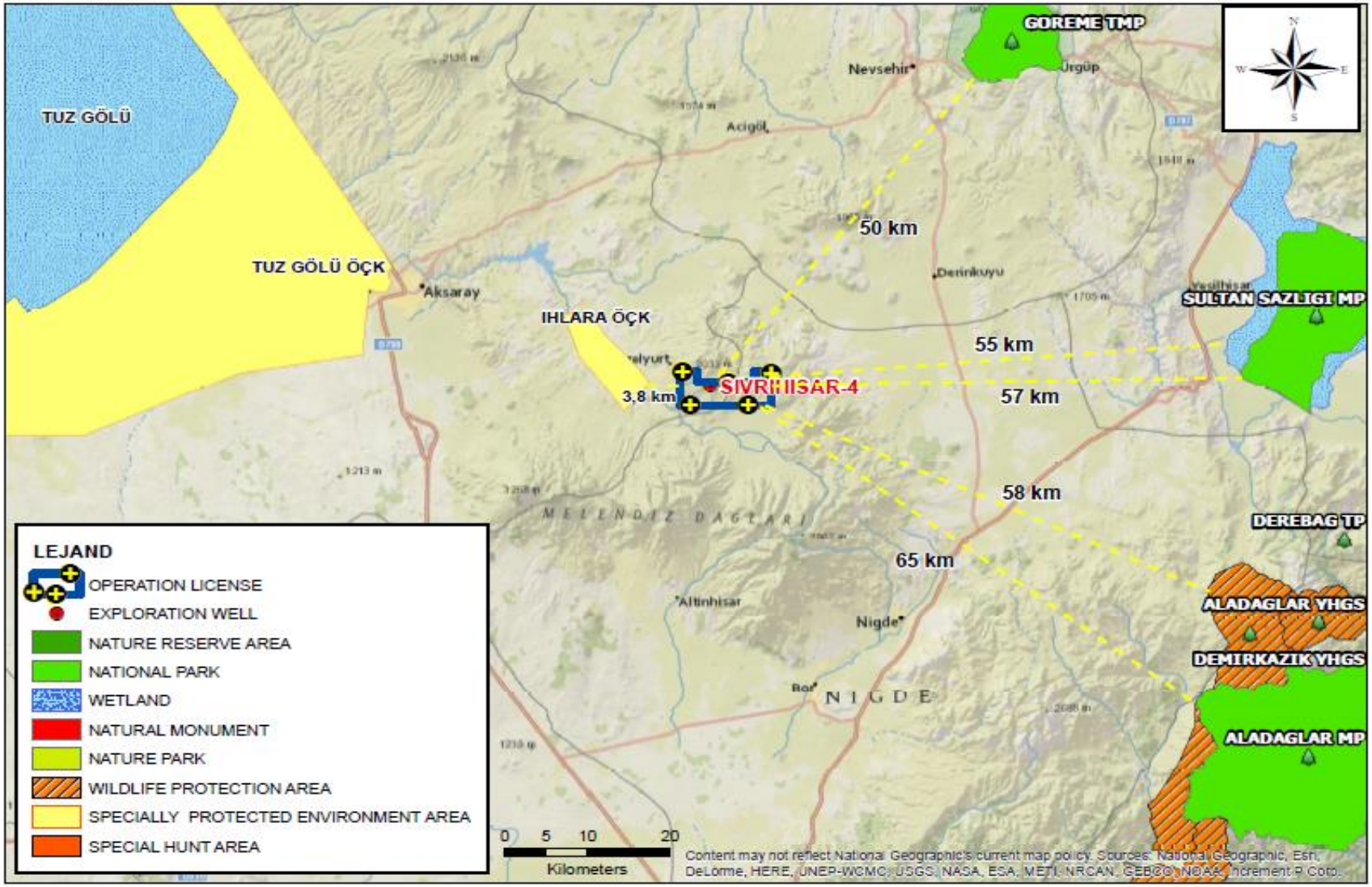


Figure 25. The Map Shows Protected Areas around the License Area

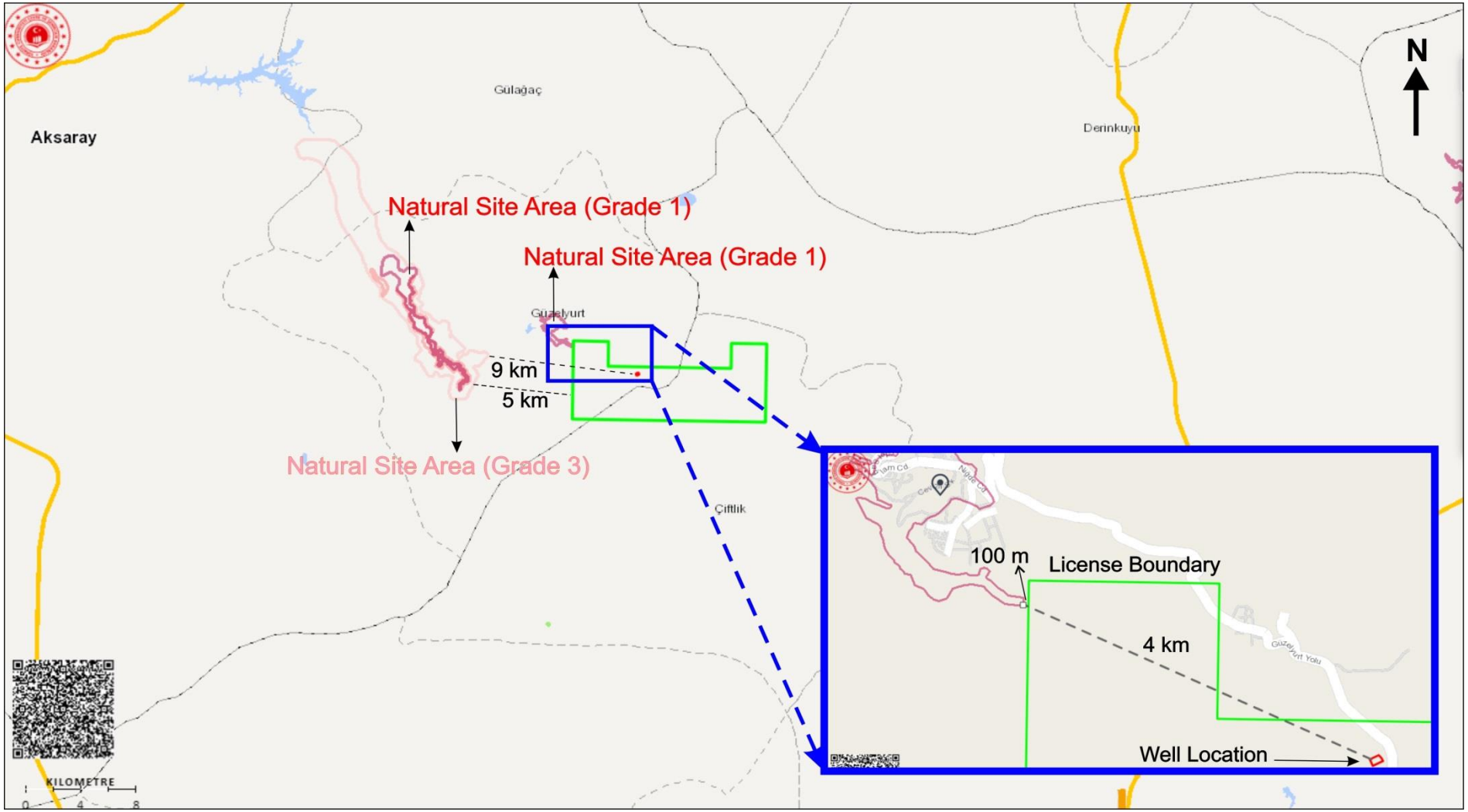


Figure 26. The Map Shows Natural Protected Areas around License Area

2.4.8 Socio – Economical Status

Population

The Bozköy license area is partially located in Niğde province and partially in Aksaray, and the drilling location is located in Aksaray province.

Niğde: According to the estimated data, the population of Niğde in 2018 was 364,707 people. 53% of the Niğde population lives in provincial and district centers while 47% live in villages and towns. It is observed that the urban population increased in the province.

Table 1. Niğde Province Population Data (By Districts)

Year	District	District Population	Male Population	Female Population	Percent of Population
2018	Merkez	224,289	112,384	111,905	61.50%
2018	Bor	60,335	29,937	30,398	16.54%
2018	Çiftlik	28,168	14,517	13,651	7.72%
2018	Ulukışla	23,252	11,737	11,515	6.38%
2018	Altunhisar	15,463	8,018	7,445	4.24%
2018	Çamardı	13,2	6,516	6,684	3.62%

Aksaray: The population of the province in 2018 was 412,172 according to the estimated data. The population density in the province was 52/km^2. It was observed that the rural population decreases and the urban population decreases.

Table 2. Aksaray Province Population Data (By Districts)

Year	District	District Population	Male Population	Female Population	Percent of Population
2018	Merkez	295,351	146,611	148,74	71.66%
2018	Ortaköy	32,504	15,846	16,658	7.89%
2018	Eskil	26,648	13,425	13,223	6.47%
2018	Gülağaç	19,903	10	9,903	4.83%
2018	Güzelyurt	11,761	5,863	5,898	2.85%
2018	Sultanhanı	10,884	5,555	5,329	2.64%
2018	Ağaçören	8,32	4,127	4,193	0.0202
2018	Sarıyahşi	6,801	3,365	3,436	1.65%

The drilling location is located in Aksaray Province, Güzelyurt District, Sivrihisar Village. The population of Güzelyurt district in 2018 was 11,761. In the same year, the population of Sivrihisar Village was 153 people, consisting of 63 males and 90 females.

The population affected by the project:

Within the license area, the largest settlement is the village of Bozköy, located within the borders of Niğde Province, at a distance of 5.4 km to the drilling location.

The closest settlement to the drilling location is Sivrihisar Village located in the borders of Güzelyurt District of Aksaray Province. The distance of the village to the drilling location is 1.8 km. However, this village is not within the license area

In Niğde and Aksaray Provinces, in rural settlements, the reason for the fact that the proportion of the elderly population to total population is very high, is the unemployment problem and lack of income, resulting in migration of younger generations to bigger towns and cities. In these settlements, the population is generally observed to be on a decreasing trend.

The population of the Sivrihisar Village, the closest settlement to the drilling site, is generally decreasing. In 2018, it increased by 3%. No population growth is expected due to the project. Priority will be given to the local selection of personnel depending on their technical abilities.

Public land will be used for the project. No private land has been purchased, nor will it be purchased under this project. The same land used previously for Sivrihisar-3 well will continue to be used. As a result of the use of this land by the project, no negative socio-economic impacts are expected due to land use in the region.

No vulnerable groups were identified near the project.

Land Acquisition

The land to be used for the project is public land. No individual land has been purchased. No private land will be purchased under this project. There is no formal or informal use of the pasture land where the well site is located.

As a part of the stakeholder engagement process, before the start of drilling operations in the region, consultations will be held with the animal owners in the region to improve and discuss the socio-economic impacts arising from the activity. Opportunities will be created for these people to make livestock with more modern facilities. Modern shepherd houses and modern sheepfolds will be built.

Observing that the water resources in the region are scarce and prohibitive to agricultural activity, the Project owner intends to work on this problem to improve water resources.

No physical or economical displacement is expected for the proposed project. No stakeholders' access to pastures is expected to be negatively impacted by the land use of the project. On the contrary, the project is aimed to revive the socio-economic life of the region. No vulnerable groups were identified near the project.

Infrastructure Services

The city center of Aksaray is connected to the surrounding provinces and other parts of the country through four state roads. In the north, there are connections to Ankara via Nevşehir in the east, to Konya in the east, and E-90 in the south by way of Niğde and Adana.

There is no transportation problem in Güzelyurt District and Sivrihisar Village where the project is located. From Aksaray to Güzelyurt district, Aksaray - Güzelyurt road is accessible every season. Sivrihisar village can be reached from Güzelyurt district via Aksaray - Güzelyurt highway.

No new road infrastructure is required for the implementation of the proposed project.

Cultural and Social Services

In Sivrihisar Village, the economy is generally based on agriculture and animal husbandry. However, water resources are insufficient. The project owner intends to work on this problem and improve water resources around the closest settlements. A pilot greenhouse structure was constructed after the Sivrihisar-3 well to test the possibility of agricultural production utilizing geothermal hot water. This pilot greenhouse provides employment opportunities for local people. Besides several social responsibility projects are planned for the local communities in the future.

3.0 Definition of Area of Influence

The area of influence of the project was determined based on the considerations below,

- Possible effects on the physical-biological environment
- Effects on natural geography and geological structure
- Effects on water resources
- Effects on the ecosystem,
- Effects on air quality,
- Noise and vibration effects,
- Effects on transportation,
- The impacts on the closest settlements

While some of the factors mentioned above are directly effective, some of them are indirectly effective. However, these factors must be evaluated together.

To examine a project as a whole, the impacts of a project should be examined in two stages: the construction phase and operation phase. The project, which is the subject of this Environmental and Social Management Plan, is to search for geothermal resources and to perform drilling activities for this purpose. Therefore, the operation phase of the project is not considered in this phase.

Geothermal resources determined as a result of drilling activities will be first evaluated in terms of some factors such as reserve amount, quality, conformity and if production is considered technically and economically feasible, the power plant construction stage will be started. Per the laws and regulations, the necessary permissions will be taken before the future construction and production phases.

Within the scope of the project, environmental impacts and emission distances of all kinds of solid/liquid waste, exhaust, dust, noise, etc. arising from the works to be performed during the drilling phase are taken into consideration. The environmental and social impacts at the drilling stage will be short-lived and will not be sustained due to the completion of drilling operations.

Taking into account the factors mentioned above, the project's area of influence is determined as an area with a radius of 2km for the Project. This area is marked on the outermost points of the drilling locations.

The map showing the impact areas is shown in Figure 27.

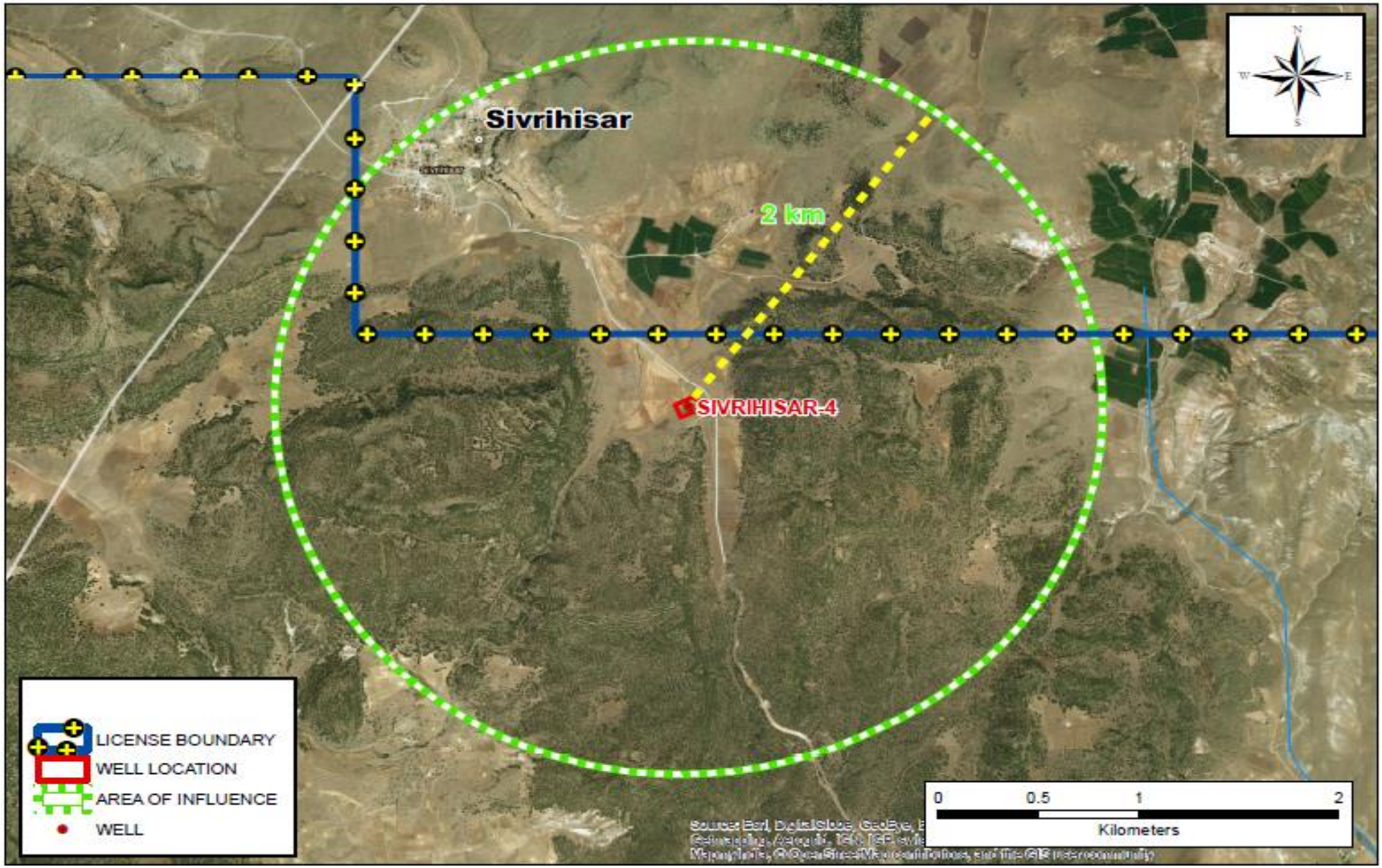


Figure 27. Area of Influence for Bozköy Geothermal Exploration

4.0 Potential Impacts

The impacts of a project should be examined considering the components of the project. The project, which is the subject of this Environmental and Social Management Plan, is to search for geothermal resources and to perform drilling activities for this purpose. In a general, the components of a geothermal exploration project are the drilling of exploration wells, constructing new roads for access to well locations, preparation of land locations, and land clearing activities for various reasons, if required.

In 2016, the Sivrihisar-3 well was drilled in the license area. A stabilized access road from the main asphalt road (Niğde-Güzelyurt road) to the site has been constructed during the previous drilling operation. Therefore, there will be **no need to open new access roads**. A mud pit was excavated for the previous drilling operation and this pit will be extended for Sivrihisar - 4 well.

Permissions were obtained for the use of land and given in Annex-A.

Environmental and social impacts, impact routes, and impact levels for the proposed drilling project and its components are evaluated below. While evaluating, national and international standards, route of impact and mitigation methods are also mentioned. At the end of the chapter, a table of potential impacts has been prepared to summarize all potential impacts, effect routes, and the impact level.

For this project, baseline data for noise and dust (PM10 and deposition) were gathered at and around the site to be able to observe and monitor the effects after the start of the activity. Dust (PM10 and deposition) were gathered at and around the site for 24 hours. Background noise measurements were taken according to regulations. Other baseline data such as soil quality will be gathered before mobilization. Besides, water samples will be taken from groundwater and surface water and analyzed by licensed laboratories. The samples will be taken from the nearest surface waters (intermittent stream) and groundwater source. The baseline measurements will be described in the effluent management plan, which will be prepared specifically for the site by the Drilling Contractor before site mobilization. Moreover, it will be ensured that current measurements are taken again for other data such as noise and dust deposition.

Potential impacts of the Covid-19 pandemic on the proposed drilling project is discussed in COVID-19 Exposure Prevention, Preparedness, and Response Plan (see Annex-E).

