KİTRELİ AND ÇÖMLEKÇİ EXPLORATION WELL PROJECT

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

Revision History

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Kitreli and Çömlekçi Geothermal Exploration Project

This report was prepared for the project to be managed in line with World Bank Environmental and Social Safeguard Policies, and delivered to RSM Project to be evaluated for 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

EU: European Union

GEPP: Geothermal Power Plants

IUCN: The International Union for Conservation of Nature

IFC: International Finance Corporation

IFC PS: International Finance Corporation Performance Standarts

O.P.: Operational Policies

PIU: Project Implementation Unit

RSM: Risk Sharing Mechanism

TKYB: Development and Investment Bank of Turkey

WB: World Bank

WHO: World Health Organization

VOC: Volatile Organic Compounds

Executive Summary

The project subject to this plan is a geothermal energy exploration project that will be implemented by 3S Kale Niğde Energy Production Inc. in Ulukışla village. The project will be implemented in accordance with two production licenses of the company, one for Kitreli-1 well (production license no 3241989 and 13) and one for Çömlekçi-3 well (production license no3241990 ER and 12). Both exploration wells will be drilled within the boundaries of Ulukışla village of Altunhisar District in Niğde province in the southeast of the Central Anatolia Region. Kitreli-1 well will be located to the north of Ulukışla village, at the border with Yenipınar village, and Çömlekçi-3 well will be located to the north east of the Ulukışla village, close to the village border of Çömlekçi village.

This document reports the potential environmental and social impacts of the project and sets out the mitigation measures that will be implemented to avoid, minimize and compensate the negative impacts of the project as well as enhance the positive impacts where applicable. A Mitigation Plan summarizing the mitigation actions and a Monitoring Plan for monitoring the impacts and the effectivity of the mitigation activities is also included.

This document should be taken as a whole with its annexes of Social Review Format, Stakeholder Management Plan, Biodiversity Management Plan, Waste Management Plan, Preliminary Occupational Health and Safety Plan, Preliminary Emergency Response Plan and Traffic Management Plan given in the Annexes. The Hazardous Materials Management Plan, Emergency Response Plan, Occupational Health and Safety Plan and Effluent Management Plan will be prepared specific to the site by the Drilling Contractor's Site Management prior to mobilization at the site in line with the principles set out in this document, once the contractor is selected. The contractor will also update the Traffic Management Plan and Stakeholder Management Plan.

Both drilling sites are located completely on pasture land. For the use of pasture, drilling permission was obtained from the relevant institutions by the Sponsor Company. For both wells the permit was obtained from Niğde Governorship, Provincial Directorate of Food, Agriculture and Animal Husbandry, on 08.01.2018. Therefore no land purchase was required nor will it be required. Both the pastures are unused by the local people for any purpose due to their distance from nearby settlements and the low quality of pasture. There is no land owner or user who will be physically or economically displaced or get harmed due to the project. A guarantee fee was paid for each pasture when obtaining the permission from the relevant authority. The fee amounts were determined by the relevant government agency, the Pastures Committee. The guarantee fees will be used by the relevant institution (Pastures Committee) to restore the sites if the land is not restored back to its original status by the investor at the end of the project. However, land will be restored to its former quality and capacity by the investor at the end of work.
The legal permits of these sites have been obtained by the project owner, and there will be no land acquisition.

The drilling locations are both barren steppe land. Although designated as pasture, they are not used for feeding animal herds. They are not suitable for grazing animals due to their rocky

structure. No animal grazing activities were observed in the vicinity of the project sites during the environmental assessment work conducted. There are no fruit trees and no agricultural fields nearby the project sites. As the area is not used for animal grazing, agriculture, or any other economic purpose, the nearby communities are not expected to be subject of economic impacts due to utilization of the land by the project.

In the region, the appearance of the steppe is dominant. Forest areas are extremely limited. The drilling locations are generally covered with stones and bushes. They are not used for grazing of animals. It is not suitable for grazing animals due to land structure and rocks. However, animals are grazed in the surrounding areas. Approximately 40 families are engaged in animal husbandry in Ulukışla Village. A total of ten thousand sheep and goats are registered in the village. There are other pasture areas nearby that can be used for grazing.

The land size of Ulukışla village is about 66000 decares and about 40000 decares of this land is pastureland. The total area of land determined to be used for the two projects is 22 decares. There are many other more fertile pasture areas available to animal owners to be used for grazing. Only 0.05% of the total pastureland of the village will be used within the scope of this project.

The well locations are already covered with concrete floor and the drilling location was constructed for both Kitreli and Çömlekçi wells before RSM application was made (early 2018). Since the well locations were already completed, the impacts from the location preparation will not occur.

Stakeholder engagement activities have been initiated by the investor company to manage the potential social impacts of the project. Stakeholder engagement meeting was held in Altunhisar District Governorship Meeting Room on April 18, 2019 at 11:00 by the Sponsor. As a future part of these activities, before the start of drilling operations in the region, specific consultations will be held with the animal owners in the region in order 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. No one shall be allowed to get harmed due to the use of this area. Works will be done to ensure better social conditions. The content of these contributions will be decided through a dialogue with the local stakeholders to ensure successful implementation.

There is a stabilized road to both the Kitreli-1 and Çömlekçi-3 well sites. These roads are state roads and will be used for access to the site. There will be no new road construction but both roads will be strengthened with stabilized coating.

As a result of the use of these lands by the project investor, there will not be any negative impact to the region with respect to land use. If the wells in the project are successful and the project progresses, no negative impact is expected due to the implementation of the same “no harm” principle.

On the other hand, there are/will be positive impacts of the project.

A library was built by the investor at the Ulukışla village school. The company also plans to make investment projects and welfare benefits for the village in the future. Scholarships for eight successful university students from the village was started. In addition, financial assistance is planned by the project owner to settle the financial debts of the village to the state.This assistance is expected to be in the form of paying the accumulated electricity debts of the village legal entity.

Moreover, the project region is arid, with insufficient water resources. The investor is considering to drill a water well for the village and construct greenhouses that will be granted to village. It is considered that greenhouses and a water well to be used for animal flocks and irrigation will positively impact the agricultural activities in the village, helping to improve employment opportunities and income in the village.

In addition, a promenade/recreation area is planned to be built by the investor in an area in a public land, located 700 m to the west of the Çömlekçi-3 drilling location and within the license area. 250 trees were planted on this area by the project sponsor, the recreation area will be completed by addition of benches. It is foreseen that this promenade/recreation area will improve social life in the region, and even possibly attract people from outside the Ulukışla village.

Stakeholder Engagement Meeting was held at the Altunhisar District Governorship Meeting Room on April 18, 2019, in order to inform the local people, provincial institutions and other stakeholders. During the meeting, there was no objection for the project. In the meeting, it was observed that there could be misunderstandings regarding geothermal projects due to misinformation of the public from different sources. By answering public questions, these misunderstandings have been resolved. On the other hand, it was seen that the project was supported by the local people and the people of the district. The local people expressed their wish for this project to be useful for themselves and Turkey.

A grievance mechanism has been established for the project to raise public requests and complaints. This mechanism will be developed and updated according to needs. A complaint box was placed in office of Ulukışla village Muhtar. In addition, the village Muhtar and the project management are in communication. A Grievance Response Officer is appointed to closely monitor, record, respond to and report on all project related grievances. The contact information of this person (name, telephone and email) is displayed on the grievance box in the village and will also be disclosed at the entrance of the drilling site.

Moreover, a grievance mechanism also 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.

Baseline studies (measurements) describing the environmental and social baseline for the project were made on the site and surrounding area. The monitoring activities will continue to be carried out within the periods specified in this report. If a negative effect or change is observed, precautions shall be taken immediately.

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, given in Annex 2. Biodiversity monitoring studies to confirm and improve this plan will be continued throughout the project. According to the findings of these monitoring studies the plan will be updated if necessary. According to the field studies and literature studies carried out so far, there is no flag species to represent the Niğde region and area and the key species to be used in monitoring the ecosystem. According to the IUCN Danger criteria; there is no species in CR (Critical), EN (Endangered); VU (Vulnerable); NT (Near Threat) category Therefore, no species of concern were identified to be monitored.

There are no physical cultural heritage assets in or near Ulukışla village.

As a conclusion, all necessary permission has been taken in line with the Turkish regulations up to now.

In other words, for this project to be carried out in the areas specified in this report, there will be no any other permit needed from any institution such as Ministry of Agriculture and Forestry, Ministry of Environment and Urbanization and Ministry of Interior.

Whether this project is successful or not, if it is decided to drill another exploration well in a different area in the future, it may be necessary to obtain permits from different institutions depending on the site characteristics of the well location.

All wastes will be treated and disposed them correctly to avoid future fines and other complaints.

1.0 Introduction

1.1 Purpose of ESMP

The aim of this Environmental and Social Management Plan for Kitreli and Çömlekçi Exploration Wells Project is to meet the requirements of the RSM Project 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 ESMF of the Turkey Geothermal Development Project.

The project is planned to be in accordance with both the EC and 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 General Environmental and Health and Safety Guidelines;
- World Bank Group Environmental and Health and Safety Guidelines for Geothermal Power Generation;

The ESMP includes mitigation measures as specified in the current Project Information Files that were prepared and approved for compliance with national environmental impact assessment legislation, and allows for additional actions not yet determined.

2.0 Description of the Project

2.1 History of the Project

Kitreli – 1 Geothermal Power Exploration Well Project is developed in line with the license numbered 3241989 and 13. The date of entry into force of the operating license is 16.05.2019 and it has been granted by Niğde Special Provincial Administration. The licence expiry date is 16.05.2049.

Çömlekçi – 3 Geothermal Power Exploration Well Project is developed in line with the license numbered 3241990 and 12. The date of entry into force of the license is 16.05.2019 and it has been granted by Niğde Special Provincial Administration. The licence expiry date is 16.05.2049

In accordance with the Turkish Legislation, EIA not required certificate was received on 22.10.2015 for Kitreli-1 and 24.04.2015 for Çömlekçi-3 wells. The certificates are given in Annex – E. No wells have been drilled in these sites until now.

Utilization permits for the well locations were obtained from the Niğde Governor's office, Provincial Directorate of Food, Agriculture and Animal Husbandry on 08.01.2018 for Kitreli Project and 09.01.2018 for Çömlekçi Project. The permits are both valid until 2020. When the exploration drilling is completed, in case the project is successful, applications will be made to the relevant institutions in order 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 a pasture land anymore in public records. It will be just public property.) Since the lands used for this project are pastureland, there has been no public interest decision issued for the project.

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. In addition, although it is not within the scope of the Project, the possible components to be built in case the project is successful are also 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.

The wells are planned to be drilled consecutively, so only one well-site will be active at a time.

❖ Main Components

- Exploration Wells

In the Kitreli Project, one exploration well, called Kitreli – 1, will be drilled.

In the Çömlekçi Project, one exploration well, called Çömlekçi – 3, will be drilled.

Both the wells are planned to be drilled to the depth of 3500 m.

- Transportation Routes

There are stabilized roads for access to both sites. Both these roads will be improved by stabilized coating before drilling starts.

- Auxilary Facilities

The well locations are already covered with concrete floor and the drilling location was constructed for both Kitreli and Çömlekçi wells in early 2018, prior to the application for RSM project. Personnel units (accommodation units, office shed, guesthouse huts etc.) will be located on these platforms. Since the well locations were already completed, the impacts from the location preparation will not occur.

In both sites, mud pits will be opened in Project Sites. Each of the mud pits will have a volume of 6900 m^3. The dimensions of the mud pits will be 14.5 meters in width, 56 meters in length and 8.5 meters in depth. These mud pits will be used for drilling mud and geothermal fluid.

In both sites, road stabilization will be made to improve the existing roads to drilling areas.

❖ 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 both wells (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 both wells are drilled, ten more wells will be opened, but locations of the wells are not known at this stage, and will be defined according to the results obtained from the currently planned two wells. 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-4 Geothermal Power Plants project, if the production wells drilled are successful, the power plant is planned 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 drilling area. The accommodation units will be established in line with "EBRD/IFC Guidance Note Workers' Accomodation: Processes and Standards". Kitreli drilling area is approximately 5000 m^2. Çömlekçi drilling area is approximately 6100 m^2. (Part of the permitted areas will be used) Each area will be used only for one well but in the future, after the well is drilled and completed, a new well can be drilled on a different location in the same area.

Drilling process will take place 24 hours/day. Drilling activities will take 55-60 days for one well. The draft layout plan of drilling area is given in Figure 1 (identical for both wells).

❖ 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 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 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 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 for one well.

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.

Schematic view of well design is given in Figure 2.

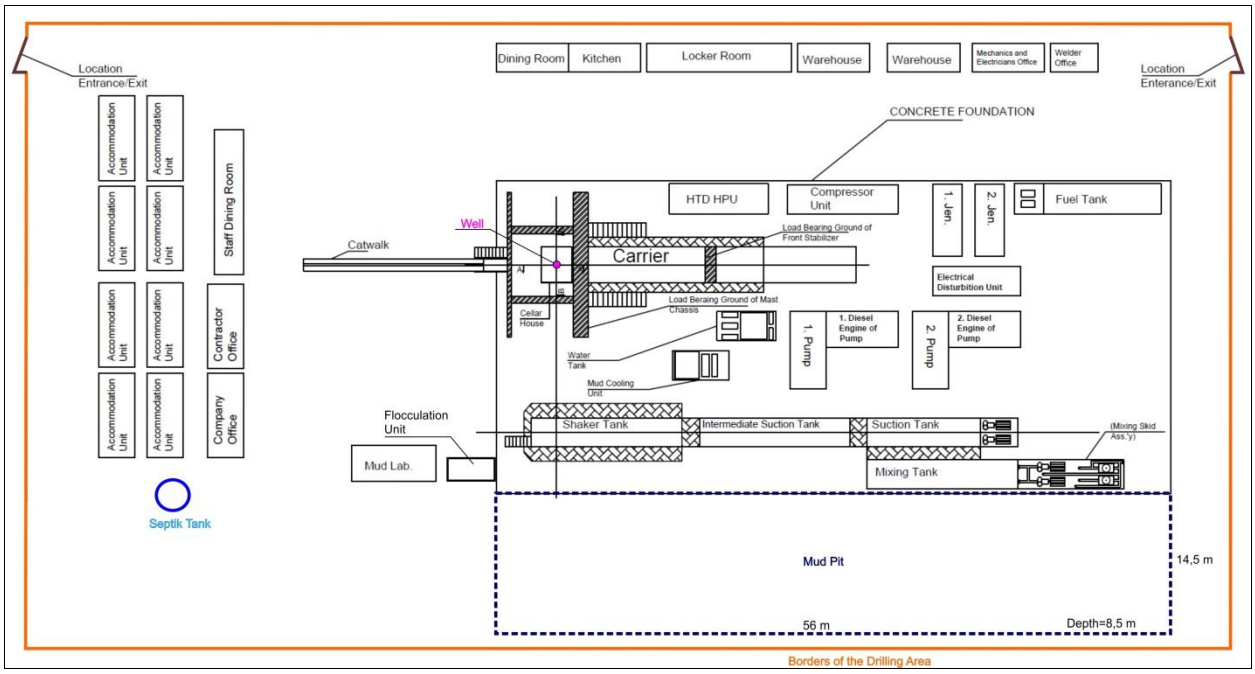

Figure 1. The Schematic View of Layout Plan of the Drilling Area

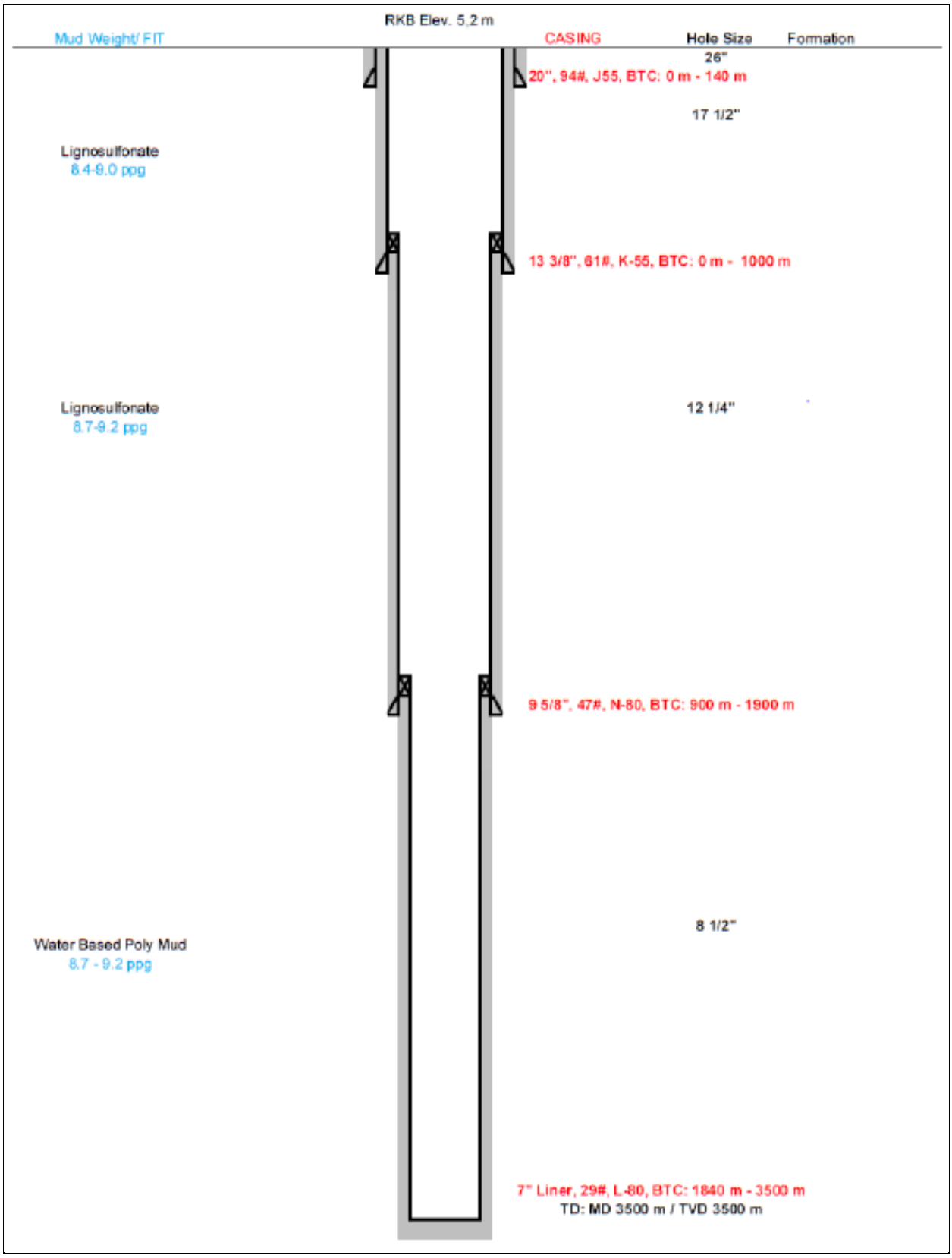

Figure 2. The Schematic View of Well Design

2.4 Location and the Characteristics of the Project

2.4.1 Geographical Location

The Nigde Region, where the project is located, is to the southeast of the Central Anatolian Region. The average altitude is 1300 meters above sea level. The proposed wells are surrounded by the provinces of Aksaray to northwest, Nevsehir to north, Kayseri to northeast, Konya to west and southwest, Mersin to the south, southeast and east.

Kitreli exploration license is partially located within the borders of Aksaray Province, and partially in Niğde Province, whereas Çömlekçi license area is entirely located within the borders of Niğde Province

Both drilling locations are located within the boundaries of Ulukışla Village of Altunhisar District of Niğde Province. Yenipınar, Kitreli, Çömlekçi, Yakacık, Akçaören, Uluören and Helvadere villages are located around the license areas where the drilling sites are located. Yenipınar and Helvadere Villages are villages of Aksaray Province.

The closest settlement to the Kitreli-1 drilling location is Yenipınar Village, which is located in Aksaray Province and the distance to the drilling location is 5.7 km. This village is not within the license area. Yenipınar is located 6 km north to the project area. Kitreli Village is located 9,6 km NE to the project area. Ulukışla Village is located 8,4 SE to the project area. Uluören is located 8.2 km SW to the project area. Çömlekçi Village is located 9.8 SE to the project area. Helvadere Village is located 9.6 km NW to the project area. Yakacık is located 12.5 km SE to the project area. Akçaören is located 11.5 km south to the project area. The distances of each settlement to the project area are given in Figure 3.

The settlement closest to Çömlekçi-3 well is Ulukışla Village at 3.8 km. Helvadere Village is located 14.3 km NW to the project area. Yenipınar is located 10.3 km NW to the project area. Kitreli Village is located 9,9 km NE to the project area. Çömlekçi Village is located 4.3 SE to the project area. Yakacık is located 7.6 km SE to the project area. Akçaören is located 8 km SE to the project area. Uluören is located 10 km SW to the project area. The distances of each settlement to the project area are given in Figure 4.

The maps showing the village borders and centers are given in Figure 3-4.

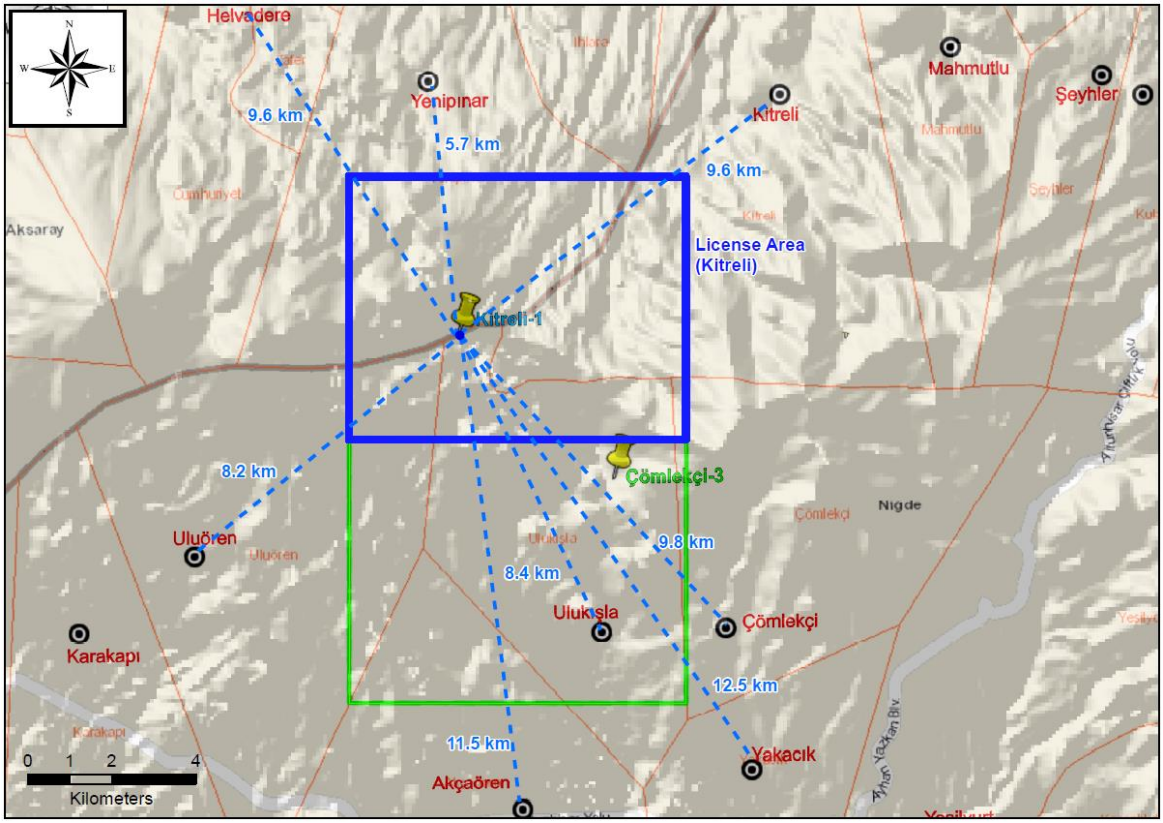

Figure 3. The Map Shows the Borders and Centers of the Villages Around the Licenses and the Distances of Each Settlements to the Project Area

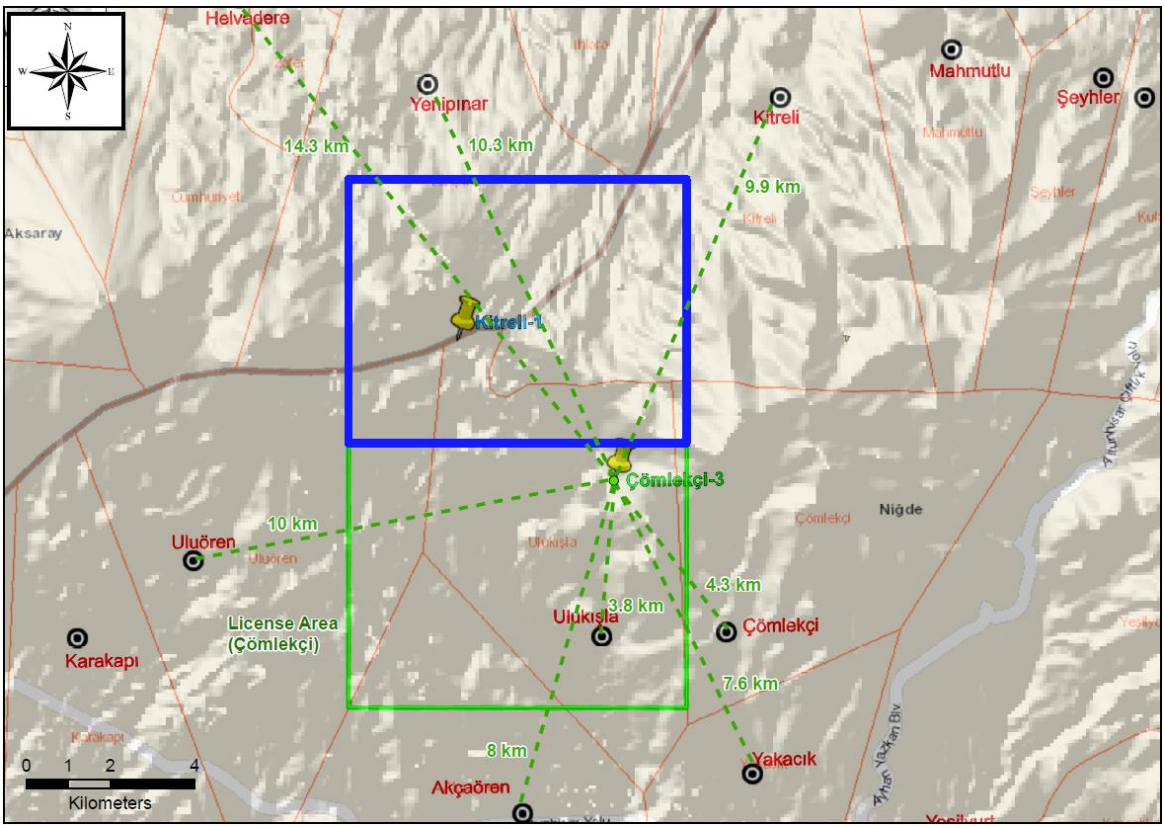

Figure 4. The Map Shows the Borders and Centers of the Villages Around the Licenses

The maps that show the location and the maps showing the license area are shown in Figure-6, Figure 7 and Figure 8.

There is an earth road for transportation to both the sites. These roads will be stabilized before drilling starts. The satellite image, which shows the well locations and the surrounding roads, is given in Figure 5.