4.1 Wastes

National and International Standards / Conditions

The primary national regulations related to waste management in Turkey is the Waste Management Regulation.

Besides, there are other regulations for specific types of waste and waste management procedures, including waste generated from excavation, construction, demolitions, oils, packaging, batteries, accumulators, medical supplies, electrical and electronic materials, as well as waste from transport. The national waste regulations to which the project will comply are given under each title in the section below.

The handling of the wastes will be in line with the Turkish regulations. A waste management plan prepared and given in Annex-F.

The project will also be in full compliance with the World Bank Environmental and Social Framework (ESMF) for the Turkey Geothermal Development Project disclosed on Development and Investment Bank of Turkey (TKYB)'s website, and the relevant EU legislation, i.e. the Waste Framework Directive or Directive 2008/98 / EC. This directive provides general provisions for waste management and identifies basic waste management definitions. The Directive has amended the previous EU directive on wastes, hazardous waste, and waste oils and currently covers all wastes defined by Decision 2000/532 / EC (i.e. European Waste Codes). It should be noted that the waste codes given in Annex 4 of the Turkish Waste Management Regulation are the same as the European Waste Codes.

The Waste Framework Directive (dated November 19, 2008, and 2008/98 / EC) focuses on the prevention of waste generation at the source, primarily by defining a waste management hierarchy. Where waste elimination is not possible, the waste materials must be reused and recycled if they cannot be reused. Waste materials that cannot be recycled should be used for recycling energy recovery. Safe disposal of waste in incineration facilities or landfill sites is the latest option in the waste management hierarchy. In addition to the Framework Directive under the heading of waste, regular storage of wastes, transport of wastes, and special wastes (such as batteries and accumulators, end-of-life vehicles, waste electrical and electronic goods, packaging and packaging waste) are included.

Current Situation in the Province

Per Regulation on the landfill of waste, landfills in Turkey are designed as Class II landfills. In these facilities, some systems prevent surface water from entering the facility, suitable impermeable primers, leachate collection, and treatment systems per the relevant legislation for the treatment of collected leachate.

Domestic wastes are collected by the district municipalities, brought to the landfill facilities in the province via transfer centers. There is one landfill facility in Aksaray Province. The facility has a solid waste storage capacity of 910,000 m^3 on an area of 108,000 m^2. Electricity is generated from the landfill gas, thus reducing the environmental impact and contributing to the economy.

Domestic wastes produced by the Project will also be disposed of in the landfill facility in Aksaray Province. The facilities available in the province for other types of wastes are summarized below (Aksaray Environment and Urbanization Directorate, Environmental Status Report 2018)

- There are 8 Licensed Packaging Waste Collection and Separation Plants and 7 Recycling Plants operating in the city.
- There are three hazardous waste recycling facilities, two of which are licensed and one has a Temporary Activity Certificate.
- There is one temporary storage area as described in Regulation on Control of End of Life Tires.
- There are three waste batteries and accumulator recovery facilities in the province.
- There is one medical waste sterilization facility in Aksaray Province, and one medical waste transport vehicle.

- There is one waste oil recovery facility.

There are also hazardous waste disposal sites in Ankara and Adana, to either of which the project site is at an equal distance.

4.1.1 Domestic Solid Wastes

Impact Definition and Reasons

No significant amount of solid waste is generated in geothermal drilling operations. Generally, domestic solid waste is generated from working personnel.

If measures are not taken for solid wastes and waste management is not done well, it will cause visual and environmental pollution. While visual pollution causes social implications, environmental pollution will affect soil, air, water, and living species.

Depending on the type of solid waste, the air quality may be affected if it is dissolved and mixed into the air. These wastes lead to deterioration of soil, surface, and groundwater quality if they are not properly collected and stored.

It also attracts wild animals to the area if there is food residue on solid wastes. This situation may cause negative effects for both the working staff and the wild animals.

Mitigation Measures

The provisions of the Waste Management Regulation (published in the Official Gazette dated 02.04.2015 and numbered 29314) will have complied with the management of domestic solid wastes. Per the provisions of the Regulation, domestic solid wastes will be stored separately from other wastes in no-leak waste containers and will be regularly collected by the Güzelyurt Municipality, in return for a fee (See annex-A).

In the disposal of domestic solid wastes, all personnel will be trained on applicable waste management practices (no littering of surface waters, lakes, and streams, similar receiving environments, streets, roads, open areas). Warning signs will also be utilized for this purpose.

4.1.2 Packaging Wastes

Impact Definition and Reasons

Within the scope of the project, personnel-related packaging waste will be generated. Packaging wastes are also classified as solid waste. Therefore, the effects given below under the title of Solid Wastes are also mentioned here.

Mitigation Measures

Packaging wastes that will be generated within the scope of the activity will be collected and stored separately from other wastes to reduce environmental pollution, to reduce the use of landfill capacity, and to contribute to the economy, regardless of the material used and where they are generated. Per the

Regulation on the Control of Packaging Waste, this waste will be delivered to the licensed recycling or the collection system of the municipality.

Collection and accumulation shall be made per the Regulation on the Control of Packaging Wastes, requiring these wastes to be collected separately from other wastes. According to this Regulation, packaging waste will be collected in separate collection containers, marked for each type of waste, which will be placed in the area of activity (glass, metal, plastic, paper/cardboard, and wood).

4.1.3 Medical Wastes

Impact Definition and Reasons

In geothermal drilling operations, work accidents are not frequent. Therefore, medical waste generation is scarce. However, in the event of medical waste generation, if it is not properly collected, stored, and disposed of, it can lead to significant environmental pollution leading to the soil, surface, and groundwater quality deterioration, as well as sanitary and public health problems.

First aid materials will be kept ready in the field of activity to respond to possible accidents. As a result of medical intervention, medical waste will be generated.

Following the first aid in the field, the closest health facilities in the district or province will be utilized to provide medical help to the victims.

Mitigation Measures

The medical wastes generated during drilling will not be mixed with other wastes in any way and will be collected in the sealed medical bags and delivered to licensed medical waste collection companies to be transported in medical waste transport vehicles. The waste will be disposed of in licensed medical waste disposal / medical waste sterilization facilities.

For the collection of medical wastes, red-colored tear-resistant plastic bags, in line with the specifications described in the Regulation on Control of Medical Wastes will be used.

Sharp or piercing wastes will be collected in containers that are resistant to puncture, tear, breakage and explosion, separately from other medical wastes.

Medical waste bags will be stored in the medical waste container while waiting to be collected. New bags and containers will be kept ready for use at the source of the waste or in the closest area.

COVID-19 medical waste will be treated as any other infectious/viral medical waste such as HIV, tuberculosis, measles, etc. Personal hygiene material/equipment wastes (such as single-use masks, gloves) will be collected, temporarily stored, transported, and delivered to waste processing facilities per Circular 2020/12 of Ministry of Environment and Urbanization on COVID-19 Measures in the Management of Personal Hygiene Equipment Wastes.

The provisions of the Regulation on the Control of Medical Wastes (published in the Official Gazette dated 25.01.2017 and numbered 29959) shall be complied with strictly.

4.1.4 Waste Batteries and Accumulators

Impact Definition and Reasons

Batteries contain metal and chemical pollutants. If waste batteries are not stored and disposed of under suitable conditions, pollutants in the batteries may be mixed with water and soil, causing water and soil quality to deteriorate.

Mitigation Measures

The waste batteries to be generated within the scope of the activity will be collected separately from other wastes and delivered to collection points of battery sellers or municipalities. Disposal of batteries into the ground and water bodies will be strictly banned.

No waste vehicle batteries are expected to be generated at the drilling site. The battery replacements of vehicles serving the site will be made in authorized service facilities with appropriate waste collection and disposal facilities.

The provisions of the Regulation on Control of Waste Batteries and Accumulators (published in the Official Gazette dated 31.08.2004 and numbered 25569) shall be complied with.

4.1.5 End of Life Tires

Impact Definition and Reasons

Since geothermal drilling operations have limited use of construction equipment, waste tire generation is expected to be limited. Being mostly non-renewable, the structure of the tire consists mostly of natural rubber, synthetic rubber, carbon black, steel, oils, and various chemicals. If scrap tires are not properly disposed of, there are two important environmental hazards.

- Severe fires originating from uncontrolled piles of used tires, and
- Diseases spreading through human populations transmitted by flies and other pests occupying and multiplying in uncontrolled piles of used tires.

Mitigation Measures

The end of life tires will be delivered to the tire distributors or other authorized carriers.

The provisions of the Regulation on Control of End of Life Tires, (published in the Official Gazette dated 25.11.2006 and numbered 26357), will be complied with.

4.1.6 Other Non-Hazardous Waste (Scrap Metals etc.)

Impact Definition and Reasons

In geothermal drilling operations, the construction sites are located within the drilling locations.

In the construction site, waste metals, glass fractures, wooden wastes may be generated in the accommodation facilities. Besides, scrap metals may also be generated due to machine parts replacements. Scrap metals include aluminum parts, brass, copper, chrome, and iron scraps.

Chemicals found in scrap metals may leach into the water resources by dissolving heavy metals in the acid metal composition and by dissolving heavy metals. Heavy metals transported to the aqueous media are highly diluted and partially precipitated by forming solid compounds as carbonates and sulfates and may accumulate at the bottom of the aqueous media. They can negatively affect water and soil quality.

Mitigation Measures

The recyclable materials in this waste stream can be separated to be stored together with the packaging wastes. It is possible to recycle scrap metals. These wastes will be stored temporarily in containers that are robust, leak-proof, safe, and conform to internationally accepted standards. Then, they will be provided to companies with recycling licenses.

4.1.7 Liquid Wastes

National and International Standards / Conditions

The most important waste group encountered in geothermal drilling operations is liquid wastes generated from the drilling operations. Therefore, liquid wastes are the most important factor that can cause a potential impact. The environmental impacts of these wastes can be faster than other wastes, so the management and disposal should be done well, and precautions should be taken before they occur.

Liquid wastes can easily leak into soil and groundwater if no precautions are taken. This situation negatively affects soil and groundwater quality. When stored under unfavorable conditions, liquid wastes may mix with surface waters and have adverse effects on the surface water quality. Besides, air quality can be undesirably affected by the evaporation of liquid wastes. Therefore, good waste management of liquid wastes is of utmost importance. Since the management of liquid wastes is covered by a multitude of national and EU legislation, a site-specific Effluent Management Plan will be prepared by the Drilling Contractor to ensure full compliance with all legal and WB requirements (Regulation on the Protection of Groundwater Against Pollution and Degradation - Ministry of Agriculture and Forestry, 2012, Regulation on Surface Water Quality, Quality Criteria for Inland Water Resources According to Classes - Ministry of Agriculture and Forestry, 2012, Directive 2006/118 / EC of the European Parliament and of the Council of 12 December 2006 on the Protection of Groundwater Against Contamination and Degradation, and others).

Management of liquid wastes is addressed under the two sections as domestic and process-based wastes.

- **Domestic Liquid Wastes:**

Mitigation Measures

In this project, an impermeable septic tank will be constructed for domestic wastewater. The wastes collected in the septic tank will be collected by a vacuum truck. The septic tank pit shall be constructed in dimensions that are per the principles specified in the regulation. When the septic tank is 80% full, it will be emptied by licensed vacuum trucks and the wastewater will be disposed of following the agreement with the nearest municipality.

- **Process Liquid Wastes:**

In geothermal drilling projects, the characteristics of process-based liquid wastes vary depending on the purpose of the well. In other words, the wastewater characteristics from wells used for exploration and wells used for operation purposes are different. The well proposed in this project is an exploration well. Liquid wastes from the proposed well will be drilling fluids and drilling mud.

Impact Definition and Reasons

Drilling fluids: Drilling fluids are required to remove cuttings from the well, cool and lubricate the bit and the drill string, form a filter cake in the well, and control the pressures during drilling. The use of drilling mud also ensures that the well wall is kept stable, forms an impermeable layer to prevent the loss of fluid in the well formation and to prevent contamination of aquifers. Currently, there are four main types of drilling fluids in use for geothermal drilling. These are water-based mud (bentonite and polymers), water only, aerated mud or water, and air and foam.

In the proposed project, a drilling mud consisting of a water-bentonite mixture will be used, spiked with additives to control the consistency and density of the sludge. These additives include xanthan gum and starch and cellulose derivatives for consistency control and solid barium sulfate for density control.

Mitigation Measures

If geothermal drilling operations are carried out under best practices related to drilling fluids and wells, it is very unlikely that geothermal water will pollute the groundwater aquifers.

Drilling mud will be kept in impermeable containers (tanks) before and after use, and will not be allowed to contaminate surface and groundwater sources.

Drilling mud will be collected in a mud pit with a capacity of 6900 m3 at the Project Site. Mud pit volume will be sufficient to collect all liquid drilling wastes. No effluents will be discharged to the environment during drilling or well testing.

Formation of the mud-pit floor and the walls

The bottom and the wall of the mud pits must be covered with impermeable layers and geomembranes to prevent leaching of the drilling mud. It will be made according to the criteria of the Class I Landfills in

Regulation on Landfill of Wastes, with the worst-case scenario in mind (Regulation on Landfill of Wastes according to the Circular on the Disposal of Drilling Mud and Wastes generated from the Physical Treatment of Chromium Minery (dated 2012/15).

The formation of mud pit bottom: minimum $K \leq 1.0 \times 10^{-9}$ m / sec permeability and compacted clay or clay group minerals with at least four layers and total thickness ≥1 m or equivalent. It will be strengthened by using a geomembrane.

A drainage layer with at least $K \geq 1.0 \times 10^{-4}$m / s permeability will be applied. The total thickness will be ≥0,5 m or equivalent.

Technical details of the mud pit are given in Figure 28.

In this project, 6000 m^3 drilling mud is expected to be used as drilling fluid. A maximum of 240 tons of water per day will be required for drilling.

The liquids mixed with solids coming out of the well will be collected in the mud pit. Some of the heavier solids will settle immediately to the bottom of the mud pit. The water mixed with drilling mud and slower settling solids will be collected from the surface of the mud pit and fed into a portable separation unit where solids will be removed through a flocculation/rapid settling process. The clear water will be taken into a separate water tank located in the project site to be reused for drilling. Settled solids will be collected in separate containers to be disposed of appropriately. Reuse of drilling water will reduce water use and prevent overflowing of the mud pit.

Geothermal drilling muds will be disposed of according to the national regulation (i.e. Regulation on Landfilling of Wastes and Regulation on Waste Management) **Project company does not plan to establish a landfill.**

After the drilling is finished, the remaining solids and liquids will be analyzed in a licensed laboratory to identify the waste type and code. After identification of the waste code, the drilling mud will be disposed of per the national regulation. Landfills have different classes that accept wastes by their hazardous properties/inertness. Accordingly, the drilling mud will be carried off-site with licensed tankers to an appropriate landfill facility. There will be no solid or liquid waste left in the mud pit.

Based on the investor's experience in the region, the drilling waste is expected to be an inert waste.

During well testing, the brine that comes during the well tests will be stored in the mud pit which will be formed according to criteria for Class I Landfills in Regulation on Landfill of Wastes.

After that, the brine will be analyzed to establish the treatment and disposal requirements. If it is found to be hazardous, it will be transported to licensed treatment and disposal facilities in line with legislation. If it is found non-hazardous, but on-site treatment is required, a treatment process at a separate packet wastewater treatment plant will be applied. Then, it will be transported to a suitably licensed wastewater treatment plant with appropriately licensed waste transport tankers.

A package pretreatment plant will be located on-site for pre-treatment of well-testing effluents before final disposal at a nearby treatment plant. Mud pit volume will not be exceeded by this means.

A contract will be signed with a treatment company for the on-site treatment process (package wastewater treatment plant described above). Another contract will be signed with a treatment plant for accepting and treating the pretreated liquid phase. A university-approved technical compliance report will be prepared to treat and reuse water.

During the drilling and the well tests, measures will be taken to ensure that surface water will not be mixed into the mud pit. In compliance with Article 16-4 of the Regulation on Landfill of Wastes, drainage channels will be established around the borehole, and contamination of surface waters will be prevented. Uncontrolled discharged of the mud from the pit will be prevented.

A fence will be established around the mud pit with appropriate warning signs to protect wildlife and people.

A separate Effluent Management Plan will be prepared by Drilling Contractor to address the site-specific management actions for effluent generated by geothermal exploration drilling.

Reclamation (Closure) of the Mud Pit Area: The mud pit will be closed according to the criteria of Class I Landfills given in Regulation on Landfill of Wastes.

After all, operations are finished: The mud pit will be filled with excavation materials, and an artificial impermeability layer defined in class I regular storage facilities will be applied to the mud pit.

A mineral impermeable layer will be applied two layers at least 25 cm thick. A drainage layer having at least 50 cm thick and a permeability of at least $K \geq 1.0 \times 10^{-4}$ m/s will be applied above the impermeable clay layer. Topsoil should be with a minimum thickness of 50 cm thick will be laid over the drainage layer. The area will be replanted with the local vegetation suitable for grazing.

A technical scheme of liquid and solid material management for geothermal drilling is given in Figure 29.

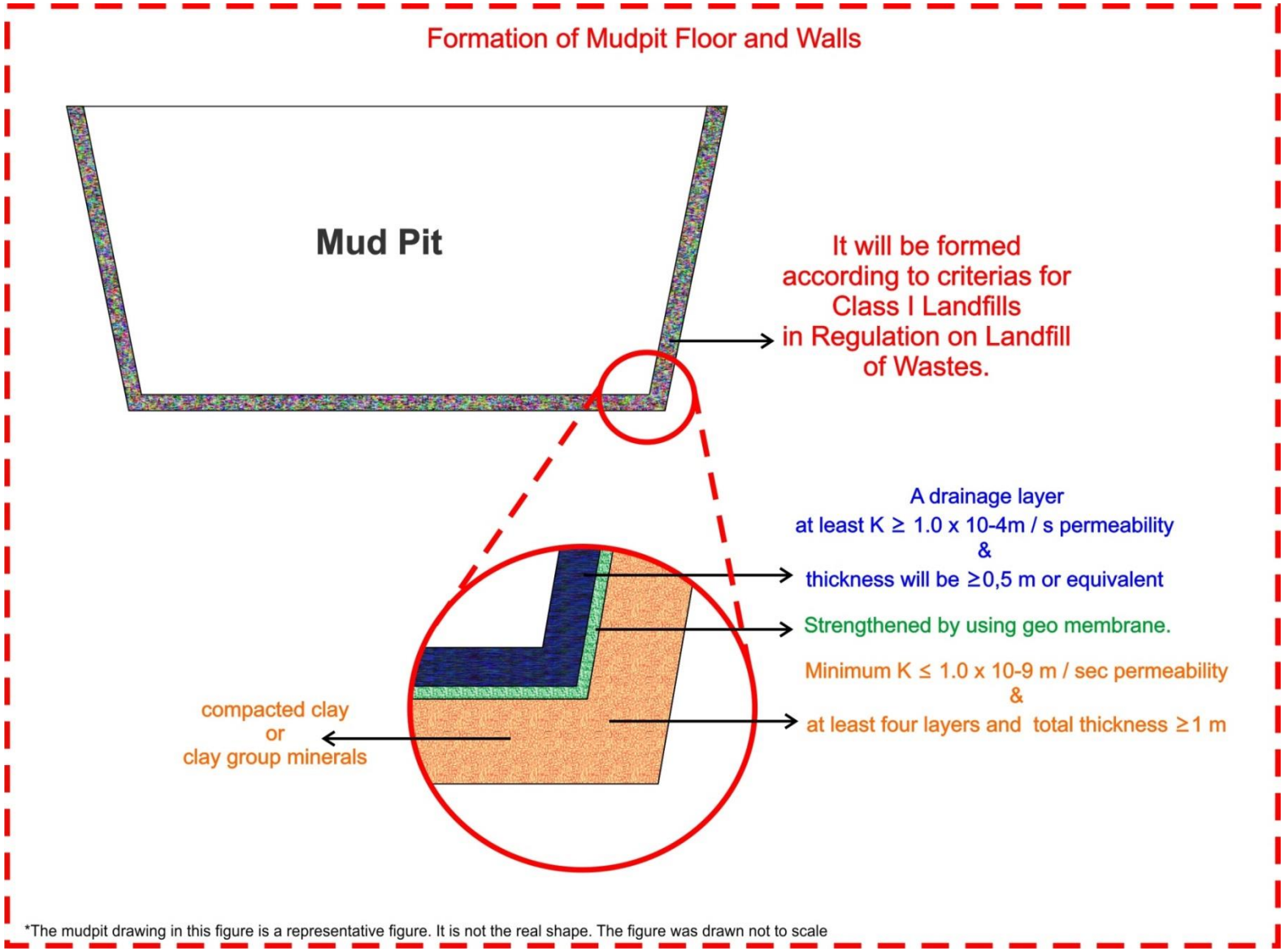
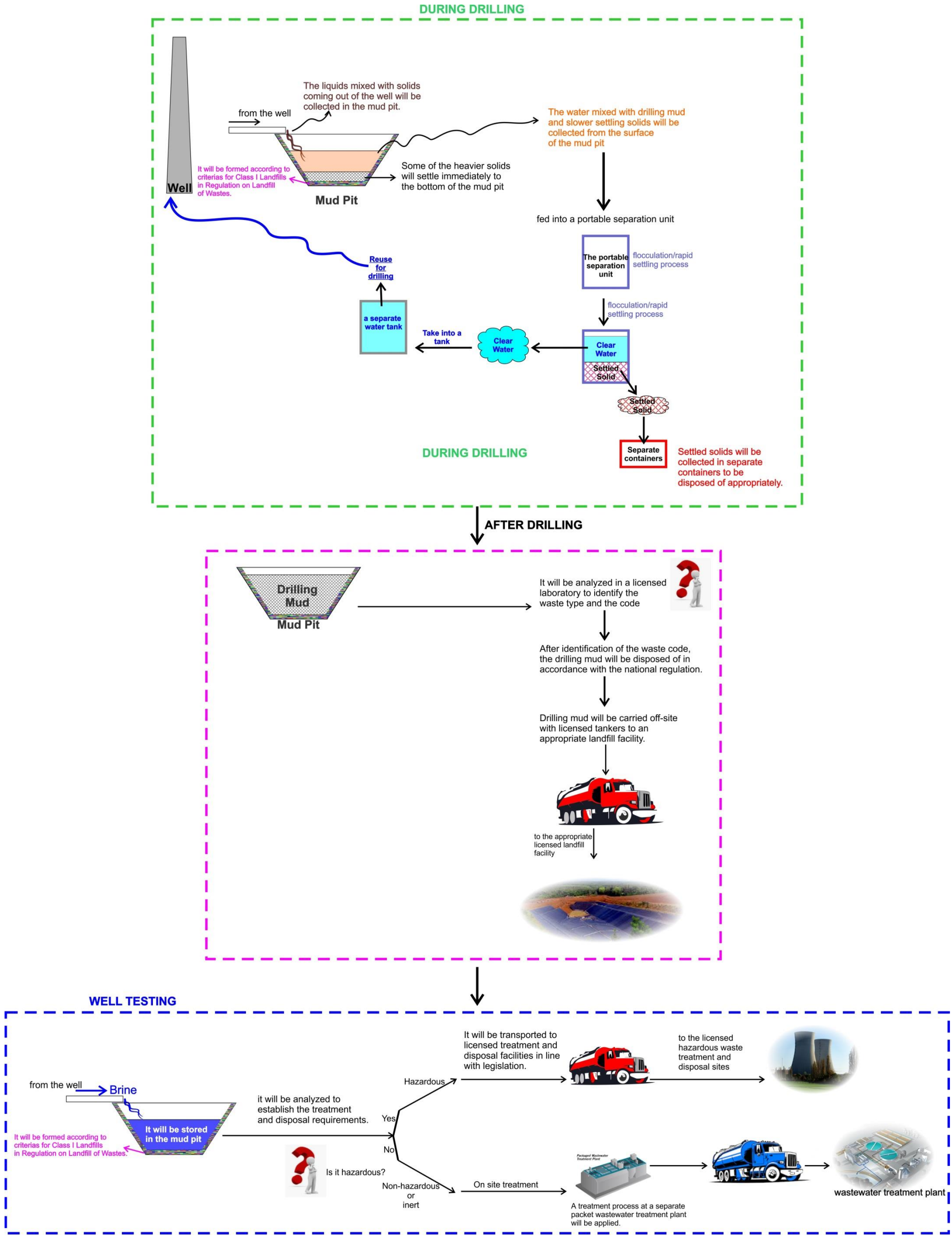


Figure 28. The Technical Details of Mud pit Floor and the Walls



The drawings in the figure are representative figures. They are not the real shapes. The figures were drawn not to scale

Figure 29. Technical Scheme for Treatment of Liquid and Solid Material Management

4.1.8 Excavation Waste

For geothermal drilling, a mud pit is used for storing drilling fluids and drilling mud. The mud pit was previously excavated by the project owner for this project (Sivrihisar – 4) but it will be enlarged by the sponsor. Therefore although small in quantity, excavation waste will occur.

Impact Definition and Reasons

Excavation waste, which will occur in the site, should be temporarily collected, transported to a suitable area within the field, and re-evaluated after the operation is completed in a way that does not harm the environment.

If the excavation waste management is not done properly, it causes erosion, dust emission, loss of material that will be used as backfill material, and loss of soil yield.

Mitigation Measures

No excessive excavation wastes are expected to be generated at the site, as the site is already leveled for the drilling of the Sivrihisar-3 well in 2016. The enlargement of the existing mud pit will cause the generation of a small number of excavation wastes. This waste will be stored separately in the drilling area and will be used to refill the mud pit at the end of the drilling and testing of the well. If any excess excavation waste is generated the excess part will be removed off-site in line with the Regulation on Controlling Demolishing and Excavation Wastes.

4.1.9 Waste Oils (Mineral Waste Oil)

Impact Definition and Reasons

Waste mineral oils are generated through the use and change of oils used in equipment, work machines' parts, or fixtures (such as motors). Gasoline engines' oils, diesel engines' oils, differential and transmission oils, grease and other special vehicle oils, hydraulic oils, turbine and compressor oils, heat transfer oils, transformer oils, molding oils, steam cylinder, and insulation oils are mineral waste oil sources. Special industrial oils and industrial greases are also included in this class (i.e. mineral oil).

Storage and disposal of waste oils may have serious effects on water, air, and soil if not carried out per the legislation and best practices. Oils poured into the surface waters (e.g. water, water sources, sewers, water drains, etc.) reduce photosynthesis in aqueous media by forming a layer that prevents sunlight on the water surface. This prevents oxygen feedback, disrupting the oxygen cycle, and allowing and growth of anaerobic microorganisms. Therefore, fish, microorganisms, and other aerobic organisms in the food chain in the aquatic environment are negatively affected by the lack of oxygen.

Waste oil that is poured into the ground is mixed with groundwater and causes pollution. Used oil with heavy metals, which accumulate in the soil after being poured because it contains heavy metals such as lead, arsenic, cadmium, chromium. Waste oils poured into the soil destroying the plants. Plants do not grow in soil contaminated with waste oil.

When waste oils are burned in inappropriate ways, heavy metals mix with air and cause pollution and cause oxygen balance to deteriorate.

Mitigation Measures

In the case of waste oil generation at the site, the requirements of Regulation on the Management of Waste Oils will be adhered to.

Waste oils will be collected in closed containers with impermeable lids, marked with appropriate color and waste codes in special areas (oil proof concrete floors of at least 25 cm thickness, covered geomembranes or epoxy coating).

Maintenance and oil change of equipment and machines will be made on a leak-proof surface in a specified part of the operating area, in a rain-proof building.
In the field of operation, waste oil spills will be immediately removed from surfaces with absorbent spill kits, which in turn will be disposed of per the provisions of the Regulation on the Control of Waste Oils.

Waste oils will not be burned, poured into the water source, to the sewage system, to drains, or on the soil.

Oil changes on site will be avoided as much as possible and waste oil generation is expected to be a minimum level. Mineral waste oils will be treated as an environmental priority and will be disposed of per the regulations.

Waste oil analyzes shall be made per the Waste Oil Control Regulation and the oil will be disposed of by licensed disposal firms or licensed recycling facilities according to the results of the analysis. The oils of different categories will not be mixed, and they will be given to licensed waste oil collectors, treatment plants, or collection points.

4.2 Potential impacts on surface waters and groundwater

National and International Standards / Conditions

- Regulation on Control of Water Pollution, Ministry of Environment and Forestry, 2004
- Regulation on the Protection of Groundwater Against Pollution and Degradation - Ministry of Agriculture and Forestry, 2012
- The Regulation on the Water for Human Consumption, Chemical Parameters, and Indicative Parameters - Ministry of Health, 2005
- Regulation on Surface Water Quality, Quality Criteria for Inland Water Resources According to Classes - Ministry of Agriculture and Forestry, 2012
- Directive 2006/118 / EC of the European Parliament and of the Council of 12 December 2006 on the Protection of Groundwater Against Contamination and Degradation

Impact Definition and Reasons

In a general, the potential effects of geothermal drilling projects on surface waters and groundwater, as well as the magnitude of the effects may vary depending on the cause. One of the reasons is activity-related (personnel and operational) wastes, and the above sections explain how wastes will affect surface waters and groundwater. These effects occur if necessary measures are not taken per the legislation and best practices. If necessary measures are taken and disposed of per the legislation, these potential impacts can be reduced and eliminated.

One of the causes of potential impacts on surface waters and groundwater is the accidents that may occur during operation.

In a general, stressing of local water sources due to water use is another impact that can affect the surface waters and groundwater.

There is no surface water around the project area and in the license area. There are some intermittent streams (dry river bed) in the license areas. These river beds are usually dry.

The closest intermittent streams are around 200 meters west and north of the drilling location Project activities will not impact the intermittent streams.

There are no springs or groundwater wells in the vicinity of the project site. Project activities will not impact groundwater with the proper mitigation measures established during drilling operations.

Mitigation Measures

In geothermal drillings, it is possible to contaminate the aquifers if the application is not done properly. However, if geothermal drilling operations are carried out following best practices related to drilling fluids and wells, it is very unlikely that the groundwater aquifers will be polluted by geothermal water.

Inefficient insulation may cause geothermal fluids to leak into the groundwater and mix. This reduces both the well efficiency and the quality of the groundwater aquifer. To prevent this, the well coatings must be faultless and impermeable.

In this project, the appropriate application of drilling technology and practices will prevent the possibility of mixing the groundwater with the drilling fluid. The most critical measure is to ensure that the drilling fluid (drilling mud) forms an impermeable layer of cake by fully plastering the wall of the well. This will also prevent subsidence in the well. During drilling operations, the casing pipes that are lowered to the well will be cemented to the top of the reservoir. Therefore, there is no possibility that the drilling fluid or geothermal fluid will interfere with the groundwater. Above mentioned methods will also prevent a mixture of groundwater and geothermal/drilling fluid during drilling through an unstable or cracked geological unit or broken structures.

During the well completion tests, sludge and fluids in the well will be discharged in line with the well testing protocol. The water (brine) that comes from the well during the well tests will be collected in the mud pit. During well testing, this water will be analyzed to determine possible treatment and disposal requirements.

If the brine is found to be hazardous, it will be transported to licensed treatment and disposal facilities in line with legislation. If the brine is found non-hazardous but an on-site treatment is required, a separate packet wastewater treatment plant will be established on-site. Then, it will be transported to a suitably licensed wastewater treatment plant with appropriately licensed waste transport tankers. A contract will be signed with a treatment company for the on-site treatment process (packet wastewater treatment plant described above). Another contract will be signed with a treatment plant for accepting and treating the pretreated liquid phase. Therefore, surface and/or groundwater is not expected to be affected negatively in this project.

Moreover, water samples for baseline measurements will be taken from groundwater and surface water and analyzed by licensed laboratories before mobilization. There are no springs, rivers, or fountains in and around the project site. There are some intermittent streams (dry river bed) around the project area. These river beds are usually dry. But these will be checked before mobilization. If it is possible, water samples will be taken before mobilization and during drilling. The results will be compared for monitoring purposes.

If it is possible to take samples and compare them, analysis results and baseline studies and measurements will also be included in the effluent management plan, which will be prepared specifically for the site by the Drilling Contractor before site mobilization.

Stressing of local sources of water due to water use is considered to be of minimal concern, as water use during drilling will be limited to make up water added to complete the evaporation losses only, and recycling will be maximized. Recycling will be done with an on-site flocculation process which will enable the separation of drilling mud and the water, which will then be taken into another water tank that will be located in the project site. The water in the water tank will be reused again for drilling (details of the process are described in Section 4.1.7). Water will be either taken from the well that was drilled in previous years by the sponsor firm or from local municipalities via water trucks. In either case, no water will be taken from surface water sources. The depth of the well previously drilled is 512 meters. It has a capacity of 35 tones/hour. A maximum of 240 tons of water per day will be required for drilling, however, the actual amount of water consumption is expected to be much less due to the recycling of the water as described above. If the make-up will be obtained from the groundwater well a water usage permit will be taken before mobilization.

4.3 Potential impacts of emissions

In geothermal drilling, noise emissions from the drilling machines and gas and dust-induced air emissions can occur. This may cause both environmental and social impacts.

4.3.1 Noise Emission

National and International Standards/Conditions

The noise limits given in the Regulation on the Assessment and Management of Environmental Noise (RAMEN) and international GIIP documents (i.e. IFC Common Guidelines) were evaluated to determine the noise limits of the project during construction and operation phases. Among all current legislation, standards, and international good industry practices, only the RAMEN sets a specific noise limit for the construction phase.

According to Article 23 of the Regulation on the Assessment and Management of Environmental Noise (published on Official Gazette on 27.04.2011 and numbered 27917), the noise level spreading from the activity in the area to the environment is given in Table-5 of Annex VII. According to this table, the noise level of the closest sensitive structure should not exceed 70 dBA during the daytime. These values are in IFC guidelines, 55 dBA for daytime and 45 dBA for night time zone.

The WBG EHS Guidelines define the day time zone between 07:00 and 22:00 and the night time zone as 22:00-07:00. Regulation on the Assessment and Management of Environmental Noise defines the day as 07: 00-19: 00, evening 19: 00-23: 00 and night 23: 00-07: 00. Besides, the 45 dBA, which is the absolute maximum limit for the night, is based on the World Health Organization guidelines, so that the sleepers are not disturbed when the window is open.

Furthermore, the Environmental Noise Directive 2002 / 49 / EC (25 June 2002) includes regulations for the assessment and management of environmental noise. Within the scope of the Directive, strategic noise maps and noise action plans should be prepared for settlements with more than 250,000 inhabitants, main roads with more than 6 million vehicles per year, main railways with more than 60,000 trains per year, and airports where more than 50,000 movements per year take place.

Impact Definition and Reasons

The most important source of noise emission is drilling machines and generators (when used).

Mitigation Measures

In geothermal drilling, the sound level can be reduced by using silencers in drilling machines. After the drilling stage, there may be noise during the well testing stages. Good conditions can also be achieved with the use of silencers during well tests.

The distance of the drilling area to the nearest settlement is approximately 1.5 km. According to the Regulation on the Assessment and Management of Environmental Noise, noise modeling was performed while preparing the Project Introduction File. According to the modeling results, the level of 70 dBA is achieved at about 90 m from the well, and the 45 dBA level is achieved at 1000 m. Thus, the nearest settlements and residences will remain below the limit values.

All workers at the site will be provided with PPE, will be trained in the use of PPE, and will be required to use PPE.

According to the evaluations made, as both drilling sites are far from settlements, the project is not expected to have any noise impact on the nearest settlement. Therefore, no complaints related to noise are expected from the local people. In the event of any complaint, this shall be assessed following the Grievance Mechanism, the complaint shall be recorded, evaluated, and responded in a timely and appropriate manner. It should be noted that no blasting activities will be carried out within the scope of the project activities. Therefore, the effect of vibration is not expected. A negligible effect that may occur near the drilling sites is an exception.

Within the scope of this project, the necessities set out in the national and international legislation (WBG EHS Guidelines) will be strictly complied with.

4.3.2 Air Quality (Dust – Gas – Exhaust Emissions)

National and International Standards/Conditions

- Regulation on Air Quality Assessment and Management.
- Industrial Air Pollution Control Regulation
- WBG General Environmental, Health, and Safety Guidelines: Environmental Air Emissions and Outdoor Air Quality, April 30, 2007.
- Directive 2008/50 / EC on outdoor air quality and cleaner air for Europe.
- WHO (World Health Organization) Environmental Air Quality Guide

The Air Quality Framework Directive 2008 / 50 / EC of 21 May 2008, includes measures for the reduction of ozone-depleting substances, reduction of volatile organic compounds emissions (VOCs), and regulations on fuel quality. The Air Quality Framework Directive introduces rules on the assessment of air quality, monitoring requirements and methods, clean air plans and programs through common methods for all pollutants.

The EU regulations on emission monitoring of greenhouse gases, emission trading, greenhouse gas emissions reduction for sectors outside the emission trading system, carbon capture and storage, control of F-gases, and protection of the ozone layer supporting, the EU to reduce its greenhouse gas emissions by 20% by 2020 and by 40% in 2030 compared to 1990.

The air quality standards in Turkey are defined according to the Air Quality Assessment and Management Regulation (published in Official Gazette dated 06.06.2008 and numbered 26898) and The Industrial Air Pollution Control Regulation (published in Official Gazette dated 03.07.2009 and numbered 27277).

The air quality limit values defined in the national legislation for various pollutants are given in the table below.

Table 3. Air Quality Limit Values Defined in National Legislation

Parameter	Time	Unit	YEAR						
			2014	2015	2016	2017	2018	2019-2023	2024 and Later
Particulate matter suspended in the air (PM 10)	24 hour (no more than 35 times a year)	$\mu g/m^3$	100	90	80	70	60	**50**	50
	Yearly		60	56	52	48	44	**40**	40
Deposition	Short Term Limit Value	mg/m^2day	390	390	390	390	390	**390**	390
	Long Term Limit Value		210	210	210	210	210	**210**	210

WBG's Environmental, Health, and Safety Guide for Air Emissions and Air Quality recommend the World Health Organization (WHO) Outdoor Air Quality Guideline values, which are given in Table 4 below.

Table 4. World Health Organization (WHO) Outdoor Air Quality Guideline Values

Parameter	Time	Value($\mu g/m^3$)
SO2	10 minutes	**500**
	24 hours	**20**
NO2	Hourly	**200**
	Yearly	**40**
PM10	24 hours	**50**
	Yearly	**20**
PM2,5	24 hours	**25**
	Yearly	**10**
O3	Maximum 8 hours per day	**100**

4.3.3 Dust Emissions:

In geothermal drilling operations, dust emission occurs during the excavation activities and road construction works before drilling. Since the drilling location and access road were already established at the project site, such works will not be carried out. Only the mud pits will be excavated (enlarged). Therefore, there will be dust emission at the well location but it will not be a significant amount.