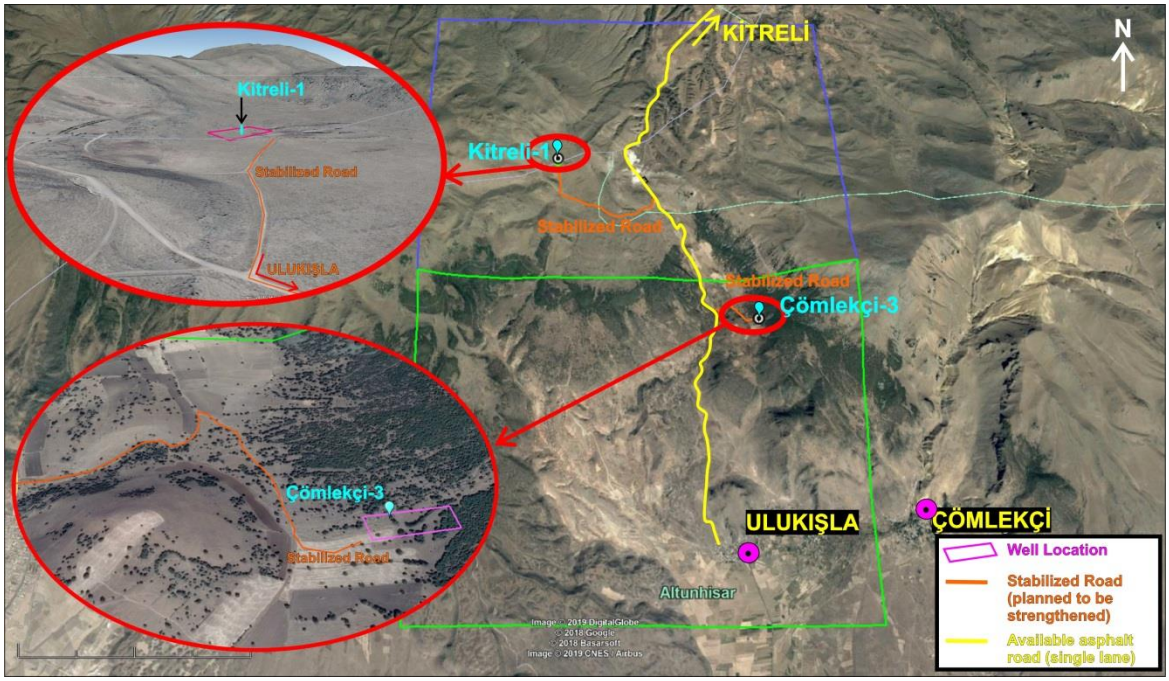

Figure 5. The Satellite View Shows Transportation to the Site and Existing Road

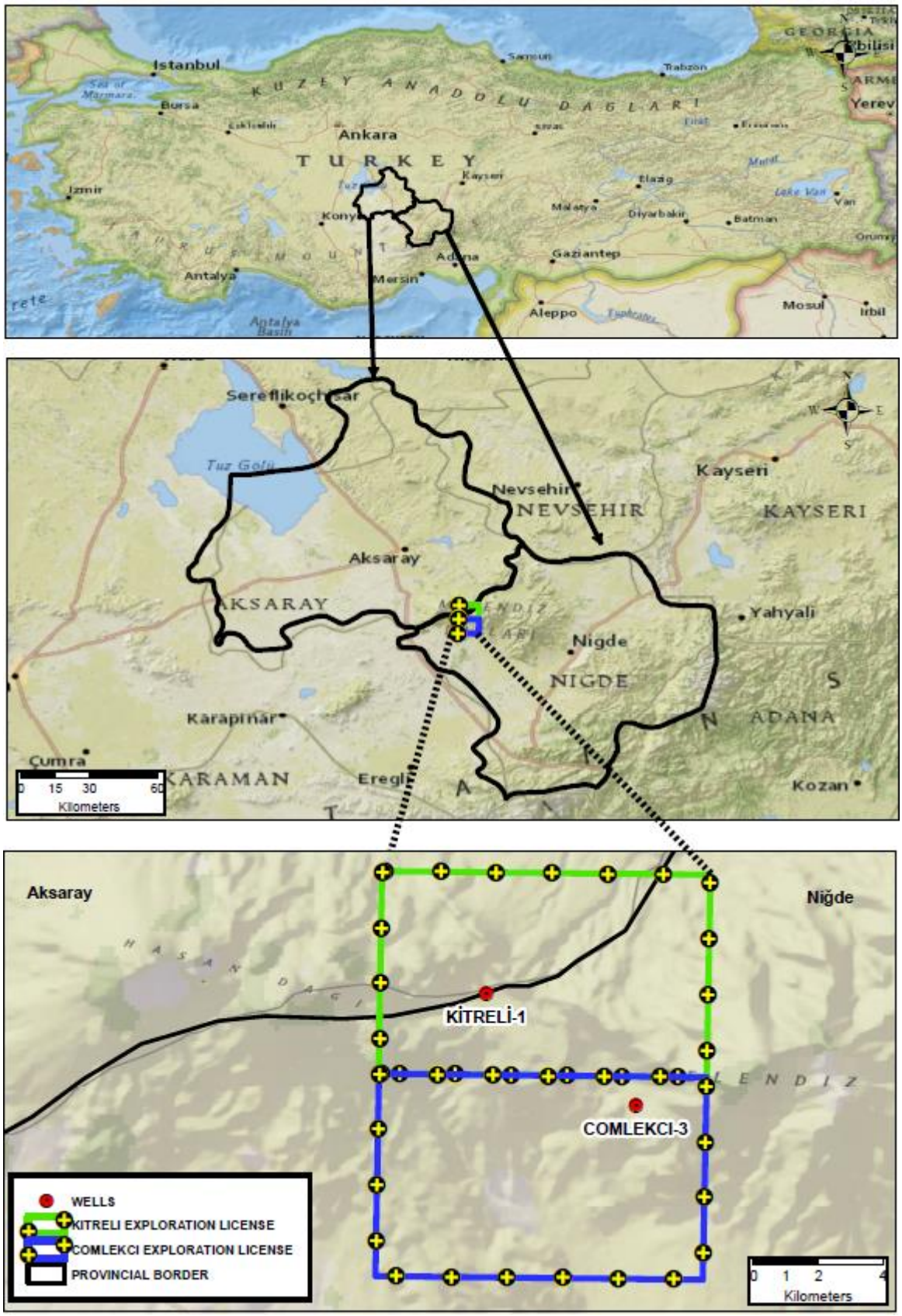

Figure 6. Location Map

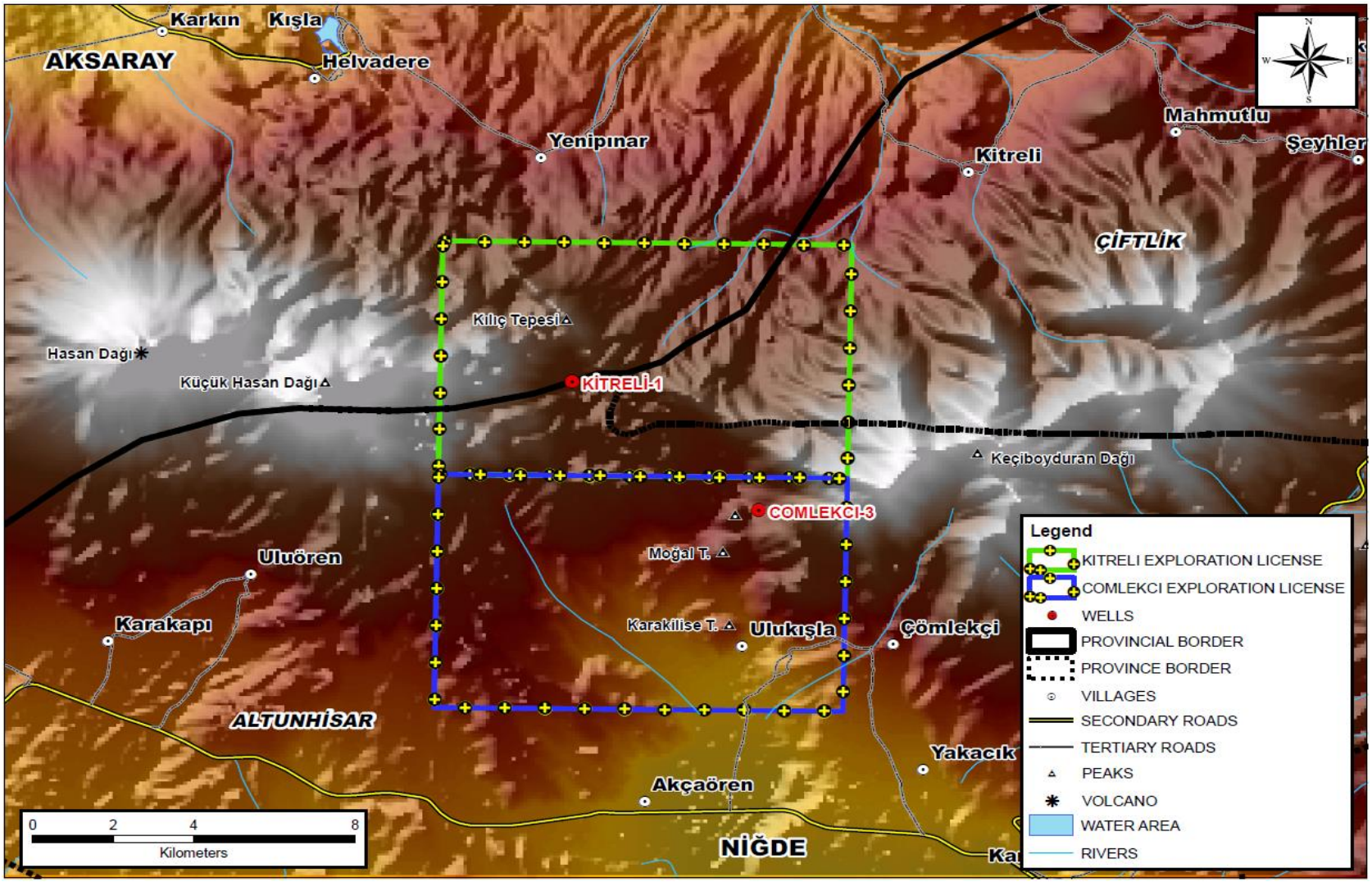

Figure 7. Physical Map Showing Settlements and Surroundings

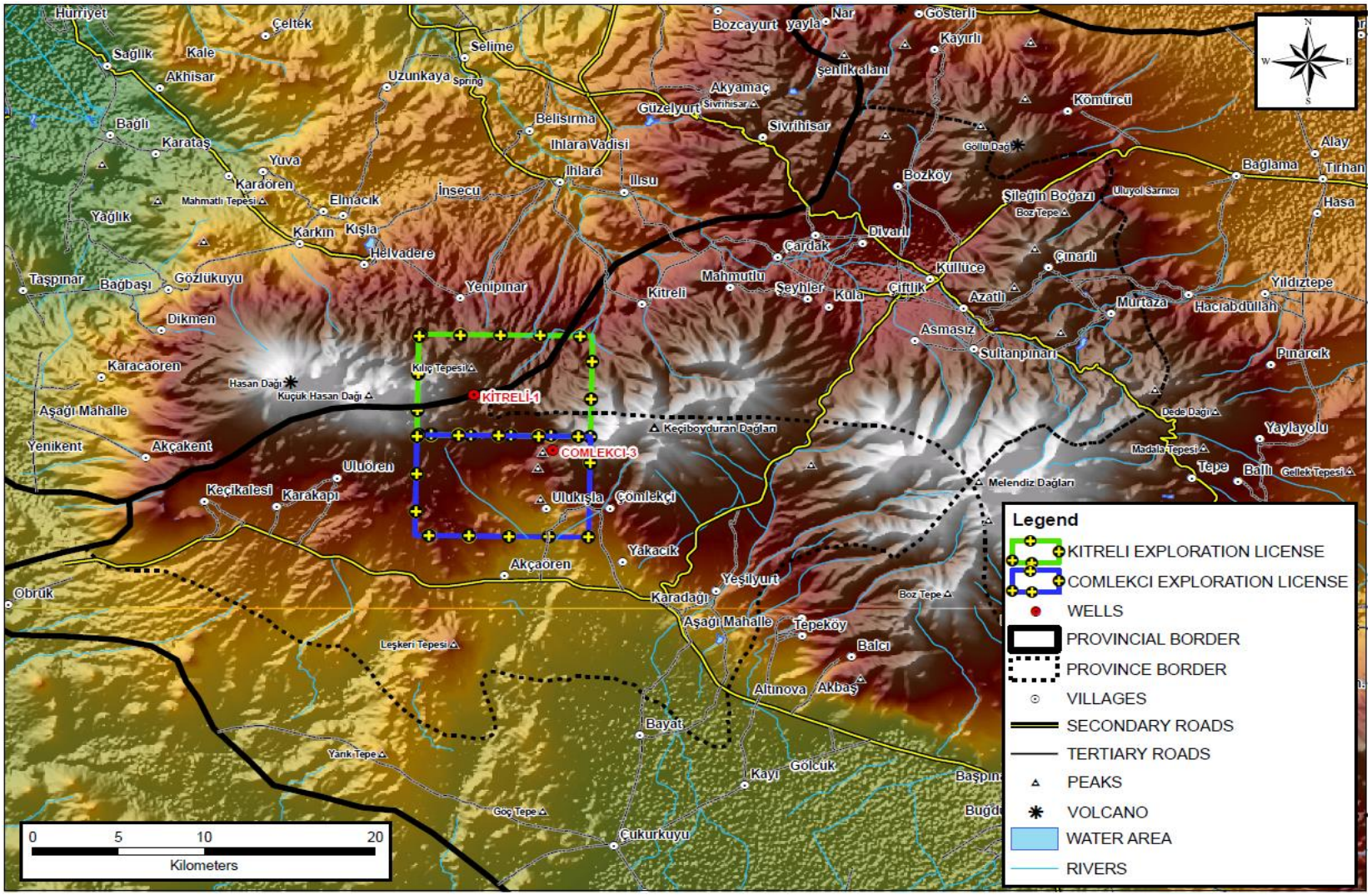

Figure 8. Physical Map Showing Near Settlements and Surroundings

2.4.2 Geographical Formations and Geology

The drilling site is located within the boundaries of Ulukışla Village, Altunhisar District of Niğde Province. The well locations are in relatively flat areas. The average height of the license areas varies between 1200-1700 m, and the drilling locations are at an approximate elevation of 1700 m above sea level.

To the southwest of the license 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 the Mount Hasan are located in the same volcano system.

The area surrounding the mountains is the highest altitude of 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 Ulukışla, there are foothills plains. To the northwest of the license 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.

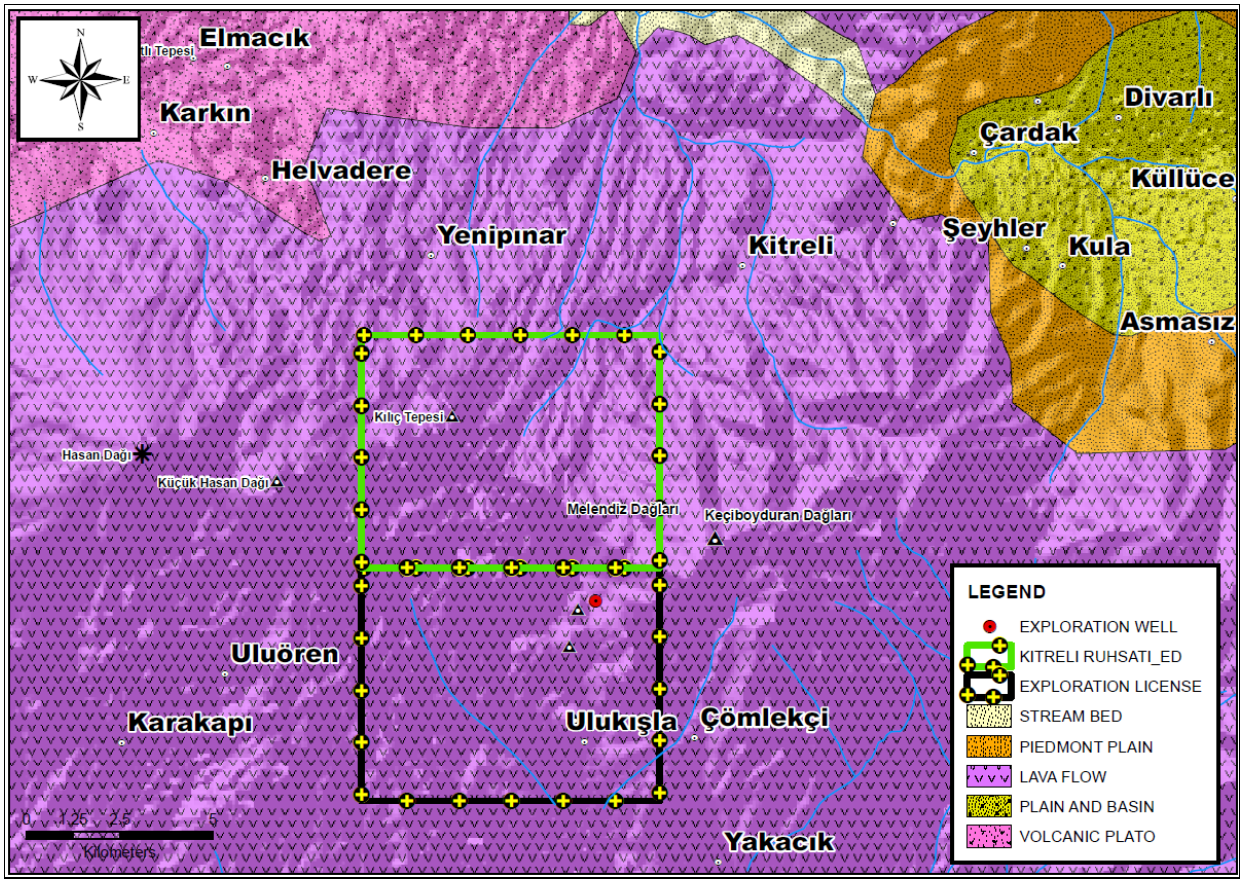

Figure 9. The Map Showing Morphological Surface Shapes of License Area

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. (See Figure 9)