Typically in geothermal drilling operations, dust emission occurs only for a short time during the start of drilling. There is no dust emission after the drill bit level is below the ground level. In the drilling process, no dust is formed as the drilling fluid is used.

Mitigation Measures

Mitigation measures that will be taken against potential dust emission are as follows:

- When transporting material to the site, all measures will be taken to ensure that the environment is not polluted, the regular traffic on the road is not disturbed, and the safety of life and property is not compromised.
- To prevent environmental contamination during transportation, the loads will be covered with suitable material (tarpaulin, etc.).
- Vehicles will not be loaded above capacity.
- If necessary, dust suppression will be done by water spraying. Unloading will be done carefully.
- Speed limitation will be introduced to the vehicles that will move in and around the drilling location.
- During the transport of materials to the site, the wheels of the vehicles will be washed periodically to prevent dust emissions.

Within the scope of the activity, the Air Quality Assessment and Management Regulations and Industrial Air Pollution Control Regulation will be fulfilled.

4.3.4 Gas Emissions

The presence and concentration of potential air pollutants vary according to the characteristics of the geothermal source. On the one hand, greenhouse gas emissions caused by geothermal projects are generally lower compared to fossil fuels. On the other hand, electricity production using medium - high-temperature geothermal sources contribute to greenhouse gas emissions due to the natural presence of non-condensable gases in the geothermal fluid which contains greenhouse gases. The greenhouse gases in geothermal reservoirs are mostly composed of CO_2, which constitutes about 95% of greenhouse gases, and CH_4, which can be up to 1.5% in rare cases (World Energy Council, 2016). Therefore, these two main gases should be taken into account in evaluations for drilling activities.

Hydrogen sulfide (H_2S) is also a gas that is commonly found in geothermal exploration wells. The release of these gases can lead to occupational health and safety problems, especially in closed areas of the power plants, in wells, and during first discharge. Depending on the chemical properties of the geothermal source, the release of these gases can also lead to significant air emissions and associated effects. A preliminary occupational health and safety plan is prepared for project activities (see Annex-G).

CO_2 is not considered toxic but can be fatal at high concentrations due to the exclusion of oxygen or alteration of pH in the blood. Besides, CO_2 is the most important greenhouse gas causing climate change. It absorbs less heat per molecule than the greenhouse gases like methane or nitrous oxide, but it's more abundant and it stays in the atmosphere much longer. And while CO_2 is less abundant and less powerful than water vapor on a molecule per molecule basis, it absorbs wavelengths of thermal energy that water vapor does not, which means it adds to the greenhouse effect uniquely. Increases in atmospheric CO_2 are responsible for about two-thirds of the total energy imbalance that is causing the rising of Earth's temperature which causes climatic change.

Hydrogen sulfide is detectable to humans at low concentrations due to its characteristic “rotten egg” smell. It is extremely dangerous and can be fatal even in low concentrations. Hydrogen sulfide dissolves in water and therefore may not be a problem during drilling using mud, water, or aerated drilling.

Mitigation Measures

- Monitoring and warning systems shall be established for gas emissions.
  - CO_2 monitoring can normally be accomplished by measuring its concentration levels in the air with portable detectors.
  - Hydrogen sulfide monitoring can be accomplished by using portable or fixed detectors. These detectors have also a warning system with an alarm
- The maintenance of the systems will be carried out regularly.
- Employees will be trained on this subject
- Gas measurements obtained from detectors will be continuously monitored during drilling and well closure as described in the Mitigation and Monitoring Plans. Safety measures will be taken when a difference is observed.
- The Emergency Action Plan will cover the gas emission security planning and uncontrolled gas emission.

4.3.5 Exhaust Emissions:

During drilling operations in geothermal drillings, NOx, CO, and SOx emissions are generated from the use of diesel fuel in construction machines.

Also, NOx, CO, and SOx emissions from the use of diesel fuel (diesel) are generated during the drilling activities if the generator is used.

For these emissions, the limit values in national legislation (“Industrial Air Pollution Control Regulation”, Annex-2, Table 2.1) are given in Table 5 below.

Table 5. Annex 2 Table 2.1 of the Industrial Air Pollution Control Regulation 2.1 Hourly Mass Flow Rate

Emissions	Mass flow rates for operating hours and normal operating conditions (kg/hour)
	Emissions Outside Chimney
Dust	1
Carbon Monoxide	50
Nitrogen Dioxide [NOx (in NO2)]	4
Total Organic Compounds	3

Mitigation Measures

- Exhaust emission measurement of the vehicles used (such as trucks) will be done regularly in certain periods.
- New and well-maintained vehicles will be used to control the gas emissions to be generated within the scope of the activity.
- Unnecessary use of machinery and equipment causing emissions will be prevented.

The provisions of the Regulation on Control of Exhaust Gas Emissions, (published in the Official Gazette dated 11.03.2017 and numbered 30004), will be complied with regarding the exhaust emissions.

4.4 Well blowouts and pipeline ruptures

Impact Definition and Reasons

In geothermal drilling operations, although not very common, well blowouts and pipeline ruptures can occur. These accidents can lead to the release of toxic liquids and gases (e.g. hydrogen sulfide) containing chemicals and heavy metals into the environment. Pipeline ruptures may occur during drilling and operation phases. These failures may also cause the precipitation of minerals (silica and calcium carbonate) and the spread of geothermal fluid and vapor containing heavy metals, acids, and other pollutants to the surface.

Prevention Methods

Blowout prevention equipment (BOPE) will be used. It consists of combinations of valves, rams, packers, and rotating heads enabling control of fluids and gases that could flow from the well.

In the geothermal drilling operation, the safety valves will be checked continuously, and the pressure of the fluid will be measured.

During the drilling, if any sudden fluid flow is observed to come through the well, the pressure to the well will be increased, if this is considered insufficient, the wellhead shall be closed with the closing unit.

The Emergency Action Plan will cover the security planning and control of the blowout (The well drilling will be done by contractor. A draft Emergency Response Plan is given Annex-H. This plan will be updated by the contractor firms).

All employees will receive training in emergency conditions. Emergency drills will be implemented periodically.

4.5 Social Impacts

4.5.1 Socio-economic impacts

Impact Definition and Reasons

In geothermal drilling operations, noise and air pollution can cause discomfort and airborne diseases (asthma, allergy, etc.) in the societies living close to the activity area.

Another typical social impact of geothermal operations can be economic effects due to land acquisition. Depending on the principles and procedures followed for the acquisition of land, this effect can sometimes be positive and sometimes negative.

If the land use for the project causes displacement of the local people that use the land for grazing or recreation purposes, there may be negative effects. Another effect of land use is the possible impacts on the agricultural lands nearby.

In Bozköy Geothermal Exploration Project only pastureland will be used and the necessary permit has been obtained by relevant government agencies. The permit is valid until 2022.

After 2022,

- **If the project fails**, the site will be closed and converted into its former quality and capacity according to the reinstatement plan to be prepared. The land will be delivered to the Provincial Directorate of Agriculture and Forestry according to the reinstatement plan given in Annex B.

- I**n case the project is successful**, applications will be made to the relevant institutions to continue the use of pastureland permits. (In line with legislation, the classification of the land will be changed.)

The project site was previously a barren and arid land, unused by the local people. Although the well site is on pasture land the area has not suitable for grazing. There were no trees on the site, so it could not be used as a recreation area. Therefore, the use of this land for geothermal drilling activities does not impact the local community's use of the land.

There are agricultural lands nearby the drilling location. According to field observations, potato cultivation is done in these fields. During drilling operations emissions from machinery and drilling well could have impacts on the nearby agricultural areas and the people working there. There will be no effect on the groundwater during drilling operations. Mitigation measures for emissions are given through Sections 4.3.3 to 4.3.5.

Mitigation Measures

Attention will be paid to create opportunities for project-affected communities to be informed about the project and to provide feedback through Stakeholder Management activities (see Annex-I Stakeholder Management Plan) including communicating with village headmen via phone and online messaging applications, targeted leaflet drops house-to-house in the closest villages with contact details and mechanisms for returning feedback.

A grievance mechanism has been established for the affected communities to collect grievances regarding the project, to be resolved by the project management in the fastest way possible. It will be developed and updated according to needs. The contact person, Serhat Kara, will be introduced to all stakeholders.

To provide information about each phase of the project, a transparent public information mechanism will be established through the website, notice boards, telecommunication instruments, and public meetings after the activities started.

To receive feedback from affected communities, well-designed and structured questionnaires will be used.

Monitoring and warning systems for gas emissions will be established during the geothermal drilling operation.

The perimeter of the activity area will be surrounded by a wire fence to protect public members from accidentally being affected. Besides, animals will be prevented from entering.

No external access will be allowed to the field of activity except authorized personnel.

The project owner will work in coordination with the local emergency and health units.

A traffic management plan is given to managing the traffic load created by the project activities (see Annex-J).

A COVID-19 Exposure Prevention, Preparedness, and Response Plan (see Annex-E) is developed to manage the social interactions between the project team and communities in the vicinity of the project site during the drilling period.

In the future, if the project is observed to impact the livelihood of any stakeholders, public members, or vulnerable populations through land use, good practices and World Bank OP 4.12 standards will be implemented to mitigate and compensate for the impacts.

4.5.2 Land Based Impacts

The drilling location is on the pastureland and is owned by the state. No new land will be purchased for drilling purposes. There are no structures on land, and, thus, no physical displacement is anticipated. Consequently, no landowners are expected to be affected by this project.

In case the well is successful, technical and economic evaluations will be made by the investor company and new well locations will be determined.

The size of the license area is around 4000 hectares. There are public lands (pasture, treasury, and forest), private lands, and non-cadastral lands within the license area.

According to the land ownership status of the newly identified wells, official applications will be carried out for permissions. When the locations are determined, the public lands will be preferred first.

If it is private land, the purchase will be made on a willing buyer willing seller basis. If deemed necessary, a public interest decision will be obtained and expropriation will be the last retort to acquiring lands. If the subject land is pasture land, the same procedures used in this project will be applied to the new plots. If land required is a treasury or forest land, permission will be obtained from the relevant public institutions.

The land within the scope of this project is not used by the local people there are no informal users. No negative socio-economic impact is expected in the region resulting from the use of this land for the project.

No physical or economical resettlement is anticipated for the proposed project.

4.5.3 Labor and Labor Influx Impacts

There will be around 20 workers at the site for drilling operations. A code of conduct was prepared and will be shared with all site workers (see Annex-K). The technical personnel for the project will stay for a short period (around 2-3 months) of time on the project site. Additionally, local employment will be prioritized depending on the technical skills of the people from local communities. Therefore, no labor influx is expected due to project activities. Hence, there will be also no sexually transmitted diseases impact because of labor influx.

Exploration well drilling is a short-term project. However, if the drilling results are promising, additional wells will be drilled creating more job opportunities. When the project is developed into the operational phase, there will be more employment opportunities also for longer terms. Thus, the project is expected to have positive effects by creating job opportunities in the region.

4.5.4 Community health and safety impacts

One of the most significant community-safety-risks posed to communities during the project activities is road safety as roads may experience an increase level of traffic, temporary disruption through traffic congestion and/or the transport of oversized loads.

These potential road safety risks will be mitigated via numerous safety measures such as, but not limited to:

- Wherever required in the vicinity of the project site, traffic control via clear signs, flagmen, signals, etc. will be implemented.
- Employees will be trained on this subject. Workers and vehicle drivers will be informed about safe driving.
- It will be ensured that the roads to be used will pass through places where there are no sensitive receivers such as the school and the settlement.
- Project traffic speeds, in line with the Turkish regulations, will be enforced and compliance with speed limits will be ensured.
- Vehicle inspection requirements, operating rules, and procedures will be determined and ensured.
- During transport activities, existing roads will not be harmed. In case of any damage to these structures, the cost of damage will be paid by the contractor.
- Project personnel will use the only project approved traffic routes.

While the traffic increase is the most significant risk posed to the communities during the drilling activities, the risk of exposure to a hazardous material is also present.

The sponsor firm will take precautions to ensure the necessary mitigations. Some of the mitigations measures are as followed, but not limited to:

- All hazardous materials will only be transported/stored/used as per project standards and pertinent regulations and appropriate procedures, e.g., adequate spill kits, bunding, correct labeling, material safety data sheet will be available, etc.
- Emissions of pollutants in air and disposal of wastes and wastewater will comply with national regulations and international standards.
- There will be no discharge of contaminated wastewater to land or water.

- Hydrocarbon or chemical spills/leaks will be promptly contained and cleaned up to minimize their effects and consequences.
- An Emergency Response Plan will be in place before the start of the construction activities

Besides the drilling site is fenced off and entrance to the site by unauthorized people will be prevented.

4.5.5 Local employment and local procurement

Before the start of the activities, at least 15 days, Sponsor will conduct a community awareness meeting following COVID-19 pandemic restrictions to describe the recruitment process in details: employment expectations, duration, employment categories (skilled, skilled-semi and unskilled), job descriptions, code of conduct, the detailed application process, interview locations, dates and conditions of recruitment, etc. Appropriate communication channels will be used to ensure the wide distribution of employment opportunities to all affected communities. Appropriate communication channels include, but are not limited to village headmen, Headmen's office notice boards, mosques, web sites, local press, recruitment leaflets in affected villages, etc.

During community meetings, emphasis will also be put on the temporary nature of work opportunities to ensure that people manage their expectations and understand the consequences of leaving previous job or farming activities to join the project. No hiring will take place at worksites and hiring will only be considered if a formal request is made via the official application procedure.

The recruitment process will prioritize employment from the affected settlements and disadvantaged groups (younger men, all women, disabled people, ethnic minorities, etc.).

Goods and service procurement will be made from the local suppliers as much as possible.

POTENTIAL IMPACTS

Table 6. Potential Impacts – Impact Routes and Impact Level

Definition of Impact/Problem	Affected Component	Potential Impacts	Impact Routes	Mitigation Measures	Impact Level
Domestic solid wastes	Water, Soil, Living Creatures	Visual and Environmental Pollution. If not properly collected and stored, may adversely affect soil quality. Disrupts the quality of underground and surface water if not properly collected and stored. Can attract wild animals to the construction site if irregularly disposed of. Can cause bacterial propagation and adversely affect human health if irregularly disposed of.	For Soil Quality: Initially drilling location, other routes may become important if no action is taken For Water Quality: Any waterbody connected with the source of waste. For Living Creatures: Wildlife in the vicinity of the location and personnel working at the location	Domestic solid wastes should be stored separately from other wastes in sealed and closed garbage containers. Will be collected by the local municipality at certain periods or will be transported to the nearest solid waste storage area (see Annex-A). Employees and interested parties will be warned that it is forbidden to litter lakes and similar receiving environments. Sealed garbage containers shall be located near or within the working area. Personnel and related persons will be warned not to mix it with other wastes.	If the mitigation measures are taken per the national and international regulations, the impact level will be “Negligible”.
Packaging Wastes	Water, Soil, Living Creatures	Visual and Environmental Pollution. If it is not properly collected and stored, it may adversely affect soil quality. Disrupts the quality of underground and surface water if not properly collected and stored. Can attract wild animals to the construction site if irregularly disposed of. Can cause bacterial propagation and adversely affect human health if irregularly disposed of.	For Soil Quality: Initially drilling location, other routes may become important if no action is taken For Water Quality: Any waterbody connected with the source of waste. For Living Creatures: Wildlife in the vicinity of the location and personnel working at the location	Will be collected separately from other wastes to reduce environmental pollution, to make maximum use of landfill facilities, and to contribute to the economy, regardless of the material used and the source to which they are formed. Collection containers (glass, metal, plastic, paper/cardboard, and wood) will be placed in the field of activity where the packaging waste will be collected separately. Signage and written names of the types of wastes that may be confused for recyclable will be posted on the containers. The waste will be separated at the source into containers within the working area, they will be collected by licensed companies or the local municipality.	If the mitigation measures are taken per the national and international regulations, the impact level will be “Negligible”.
Medical Wastes	Water, Soil, Living Creatures	Soil, surface water, and groundwater quality may deteriorate if not properly collected and disposed of. Will cause health problems because through infection and bacterial growth if irregularly disposed of	For Soil Quality: Initially drilling location, other routes may become important if no action is taken For Water Quality: Any waterbody connected with the source of waste. For Living Creatures: Personnel working at the location	Medical wastes will in no way be mixed with other wastes and will be collected in sealed medical bags and delivered to vehicles with medical waste collection license. Medical wastes will be sent to licensed medical waste disposal / medical waste sterilization facilities. In the collection of medical wastes, plastic bags will be used which are leak-proof per the legislation, with special bio-hazard emblem on both sides, and CAUTION MEDICAL WASTE. Wastes that are sharp or penetrating will be collected in boxes or containers that are resistant to puncture, tear, breakage, and explosion separately from other medical wastes. Medical waste bags will be stored in the medical waste container or bucket during the deposition.	If the mitigation measures are taken per the national and international regulations, the impact level will be “Negligible”.

Definition of Impact/Problem	Affected Component	Potential Impacts	Impact Routes	Mitigation Measures	Impact Level
				COVID-19 medical waste will be treated as any other infectious/viral medical waste such as HIV, tuberculosis, measles, etc. Personal hygiene material/equipment wastes (such as single-use masks, gloves) will be collected, temporarily stored, transported, and delivered to waste processing facilities per Circular 2020/12 of Ministry of Environment and Urbanization on COVID-19 Measures in the Management of Personal Hygiene Equipment Wastes.	
Waste Batteries and Accumulators	Water, Soil	Toxic substances in the batteries may leach into water and soil if waste batteries are not stored and disposed of appropriately. Water and soil quality may deteriorate and create environmental pollution.	For Soil Quality: Initially drilling location, other routes may become important if no action is taken For Water Quality: Any waterbody connected with the source of waste.	Waste batteries will be collected separately from other wastes and delivered to collection points that will be created by enterprises or municipalities that distribute and sell battery products. Disposal of waste batteries into the soil and water sources will be prevented.	If the mitigation measures are taken per the national and international regulations, the impact level will be “Negligible”.
End-of-life Tires	Water, Soil, Living Creatures	Severe fires may occur in the uncontrolled areas of the tires. Diseases may spread among the local community by pests and insects finding shelter in uncontrolled used tires	For health: Drilling Location and Surrounds If there is a fire in uncontrolled stacks: Initially, the fire would be at the center of the problem, the probability of spread is very high, causing the impact route to widen.	Waste tires will be delivered to the tire distributor, selling the company or other authorized carriers. Then, it should be provided to the companies that have an environmental license.	If the mitigation measures are taken per the national and international regulations, the impact level will be “Negligible”.
Scrap Waste	Soil, water	Chemical substances in scraps can be dissolved with rainwater, etc., and can be leach into water and soil.	For Water Quality: Any waterbody connected with the source of waste. For Soil Quality: Initially drilling location, other routes may become important if no action is taken	Scraps should be stored temporarily in containers that conform to robust, leak-proof, safe, and internationally accepted standards located over a concrete base.	If the mitigation measures are taken per the national and international regulations, the impact level will be “Negligible”.
Domestic wastewater	Living Creatures, Soil, water	When stored in unsuitable conditions, it can be mixed with surface and groundwater and the quality of the water has deteriorated. In the case of soil leakage, soil quality also deteriorates.	For Soil Quality: Initially drilling location, other routes may become important if no action is taken For Water Quality: Any waterbody connected with the source of waste. For Living Creatures: Everywhere the water reaches and is used is the route of impact.	For the liquid wastes generated from personnel, an impermeable septic tank will be constructed and will be emptied with a vacuum truck when filled. Discharge of wastewaters into the receiving environment will be prevented.	If the mitigation measures are taken per the national and international regulations, the impact level will be “Negligible”.
Liquid wastes (Process Originated)	Living Creatures, Soil, water, air	When stored in unsuitable conditions, it can be mixed with surface and groundwater and the quality of the water has deteriorated. Air quality may also be adversely affected if liquid wastes evaporate. The water may affect the living creatures everywhere (fish in the water, people, etc.).	For Soil Quality: Initially drilling location, other routes may become important if no action is taken For Water Quality: Any waterbody connected with the source of waste. For Living Creatures: Everywhere the water reaches and is used is the route of impact.	Applications related to drilling fluids and well coverings of geothermal drilling operations will be carried out following best practices. Drilling fluid shall be recirculated as much as possible. Drilling fluids (drilling mud) will be collected in a mud pit in the well location. The bottom of the mud pit and closure of the mud pit will be established ensuring impermeability and provided according to Regulation on the Landfill of Wastes.	If the mitigation measures are taken per the national and international regulations, the impact level will be “Manageable”.

Definition of Impact/Problem	Affected Component	Potential Impacts	Impact Routes	Mitigation Measures	Impact Level
				Geothermal drilling muds will be disposed of according to the national regulation (i.e. Regulation on Landfilling of Wastes and Regulation on Waste Management). After the drilling is finished, the remaining solids and liquids will be analyzed in a licensed laboratory to identify the waste type (hazardous, inert, and/or non-hazardous waste) and code. After identification of the waste code, the drilling mud will be carried off-site with licensed tankers to an appropriate landfill facility for disposal. There will be no solid or liquid waste left in the mud pit. **The project company does not plan to establish a landfill.** During well testing, the brine that comes during the well tests will be stored in the mud pit which will be formed according to criteria for Class I Landfills in Regulation on Landfill of Wastes. After that, it will be analyzed to establish the treatment and disposal requirements. If it is found to be hazardous, it will be transported to licensed treatment and disposal facilities in line with legislation. If it is found non-hazardous but that on-site treatment is required, a treatment process at a separate packet wastewater treatment plant will be applied. Then, it will be transported to a suitably licensed wastewater treatment plant with appropriately licensed waste transport tankers. A packet pretreatment plant will be located on-site for pre-treatment of well-testing effluents before final disposal at a nearby treatment plant in case mud pit volume is exceeded. The mud pit will be covered impermeable membrane (geomembrane) meeting the appropriate conditions. All measures will be taken in line with regulations and laws. Impermeability conditions will be provided according to Regulation on the Landfill of Wastes.	
Drilling Muds	Water, Soil	If the drilling mud is mixed with surface and groundwater, there will be negative effects on soil and water quality.	For Soil Quality: Initially drilling location, other routes may become important if no action is taken For Water Quality: Any waterbody connected with the source of waste. For Living Creatures: Everywhere the water reaches and is used is the route of impact.	Drilling mud will be collected in a mud pit with a capacity of 6900 m^3 at the Project Site. Mud pit volume will be enough to collect all liquid drilling wastes. **The bottom of the mud pit and closure of the mud pit will be established according to Regulation on the Landfill of Wastes for Class I Landfills.** **Impermeability conditions in mud pit bottom will be provided according to Regulation on the Landfill of Wastes for Class I Landfills.** Impermeability conditions: The mud pit bottom must have a minimum $K \leq 1.0 \times 10^{-9}$ m / sec and clay or clay group minerals with at least four layers and a total thickness ≥1 m or equivalent. If the geological impermeability layer does not meet these conditions, artificial impermeability material will be used. It will be strengthened by using a geomembrane. A drainage layer with at least K ≥ 1.0 x 10-4m / s permeability will be applied. The total thickness of the impermeable layer to be formed by the impermeable mineral material shall not be less than 0.5 meters.	If the mitigation measures are taken per the national and international regulations, the impact level will be “Manageable”.

Definition of Impact/Problem	Affected Component	Potential Impacts	Impact Routes	Mitigation Measures	Impact Level
				The liquids coming out of the well will be collected in the mud pit. Some of the heavier solids will settle immediately to the bottom of the mud pit. The water mixed with drilling mud and slower settling solids will be collected from the surface of the mud pit and fed into a portable separation unit where solids will be removed through a flocculation/rapid settling process. The clear water will be taken into a separate water tank located in the project site to be reused for drilling. Settled solids will be collected in separate containers to be disposed of appropriately. Reuse of drilling water will reduce water use and overflowing of the mud pit. Geothermal drilling muds will be disposed of according to the national regulation (i.e. Regulation on Landfilling of Wastes and Regulation on Waste Management) **Project company does not plan to establish a landfill.** After the drilling is finished, the remaining solids and liquids will be analyzed in a licensed laboratory to identify the waste type and code. After identification of the waste code, the drilling mud will be disposed of per the national regulation. Landfills have different classes that accept wastes following their hazardous properties/inertness. Accordingly, the drilling mud will be carried off-site with licensed tankers to an appropriate landfill facility. There will be no solid or liquid waste left in the mud pit. Drainage channels will be established around the drilling well area and contamination of surface waters will be prevented. Uncontrolled discharged of the mud from the pit will be prevented.	
Waste oils	Water, Air, Soil, Living creatures	If the waste oil is mixed with water, the water quality deteriorates. Waste oil that is poured into the ground is mixed with groundwater and causes pollution. Waste oils poured into the soil destroying the plants. Plants do not grow in contaminated soil in waste oil. When the waste oils are burned in inappropriate ways, heavy metals mix with air and cause pollution and cause oxygen balance to deteriorate.	For Water Quality: Everywhere the water flows, is within the route. Air Quality: close vicinity of the place where the drilling process is carried out (generally the vicinity of the drilling location) For Soil Quality: Initially drilling location, other routes may become important if no action is taken For Living Creatures: Everywhere the water reaches and is used is the route of impact.	Waste oils shall be stored in red-colored tanks/containers with a leak-proof and sealed lid. The containers will have the necessary means for cleaning solid or slurry deposits which may be collected at their bottom. These tanks/containers shall be on the reinforced concrete floor with a thickness of at least 25 cm, which is coated with epoxy paint, geomembrane, etc., to provide impermeability to spills. Maintenance/oil change will be made on the leak-proof surface in the operating area, protected from the rain. Waste oil that is accidentally spilled during the maintenance and oil changes in the field of operation and on the sealed floor, will be disposed of with absorbent materials on the concrete floor before reaching the receiving environment and disposed of per the provisions of the Waste Oil Control Regulation. Waste oil will be prevented from pouring into water sources or soil. The burning of waste oils will be prevented.	If the mitigation measures are per the national and international regulations, the impact level will be “Negligible”.

Definition of Impact/Problem	Affected Component	Potential Impacts	Impact Routes	Mitigation Measures	Impact Level
				Analyzes will be made per the Waste Oil Control Regulation. Waste oils will be disposed of by sending them to licensed recycling or disposal facilities according to the results of the analysis. The oils of different categories will not be mixed and they will be given to licensed waste oil collectors, plants, or collection points.	
Potential effects of mixing geothermal fluid with surface waters and groundwater	Groundwater aquifers	In geothermal drillings, geothermal fluid can contaminate the aquifers through leaks in the well structure if the application is not done properly. Decreases the well efficiency. With the removal of geothermal fluid, a decrease in underground aquifers can occur.	For Water Quality: Everywhere the water flows, is within the route.	Drilling fluid arrangements and well coverings of geothermal drilling will be carried out following best practices. According to the latest technology, the well will be cemented and coated with steel pipes to prevent contamination of the groundwater. The aquifer tests will be best applied and the re-injection well planning for the production period will be performed properly. During well testing, the brine that comes during the well tests will be stored in the mud pit. After that, it will be analyzed to establish the treatment and disposal requirements. If it is found to be hazardous, it will be transported to licensed treatment and disposal facilities in line with legislation. If it is found non-hazardous but that on-site treatment is required, a treatment process at a separate packet wastewater treatment plant will be applied. Then, it will be transported to a suitably licensed wastewater treatment plant with appropriately licensed waste transport tankers. A package pretreatment plant will be located on-site for pre-treatment of well-testing effluents before final disposal at a nearby treatment plant in case mud pit volume is exceeded. A contract will be signed with a treatment company for the on-site treatment process (packet wastewater treatment plant described above). Another contract will be signed with a treatment plant for accepting and treating the pretreated liquid phase. During the drilling and the well tests, measures will be taken to ensure that surface water and groundwater will not be mixed into the mud pit. In compliance with Article 16-4 of the Regulation on Landfill of Wastes, drainage channels will be established around the borehole area and contamination of surface and underground waters will be prevented. Uncontrolled discharged of the mud from the pit will be prevented.	If the mitigation measures are taken per the national and international regulations, the impact level will be “Manageable”.
Dust Emission	Living Creatures, air	Dust emission results in poor air quality. Dust can accumulate in the body, leaf, etc. organs of plant species, preventing both respiration and photosynthesis.	Air Quality: Dust emission can affect nearby air quality if mitigation measures are not taken.	To prevent environmental contamination during transportation, the truck beds will be covered with suitable material (tarpaulin, etc.). Vehicles will not be loaded above capacity.	If the mitigation measures are taken per the national and international regulations, the impact level will be “Negligible”.

Definition of Impact/Problem	Affected Component	Potential Impacts	Impact Routes	Mitigation Measures	Impact Level
		Besides, dust can accumulate in the places where the vegetative organs of the plant, such as flowers, can accumulate and prevent the plant from reproducing and growing.	Land: Dust emission may affect nearby farmland and production in these fields if mitigation measures are not taken. Living Creatures: Dust emission can affect the nearby flora if mitigation measures are not taken.	If necessary, water sprinkling will be done for dust suppression. Speed limitation will be introduced to the vehicles that will move in the activity area and on the roads. During the transport of materials to the site, water spraying and washing of the wheels of the vehicles will be carried out periodically to prevent dust emissions.	
Noise	Living Creatures	Noise is defined as unwanted sound. Therefore, the sound level above the limit values is effective in a negative way on the health of the community living and the staff working in the environment. It also affects the social lives of people living in and around the activity area.	The noise limit values are 45 dBA according to the WBG EHS Guidelines. This limit value is ensured at 1000 m from the well. The noise limit values are 70 dBA according to national legislation. This limit value is ensured at 90 m from the well.	Noise-reducing silencers will be installed in vehicles and equipment if not already present. Truck drivers will be trained to use the horns as little as possible. Annual examination of the vehicles will be ensured. It shall be ensured that the vehicles will not disturb the environment, and they will not be allowed to install light and sound equipment that will disturb their surroundings. Speed limits and axle load limits will be enforced diligently. Noise reduction and noise isolation barriers will be used in line with the Regulation on the Assessment and Management of Environmental Noise if any noise complaint is received. (In the project, a grievance mechanism was established as part of stakeholder engagement activities.) Transport activities on the settlement routes will be planned to reduce the noise impact at certain time intervals Workers will be trained to minimize the source of the noise. Unnecessary use of machines and equipment causing noise will be prevented. The vehicles that are not currently in use will be stopped. Measurements will be made for monitoring purposes and recorded once a month and in case of complaint. If necessary, a noise barrier will be installed.	If the mitigation measures are taken per the national and international regulations, the impact level will be “Negligible”.
Gas Emissions	Living Creatures, air	H_2S is a smelly and toxic gas that creates health and safety problems. It negatively affects air quality.	Drilling location and close surroundings	Monitoring and warning systems for gas emissions are required. The maintenance of the systems will be carried out regularly. Employees will be trained on this subject. An Emergency Action Plan will be prepared for the control of safety planning and uncontrolled gas emissions. There will be detectors for monitoring. The values of gases will be read and recorded at hourly intervals.	If the mitigation measures are taken per the national and international regulations, the impact level will be “Negligible”.

Definition of Impact/Problem	Affected Component	Potential Impacts	Impact Routes	Mitigation Measures	Impact Level
				Hydrogen sulfide monitoring will be done by using portable or fixed detectors that have a warning system Carbon dioxide monitoring will be done with portable detectors by measuring its levels in the air	
Exhaust Emissions	Living Creatures, Air	They deteriorate air quality and effect living creatures.	Drilling location and surroundings Transportation Routes	Exhaust gas emission measurement of the vehicles will be diligently checked. New and well-maintained vehicles will be used to control the gas emissions to be generated within the scope of the activity. Exhaust gas measurements of all work machines to be used shall be made in appropriate periods. Unnecessary use of machinery and equipment causing emissions will be prevented.	If the mitigation measures are taken per the national and international regulations, the impact level will be “Negligible”.
Well Blowout	Living Creatures, Air	Well, Blowout leads to the release of toxic liquids (containing chemical and heavy metals) and gases (e.g. hydrogen sulfide) into the environment,	Drilling location and surroundings	Blowout prevention equipment (BOPE) will be used. It consists of combinations of valves, rams, packers, and rotating heads enabling control of fluids and gases that could flow from the well. The pressure will be measured by checking the safety valves and taking the measurements. During the drilling, if there is a sudden liquid flow through the well, the pressure to the well will be increased. If this is considered insufficient, the wellhead shall be closed with the closing unit. An Emergency Action Plan will be prepared for security planning and control of the explosion.	Measures should be taken to prevent the event. Even if the action is realized, the effect level will be at a “Significant” level.
Land Use	Living Creatures, water, soil	Soil erosion may occur if the land clearing is not carried out with a good management plan. A reduction in soil quality occurs. Animals in the environment can affect grazing activities. Uncontrolled land clearing activities may affect water resources in the long term. If people are living nearby, they can be socially affected negatively	Drilling location	Topsoil will be stored separately from the excavation material in an area to be determined on-site and re-laid when the activity is completed. The excavation material will be stored in a planned manner, then again used for landscaping. The land use activity will be carried out with good management practice. Existing roads will be used and no new roads will be constructed unnecessarily.	If the mitigation measures are taken per the national and international regulations, the impact level will be “Less Important”.
Sensitive Areas	Cultural areas Sensitive Areas	Deterioration/destruction of unknown sensitive areas	Drilling location and surroundings	The closest cultural heritage site to the project site is the Kızılkilise 3rd-degree archeological protected site. The distance	

Definition of Impact/Problem	Affected Component	Potential Impacts	Impact Routes	Mitigation Measures	Impact Level
	Protected Areas Historic areas			between the well site and the Kızılkilise is around 1.5 km. Additionally, Manastır Valley Archeological and Natural Protection Area is around 4 km northwest of the well location. If any historical, cultural, or archaeological assets are encountered in the excavations, according to Article 4 of the Law on Protection of Cultural and Natural Heritage Numbered 2863, the work on the site will be stopped and the related Museum Directorates will be notified immediately. No one shall be allowed to remove or enter the historical monuments. The activities shall be resumed once the controls have been carried out and the written approvals of the competent authorities have been obtained. Employees will be trained on this subject. Besides, there is no intangible cultural heritage (resources) has been observed in the project area. If an intangible cultural heritage is encountered measures will be taken to ensure that the project does not effect these values.	If there is no sensitive area within the working area, In the case of taking mitigation, measures, and working per the national and international legislation, the impact level will be at a level of "Insignificance".
Flora-Fauna	Living Creatures	Negative impacts on the surrounding ecosystem may occur if mitigation measures are not taken.	Drilling location and surroundings	A Biodiversity Assessment Study (consisting of literature and field studies) was conducted for the project and the findings of this study were used to prepare a Biodiversity Management Plan to better manage the potential biodiversity impacts of the project. Biodiversity Management Plan will be implemented throughout the Project lifetime. Existing roads will be used and no new roads will be constructed unnecessarily. To minimize the loss of habitat, as much as possible, unnecessary space utilization and destruction will be prevented. Visual controls will be carried out during the activity. If any wild animals are encountered, they will either be allowed to leave the area safely or will be transported to safer habitats nearby with appropriate methods. Employees will be trained to be aware of; how to avoid disturbance of the local habitat, and what to do if they come across any protected or unprotected species	If the mitigation measures are taken per the national and international regulations, the impact level will be "Less Important".
Aesthetics and Landscaping	Land	Activities related to geothermal drilling can cause visual pollution as it changes the natural environment	Drilling location	The layout will be designed in line with the general landscape of the area. Good housekeeping will be implemented. The location area will be revegetated after the drilling process. Although there are no trees originally, trees will be planted to support the local ecosystem. Disposal of waste will be done per the legislation.	If the mitigation measures are taken per the national and international regulations, the impact level will be "Less Important".

Definition of Impact/Problem	Affected Component	Potential Impacts	Impact Routes	Mitigation Measures	Impact Level
Communication with local people	Human	Local communities in the vicinity may have concerns about the activities.	Nearest settlements	A stakeholder Engagement Plan will be implemented. Stakeholder engagement will be continued to disseminate information about the project and to collect comments and complaints from the stakeholders. A grievance mechanism was established so that the concerns and complaints of the affected communities can be gathered and resolved (related to the sponsor's environmental and social performance). It will be developed and updated according to needs. To provide information about each phase of the project, a transparent public information mechanism will be established through the website, notice boards, telecommunication tools, and public meetings. To receive feedback from affected communities, a well-designed and structured questionnaire will be prepared. The efforts to identify vulnerable populations in the nearby settlements will be continued. If identified, special attention will be paid to engage with these groups.	If the mitigation measures are taken per the national and international regulations, the impact level will be “Less Important”.
Occupational Health and Safety	Personnel	The health and safety of the personnel will be negatively affected if ; Wastes are not managed appropriately, National and International OHS measures (including COVID-19 measures) not taken,	Drilling location	Monitoring and warning systems shall be established for gas emissions. Training will be given to the employees on occupational health and safety. Workers will be provided with an information booklet or other easily accessible information about the chemical composition of liquid and gaseous phases and will be trained on their potential impact on human health and safety. Where workers are in danger of contact with hot equipment (such as production equipment and pipes), a protective shield will be applied to the hot surfaces. When necessary, personnel will use personal protective equipment such as insulated gloves and shoes. Personnel will be trained in the use of Personal Protective Equipment Material safety data sheets for chemical substances such as bentonite (a natural clay), xanthan gum, starch, cellulose derivatives and solid barium sulfate used in the facility will be in a place where personnel can easily reach. Staff will be provided with first aid training Staff will be trained on fire fighting All employees will be received training on emergency conditions	Measures must be taken per national and international regulations. The impact level is significant when there is a case in the area of Occupational Health and Safety.

Definition of Impact/Problem	Affected Component	Potential Impacts	Impact Routes	Mitigation Measures	Impact Level
				Emergency drills will be implemented periodically. It will be checked whether all employees attend. Face coverings will be available and should be worn by employees in -an enclosed space; -where social distancing isn't always possible; and -where they come into contact with others they do not normally meet. All in-person meetings will be limited. To the extent possible, meetings will be conducted by telephone or online. During any in-person meetings, avoid gathering in groups of more than 10 people and participants must remain at least two (2) meters apart. Employees accommodated on-site should be required to minimize contact with people near the site, and in certain cases be prohibited from leaving the site for the duration of their contract, so that contact with local communities is avoided. COVID-19 guidance issued by relevant authorities, both national and international (e.g. WHO), will be strictly followed on site. A grievance mechanism will be established for workers so that the concerns and complaints of the workers (including any health issues such as Covid-19) can be gathered and resolved. It will be developed and updated according to needs.	
Local Community Health and Safety	Humans	Accidents occurring at the project site, improperly disposed of wastes, noise, gas emissions, and other factors (such as the COVID-19 pandemic) may negatively affect the health and safety of the local community if not managed properly.	People living in the nearest settlements	Monitoring and warning systems for gas emissions will be used for H_2S. A monitoring system will be used for CO_2. All hazardous materials will only be transported/stored/used as per project standards and pertinent regulations and appropriate procedures, e.g., adequate spill kits, bunding, correct labeling, material safety data sheet will be available, etc. Emissions of pollutants in air and disposal of wastes and wastewater will comply with national regulations and international standards If noise emissions are determined to exceed the limit values, a suitable noise barrier shall be installed. There will be no discharge of contaminated wastewater to land or water. Hydrocarbon or chemical spills/leaks will be promptly contained and cleaned up to minimize their effects and consequences. An Emergency Response Plan will be in place before the start of the construction activities	Measures must be taken per national and international regulations. The impact level is significant when there is a case about public health.