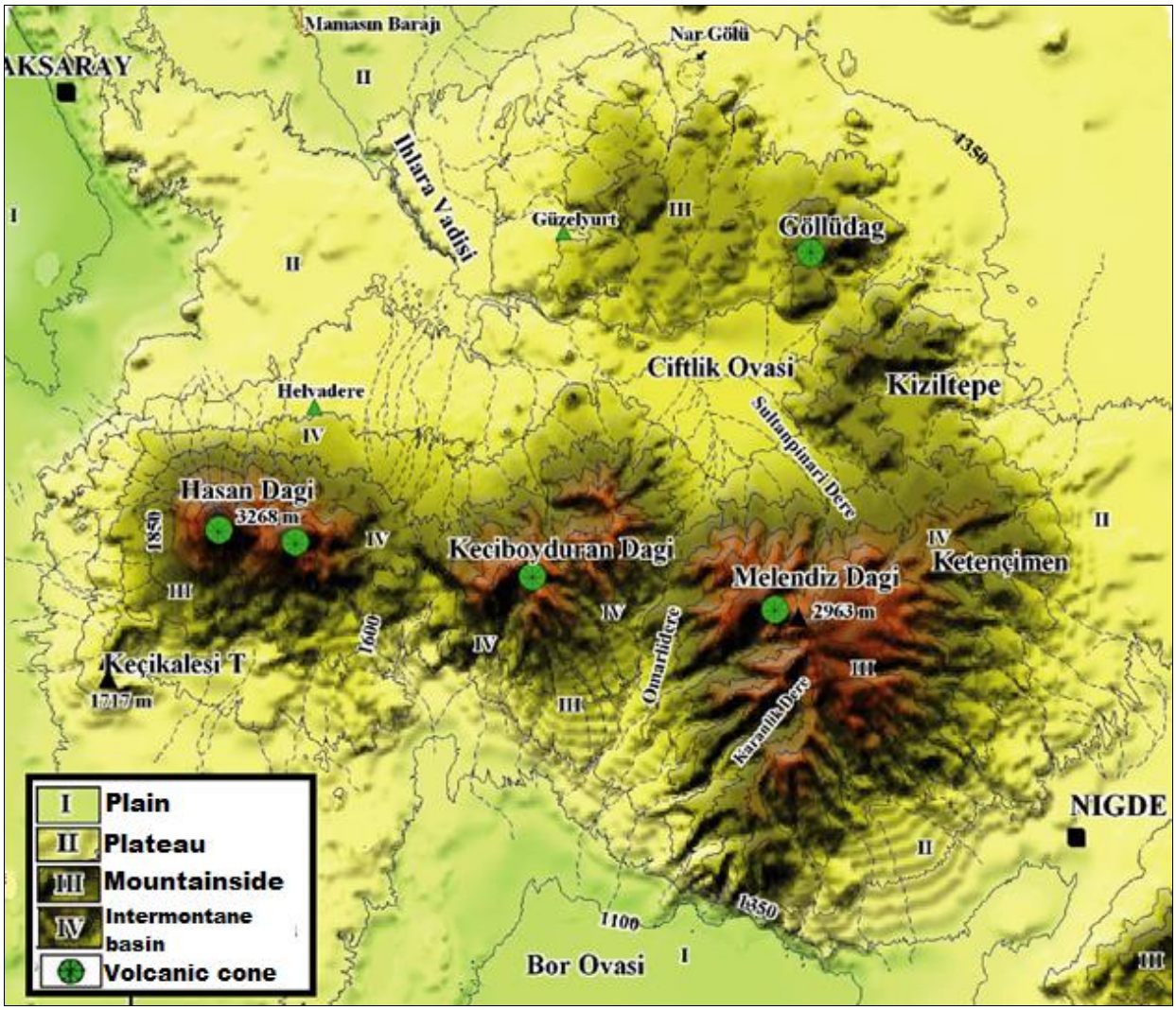

Figure 10. General Morphology Map of the Region

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 locations are composed of Keçikalesi caldera, Melendiz, Keçiboyduran and Hasandağı composite volcanoes and lava and pyroclastic materials from the parasitic cones of these volcanoes.

The CAVP lies between the NAFZ and EAF (North and East Anatolian fault zones), with the Taurus Mountains and Lake Tuz bounding the region to the south/southeast and west, respectively. The most pronounced volcanic centers in the region are aligned along a NE-SW trend and include (from NE to SW): Mt. Erciyes (Erciyes Daği), Acigöl-Neveşehir, Mt. Göllü, Mt. Hasan (Hasan Dağı), Karapinar Field and Mt. Karadağ. This widespread volcanic activity at the surface within the CAVP has been explained by Ates et al. (2005) to be associated with a deep-seated magnetic anomaly that has been detected in gravitimetric and aeromagnetic surveys. This anomaly has been interpreted by the authors as evidence of a magmatic intrusion related to a thin crust in the region, in turn providing an explanation for the regionally elevated geothermal gradient of 5 to 8°C/100 m (Basel et al., 2010) in the CAVP versus the typical gradient in non-tectonically active areas of 2.5 to 3°C/100 m.

Hasan Dağı is one of the two largest stratovolcanoes in the CAVP and is near the Kitreli and Çömlekçi prospects (and therefore represents a potential source of heat). It is a double-peaked stratovolcano rising to 3,253 m and 3,069 m, with a 5-km-wide summit caldera. Volcanic activity has been age dated back to 13 Ma, but the most active period occurred at less than 2.6 Ma. Compositions of erupted lavas range from rhyolitic to (most recently) basaltic, and the eruptive products of Hasan Dağı are generally considered to belong to the calc-alkaline magmatic series. Most samples from Hasan Daği studied and reported on by researchers define an almost complete series from basaltic andesite to rhyolite.

However, the more recent (<1 Ma) mafic samples are alkaline basalts (Deniel, et al., 1998). The Youngest Strombolian-type eruption (of basaltic composition) occurred about 34,000 years ago. In addition:

- Archeological evidence supports a more recent explosive eruption in the Holocene epoch, between 7,500 – 6,000 BC, corresponding to the most recent caldera collapse. Local Neolithic communities recorded the event in a mural excavated in 2014.

- Hasan Dağı is not considered to be active, and the risk of it erupting during the project lifetime is low. Historically, weak fumarolic activities at the summit and occasional snow melt in the winter have been noted on Hasan Dağı, but it is unclear if these conditions still persist.

Areas with recent volcanic eruptions such as Hasan Dağı typically have anomalously high rates of heat flow created by the emplacement of magma at relatively shallow depths in the earth's crust (typically 24 kilometers or shallower for basaltic magmas, and 6.5 kilometers or less for andesitic magmas). The high heat flow can lead to the formation of a geothermal system where subsurface permeability is present initially or develops over time. Outflow from the geothermal system can create an exploitable geothermal reservoir even some distance away from the center of a volcano.

Using this generalized model, the Hasan Dağı volcano itself and geoscientific literature on the volcano have been evaluated for indications of the presence of a heat source, and of a geothermal system that may extend outward from the volcano. Because of the recent activity of Hasan Dağı, it is reasonably likely that a convective geothermal system may exist within the volcanic edifice. However, it remains uncertain whether there is outflow of geothermal fluid from the volcano into more accessible areas within the Kitreli and Çömlekçi prospects.

2.4.3 Climatic Properties

Altunhisar district has a continental climate. Summers are hot and dry, winters are cold and snowy. Spring receives the most rain in the year. The average annual temperature is 12 degrees, average rainfall is 334 mm, the relative humidity is low. The month with the highest humidity is February and the lowest month is August. Frost in the district starts in the middle of October, can last until the middle of April.

2.4.4 Hydrological Properties

The license areas are scarce with respect to water sources. There is no any surface water around the project areas and in the license areas. There are some intermittent streams (dry river bed) in the license areas. These river beds are usually dry. In some of them, short-term flows are observed after the snow melts. Dry river beds around the project areas, in the impact areas and the license areas are given in figure below.

The closest intermittent stream (dry river bed) to the Kitreli drilling location is the the distance of 404 meters, to the Çömlekçi drilling location is the the distance of 210 meters. The closest intermittent stream to the Çömlekçi drilling location is located higher elevation. Project activities will not impact the river beds.

There is one groundwater well that was drilled in previous years by the sponsor firm. This well is located on Çömlekçi project area. It was drilled as a geological exploration drilling.

This well will be used for water requirement during drilling activities. The depth of this well is 512 meters. Cold water comes from the well therefore it will be used for drilling water. It has the capacity of 35 tone/hour. After the drilling operations were completed, this well will be left to the local people for using as water well. Project activities will not impact groundwater or the water well.

The permit for the water well that will be utilized for drilling purposes will be provided before mobilization. The permit process of the water well continues at the relevant institution.

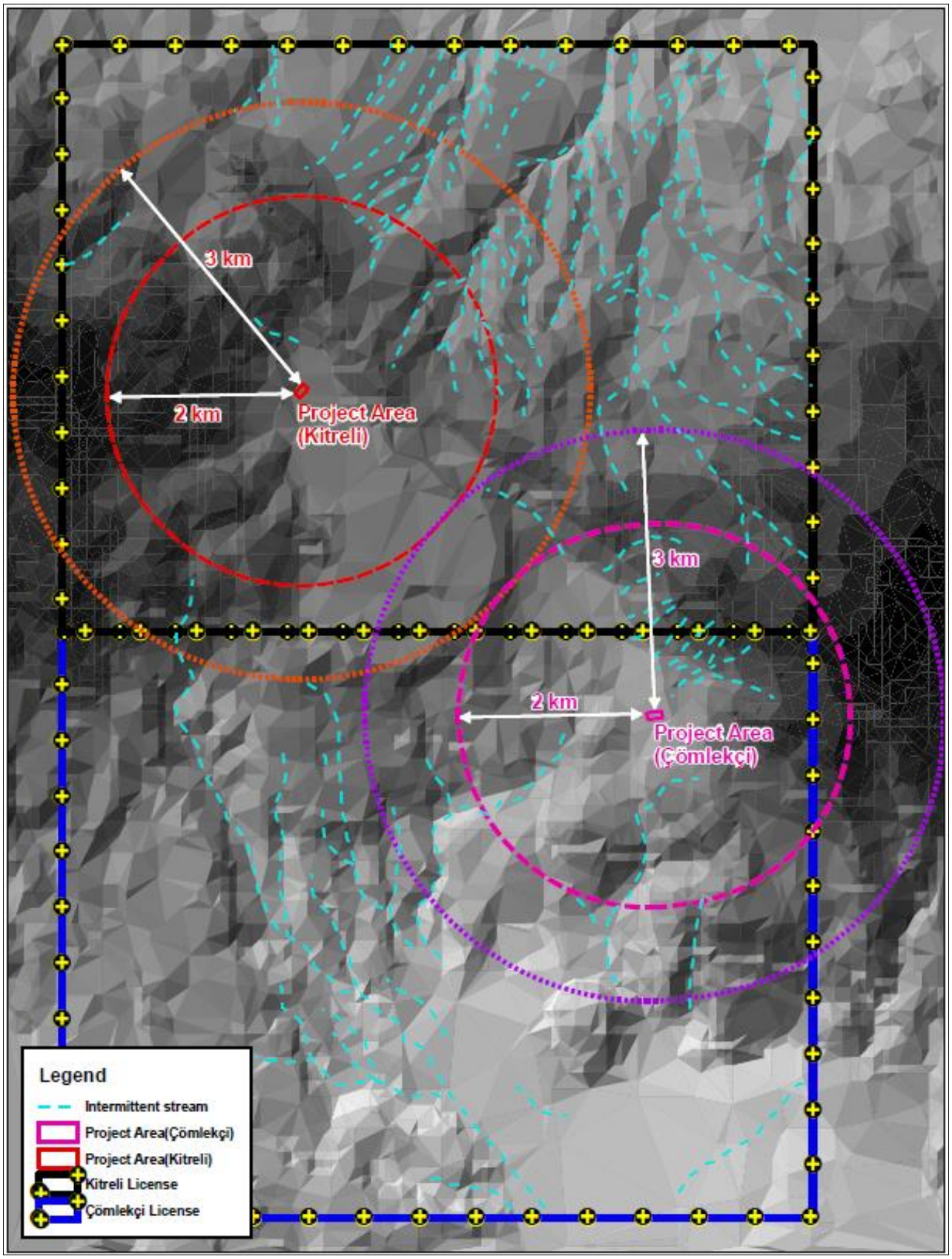

Figure 11. Hydrological Map of the Region

2.4.5 Land and Land Features

In the region, the appearance of the steppe is dominant. Forest areas are extremely limited. The drilling locations are generally covered with stones and bushes. To the southeast of the Kitreli-1 license area is a wooded area consisting of maquis and pines. 1200 m to east of the location, there is a road from the village of Kitreli to the Ulukışla village.

To the east of the Çömlekçi-3 well location there is a wooded area consisting of maquis and pines.

Well locations are both designated as a pastures. Utilization permits for the locations were obtained from the Niğde Governor's office, Provincial Directorate of Food, Agriculture and Animal Husbandry on 08.01.2018 for Kitreli Project and 09.01.2018 for Çömlekçi Project. 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.
- Pasture utilization permits are received from the Provincial Directorate of Agriculture or Directorate of Forestry, depending on the province.
- Pasture areas can not be purchased
- A guarantee fee is paid when obtaining permission. Permission is provided on condition that the land is restored to its former quality and capacity at the end of work. In the event that 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. However, land will be restored to its former quality and capacity by the investor at the end of work
- The amount of guarantee fee is defined by Pasture Commission in 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).
- These 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 the 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, **<u>in case the project is successful</u>**, applications will be made to the relevant institutions in order to continue the use of pastureland permits. (In the context of legal processes, the qualification of the land will be changed.)

No new land will be purchased for either of the drilling locations. Well locations are pasture land however they are not used by anyone including the locals. It was completely unused land. Although there are agricultural areas around the locations, the well sites are not suitable for agriculture because of quality of soil. (Both sites are 7th Class land and not suitable for cultivated agriculture.) No crops are grown on either of the well sites. There are no orchards at the sites, or in close vicinity. Fruit cultivation is not done in the region. In the agricultural lands that are closest to the drilling area, grain is usually grown.

The drilling locations are both generally covered with rocks and bushes. The sites are not directly used for grazing for animals. They are not suitable for grazing animals due to land structure and rocks. However, animals are grazed in the surrounding areas.

In Turkey, there are the land use maps of the General Directorate of Agriculture and Forestry. These maps show the quality of soil and the class of land. In Turkey, I, II and Class III lands are reserved for agricultural use only. IV. Class plots are potential agricultural land. V.Grade land is usually meadow land. VI. and VII. Class lands are pastureland-forest lands and they are not suitable for cultivated agriculture. According to the land use maps, land use ability class of both well sites is VII. Class (Figure 12).

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

Pasture areas are widespread in this region. The planned drilling will not negatively affect grazing activities in the region, because, there are other pasture areas nearby that can be used for grazing. The land size of Ulukışla village is about 66000 decares and about 40000 decares of this land is pastureland. The total area of land permitted to be used for the two well sites is 22 decares. Therefore, there are many other areas to be used for grazing. Only 0.05% of the total pastureland of the village will be used within the scope of this project.

The areas approved to be used for the drilling location is only 10,316 m^2 for Kitreli, and 12,015 m^2 for Çömlekçi, and the availability of local pastures will not be significantly diminished (See permits in Annex 5). Of the approved areas, only 5000 m^2 will be used for Kitreli and 6100 m^2 will be used for Çömlekçi.

Further consultations will be held with the animal owners in the region in order to improve and discuss the socio-economic impacts arising from the project, prior to the start of 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 by the project company.

Observing that the water resources in the region are scarce, and prohibitive to agricultural activity, the Project sponsor intends to work on this problem to improve water resources. 1,6 km southeast of the Kitreli-1 drilling location, outside the license area, a 10,000 m^2 area was rented by Ulukisla Village Muhtar. The project sponsor plans to drill a water well on this plot for the

villagers to use for animal husbandry and for agricultural irrigation. A greenhouse is also planned on this plot. The greenhouse will be built by the sponsor and granted to the village.

This area has been leased on 12.04.2018 for 10 years for the Ulukışla village. The water well and the greenhouse planned on this plot are expected to have a positive impact in socio-economic conditions of the local area.

No physical or economical displacement is expected for the proposed project. No stakeholders' access to pastures are expected to be negatively impacted through the land use of the project. On the contrary, the project is expected to revive 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 two wells.
The size of the license areas is 5000 hectares and the total size is 10,000 hectares. There are public lands (pasture, treasury, forest), private lands and non-cadastral lands. Pasture areas are widespread in the licenses.

In case the project is successful, when the locations are determined, the public lands will be preferred firstly. If it is not possible, the investor will acquire land on a willing buyer seller basis.