Definition of Impact/Problem	Affected Component	Potential Impacts	Impact Routes	Mitigation Measures	Impact Level
				The perimeter of the project site and the surroundings of the mud pit will be surrounded by a wire fence. No unauthorized person shall be allowed to enter the project site. The grievance mechanism was established. During the activity period, it will be implemented to get the grievances and opinions of the local people. Engagement with all stakeholders will continue throughout the project. Information signs about situations that threaten public health will be hung and emergency contact information will be displayed at the project location. Work will be carried out in coordination with local health units. Employees accommodated on-site should be required to minimize contact with people near the site, and in certain cases be prohibited from leaving the site for the duration of their contract, so that contact with local communities is avoided. Communications should be clear, regular, based on fact, and designed to be easily understood by community members. Communications should utilize available means. In most cases, face-to-face meetings with the community or community representatives will not be possible. Other forms of communication should be used; posters, pamphlets, radio, text messages, electronic meetings. The means used should take into account the ability of different members of the community to access them, to make sure that communication reaches these groups. The local community should be made aware of procedures put in place at the site to address issues related to COVID-19. This should include all measures being implemented to limit or prohibit contact between employees and the community. The local community should be made aware of the procedure for entry/exit to the site, the training being given to employees, and the procedure that will be followed by the project if an employee becomes sick. If project representatives, contractors, or employees are interacting with the community, they should practice social distancing and follow other COVID-19 guidance issued by relevant authorities, both national and international (e.g. WHO).	
Increase in Traffic Load	Living Creatures and Social Life and environment	Increasing Traffic Load has both environmental and social impacts.	Transportation Routes	Traffic Management Plan was prepared but it will be updated by the contractor. It will be ensured that the traffic management plan is abided by.	If the mitigation measures are taken per the national and international regulations, the impact level will be “Negligible”.

Definition of Impact/Problem	Affected Component	Potential Impacts	Impact Routes	Mitigation Measures	Impact Level
				Employees will be trained on this subject. It will be ensured that the roads to be used will pass through places where there are no sensitive receivers such as the school and the settlement. Security and traffic warning signs will be placed on the project site and its surroundings. Compliance with speed limits will be ensured. Workers and vehicle drivers will be informed about safe driving. In cases such as safe loading/unloading and load limits, operators who will use special vehicles such as forklifts will be trained and licensed on safe use. The right of way, field speed limits, vehicle inspection requirements, operating rules, and procedures will be determined and ensured. During transport activities, existing roads will not be harmed. In case of any damage to these structures, the cost of damage will be paid by the contractor.	
Abandonment of Field of Activity	Living Creatures, Natural life	The natural life and social life will be affected if the rehabilitation is not done properly when the activity area is closed.	Drilling location	If the exploration activities are positive, the drilling holes will be valved until the production stage. After all, operations are finished, the mud pit will be filled with excavation materials and covered with vegetative soil which was stripped and stored separately during land preparation. The area will be replanted per the natural vegetation. If the presence of geothermal resources cannot be determined, the well will be closed with concrete and rehabilitation will be carried out following the characteristics of the land. After the end of the activity, it is planned to lay vegetative soil and plant trees suitable for growing in the field and to restore nature. In terms of the success of the rehabilitation, the selection of species for planting and afforestation will be taken into account, the species will be adapted to the climatic conditions of the area, the need for less water and fertilizers, and the species that compete with the tree species to be occupied and planted. The species to be selected will prevent erosion in the area and be fast-growing species to cover the damage caused by the operation. After the drilling operation, the sealed septic tank will be removed	If the mitigation measures are taken per the national and international regulations, the impact level will be “Negligible”.

Definition of Impact/Problem	Affected Component	Potential Impacts	Impact Routes	Mitigation Measures	Impact Level
				The waste bins in this area will be removed at the end of the activity and the site will be abandoned by taking necessary security measures.	

5.0 Mitigation Plan

Table 7. Mitigation Plan

Stage	Activity	Impact Definition/Subject	Mitigation Measure	Cost	Responsibility	Legal Framework
Preparation for Mobilization	**Preparation**	Preparation of Documentation and Management Plans Permits	• The Hazardous Materials Management Plan will be prepared specifically for the site by Drilling Contractor before mobilization • Effluent Management Plan will be prepared specifically for the site by Drilling Contractor before mobilization. The baseline measurements will be described in the effluent management plan • Emergency Response Plan to be updated • Occupational Health and Safety Plan to be updated • Traffic Management Plan to be updated • COVID-19 Exposure Prevention, Preparedness, and Response Plan to be updated • Waste Management Plan to be updated • Stakeholder Management Plan to be updated • Water usage permit will be taken in case make-up water will be obtained from groundwater well (before mobilization).	Included in Project Cost	Drilling Contractor's Site Management	WB OP.4.01
Exploration	**Land Preparation**	Collection of excavated material	• The topsoil will be stored in an area to be determined in the field separately from the excavation material and re-laid when the activity is completed. • In order not to lose the yield of the topsoil will be kept moist. • The excavation material will be stored in a planned manner, and reused for the rehabilitation of the areas. • Excavation soil shall be kept closed. • The land use activity will be carried out with good management practice. • Existing roads will be used and will not construct unnecessarily. • Plantation will be done to prevent erosion. • Surface stabilization will be ensured after the off-road activity. • Within the context of prevention and control of soil pollution, waste will not be mixed with excavation material and herbal soil	Included in Construction Cost	Project Sponsor through Contractor's Site Manager	Regulation On Control of Excavation, Construction and Demolition Wastes Regulation on Soil Pollution Control and Contaminated Sites by Point Source WB OP.4.01 EBRD PR1, PR3 IFC PS1, PS3
	Land Preparation	Erosion-Runoff				
	Drilling Mud-pit Construction	Collection of excavated material				
Exploration	**Land Preparation & Drilling Works**	**Domestic Solid Wastes**	• Domestic solid wastes should be stored separately from other wastes in sealed and closed garbage containers. • It will be given to the municipality at certain periods or will be transported to the nearest solid waste storage area. • Employees and interested parties will be warned that it is forbidden to pour into lakes and similar receiving environments. • Sealed garbage containers shall be located near or within the working area. • Personnel and related persons will be warned not to be confused with other wastes. Waste management plan will be implemented.	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	Regulation on Waste Management EBRD PR3 EU Waste Framework Directive (2008/98/EC) IFC PS1, PS3 WB OP.4.01
Exploration	**Land Preparation & Drilling Works**	**Packaging Wastes**	• Packaging wastes will be collected separately from other wastes to reduce environmental pollution, to make maximum use of landfill facilities, and to contribute to the economy, regardless of the material used and the source to which they are formed. • Piggybank (glass, metal, plastic, paper/cardboard, and wood) will be placed in the field of activity where the packaging waste is separated separately.	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	Regulation on Waste Management Regulation on Control of Packaging Waste EBRD PR3

Stage	Activity	Impact Definition/Subject	Mitigation Measure	Cost	Responsibility	Legal Framework
			• The types of waste that must be collected on the piggy bank and which should not be collected inside shall be indicated as figure and letter. • Disposal and separation of waste shall be made in the separate piggy bank, within the working area, then to the companies which have an environmental license or to the collection system of the municipality • Waste management plan will be implemented.			EU Waste Framework Directive (2008/98/EC) IFC PS1, PS3 WB OP.4.01
Exploration	**Land Preparation & Drilling Works**	**Medical Wastes**	• Medical wastes will in no way be mixed with other wastes and will be collected in sealed medical bags and delivered to vehicles with medical waste collection license. • Medical wastes will be sent to medical waste disposal / medical waste sterilization facilities which have environmental permits and licenses. • In the collection of medical wastes, plastic bags are used which are leak-proof per the legislation, with special bio-hazard emblem on both sides, and CAUTION MEDICAL WASTE. • Wastes that are cutting and penetrating are collected in boxes or containers that are resistant to puncture, tear, breakage, and explosion apart from other medical wastes. • Medical waste bags are stored in the medical waste container or bucket during the deposition. • COVID-19 medical waste will be treated as any other infectious/viral medical waste such as HIV, tuberculosis, measles, etc. • Personal hygiene material/equipment wastes (such as single-use masks, gloves) will be collected, temporarily stored, transported, and delivered to waste processing facilities per Circular 2020/12 of Ministry of Environment and Urbanization on COVID-19 Measures in the Management of Personal Hygiene Equipment Wastes. • Waste management plan will be implemented.	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	Regulation on Waste Management Regulation on Control of Medical Waste EBRD PR3 EU Waste Framework Directive (2008/98/EC) IFC PS1, PS3 WB OP.4.01
Exploration	**Land Preparation & Drilling Works**	**Waste Oils**	• Waste oils shall be stored in red-colored tanks/containers with a leak-proof and sealed oil which has the necessary means for cleaning solid or slurry deposits that may be collected at their bottom. • These tanks/containers shall be on the reinforced concrete floor with a thickness of at least 25 cm, which is coated with epoxy paint, geomembrane, etc., to provide impermeability to spills. • Maintenance/oil change will be made on the leak-proof surface in the operating area, in the rain-free environment. • Waste oil that is accidentally poured during the maintenance and oil changes in the field of operation and on the sealed floor, will be disposed of with absorbent materials on the concrete floor before reaching the receiving environment and disposed of per the provisions of the Waste Oil Control Regulation. • Waste oil will be prevented from pouring into the water source, sewer system, or soil. • The burning of waste oils will be prevented. • Analyzes shall be made per the Waste Oil Control Regulation and shall be disposed of by sending to environmental permits and licensed disposal or licensed recycling facilities according to the results of the analysis. • The oils of different categories will not be mixed and they will be given to waste oil collectors, plants, or collection points that have been licensed. • The Hazardous Materials Management Plan will be prepared specifically to the site by the Drilling Contractor's Site Management before mobilization at the site in line with the principles set out in this document, once the contractor is selected. • Waste management plan will be implemented.	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	Regulation on Waste Management Regulation on Control of Waste Oils EBRD PR3 EU Waste Framework Directive (2008/98/EC) IFC PS1, PS3 WB OP.4.01
Exploration	**Land Preparation &**	**Waste Batteries and Accumulators**	• Waste batteries will be collected separately from other wastes and delivered to collection points that will be created by enterprises or municipalities that distribute and sell battery products.	Included in Project Cost	**Project** Sponsor through	Regulation on Control of Waste Batteries and Accumulators

Stage	Activity	Impact Definition/Subject	Mitigation Measure	Cost	Responsibility	Legal Framework
	Drilling Works		• Disposal of waste batteries into the soil and the sea will be prevented. • Waste management plan will be implemented.		Contractor's Site Manager	Regulation on Waste Management EBRD PR3 EU Waste Framework Directive (2008/98/EC) IFC PS1, PS3 WB OP.4.01
Exploration	**Land Preparation & Drilling Works**	**End-of-life Tires**	• In the event of end-of-life tires, these tires will be delivered to the tire distributor, selling a company or authorized carriers. • Waste management plan will be implemented.	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	Regulation on Waste Management Regulation on Control of End-of-Life Tires EBRD PR3 EU Waste Framework Directive (2008/98/EC) IFC PS1, PS3 WB OP.4.01
Exploration	**Land Preparation & Drilling Works**	**Scrap Wastes**	• Scrap wastes should be stored temporarily in containers that conform to robust, leak-proof, safe, and internationally accepted standards. • Then, it should be provided to the companies that have an environmental license. • Waste management plan will be implemented.	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	Regulation on Waste Management EBRD PR3 EU Waste Framework Directive (2008/98/EC) IFC PS1, PS3 WB OP.4.01
Exploration	**Land Preparation & Drilling Works**	**Liquid wastes (Based on Personnel)**	• For the liquid wastes generated from personnel, the septic tank shall be done and shall be drawn with a vacuum truck when filled. • The opinion was received from the relevant municipality. (an opinion that these wastes may be withdrawn by the municipality) • Discharge of contaminated water into the receiving environment will be prevented. • Effluent Management Plan will be prepared specifically for the site by the Drilling Contractor before site mobilization in line with the principles set out in this document, once the contractor is selected. The baseline measurements will be described in the effluent management plan.	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	Regulation on Control of Water Pollution Regulation on the Monitoring of Surface Waters and Groundwater Regulation on Protection of Groundwater against Pollution and Deterioration EBRD PR3, PR4, and PR6 IFC PS1, PS3 WB OP.4.01
Exploration	**Drilling Works**	**Liquid wastes - Drilling Mud (Process)**	• Applications related to drilling fluids and well coverings of geothermal drilling operations will be carried out under best practices. • Drilling fluid shall be used as recirculated as possible. • Drilling fluid (drilling mud) will be collected in a mud pit in the well location. Mud pit volume will be sufficient to collect all liquid drilling wastes. • This mud pit will be covered with an impermeable membrane (geosynthetic clay and geomembrane) which have met the appropriate impermeability conditions defined below on Regulation on Landfill of Wastes. • The waste analysis will be done by licensed laboratories. After identification of the waste code, the drilling mud will be disposed of per the national regulation. • Impermeability conditions:	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	Regulation on Control of Water Pollution Regulation on the Monitoring of Surface Waters and Groundwater Regulation on Protection of Groundwater against Pollution and Deterioration EBRD PR3, PR4, and PR6

Stage	Activity	Impact Definition/Subject	Mitigation Measure	Cost	Responsibility	Legal Framework
			The mud pit bottom must have a minimum K ≤ 1.0 x 10-9 m / sec and thickness ≥1 m or equivalent. If the geological impermeability layer does not meet these conditions, artificial impermeability material will be used. It will be strengthened by using a geomembrane. The total thickness of the impermeable layer to be formed by the impermeable mineral material shall not be less than 0.5 meters. A drainage layer with at least K ≥ 1.0 x 10-4m / s permeability will be applied. • Drainage channels will be formed around the borehole and contamination of surface waters will be prevented • Effluent Management Plan will be prepared specifically for the site by the Drilling Contractor before site mobilization in line with the principles set out in this document. The baseline measurements will be described in the effluent management plan.			WB OP.4.01 Regulation on Waste Management Regulation on the Landfill of Wastes IFC PS1, PS3
Exploration	**Land Preparation & Drilling Works**	**Excavation Wastes**	• The excavation material will be stored in a planned manner, then again used to correct the areas. • Excavation soil shall be kept closed. • The land use activity will be carried out with good management practice. • Waste management plan will be implemented.	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	Regulation On Control of Excavation, Construction and Demolition Wastes EBRD PR3
Exploration	**Drilling Works**	**Contamination of Surface and Groundwater**	• Applications related to drilling fluids and well coverings of geothermal drilling operations will be carried out following best practices. • According to the latest technology, the well will be cemented and coated with steel pipes to prevent contamination of the groundwater. • The aquifer tests will be best applied and the re-injection well planning for the production period will be performed properly.	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	Regulation on Control of Water Pollution Regulation on the Monitoring of Surface Waters and Groundwater Regulation on Protection of Groundwater against Pollution and Deterioration EBRD PR1, PR4, PR6 WB OP.4.01 WB OP.4.07
Exploration	**Land Preparation & Drilling Works**	**Soil Pollution**	• All chemical materials used for drilling operations such as bentonite (a natural clay), xanthan gum, starch, cellulose derivatives, and solid barium sulfate used will be stored in their packaging. • Chemical materials shall be stored on a sealed concrete floor that has at least 25 cm thickness. (There are Material Safety Data Sheets (MSDS) for every chemical material. There may be some specific storage conditions for chemical material. These conditions are written on MSDS. Therefore firstly, the MSDS of the material should be read. After that, the materials should be stored. If there are specific conditions for storage, they should also be applied.) • Waste oil stored tanks shall be stored on a sealed floor that has at least 25 cm thickness. The sidewalls of the storage area should be covered with epoxy paint and geomembrane to ensure impermeability. • Absorbent pads or materials will be used on storage floors, if necessary. (Absorbent pads or materials will be available at the site to be used immediately when needed)	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	EBRD PR3 EU Waste Framework Directive (2008/98/EC) IFC PS1, PS3 Regulation on Health and Safety in Work with Chemicals Regulation on Waste Management Regulation on Soil Pollution Control and Contaminated Sites by Point Source WB OP.4.01
Exploration	**Land Preparation &**	**Dust Emissions**	• To prevent environmental contamination during transportation, the truck bed shall be covered with suitable material (tarpaulin, etc.). • Vehicles will not be loaded above capacity. • If necessary, irrigation will be done, and dust will be suppressed. • Unloading will be done carefully.	Included in Project Cost and Construction Cost	**Project** Sponsor through Contractor's Site Manager	Regulation on Air Quality Assessment and Management Regulation on Industrial Air Pollution Control

Stage	Activity	Impact Definition/Subject	Mitigation Measure	Cost	Responsibility	Legal Framework
	Drilling Works		• Speed limitation will be introduced to the vehicles • During the transport of materials to the site, water spraying and washing of the wheels of the vehicles will be carried out periodically to prevent dust emissions			WB OP.4.01
Exploration	**Drilling Works**	**Gas Emission**	• Monitoring and warning systems for gas emissions are required. (Generally, for detecting gas emissions, detectors are generally present in the area. If there is no detector, it will be installed. It will be monitored hourly and daily using these detectors. Alert systems will be installed utilizing programs related to these detectors.) For H_2S a monitoring and warning detector, and for CO2, a monitoring detector will be used • The maintenance of the systems will be carried out regularly. • Employees will have training on potential gas emissions, monitoring systems, and emergencies related to gas emissions. • An Emergency Action Plan will be prepared to control security planning and uncontrolled gas emissions.	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	Regulation on Air Quality Assessment and Management Regulation on Industrial Air Pollution Control Regulation on Monitoring the Emissions of Greenhouse Gases WB OP.4.01
Exploration	**Land Preparation & Drilling Works**	**Exhaust Emissions**	• Exhaust gas emission measurement of the vehicles to be used and emission stamps will be taken into consideration. • New and well-maintained vehicles will be used to control the gas emissions to be generated within the scope of the activity. • Exhaust gas measurements of all work machines to be used shall be made in certain periods. • Unnecessary use of machinery and equipment causing emissions will be prevented.	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	Regulation on Exhaust Gas Emission Control WB OP.4.01
Exploration	**Land Preparation & Drilling Works**	**Noise**	• Vehicles without noise reduction silencers will not be used for the project • Training, stimulation, and awareness-raising of truck drivers will be ensured to prevent the use of horns unless required for safety reasons. • The annual examination of the vehicles will be controlled and enforced • It shall be ensured that the vehicles will not disturb the environment, and they will not be allowed to install light and sound equipment that will distract attention, apart from those required for legal and security reasons. • Extra attention will be paid not to allow vehicles to exceed the transport speed limits, attention shall be paid not to exceed the limits in the load on the axle weights of the vehicles. • In the project area, if there is a complaint to decrease the noise level and if necessary, the noise reduction and noise isolation barriers will be used within the scope of the Regulation on the Assessment and Management of Environmental Noise. • Transport activities on the settlement routes will be programmed to reduce the noise impact at certain time intervals (such as at night, or weekends) • Workers will be informed to minimize the source of the noise. • Besides, unnecessary use of machine-equipment causing noise will be prevented. Idling of the vehicles that are not currently in use will be prevented. • Measurements shall be made for monitoring purposes. If necessary, a noise barrier will be installed. Monitoring will be conducted in case of complaint. Noise measurement equipment will be located on one point around the well site and one point nearest receptor (home etc.) 5 minutes of measurements will be made at these defined points. Then it will be compared with baseline measurements.	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	Regulation on Assessment and Management of Environmental Noise Regulation on Noise Emission in the Environment Created by Outdoor Equipment EU Environmental Noise Directive (2002/49/EC) IFC PS WB OP.4.01
Exploration	**Drilling Works**	**Well Blowout / Accidents**	• Blowout prevention equipment (BOPE) will be used. It consists of combinations of valves, rams, packers, and rotating heads enabling control of fluids and gases that could flow from the well. • In the geothermal drilling operation, the pressure will be measured by checking the safety valves and taking the measurements.	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	

Stage	Activity	Impact Definition/Subject	Mitigation Measure	Cost	Responsibility	Legal Framework
			• During the drilling, if the pressure suddenly flows through the well, the pressure to the well will be increased. If not enough, the wellhead shall be closed with the closing unit. • An Emergency Action Plan will be prepared and updated specifically to the site by the Drilling Contractor's Site Management before mobilization at the site in line with the principles set out in this document, once the contractor is selected. • All employees will receive training in emergency conditions. Emergency drills will be implemented periodically.			
Pre-Construction	Land Preparation	**Affecting / Destruction of Sensitive Areas**	An official letter was written to the Provincial Directorate of Culture and Tourism of Aksaray for Kızılkilise about the drilling location and the official answer from the institution is awaited (see Annex A). This plan and cultural heritage management plan will be updated according to the official answer, as appropriate.	Included in Project Cost	Project Sponsor	World Bank OP 4.11 IFC PS 8 EBRD PR8 WB OP/BP.4.11
Exploration	**Land Preparation & Drilling Works**	**Affecting / Destruction of Sensitive Areas**	• If any historical, cultural, or archaeological assets are encountered in the excavations, the work on the site will be stopped and the related Museum Directorates will be notified immediately. No one shall be allowed to remove or enter the historical monuments. • The activities shall be resumed once the controls have been carried out and the written approvals of the competent authorities have been obtained. • Employees will be trained on this subject. • The Chance Find Procedure shall be applied. • All Project personnel, including contractors, will be trained on the implementation of the Chance Find Procedure. • In the reports given to the local people, random finds will be included. • The Cultural Management Plan will be abided.	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	World Bank OP 4.11 IFC PS 8 EBRD PR8 WB OP/BP.4.11
Exploration	**Land Preparation & Drilling Works**	**Habitat loss Influence of Natural Life (Flora - Fauna)**	• Existing roads will be used. • To minimize the loss of habitat, unnecessary space use, and destruction will be prevented. • Dust emission may accumulate in the places where vegetative organs of the plant are located, such as flowers, and may prevent the plant from reproduction and reproduction. To prevent this situation, irrigation work will be carried out to suppress dust emissions. • Animal species (small mammals, biodiversity, and reptiles) encountered in the field of activity will be directed to suitable habitats outside the boundaries of the site. (at the stage of land preparation) • During the activity, visual controls will be performed, and animals will be transported to similar life areas with appropriate methods from these areas. • Employees will be trained on this subject by expert biologists. • The species detected around the project area are not classified as Critically Endangered, Endangered, Vulnerable, endemic, or Near Threatened in Turkey • Monitoring studies for animal taxons will be carried out in the seasons given in Biodiversity Management Plan to determine whether our project has an impact on plant species in or around our site • Any fauna species that will continue to live in the project site impact area will not be intervened, and all measures will be taken to protect living environments. • In all activities carried out within the scope of the project, wild fauna species will never be deliberately harmed, and national and international legislation and contract provisions will be strictly adhered to.	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	World Bank OP 4.04 EBRD PR6 IFC PS6 EU Habitats Directive (92/43/EEC) EU Birds Directive (2009/147/EC) IUCN (Red List of Endangered Species) BERN CITES

Stage	Activity	Impact Definition/Subject	Mitigation Measure	Cost	Responsibility	Legal Framework

			• Within the scope of the project, all kinds of protection measures shall be taken for the flora and fauna and the provisions of the national and international legislation and contracts shall be strictly observed during the activity.
			• According to the Biodiversity Management Plan for this area:
			  • Among the fauna taxa that are detected in the project area and its immediate vicinity, some species need to be protected by contracts such as, Bern Convention, Cites Convention, and Central Hunting Commission Decisions. However, there are no endemic species in these taxa. Besides, there is no flag species representing the Niğde-Aksaray region and the area and no key species to be used in monitoring the ecosystem among the identified plant taxa. Therefore, no plant taxon needs to be monitored. But this place is a Key Biodiversity Area, therefore monitoring studies will be done for fauna taxa especially for the species that need to be protected. Monitoring studies for animal taxons will be carried out in the seasons given in Biodiversity Management Plan to determine whether our project has an impact on plant species in or around our site
			  • Among the plant taxa identified in the project area and near vicinity, according to the IUCN Danger criteria; there is no type in CR (Critical), EN (Endangered); VU (Vulnerable); NT (Near Threat) category. Besides, there is no flag species representing the Niğde-Aksaray region and the area and no key species to be used in monitoring the ecosystem among the identified plant taxa. Therefore, no plant taxon needs to be monitored. But this place is a Key Biodiversity Area, therefore monitoring studies will be done for plant taxa.			

Exploration	**Land Preparation & Drilling Works**	**Aesthetic and Landscape Problem (Visual Pollution)**	• Location design should be done carefully. • Disturbing images should be screened. • The location area should be reforested. • Disposal of waste should be done per the legislation	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	WB OP.4.01 Regulation on Waste Management
Exploration	**Land Preparation & Drilling Works**	**Increase in Traffic Load Environmental and Social Effects**	Traffic Management Plan was prepared, but it will be updated by the contractor. • It will be ensured that the traffic management plan is abided by. • Employees will be trained on the risk of the traffic both on the environment and on the closest societies. • It will be ensured that the roads to be used will pass through places where there are no sensitive receivers such as the school and the settlement. • Security and traffic warning signs will be placed on the project site and its surroundings. • Compliance with speed limit rules will be ensured. • Workers and vehicle drivers will be informed about safe driving. • In cases such as safe loading/unloading and load limits, operators who will use special vehicles such as forklifts will be trained and licensed on safe use. • Field speed limits, vehicle inspection requirements, operating rules, and procedures will be determined and ensured. • During transport activities, existing roads will not be harmed. • In case of any damage to the roads, it will be repaired by the contractor. • Any possible road closures (during machinery transportation) will be informed to the related societies promptly.	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	Highways Traffic Law Regulation on Road Traffic Regulation on Road Transport EBRD PR4 IFC PS4 Regulation on Waste Management
Exploration	**Land Preparation**	**Socio-economic impacts**	• A grievance Mechanism was established. It will be developed and updated according to needs.	Included in Project Cost	**Project** Sponsor through	EBRD PR7

Stage	Activity	Impact Definition/Subject	Mitigation Measure	Cost	Responsibility	Legal Framework
	& Drilling Works		• To receive feedback from affected communities, a well-designed and structured questionnaire was prepared. • There have been no complaints so far, if there are any complaints of the public, they will be returned as soon as possible and the problem causing the complaint will be solved. • When an activity such as transportation of equipment to the site is carried out near the lands that the public actively uses, all precautions will be taken into consideration. • Monitoring and warning systems shall be established for gas emissions. • If noise emissions are monitored and determined to exceed the limit values, a suitable noise barrier shall be installed. • In case the project is successful when the locations are determined, the public lands will be preferred first. If it is not possible, the investor will acquire land on a willing buyer-seller basis.		Contractor's Site Manager	IFC PS5, PS1, PS7
Exploration	**Land Preparation & Drilling Works**	**Occupational Health and Safety & Effects on Work and Working Conditions**	• Monitoring and warning systems for gas emissions of H2S will be established. • Training will be given to the employees on the necessity of occupational health and safety. • Workers will be provided with an information booklet or other easily accessible information about the chemical composition of liquid and gaseous phases and will be trained to explain their potential impact on human health and safety. • Where workers are in danger of contact with hot equipment (such as production equipment and pipes), a protective shield will be applied to the surfaces. • When necessary, personnel will use personal protective equipment such as insulated gloves and shoes. • Material safety data sheets for chemical substances used in the facility will be in a place where personnel can easily reach them. • Staff will be provided first aid training • Staff will be trained about the fire extinguishing system • Occupational Health and Safety Plan will be prepared specifically to the site by the Drilling Contractor's Site Management before mobilization at the site in line with the principles set out in this document, once the contractor is selected. • A grievance mechanism will be established for workers so that the concerns and complaints of the workers can be gathered and resolved. It will be developed and updated according to needs. • Face coverings will be available and should be worn by employees in -an enclosed space; -where social distancing isn't always possible; and -where they come into contact with others they do not normally meet. • All in-person meetings will be limited. To the extent possible, meetings will be conducted by telephone or online. • During any in-person meetings, avoid gathering in groups of more than 10 people and participants must remain at least two (2) meters apart. • Employees accommodated on-site should be required to minimize contact with people near the site, and in certain cases be prohibited from leaving the site for the duration of their contract, so that contact with local communities is avoided. • COVID-19 guidance issued by relevant authorities, both national and international (e.g. WHO), will be strictly followed on site. • A grievance mechanism will be established for workers so that the concerns and complaints of the workers (including any health issues such as Covid-19) can be gathered and resolved. It will be developed and updated according to needs. • COVID-19 Exposure Prevention, Preparedness, and Response Plan will be implemented.	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	Law of Occupational Health and Safety Regulation on Health and Safety Conditions Regarding Use of Work Equipment Regulation on Health and Safety in Work With Chemicals Regulation on Occupational Health and Safety Services Regulation on Occupatıonal Health and Safety EBRD PR2 IFC PS1, PS2
Exploration	**Land Preparation &**	**Local People's Health and Safety**	• Monitoring and warning systems for gas emissions are required. • If noise emissions are monitored and determined to exceed the limit values, a suitable noise barrier shall be installed.	Included in Project Cost	**Project** Sponsor through	EBRD PR4 IFC PS1, PS4

Stage	Activity	Impact Definition/Subject	Mitigation Measure	Cost	Responsibility	Legal Framework
	Drilling Works		• The perimeter of the activity area and the surroundings of the mud pits will be surrounded by a wire fence. • No unauthorized individual shall be allowed to enter the activity area except for personnel. • The grievance mechanism was established. During the activity period, a grievance mechanism will be continued to get the opinions of the local people. • The speed limit on the roads around the activity area will be considered. • Wastes and materials shall be kept inaccessible to the local people. • Information signs about situations that threaten public health will be hung and emergency contact information will be kept in the location area. • Work will be carried out in coordination with local health units. • Employees accommodated on-site should be required to minimize contact with people near the site, and in certain cases be prohibited from leaving the site for the duration of their contract, so that contact with local communities is avoided. • Communications should be clear, regular, based on fact, and designed to be easily understood by community members. • Communications should utilize available means. In most cases, face-to-face meetings with the community or community representatives will not be possible. Other forms of communication should be used; posters, pamphlets, radio, text messages, electronic meetings. The means used should take into account the ability of different members of the community to access them, to make sure that communication reaches these groups. • The local community should be made aware of procedures put in place at the site to address issues related to COVID-19. This should include all measures being implemented to limit or prohibit contact between employees and the community. • The local community should be made aware of the procedure for entry/exit to the site, the training being given to employees, and the procedure that will be followed by the project if an employee becomes sick. • If project representatives, contractors, or employees are interacting with the community, they should practice social distancing and follow other COVID-19 guidance issued by relevant authorities, both national and international (e.g. WHO). • COVID-19 Exposure Prevention, Preparedness, and Response Plan will be implemented.		Contractor's Site Manager	
Exploration	**Land Preparation & Drilling Works**	**Employment and Working Conditions**	• The construction site will be installed within the drilling location area • The living conditions of the workers will be by the international standards, environmental hygiene will be ensured, and health care facilities, district and province facilities will be used. • The workers' camp will be designed and arranged per the EBRD/IFC Guidance Note "Worker Accommodation, processes, and standards". • Priority for employment will be given to those who live in the region • Human resources policies appropriate to the labor force will be applied.	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	Law of Occupational Health and Safety Regulation on Health and Safety Conditions Regarding Use of Work Equipment Regulation on Health and Safety in Work With Chemicals Regulation on Occupational Health and Safety Services Regulation on Occupatıonal Health and Safety Standards IFC & EBRD EBRD PR2 IFC PS2
Exploration	**Land Preparation &**	**Stakeholders and Impacts on this Sector**	• A stakeholder Engagement Plan was prepared for the project • Attention will be paid to creating opportunities for project-affected communities to receive their views on the project.	Included in Project Cost	**Project** Sponsor through	IFC PS1 EBRD PR7, PR10

Stage	Activity	Impact Definition/Subject	Mitigation Measure	Cost	Responsibility	Legal Framework
	Drilling Works		• The grievance mechanism was established to collect the opinions and resolve the complaints of the affected communities. The grievance box was placed at the village Muhtar office in Sivrihisar village. It will be developed and updated according to needs. • To provide information about each stage of the project, a transparent public information mechanism will be established through the website, notice boards, telecommunication instruments, and public meetings. • To receive feedback from affected communities, a well-designed and structured questionnaire will be prepared in future stakeholder engagements.		Contractor's Site Manager	
Closure	**Composition of activity field**	**Land**	• If the exploration activities are positive, the drilling holes will be valved until the production stage. • After the activities are completed, the mud pit will be filled with excavation materials. Then, it will be covered with vegetable soil and the land will be restored. • If the presence of geothermal resources cannot be determined, the well will be closed with concrete and rehabilitation will be carried out following the characteristics of the land in line with reinstatement plan. • After the end of the activity, if the presence of geothermal resources cannot be determined, it will be planned to lay vegetative soil and plant, trees suitable for growing in the field and to be restored to nature. • In terms of the success of the rehabilitation, the selection of species for planting and afforestation will be taken into account, the species will be adapted to the climatic conditions of the area, the need for less water and fertilizers, and the species that compete with the tree species to be occupied and planted. • The species to be selected will prevent erosion in the area and be fast-growing species to cover the damage caused by the operation. • The septic tank will be removed. • The waste bins in this area will be removed at the end of the activity and the site will be abandoned by taking necessary security measures.	Included in Project Cost	Project Sponsor through Contractor's Site Manager	World Bank OP 4.04 EBRD PR6 IFC PS6 EU Habitats Directive (92/43/EEC)

6.0 Monitoring Plan

Table 8. Monitoring Plan

Stage	Which Parameter	Where	How/Monitoring Equipment	Monitoring /Reporting Time/Frequency	Why	Cost	Responsibility
LAND PREPARATION & DRILLING							
Exploration	**Topsoil Stripping Collection of excavated material** **Erosion-Runoff** **Collection of excavated material**	**Drilling Location**	Field Observations Routine Controls Control of Grievance Mechanism	It will be checked daily during the land preparation	Land preparation is a short-term activity. If there is a problem, it must be prevented and corrected in a short time. If it is not taken immediately, it will be costlier to correct it later.	Included in Land Preparation Cost	Project Sponsor through Site Manager of Contractor
WASTES							
Exploration **Land Preparation & Drilling**	**Domestic Solid Wastes**	**Drilling Location**	Field Observations Control of Grievance Mechanism Control of Waste Transport and Disposal Records (It will be checked whether they are filled regularly and whether the waste is taken regularly)	Daily Routine controls (Field Observation) Weekly (For Grievance Mechanism)	These wastes should be collected and stored regularly. In an unfavorable situation, immediate action must be taken and noncompliance terminated before the environmental impact begins.	Included in Project Cost	Site Manager of Contractor with support from Environmental Manager
Exploration **Land Preparation & Drilling**	**Packaging Wastes**	**Drilling Location**	Field Observations Control of Grievance Mechanism Control of Waste Transport and Disposal Records (Check whether they are filled regularly and whether the waste is taken regularly)	Daily Routine controls (Field Observation) Weekly (For Grievance Mechanism)	These wastes should be collected and stored regularly. In an unfavorable situation, immediate action must be taken and noncompliance terminated before the environmental impact begins.	Included in Project Cost	Site Manager of Contractor with support from Environmental Manager
Exploration **Land Preparation & Drilling**	**Medical Wastes**	**Drilling Location**	Field Observations Weekly Controls Control of Grievance Mechanism Control of Waste Transport and Disposal Records (Check whether they are filled regularly and whether the waste is taken regularly)	After any medical incident & Weekly Routine controls	These wastes should be collected and stored regularly. In an unfavorable situation, immediate action must be taken and noncompliance terminated before the environmental impact begins.	Included in Project Cost	Site Manager of Contractor with support from Environmental Manager
Exploration **Land Preparation & Drilling**	**Waste Oils**	**Drilling Location**	Field Observations Weekly Controls Grievance Mechanism Control Control of Waste Transport and Disposal Records (Check whether they are filled regularly and whether the waste is taken regularly) Check whether the analysis reports are available or not.	Daily Routine controls (Field Observation) Weekly (For Grievance Mechanism) Hazardous Materials Management Plan will be checked before work starts. It will be prepared specifically for the site by the Drilling	These wastes should be collected and stored regularly. In an unfavorable situation, immediate action must be taken and noncompliance terminated before the environmental impact begins.	Included in Project Cost	Site Manager of Contractor with support from Environmental Manager