If it is obligatory, public interest decision will be taken and expropriation will be made.

The satellite images of the drilling location in 2011-2013- 2014 are shown in Figures and the recent photographs are given in Figures given below

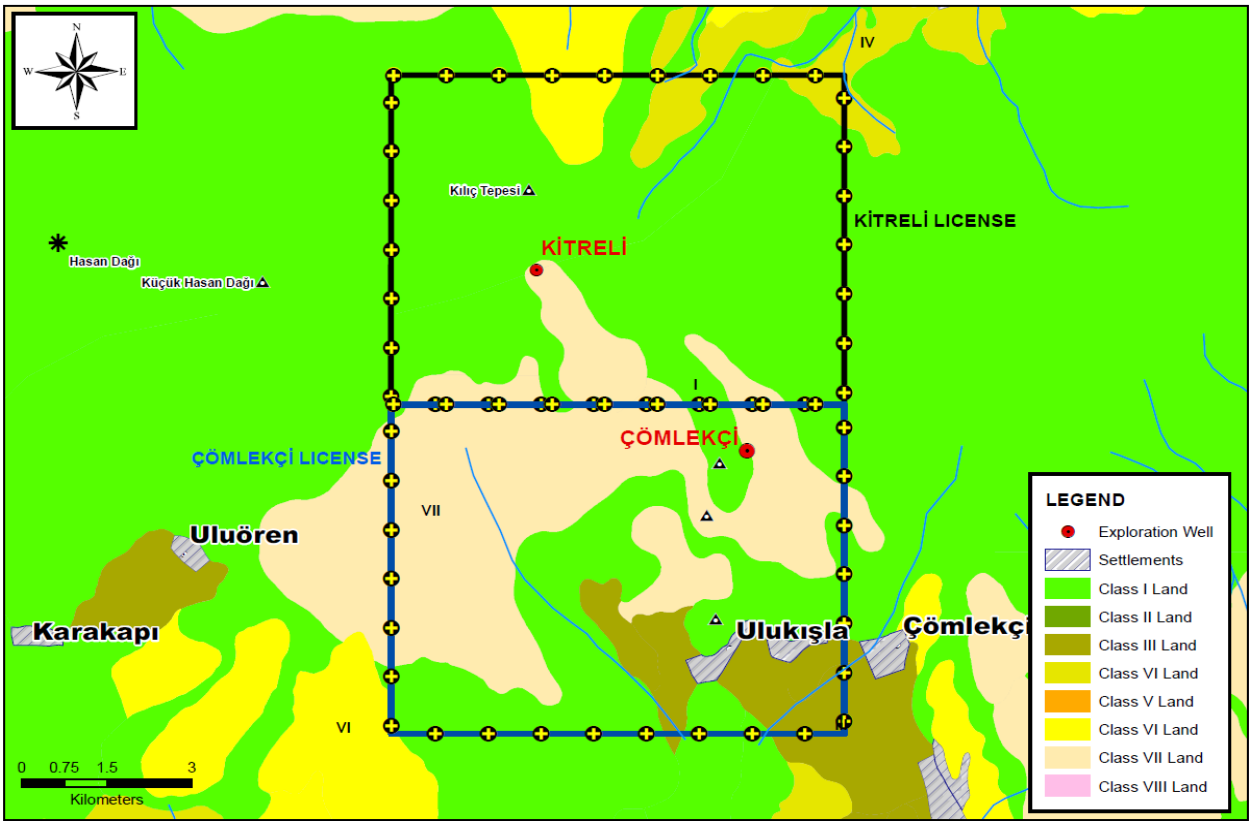

Figure 12. The Map Shows Land Use Classes of License Area and Surrounding Area

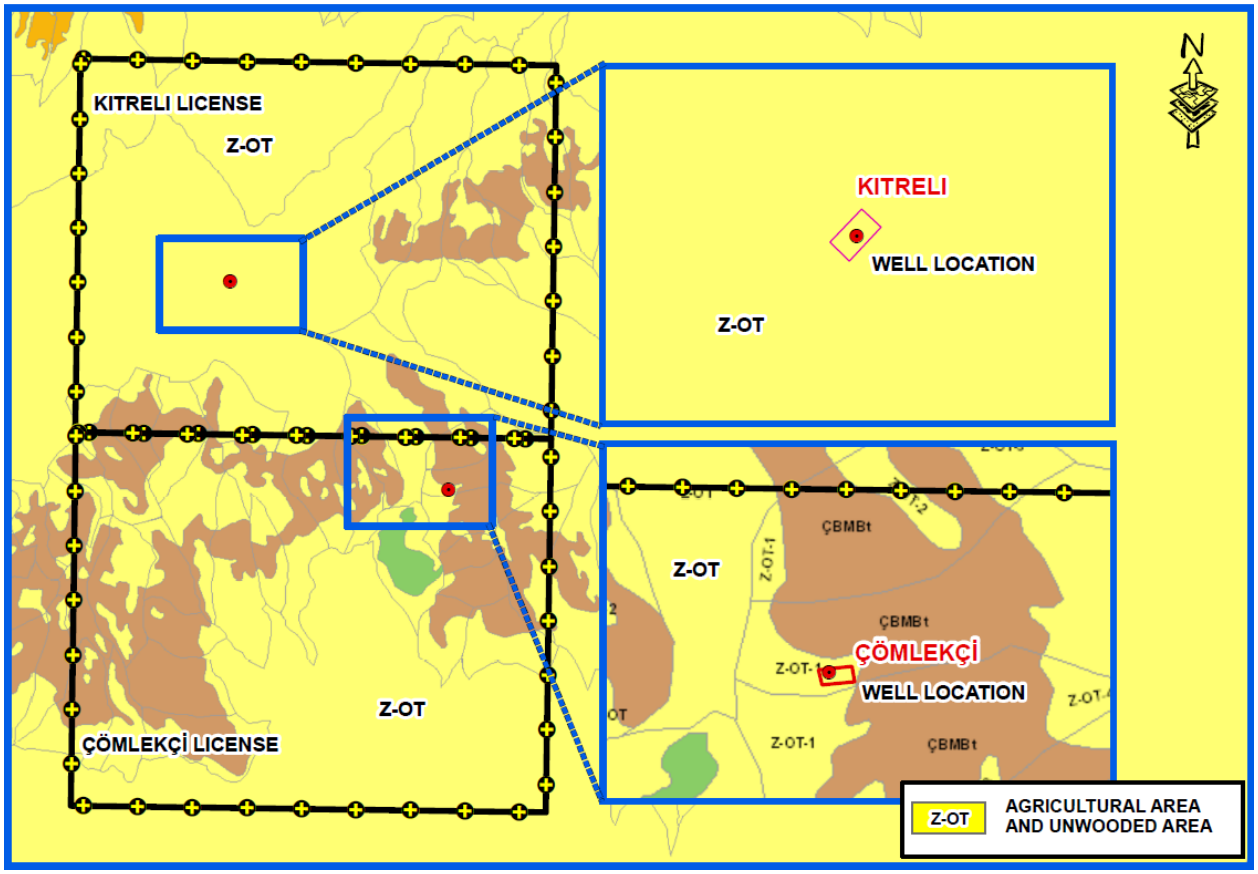

Figure 13. Forest Map shows License Area and Surrounding Area

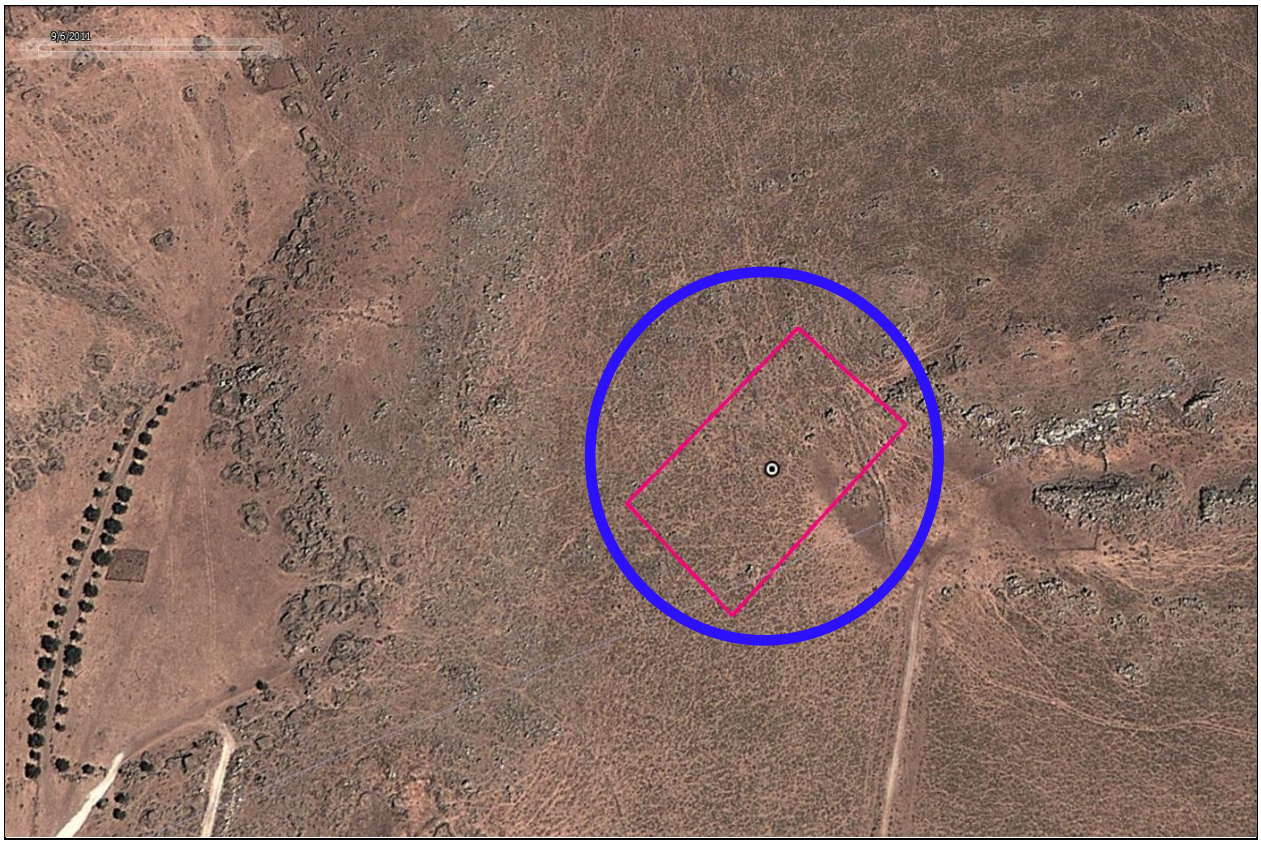

Figure 14. Drilling Location Satellite View for 2011(Kitreli Project)

Figure 15. Drilling Location Satellite View for 2014 (Kitreli Project)

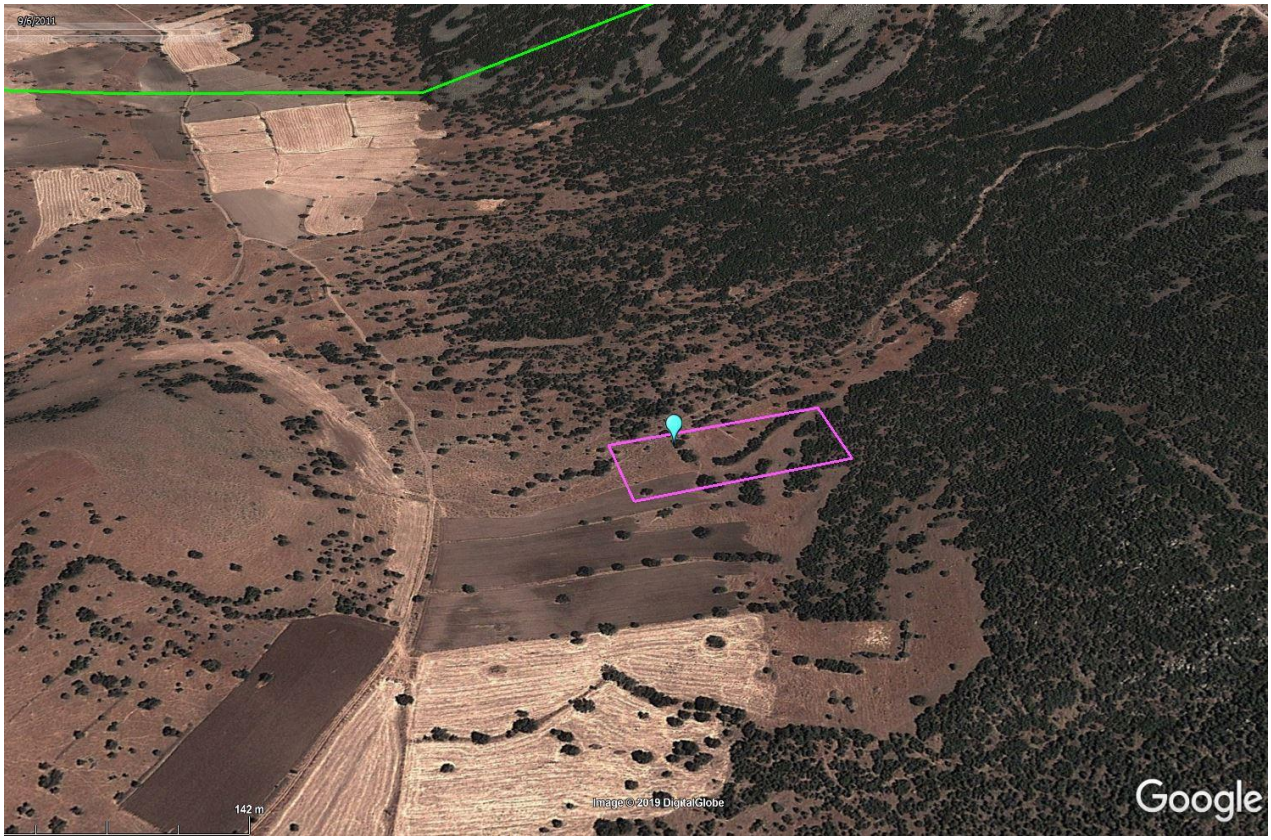

Figure 16. Drilling Location Satellite View for 2011 (Çömlekçi Project)

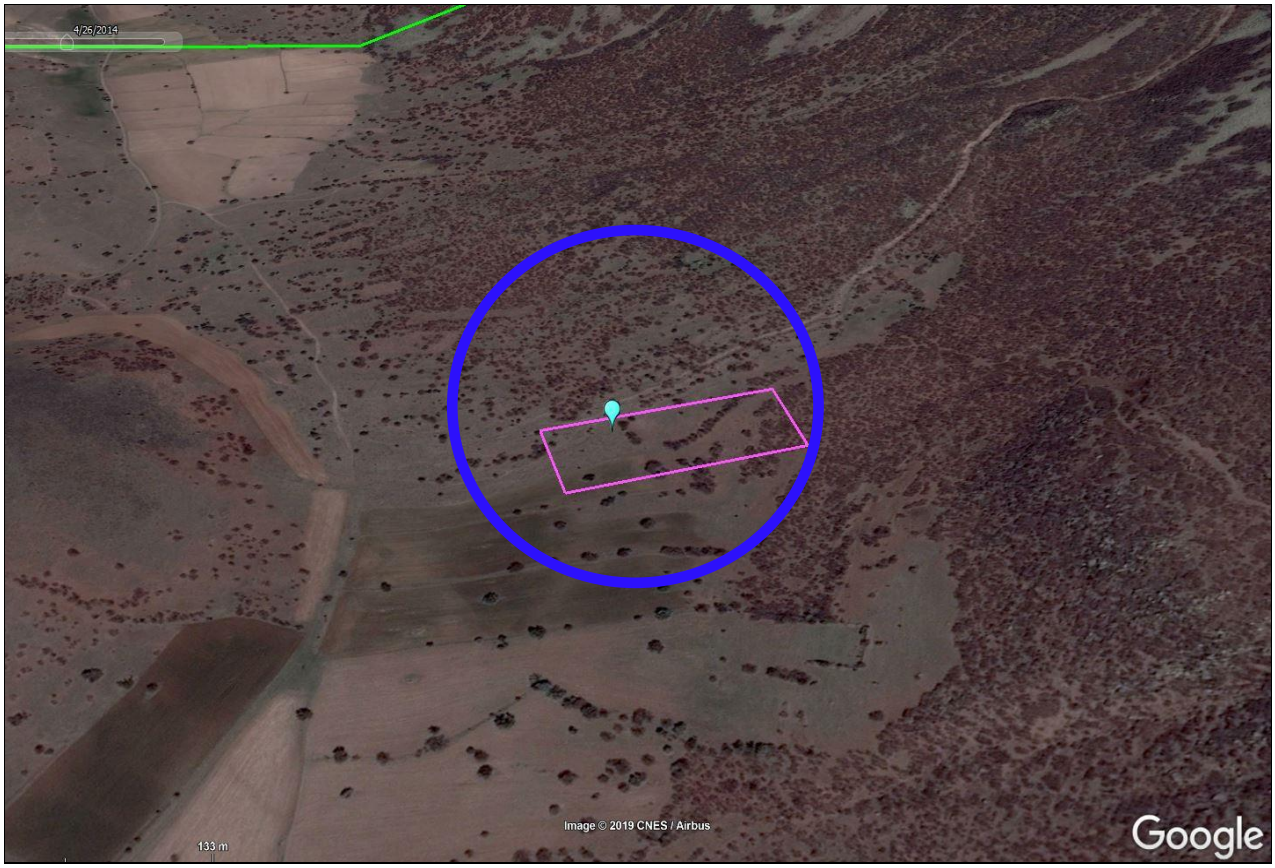

Figure 17. Drilling Location Satellite View for 2014 (Çömlekçi Project)

Figure 18. Drilling Location Photo (1) (Kitreli Project)

Figure 19. Drilling Location Photo (2) (Kitreli Project)

Figure 20. Drilling Location Photo (3) (Kitreli Project)

Figure 21. Drilling Location Photo (4) (Kitreli Project)

Figure 22. Drilling Location Photo (1) (Çömlekçi Project)

Figure 23. Drilling Location Photo (2) (Çömlekçi Project)

Figure 24. The Photo Shows Northwest of the Drilling Location (Çömlekçi Project)

Figure 25. The Photo Shows West of the Drilling Location (Çömlekçi Project)

As seen in the pictures given above, the drilling locations are ready. They had been constructed in early 2018. Currently, the perimeters of both sites are fenced. Areas outside the locations will not be interfered with.

The exploration permit of the area where the drilling location is located was taken on 08.01.2018 for Kitreli-1 and 09.01.2018 for Çömlekçi-3 wells. (Annex E).

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 (Provincial Directorate of Agriculture and Forestry) received 6073 TL from the project owner for Kitreli, and 7,296.70 TL for Çömlekçi 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 Letters are given in Annex-E

2.4.6 Flora - Fauna

In Turkey, there are sensitive areas which are not defined as protected areas by legal regulations but are determined as a result of the work of national and internatonal NGOs with a nature conservation strategy, such as, Key Biodiversity Area (KBA), Important Bird Areas (IBA), 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 by means of 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, "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 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 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 was 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-B. 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 levelled and partially cemented in preparation for drilling activities in early 2018, 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. In addition, 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, there is no plant taxon that needs to be monitored according to these criteria. Details of these studies can be found in the Biodiversity Management Plan in Annex 2.

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 require 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. Details of the monitoring plans can be found in the Biodiversity Management Plan in Annex 2.

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.

Literature on previously studied wildlife and fauna studies in the vicinity of Mount Hasan, Keçiboyduran Village and Ulukışla 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 2.

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. In addition, 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 39ubbuteo, 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 at 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 the 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 is no animal species that needs 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 Biodiversity Management Plan, in order to determine the potential impact of the proposed project on these species in or around the project site. In addition, the mitigation measures to minimize the impact on the local habitat are also given in Biodiversity Management Plan and Mitigation Plan in Table 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 which can be harmful to environmental and public health are called Sensible Areas which are deemed necessary to be protected in accordance with national legislation and international conventions to which they are party. 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 in accordance with the relevant legislation for the purpose of 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 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 the 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 the 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 in accordance with 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 exploration permits of the areas where the drilling locations are located were taken on 08.01.2018 for Kitreli-1 and 09.01.2018 for Çömlekçi-3 wells (Annex E).

This permission requires that the environment is not harmed during the geothermal resource exploration works and that the site is brought to its old capacity after the end of the work.

When the exploration drilling is completed, if sufficient geothermal resources cannot be found, the sites will be closed and converted into its old capacity and capacity.

Aksaray Provincial Pasture Commission (Provincial Directorate of Agriculture and Forestry) received 11.393,68 TL for Kitreli-1, and 7,296.70 for Çömlekçi-3 well sites from the investor to be used to restore the pasture to its previous quality and capacity if the sites are not restored by the project owner.

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 in accordance with 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 in accordance with 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 environment of the endangered endangered species of the Mediterranean in the 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 pursuant 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 in accordance with 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.

In addition, there is no protected area or sensitive area and cultural heritage sites in the vicinity of the drilling area and in the license area.

Protected areas, Sensitive areas: Ihlara Valley Special Environmental Protection Area is in the north of the license area. The distance of this area is 8,2 km from the Kitreli license, and 12 km from çömlekçi license area. No intervention will be made to this area during the project activities. Project activities will not impact the Ihlara Valley in case the well is successful.

Cultural Heritage Sites: The distance of Kızılkilise is 15 km from Kitreli license, 21.3 km from Kitreli exploration well, 21 km from Çömlekçi license and 22 km from Çömlekçi exploration well. Project activities will not impact Kızılkilise during exploration period and future operation period in case the well is successful. There is official letter obtained from Provincial Directorate of Culture and Tourism for Kızılkilise

In the official letter of this institution, it was stated that the Kızılkilise was in the third degree natural protected area. In addition, it was stated that neither drilling area was not within the site and protection area of Kızılkilise. Apart from this, it is also stated that since both areas are far away from the site area, there is no objection in conducting exploration drilling in these areas.

In addition, it was stated that the areas where the drilling works will be carried out locate within the responsibility area of the Niğde Province and if any cultural assets are found in future exploration studies, it is obligatory to inform Niğde Provincial Directorate of Culture and Tourism in accordance with the legislation (Article 4 of the Law on Protection of Cultural and Natural Heritage Numbered 2863).

Therefore, 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 map showing the protected areas and sensitive areas around the license area is shown in Figure 26-27.

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 in 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 in the coming years, these cultural values will be protected. Measures will be taken to ensure that the project does not have a negative impact on these values.

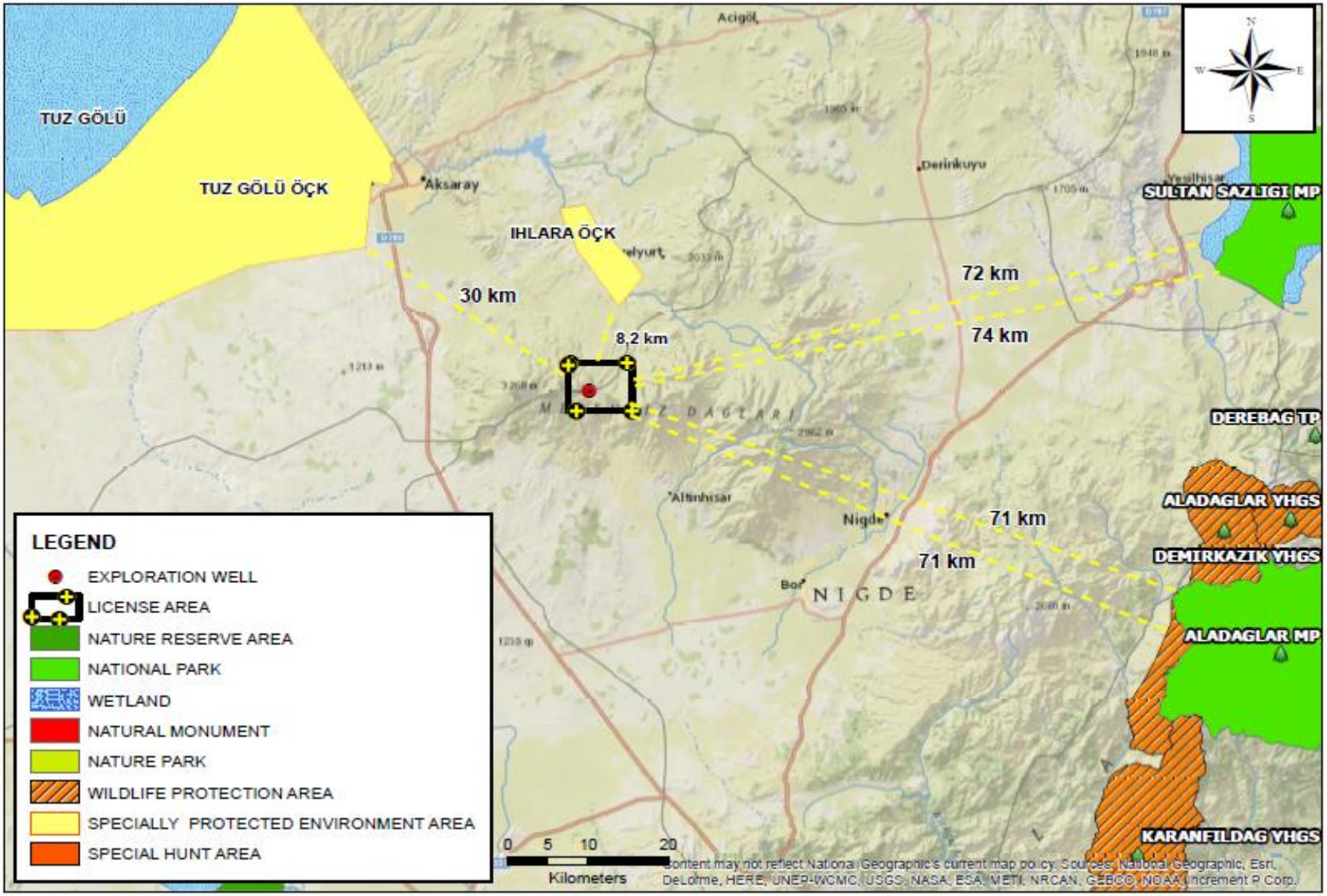

Figure 26. The Map Shows Protected Areas Around the Kitreli License Area

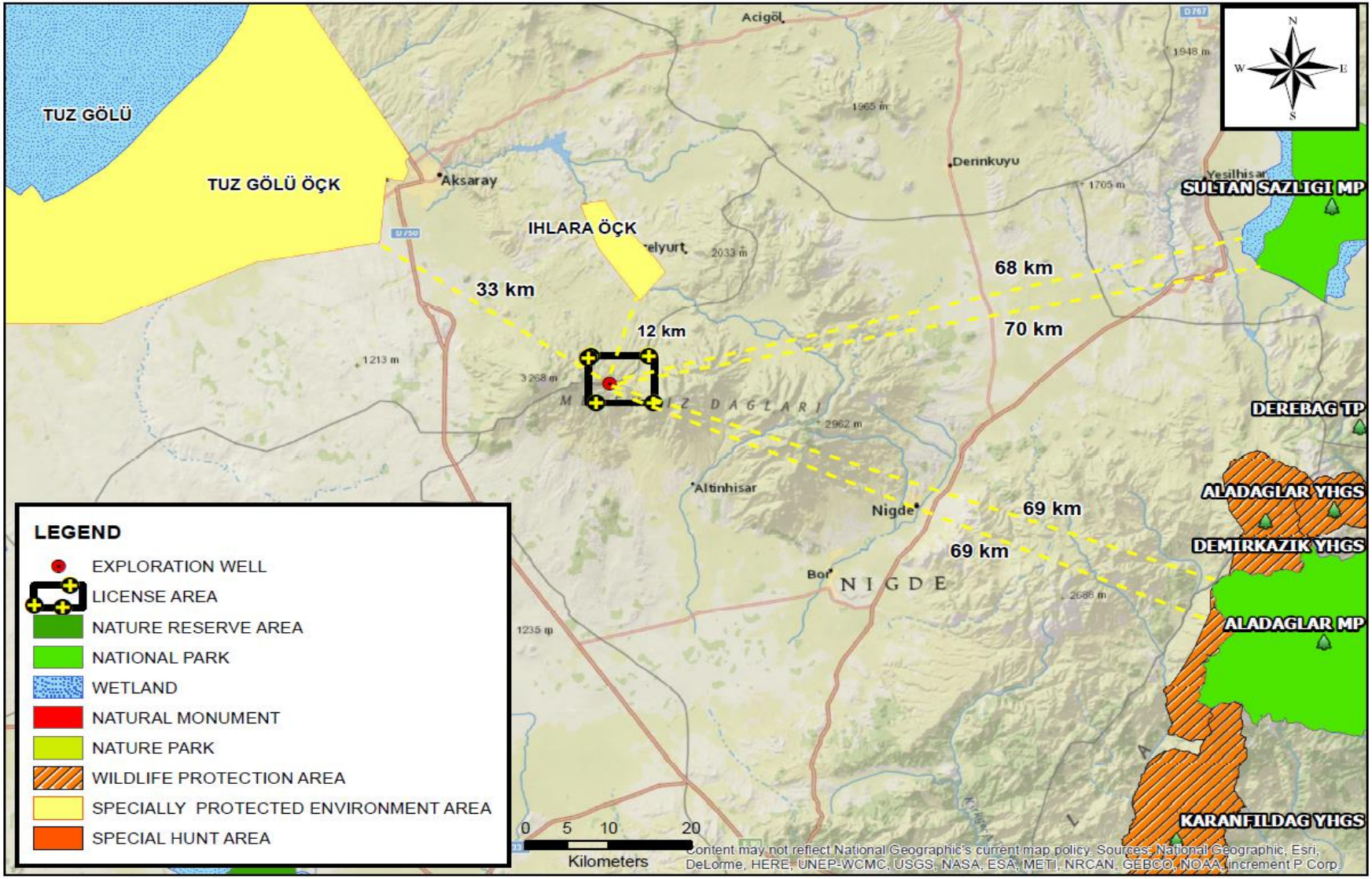

Figure 27. The Map Shows Protected Areas Around the Çömlekçi License Area

2.4.8 Socio – Economical Status

Population

Kitreli license area is located partially in Niğde and partially in Aksaray provinces and the drilling location is located in Aksaray, whereas the Çömlekçi license area is completely in Niğde province.

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

Table 1. Nigde 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 sites are both located in the province of Niğde, Altunhisar District, Ulukışla Village. The population of Ulukışla village in 2018 was 751 people, of which 332 were male and 419 were female.

The population affected from project:

There are no settlements within the license area of Kitreli. The drilling location is located within the administrative boundaries of Ulukisla village. Ulukışla village is approximately 8 km away from the drilling location of Kitreli, and 3.8 km away from Çömlekçi.

The closest settlement to the Kitreli-1 drilling location is Yenipınar Village, which is located in Aksaray Province and the distance to the drilling location is 5.7 km. This village is not within the license area. The settlement closest to Çömlekçi-3 well is Ulukışla Village at 3.8 km.

The settlements in the rural areas of Niğde and Aksaray mostly lose population due to emigration because of the unemployment problem and lack of income. In these settlements, population is generally decreasing compared to years.