Stage	Which Parameter	Where	How/Monitoring Equipment	Monitoring /Reporting Time/Frequency	Why	Cost	Responsibility
				Contractor's Site Management before mobilization at the site in line with the principles set out in this document, once the contractor is selected.			
Exploration **Land Preparation & Drilling**	**Waste Batteries and Accumulators**	**Drilling Location**	Field Observations Weekly Controls Grievance Mechanism Control Control of Waste Transport and Disposal Records	Weekly Routine Controls	These wastes should be collected and stored regularly. In an unfavorable situation, immediate action must be taken and noncompliance terminated before the environmental impact begins.	Included in Project Cost	Site Manager of Contractor with support from Environmental Manager
Exploration **Land Preparation & Drilling**	**End-of-life Tires**	**Drilling Location**	Field Observations Weekly Controls Grievance Mechanism Control Control of Waste Transport and Disposal Records	Weekly Routine Controls	These wastes should be collected and stored regularly. In an unfavorable situation, immediate action must be taken and noncompliance terminated before the environmental impact begins.	Included in Project Cost	Site Manager of Contractor with support from Environmental Manager
Exploration **Land Preparation & Drilling**	**Scrap Wastes**	**Drilling Location**	Field Observations Weekly Controls Grievance Mechanism Control Control of Waste Transport and Disposal Records	Weekly Routine Controls	These wastes should be collected and stored regularly. In an unfavorable situation, immediate action must be taken and noncompliance terminated before the environmental impact begins.	Included in Project Cost	Site Manager of Contractor with support from Environmental Manager
Exploration **Land Preparation & Drilling**	**Liquid wastes (Based on Personnel)**	**Drilling Location**	Control of Sewage Truck Control of Records Sewage Truck	Weekly Routine Controls Effluent Management Plan will be checked before work starts. It will be prepared specifically for the site by the Drilling Contractor before site mobilization in line with the principles set out in this document.	These wastes should be collected and stored regularly. In an unfavorable situation, immediate action must be taken and noncompliance terminated before the environmental impact begins.	Included in Project Cost	Site Manager of Contractor with support from Environmental Manager
Exploration (Drilling)	**Liquid wastes (Process)**	**Drilling Location**	Field Observations Check whether the storage in the drilling mud pit is carried out according to the rules (Mud pit has a volume of 6900 m^3) Analyses by Accredited Laboratory at the end of drilling to determine final disposal method	Daily Effluent Management Plan will be checked before work starts. It will be prepared specifically for the site by the Drilling Contractor before site mobilization in line with the principles set out in this document. Analysis at the end of drilling by Accredited Laboratory	These wastes should be collected and stored regularly. In an unfavorable situation, immediate action must be taken and noncompliance terminated before the environmental impact begins.	Included in Project Cost	Site Manager of Contractor with support from Environmental Manager
Exploration **Land Preparation &**	**Excavation Wastes**	**Drilling Location**	Field Observations	Before Drilling (During the land preparation phase) Daily	These wastes should be collected and stored regularly. In an unfavorable situation, immediate action must be taken and	Included in Project Cost	Site Manager of Contractor with support from Environmental Manager

Stage	Which Parameter	Where	How/Monitoring Equipment	Monitoring /Reporting Time/Frequency	Why	Cost	Responsibility
Drilling					noncompliance terminated before the environmental impact begins.		
Exploration (Drilling)	**Drilling Mud**	**Drilling Location Mud-pit**	Analysis of Reports will be checked. Check Whether the treatment tanks are working properly Check whether a foreign substance (packaging etc.) has fallen into a mud pit. Check whether the edges of the fence around the mud-pit are correctly (no opening should be formed at the bottom). Check whether there is leakage caused by mud-pit. Check whether there are leaks in the treatment tanks.	Daily Effluent Management Plan will be checked before work starts. Effluent Management Plan will be checked before work starts. It will be prepared specifically for the site by the Drilling Contractor before site mobilization in line with the principles set out in this document.	Management of drilling muds should be done carefully. In an unfavorable situation, immediate action should be taken and noncompliance terminated before the environmental impact begins	Included in Project Cost	Site Manager of Contractor with support from Environmental Manager
Land Preparation & Exploration (Drilling)	**Contamination of Surface and Groundwater**	**Nearest surface water sources and groundwater sources**	Water samples will be taken from groundwater and surface water and analyzed by licensed laboratories. Then the results will be compared with the baseline measurements taken before mobilization. The samples will be taken from the nearest surface waters (intermittent stream) and groundwater (water well).	Once a Month	In an unfavorable situation, immediate action should be taken and noncompliance terminated before the environmental impact begins.	Included in Project Cost	Site Manager of Contractor with support from Environmental Manager
Emissions							
Exploration Land Preparation & Drilling	**Dust Emissions**	**Nearest agricultural land and sensitive structure**	Field observations Field inspections Control of grievance mechanism records related to dust complaints	Daily: at the excavation of the mud pit and at the early stages of drilling (when the drilling starts), in case of a complaint	Dust Emissions can quickly cause discomfort in the environment. There are also agricultural lands near the location. It is necessary to monitor and take precautions before emission formation occurs.	Included in Project Cost	Site Manager of Contractor with support from Environmental Manager
Drilling	**Greenhouse Gases and Other Geothermal Gasses**	**Drilling Location**	Visual controls of maintenance and monitoring devices (detectors) The concentration value of gases will be read and it will be recorded in the monitoring documents	Hourly for geothermal gases, monthly for Greenhouse Gases	Gases can be toxic. Immediate action and monitoring are necessary.	Included in Project Cost	Site Manager of Contractor with support from Environmental Manager
Exploration Land Preparation & Drilling	**Exhaust Emissions**	**Around the drilling location and transportation routes, around settlements**	Maintenance and inspection documents of vehicles will be checked. The exhaust gas emission measurement documents will be checked. The emission stamps of the vehicles will be checked.	At the early stage of the operations	Exhaust emissions, besides other pollutants, cause immediate and direct effective toxicity as well as pollutant effects. Care must be taken and precautions should be taken before it occurs.	Included in Project Cost	Site Manager of Contractor with support from Environmental Manager
Exploration Land Preparation &	**Noise**	**The closest sensitive structure (home) and**	Control of complaints mechanism related to noise complaints. Measurements will be done with Noise Measurements Equipment for five minutes at defined places by	In case of a complaint	Noise is socially uncomfortable and is harmful to health, depending on the duration of exposure.	Included in Project Cost	Site Manager of Contractor with support from Environmental Manager

Stage	Which Parameter	Where	How/Monitoring Equipment	Monitoring /Reporting Time/Frequency	Why	Cost	Responsibility
Drilling		**Around the site**	licensed laboratories. Then they will be compared to previous results.				
Exploration (Drilling)	**Well Blowout / Accidents**	**Drilling Location**	Check the availability of an Emergency Action Plan. Check whether all employees receive training on emergency conditions Check whether emergency drills are implemented periodically. Check if the Blow Out Prevention Equipment is in working order. Well progress will be controlled, measures will be taken when there is a problem	Emergency Action Plan will be checked before work starts. It will be prepared specifically for the site by the Drilling Contractor's Site Management before mobilization at the site in line with the principles set out in this document, once the contractor is selected.	To avoid any harm to the workers or the local communities.	Included in Project Cost	Site Manager of Contractor with support from Environmental Manager
Sensitive Area (Cultural Heritage)							
Exploration Land Preparation & Drilling	**Affecting / Destruction of Sensitive Areas**	**Drilling Location And Area of Influence**	Control of Chance Find Procedure	Weekly and in case of complaints/events	In the case of damage to sensitive areas, restoration is difficult. Furthermore, permanent damage may occur in the event of destruction of cultural assets	Included in Project Cost	Site Manager of Contractor with support from Environmental Manager
ECOLOGICAL IMPACTS (Flora-Fauna)							
Exploration Land Preparation & Drilling	**Habitats and Natural Life Flora - Fauna**	**Drilling Location and Neighborhoods**	It must be monitored by a biodiversity expert	Once a Month after the drilling starts And Seasonally before drilling	It should be monitored and reported by the biodiversity expert. Monitoring studies will be done for plant taxa and fauna taxa especially for the species that need to be protected.	Included in Project Cost	Environmental Manager with support from Biodiversity Expert
Exploration Land Preparation & Drilling	**Aesthetic and Landscape Problem (Visual Pollution)**	**Drilling Location and Neighborhoods**	Control of Grievance Reports Field Observations	Daily & before the site is closed at the end of work	Prevention actions should be taken. It is more difficult and costlier to restore aesthetic values when damage occurs.	Included in Project Cost	Site Manager of Contractor with support from Environmental Manager
Exploration Land Preparation & Drilling	**Increase in Traffic Load**	**Drilling Location And Transportation Routes**	Control of field and traffic routes Checking vehicle maintenance records Control of compliance with the Traffic Management Plan Control of grievance mechanism records related to traffic complaints	Daily	Socially disturbing Environmental impacts cause exhaust emissions, causing health problems when uncontrolled. Failure to take precautions can result in accidents or public discomfort.	Included in Project Cost	Site Manager of Contractor
SOCIAL IMPACTS							
Exploration Land Preparation & Drilling	**Increase in Traffic Load**	**Drilling Location And Transportation Routes**	Control of field and traffic routes Checking vehicle maintenance records Control of compliance with the Traffic Management Plan	Daily	Socially disturbing. If measures are not taken, it can cause accidents.	Included in Project Cost	Site Manager of Contractor with support from Environmental Manager and Grievance Response Officer

Stage	Which Parameter	Where	How/Monitoring Equipment	Monitoring /Reporting Time/Frequency	Why	Cost	Responsibility
			Control of grievance mechanism records related to traffic complaints				
Exploration Land Preparation & Drilling	**Use of land that belongs to local people**	**Nearest Settlements & Nearest agricultural land**	Control of grievance reports Regular site visits	Weekly	It is important to be sensitive and not to cause negative impacts. If possible, preventive measures should be taken before the complaint is received.	Included in Project Cost	Site Manager of Contractor with support from Environmental Manager and Grievance Response Officer
Exploration Land Preparation & Drilling	**Occupational Health and Safety**	**Drilling Location**	Field Observations Inspection of accident/event records. Regular OHS audits Control of Grievance Reports	Daily. COVID-19 Exposure Prevention, Preparedness, and Response Plan will be checked before work starts. Occupational Health and Safety Plan will be checked before work starts. It will be prepared specifically for the site by the Drilling Contractor's Site Management before mobilization at the site in line with the principles set out in this document, once the contractor is selected.	All precautions must be taken without interruption. If a precaution is not taken, this causes serious accidents and incidents	Included in Project Cost	Site Manager of Contractor and Grievance Response Officer
Exploration Land Preparation & Drilling	**Occupational Health and Safety:** For any significant events (e.g. environmental spills, fatal incidents, or serious incidents with lost time, etc.) the project sponsor will inform TKYB immediately. The incident report including the details such as root-cause analysis, the compensation given, etc. will be submitted to TKYB within 30 business days	**Drilling Location**	Inspection of accident/event records Risk Assessment Study Training Records Controlling of usage of Personnel Protecting Equipment	Daily. Occupational Health and Safety Plan will be checked before work starts. It will be prepared specifically for the site by the Drilling Contractor's Site Management before mobilization at the site in line with the principles set out in this document, once the contractor is selected.	Compliance with RSM Project Requirement	Included in Project Cost	Project Sponsor with feedback from Site Manager of Contractor
Exploration Land Preparation	**Local People's Health and Safety**	**Nearest Settlements**	Field Observations Inspection of accident/event records.	Weekly	All precautions must be taken without interruption. If a	Included in Project Cost	Site Manager of Contractor and Grievance Response Officer

Stage	Which Parameter	Where	How/Monitoring Equipment	Monitoring /Reporting Time/Frequency	Why	Cost	Responsibility
& Drilling			Control of Grievance Reports	COVID-19 Exposure Prevention, Preparedness, and Response Plan will be checked before work starts.	precaution is not taken, this causes serious accidents and incidents		
Exploration Land Preparation & Drilling	**Employment and Working Conditions**	**Drilling Location**	Field observations Control of Grievance Reports Control of Contracts	During Drilling Operations	To ensure that the employees are not get harmed, the working conditions must comply with the standards.	Included in Project Cost	Site Manager of Contractor and Grievance Response Officer
Exploration Land Preparation & Drilling	**Stakeholders and Impacts on this Sector**	**Nearest Settlements**	Grievance Mechanism The brochure, signage, and other areas will include contact information for the grievance mechanism. Grievance Records	Weekly Besides, before the start of drilling operations in the region, specific consultations will be held with the stakeholders especially with the animal owners in the region to improve and discuss the socio-economic impacts arising from the activity	Stakeholders are the most important factors affecting a project. It is important that they are not discomforted and are not harmed.	Included in Project Cost	Site Manager of Contractor with support from Environmental Manager and Grievance Response Officer
Closure	**Closure of Drilling Area**	**Drilling Location**	After Closure	Once after Closure	Permissions are allowed on the site, provided that they have been converted to their former qualifications.	Included in Project Cost	Site Manager of Contractor with support from Environmental Manager

7.0 Institutional Arrangements

To mitigate and prevent the potential negative environmental and social impacts that are expected to occur in an activity, institutional arrangements need to be clarified so that the measures given in the plans can be successfully applied.

These arrangements are necessary for the successful implementation of the Environmental and Social Management Plan. The roles and responsibilities of the institutions, organizations, and persons involved in the implementation - monitoring - review process of the Environmental and Social Management Plan are given below.

3S KALE (Sponsor)

- Ensures the management, implementation, monitoring, and compliance of EIA (Environmental Impact Assessment) obligations in national legislation, as well as ensuring the Environmental and Social Assessment of the Project is done in line with World Bank Safeguard Policies.

- Ensures that the content and requirements of the Environmental and Social Management Plan are disclosed to contractors and subcontractors, and supports and enforces them to implement it.

- Provides monitoring of Environmental and Social Management Plan

- Ensures compliance with all commitments of the Environmental and Social Management Plan

- Ensures creation of Grievance Mechanism to obtain the opinions and complaints of the local community during the activity

- Provides Continuous and regular follow-up of the Grievance Mechanism, ensuring the necessary communication to eliminate public concerns

- Implements and updates the Stakeholder Engagement Plan

- Ensures the fulfillment of commitments to the public

- Prepares and distributes necessary documents to inform the public

- Ensures communication with the relevant institutions and organizations for the implementation of the Environmental and Social Management Plan

- Assigns experts for Environmental and Social Monitoring, reviews environmental and social monitoring reports prepared by Site Manager and Environmental and Social Consultants (Manager)

- In case of incompatibility with the Environmental and Social Management Plan, it ensures that the cause of non-compliance is eliminated (if the contractor is present and if the contractor has caused the incompatibility, the sponsor will eliminate the contractor's incompatibility)

- Informs the PIU and RSM Advisor in case of incompatibility with the Environmental and Social Management Plan

- Informs PIU and RSM Advisor with monthly progress reports

- Ensures the Contractor implements the project in compliance with all relevant Turkish laws and regulations as well as the World Bank Operational Policies on Environment and Social Safeguards

- In case of any significant events (e.g. environmental spills, fatal incidents, or serious incidents with lost time, etc.) the project sponsor will inform TKYB immediately. The incident report including the details such as root-cause analysis, the compensation given, etc. will be submitted to TKYB within 30 business days

- **Takes full responsibility for the subcontractor to be contracted concerning. environmental and social issues in line with the plan as proposed to RSM**

Environmental and Social Consultant

- Monitors the activities as specified in the Environmental and Social Management Plan.

- Prepares the reports for the monitoring plan as specified in the Environmental and Social Management Plan, as well as monthly reports for RSM Monitoring

- Makes necessary analyzes for the activities specified in the Environmental and Social Management Plan and that need to be monitored

- **Oversees that the Stakeholder Engagement Plan is implemented properly**

- In case it finds that there is a non-compliance with the Environmental and Social Management Plan, it informs the sponsor by reporting and informs the measures to be taken to eliminate the incompatibility

- As the monitoring and analysis specified in the Environmental and Social Management Plan are made, it reports and sends the reports to the PIU and RSM Advisor

RSM Consultant

- Examines applications for information to the World Bank

- Provides the coordination of the selected sponsor to ensure compliance with all relevant standards and regulations throughout the project

- It organizes the internal working structure for investment options
- It monitors the entire process to ensure the proper implementation of the World Bank's environmental and social protection policy

8.0 Consultations with Affected Groups and Non-Governmental Organizations

- **Date(s) and Location(s) of consultation(s)**

Stakeholder engagement meeting, for Bozköy Geothermal Exploration Well Project, located Aksaray, Güzelyurt District, Sivrihisar Village, was held in Güzelyurt Vocational High School Conference Hall - Karballa Hotel on April 16, 2019, at 11:00 by 3S Kale Niğde Energy Production Inc.

For the Stakeholder Engagement Meeting, the announcements stating the subject, date, place, and time of the meeting at the national and local level newspapers were published 15 days in advance. Besides, Stakeholders were invited to consultations a few days before the meeting through official letters sent to nearby administrative regions and through announcements and announcements made locally. On the day of the meeting, a service vehicle was provided from the nearest settlement, Sivrihisar Village, to the meeting place of the local people.

- **Details on attendees (as appropriate)**

47 people participated in the meeting from Sivrihisar Village, Güzelyurt District, and some institutions. Only one woman was among the participants. Because of the cultural tendencies of the region, women do not prefer to participate in public meetings. Besides, most of the population of the nearest villages are elderly people, who tend to be more conservative. Old women in the family prefer to stay at home or village with other old women in the villages located in Central Anatolian in Turkey.

But there will be future efforts to engage and include local women in the project process. For more women to participate, the next meetings will be held in different settings (like homes) preferred by women locals.

- **Meeting Program/Schedule:**

The presentation was made by the environmental consultant company and the purpose of the meeting, information about the project, location, effects, benefits, and how to ensure stakeholder participation were explained to the participants.

3S Kale Niğde Energy Production Inc and the environmental consultant company listened to the opinions and suggestions of the public, recorded, and answered the questions and comments of the participants.

Video-camera recordings were taken, and photographs were taken at the meeting.

- **Summary Meeting Minutes (Comments, Questions, and Response by Presenters)**

During the meeting, the opinions, suggestions, and complaints of the public were recorded. Besides, to inform the public about their opinions, suggestions, and complaints in writing, the opinion/complaint form has been distributed and the persons who are willing to fill it were allowed. These forms and minutes will be recorded and kept by 3S Kale Niğde Energy Production Inc.

The participants asked if the installation of the power plant could be used to provide facilities for their needs from the geothermal resource (such as heating the village, hot water from taps, use of water, etc.).

3S Kale Niğde Energy Production Inc and its environmental consultant company stated that if all wells to be drilled are successful, the power plant will be established three years later. The use of geothermal energy for central heating and hot water usage was described. However, to carry out such projects, it was explained that a feasibility study should be carried out and the project would only be implemented if found to be feasible.

The participants asked if the energy to be obtained could be used for the existing greenhouses in the district. 3S Kale Niğde Energy Production Inc stated that this project is possible, but the distance is also far away. Besides, a pilot greenhouse by the company will be established and this can be an example.

The participants were asked how many wells could be installed after the drilling. Environmental consultant company stated that a decision can be made when the wells are drilled, and the results are seen.

The participants were asked how much space could be heated by geothermal energy. 3S Kale Niğde Energy Production Inc has announced that heating can be done in a nearby settlement.

Participants were asked whether there would be a continuous steam output if the plant was installed. 3S Kale Niğde Energy Production Inc stated that with the establishment of the system, the system will be closed, and steam will not emerge.

Participants asked how many people would be employed and whether there would be employment from the communities around if the power plant was established. 3S Kale Niğde Energy Production Inc has stated that if the power plant is installed, 60 - 70 people are working in a power plant. It was also announced that there will be employment from local communities for the enterprise.

Aksaray Provincial Special Administration, asked if the power plant is installed, where it would be. 3S Kale Niğde Energy Production Inc. stated that this issue is not clear now.

Participants from the village of Sivrihisar said they wanted to drill cold water well. 3S Kale Niğde Energy Production Inc. stated that they could help.

- **Agreed actions.**

During the meeting, there was no objection to the project. In the meeting, it was observed that there could be misunderstandings due to the knowledge of the public from different sources. By answering public questions, these misunderstandings have been corrected. On the other hand, it was seen that the project was supported by the local people and the people of the district and wanted to cooperate with the project.

Annex A

Official Documents

Annex B

Reinstatement Plan

Annex C

Biodiversity Management Plan

Annex D

Cultural Heritage Management Plan

Annex E

COVID-19 Exposure Prevention, Preparedness, and Response Plan

Annex F

Waste Management Plan

Annex G

Preliminary Occupational Health and Safety Plan

Annex H

Preliminary Emergency Response Plan

Annex I

Stakeholder Management Plan

Annex J

Traffic Management Plan

Annex K

Code of Conduct

Annex L

Social Review Format