The population of the Ulukışla Village, is decreasing. No population growth is expected due to the project. Priority will be given to the local selection of personnel depending on their technical abilities.

Land Acquisition

<u>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.</u>

As a part of the stakeholder engagement process, prior to the start of drilling operations in the region, consultations will be held with the animal owners in the region in order 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. 1,6 km southeast of the Kitreli-1 drilling location, outside the license area, 10,000 m^2 area was rented by Ulukisla Village Muhtar. The project sponsor plans to drill a water well on this plot for the villagers to use for animal husbandry and for agricultural irrigation. A greenhouse is also planned to be built on this plot. This area has been leased on 12.04.2018 for 10 years for the Ulukışla village. The water well and the greenhouse planned on this plot are expected to have a positive impact in socio-economic conditions of the local area.

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

Infrastructure Services

In Ulukışla Village, where the drilling sites are located within the administrative boundaries, transportation is possible in all seasons. Drinking water network, sewerage system and inland roads are available. No new infrastructure will be built for the drilling project. The existing infrastructure is not expected to be impacted negatively due to the project.

Cultural and Social Services

In Ulukisla Village, the economy is generally based on agriculture and animal husbandry. However, water resources are insufficient. It is thought that the greenhouses and the well to be drilled for animal use and irrigation will positively affect agriculture in the economic sense. It will also bring vitality in the social sense.

A library was built by the investor at the Ulukışla village school. Other welfare projects are also planned to be made for the village in the future. Provision of scholarships for eight successful university students from the village was started. Project owner is also considering to provide financial assistance for the village's financial liabilities to the state.

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 ecosystem,
- Effects on Air Quality,
- Noise and Vibration effects,
- Effects on transportation,
- The impacts on the settlements was taken into account

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

In order to examine a project as a whole, the impacts of a project should be examined in two stages: 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.

For the geothermal resource determined as a result of drilling activities, such as reserve amount, quality, conformity will be evaluated and if production is considered technically and economically feasible, power plant construction stage will be started, followed by production stage. In accordance with the laws and regulations, the necessary permissions will be taken again before the 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 each well in Kitreli and Çömlekçi. This area is marked on the outermost points of the drilling locations.

The maps showing the impact areas is shown in Figure 28-29.

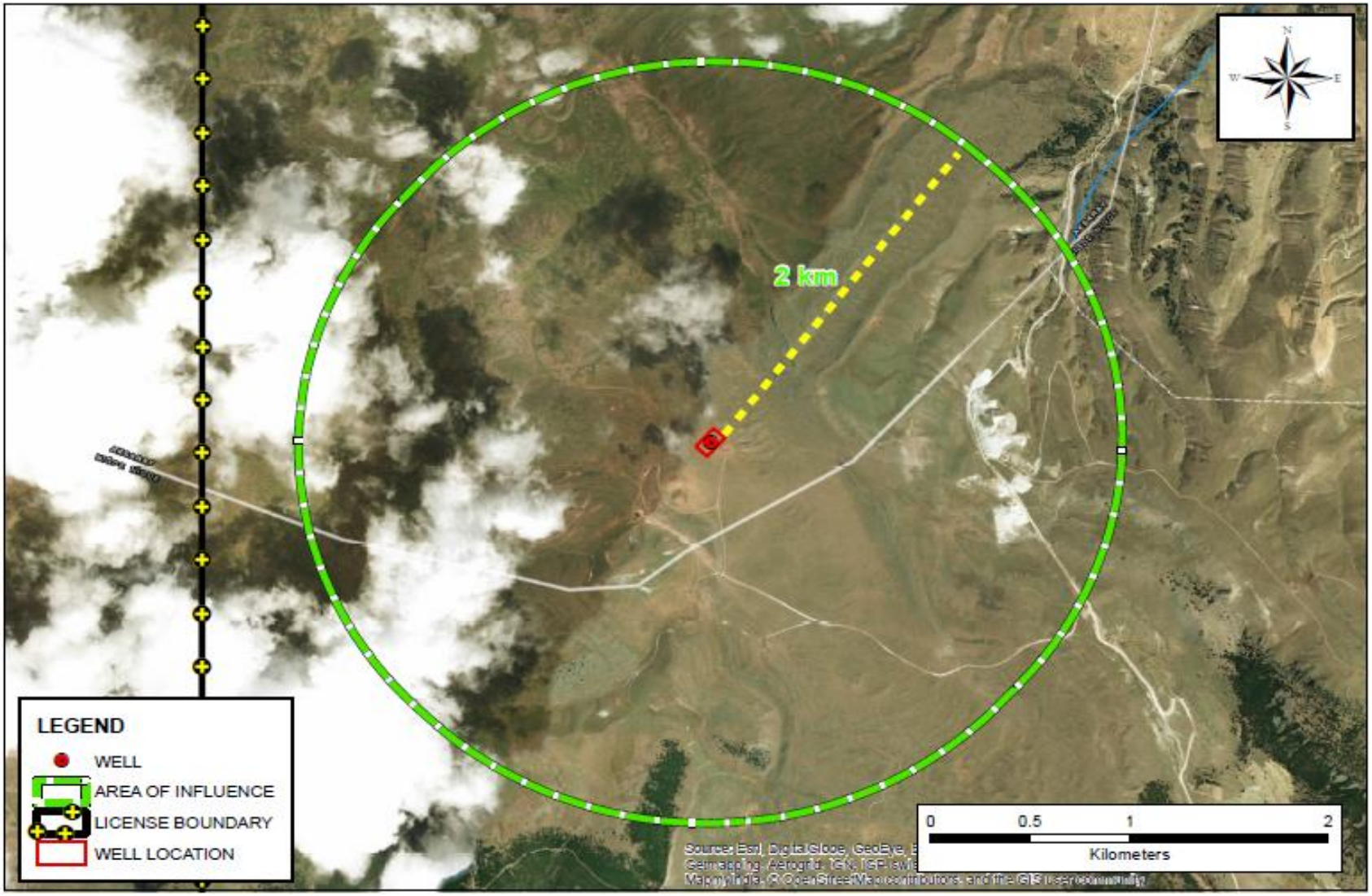

Figure 28. The Map Shows Area of Influence for Kitreli Project

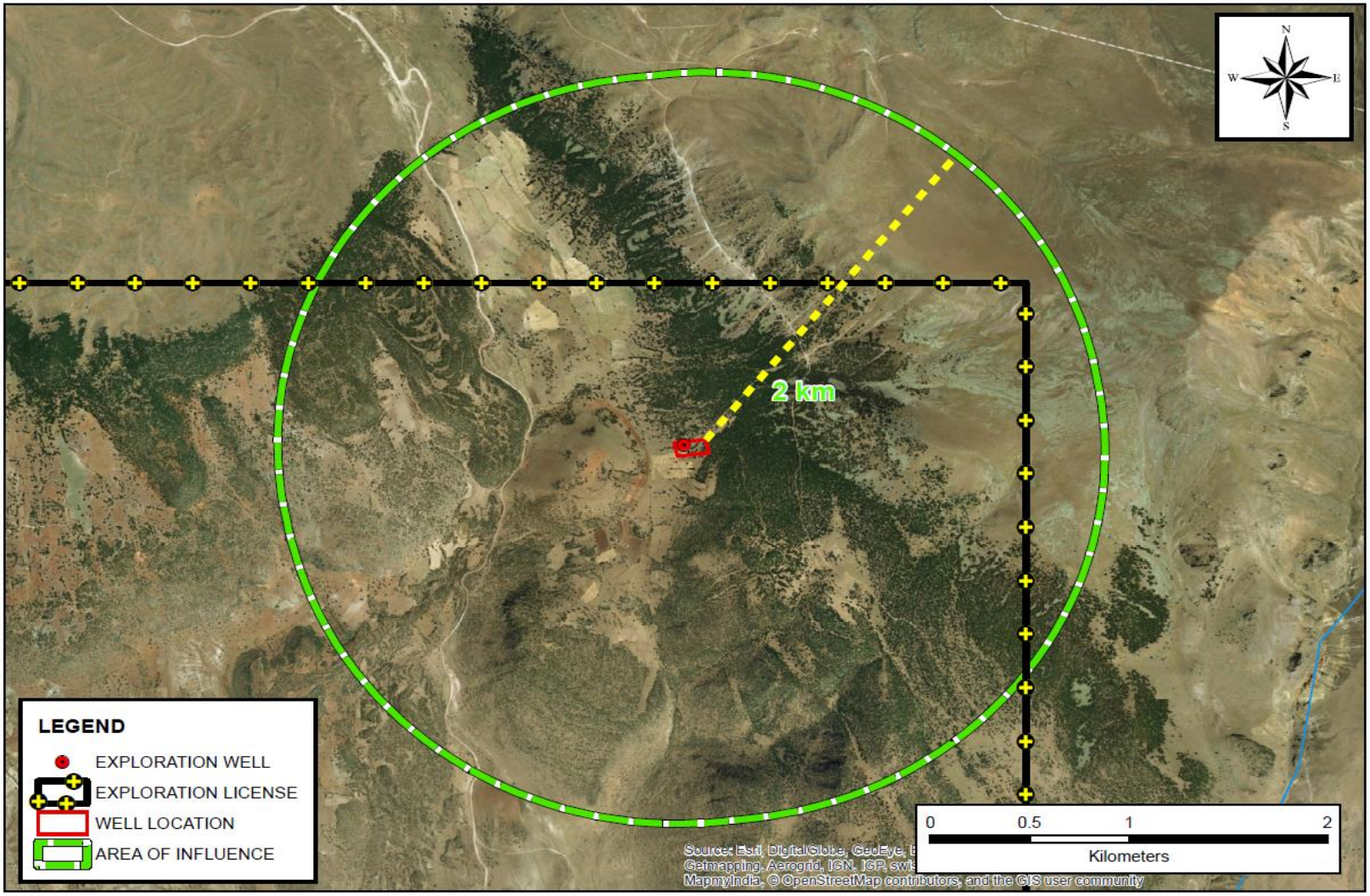

Figure 29. The Map Shows Area of Influence for Çömlekçi Project

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 of new roads for access to well locations, preparation of land locations, and land clearing activities for various reasons, if required.

In this project both drilling locations of the project are ready. Concrete surfaces were prepared. Land preparation was completed for the wells.

Excavation will be performed for the mud pits in the well locations.

Stabilized roads have established around both drilling locations. These roads will be improved with stabilization coating. Therefore, there will be **no need to open new access roads**.

Permissions were obtained for the land and are given in Annex-E.

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 showing the potential impacts, the effect route and the level is given.

For this project, baseline data for noise and dust (PM10 and deposition) were gathered at and around the site in order 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 measuremens were taken according to regulations. Other baseline datas such as soil quality will be gathered prior to mobilization. In addition, water samples will be taken from groundwater and surface water and analyzed by licensed laboratories. The samples will be taken from nearest surface waters (intermittent stream) and ground water (water well). The baseline measurements will be described in the effluent management plan. Moreover, it will be ensured that current measurements are taken again for other data such as noise and dust deposition.

4.1 Wastes

National and International Standards / Conditions

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

In addition, 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. **Handling of the wastes will be in line with the Turkish regulations.**

The project will also be in full compliance with the World Bank Environmental and Social Framework (ESMF) disclosed on Develeopment and Investment Bank of Turkey (TKYB)'s website, and the relevant EU legislation, ie 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 (ie European Waste Codes). It should be noted that the waste codes given in Annex 4 of the Turkish Waste Management Regulation are exactly 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 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

In accordance with Regulation on the landfill of waste, landfills in Turkey are designed as Class II landfills. In these facilities, there are systems that prevent surface water from entering the facility, suitable impermeable primers, leachate collection and treatment systems in accordance with 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 be complied with in the management of domestic solid wastes. In accordance with 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 Altunhisar Municipality, in return for a fee.

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 used for this.

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

Collection and accumulation shall be made in accordance with 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 soil, surface and ground water 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.

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 into water bodies will be strictly banned.

No waste vehicle batteries are expected be generated at 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. In addition, 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 sulphates and may accumulate at the bottom. They can negatively affect the 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 the 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. Therefore, liquid wastes are the most important factor that can cause potential impact. Liquid wastes can be generated from personnel and drilling operation. 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 ground water 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.

Negative environmental impacts are initially caused by contamination of surface water and then of groundwater. These environmental impacts negatively affect every region and everything that the polluted water body reaches. In addition, air quality can be adversely affected by evaporation of liquid wastes. Therefore, good waste management of liquid wastes is of utmost importance. Since the management of liquid wastes are covered by a multitude of national and EU legislation a specific Effluent Management Plan will be prepared 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 in this project 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 the 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 which are in accordance with 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 in accordance with the agreement with the nearest municipality.

- **Process Liquid Wastes:**

In geothermal drilling projects, 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, form 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 in accordance with best practices related to drilling fluids and wells, it is very unlikely that geothermal water will pollute the groundwater aquifers.

There is no any surface water around the project area and in the license area. There is one groundwater well that was opened in previous years by the sponsor firm. This well will be used for water requirement during drilling activities. Details about hydrological properties are given in Section 2.4.4

Drilling mud will be kept in impermeable containers (tanks) prior to 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 m^3 in each 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 criterias 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 geo membrane.

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

In this project, 6000 m^3 drilling mud is expected to be used as drilling fluid for each well. 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 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 in accordance with the national regulation. Landfills have different classes that accept wastes in accordance with 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 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 criterias 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 suitable 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 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 the 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 to address the specific management actions to be taken for effluent management.

Reclamation (Closure) of the Mud Pit Area: It will be formed according to criterias for Class I Landfills in Regulation on Landfill of Wastes.

After all operations are finished:

The mud pit will be filled with excavation materials. Before starting the closure process, it is determined that the structures are sufficiently seated against the risk of slipping and collapsing.

It is obligatory to apply the artificial impermeability coating in class I regular storage facilities.

The mineral impermeable layer is applied in two layers at least 25 cm thick. The drainage layer must be at least 50 cm thick and have a permeability of at least $K \geq 1.0 \times 10^{-4}$ m / s.
The top cover soil should be at least 50 cm thick depending on the type of plant to be grown so as to enable the plants to be grown later.
The area will be replanted in accordance with the natural vegetation.

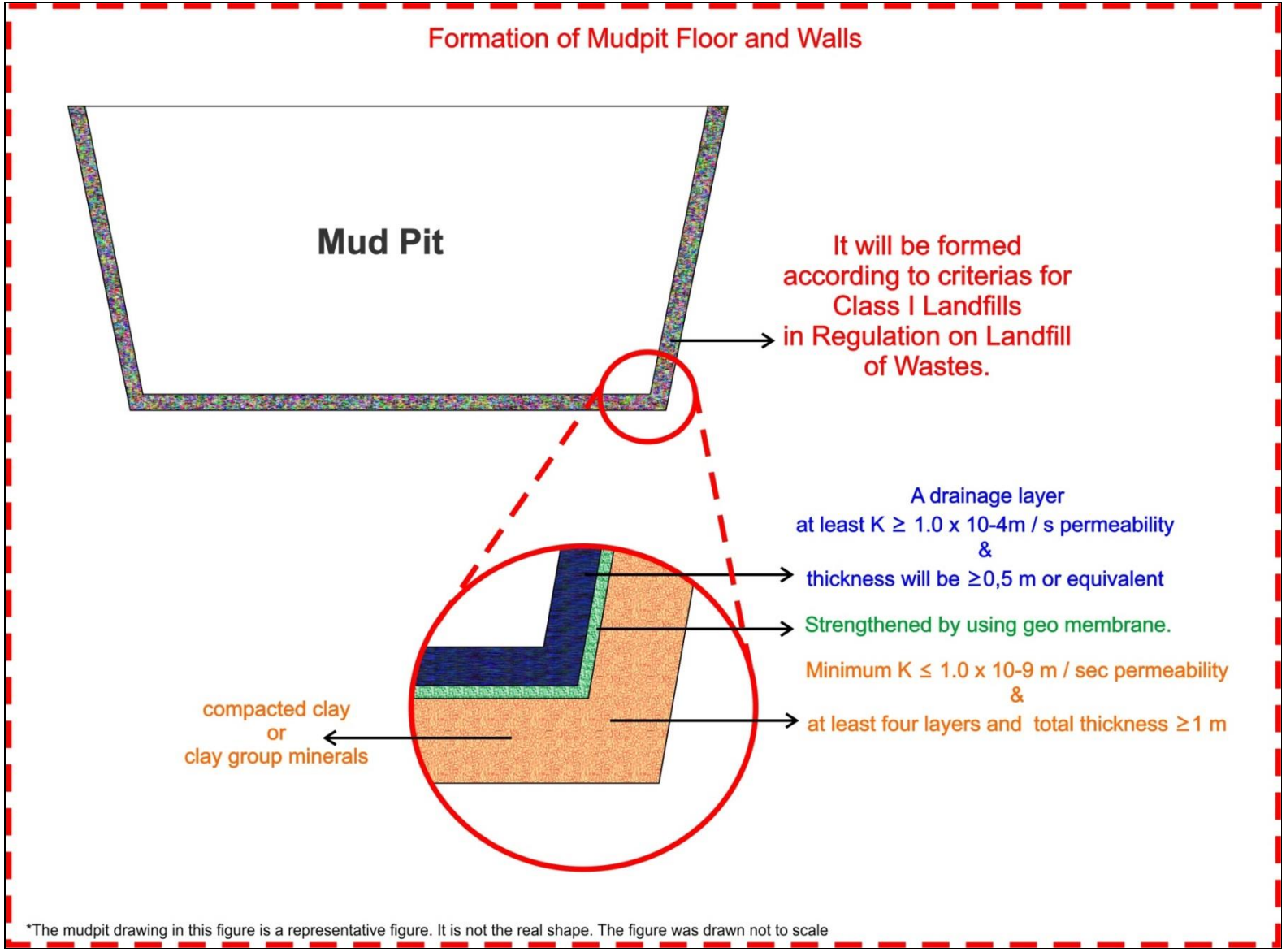

Figure 30. The Figure Shows the Formation of Mudpit Floor and the Walls

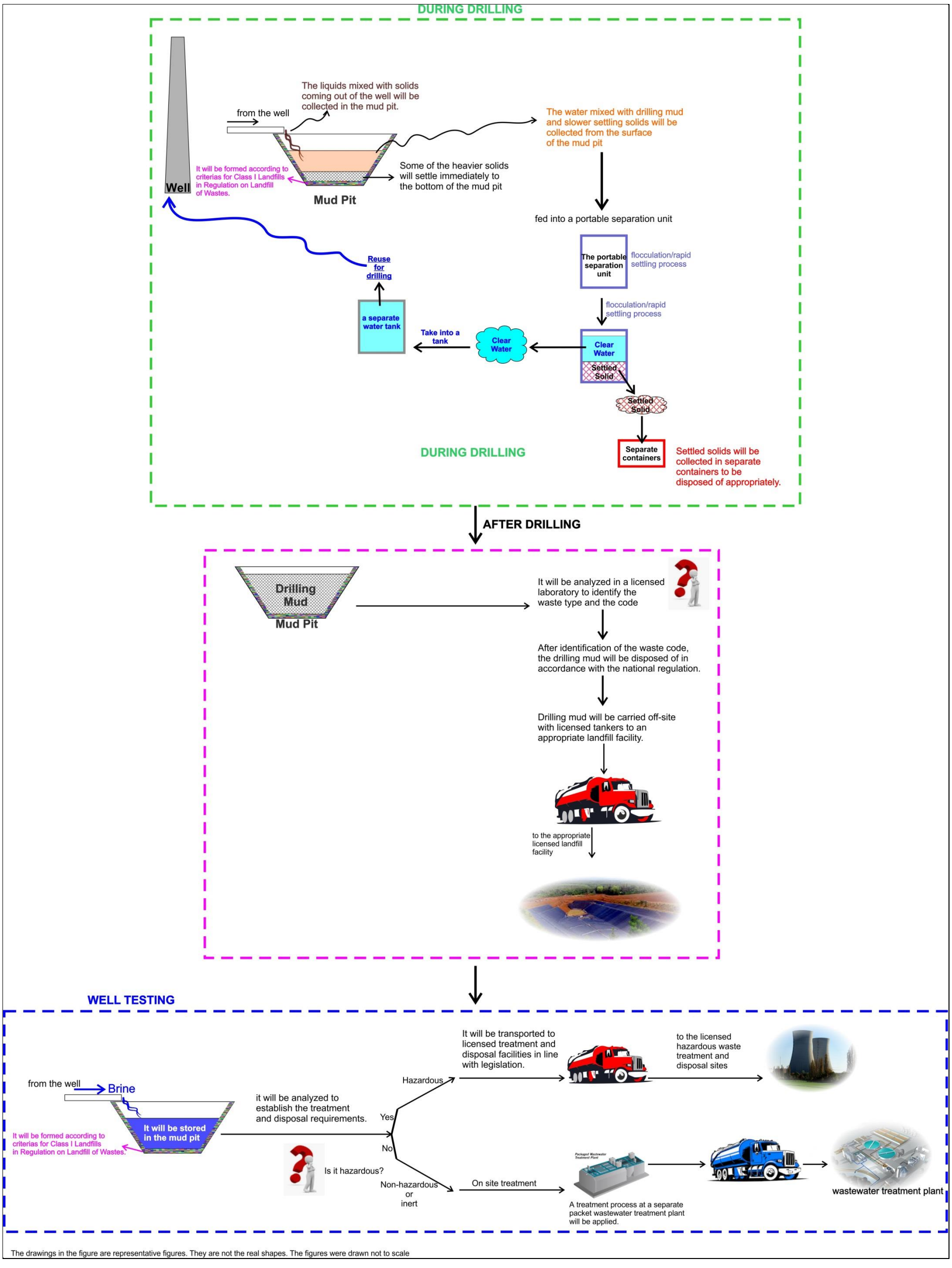

Figure 31. The Figure Shows Treatment of Mud and Wastewater in Mudpit

4.1.8 Excavation Waste

In both sites, mud pit will be opened in Project Sites. Each of the mud pits will be 6900 m^3. Therefore, excavation waste will occur on both sites. Although there is very little vegetative soil in the sites, the surface soil from these areas will be stored separately from the excavation material in an area to be determined on site and re-laid when the activity is completed.

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 which will be used as backfill material and loss of soil yield.

Mitigation Measures

The opening of the mud pit will cause the generation of excavation wastes. These wastes 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 in accordance with the legislation and best practices. Oils poured into the surface waters (eg water, water sources, sewers, water drains, etc.) reduce the 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 destroy 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 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 geo membranes 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 in accordance with the provisions of the Regulation on the Control of Waste Oils.

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

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

Waste oil analyzes shall be made in accordance with 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 the Purpose of 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 in accordance with the legislation and best practices. If necessary measures are taken and disposed in accordance with the legislation, these potential impacts can be reduced and eliminated.

One of the causes of potential impacts on surface waters and groundwaters 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 groundwaters.

In the paragraphs above, general impact definitions and reasons of geothermal drilling are given. In this project, the license areas are scarce with respect to water sources. There is no any surface water around the project areas and in the license areas. There are some intermittent streams (dry river bed) in the license areas. These river beds are usually dry.

The closest intermittent stream (dry river bed) to the Kitreli drilling location is the the distance of 404 meters, to the Çömlekçi drilling location is the the distance of 210 meters. The closest intermittent stream to the Çömlekçi drilling location is located higher elevation. Project activities will not impact the river beds.

There are no springs close to the project site. There is just one groundwater well that was drilled in previous years by the sponsor firm. This well is located on Çömlekçi project area. It will be used for water requirement during drilling activities. Project activities will not impact groundwater or the water well with the taking of mitigation measures.

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 in accordance with 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 the geothermal fluids to leak into the ground water and mix. This reduces both the well efficiency and the quality of the groundwater aquifer. To prevent this, it is important that the well coatings are faultless and impermeable.

In this project, 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. In addition, when the geological units with unstable or cracked, or if broken structures are drilled through, through the use of these methods geothermal fluid

removed from the underground will be prevented from being directed into the cracked geological units instead of the well mouth.

During the well completion tests during the exploration phase, 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 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 suitable licensed wastewater treatment plant with appropriately licensed waste transport tankers.

A contract will be signed with a treatment company for 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, baseline measurements water samples 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 project site. There is one groundwater well that was drilled in previous years by the sponsor firm on Çömlekçi project area. The sample of groundwater for Çömlekçi project area will be taken from this well. However it is far from Kitreli for baseline measurements. There are some intermittent streams (dry river bed) around the project areas. These river beds are usually dry. But these will be checked before mobilization. If it is possible, water samples will be taken prior to mobilization and during drilling. The results will be compared. Thus, it will be observed whether the activities carried out have an impact on surface waters.

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.

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 taken from the well that was drilled in previous years by the sponsor firm. In either case no water will be taken from surface water sources. The depth of the well previously drilled is 512 meters. Cold water comes from the well therefore it will be used for drilling water. Its capacity is enough to meet the water need. It has the capacity of 35 tone/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 recycling of the water as described above.

This well is located on Çömlekçi project area. The permit for the water well that will be utilized for drilling purposes will be obtained before mobilization. The permit process of the water well continues at the relevant institution.

4.3 Potential impacts from emissions

In geothermal drillings, noise emission 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 at 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 IFC EHS Manuals 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 time period as 07: 00-19: 00, evening 19: 00-23: 00 and night 23: 00-07: 00. In addition, 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 at a drilling site are drilling machines.

Mitigation Measures

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

The distance of the drilling area to the nearest settlement is approximately 5.7 km for Kitreli (Yenipınar Village) and 3.8 km for Çömlekçi (Ulukışla Village). According to 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 each well, and 45 dBA level is achieved at 1000 m. Thus, the nearest settlements and residences will remain below the limit values.
All workers at 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 in accordance with 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 in the immediate vicinity of the drilling sites as an exception.

Within the scope of this project, the provisions set out in the national and international legislation (IFC EHS) will be strictly observed.

4.3.2 Air Quality (Dust – Gas – Exhaust Emissions)

National and International Standarts/Conditions

- Regulation on Air Quality Assessment and Management.
- Industrial Air Pollution Control Regulation
- IFC 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

IFC's Environmental, Health and Safety Guide for Air Emissions and Air Quality recommends 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 prior to drilling. Since there is a drilling location area and access road already established at project site, such works will not be carried out. Only the mud pits will be excavated. 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 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, 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 varies 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 contain greenhouse gases. The greenhouse gases in geothermal reservoirs is 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 sulphide (H_2S) is also a gas that is commonly found in geothermal exploration wells. Basically, 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.

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. In addition, 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 in a unique way. 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 sulphide 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 sulphide 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 air with portable dedectors.
  - Hydrogen sulphide monitoring can be accomplished by using portable or fixed dedectors. These dedector have also warning system with 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. It will be prepared by contractor.

4.3.5 Exhaust Emissions:

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

In addition, 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 to occur within the scope of this activity.

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, although not very common. These accidents can lead to the release of toxic liquids and gases (eg 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. The draft Emergency Action Plan is given Annex – D. This plan will be developed and updated for the contractor firms.)

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

4.5 Social Impacts

4.5.1 Socio-economic impacts, including local public health effects:

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. These disorders do not always affect physical health but can be socially disturbing.

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 activity is land owned by the state and 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 this project, the lands to be used are pasture lands and necessary permissions have been obtained. There are permits for both project site for use that is valid until 2020.

After 2020,

- **If the project fails**, the site will be closed and converted into its former quality and capacity. The land will be delivered to the Provincial Directorate of Agriculture and Forestry.

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

The sites to be used for the project was previously a barren and arid land, unused by the local people. Both the locations are surrounded by steep and rocky hills. It did not have the necessary features to be used by the public for grazing. There were no trees in either of the sites, 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.

Measures will be taken to minimize these effects.

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 Engagement activities.

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.

In order 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 also be used.

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

If noise monitoring reveals that noise levels exceed the limit values, a suitable noise barrier will be provided.

The perimeter of the activity area will be surrounded by a wire fence to protect public members from accidentally being affected. In addition, 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.

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 Socio-economic impacts based on land use:

No new land will be purchased for drilling location in this project. The land used is a pasture-grade land. Since the land is pasture, there is no land owner. The land (the parcel area) is completely public land. Consequently, no landowner was affected from the previous exploration activities performed on site. No land owners are expected to be affected by this project.

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

The size of the license areas is 5000 hectares and the total size is 10,000 hectares for two project. There are public lands (pasture, treasury, forest), private lands and non-cadastral lands within the license areas. Pasture areas are widespread in the licenses.

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

If it is private land, purchase will be made on a willing buyer willing seller basis. If it is obligatory, public interest decision will be taken and expropriation will be made. If it is pasture land, the same procedures used in this project will be applied on the new identified land. If it is a treasury or forest land, permission will be obtained from the official institutions.

The land within the scope of this project is not used by the local people there are no informal users. Land is not suitable for activities such as grazing or fruit cultivation. Since there is no area used by the local people, there is no community to use this area. 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 required for the proposed project.

In addition, a promenade/recreation area is planned to be built by the investor in a part of the public land, within the boundaries of Ulukışla village, located 700 m to the west of the Çömlekçi-3 drilling location and within the license area. The distance of this area is 4.6 km to Kitreli drilling location.

This area will be planted with the number of 250 trees. Pictures are given in Figures 32-33-34-35. Benches will be placed, and a recreation area will be completed. In the case that the drilling wells are successful, any facility or additional wells will not be close to this area not to have a negative impact on this promenade. If necessary, visual barriers will be built around it.

No one is expected to be negatively impacted in the village by the proposed exploration project. On the contrary, the project is expected to improve the socio-economic life in the village through the social responsibility projects planned by the investor, such as the water wells to be drilled, greenhouse to be built etc.

Figure 32. The Figure Shows Planted Area

Figure 33. The Figure Shows Planted Area

Figure 34. The Figure Shows Planted Area

Figure 35. The Figure Shows Planted Area

4.5.3 Socio-economic impacts based on employment:

No population growth is expected due to the project. There will be 23 (twenty three) workers in the site. The technical personnel that will work in the project will be staying at the site for the short period of drilling and are not expected to cause a population growth at the settlements nearby.

Priority will be given to the employment of local people depending on their technical abilities. Exploration well drilling is a short term project. If the project is successful additional wells will be drilled in the region and the project is developed into operation phase, the employment opportunities would be extented into long term employment. Thus the project is expected to have positive effects through creating job opportunities in the region, even in the long term.

- **Impacts from other social and economic investments to the region:**

In Ulukisla Village, the economy is generally based on agriculture and animal husbandry. However, water resources are insufficient. It is considered that the greenhouses and the well to be drilled for animal use and irrigation will positively affect agriculture in the economic sense. It will also bring vitality in the social sense.

A library was built by the investor at the Ulukışla village school. It is also planned to make investment projects and welfare benefits for the village in the future. It is planned by the project owner to provide scholarships to successful university students in the village. In addition, financial assistance is planned by the project owner for the financial liabilities of the village to the state (i.e. payment of electricity bill debts of the village to the state).

POTENTIAL IMPACTS

Tablo 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 water body 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. 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 to not to mix it with other wastes.	If the mitigation measures are taken in accordance with 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 water body 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 in order 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 source into containers within the working area, then will be collected by licensed companies or the local municipality.	If the mitigation measures are taken in accordance with 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 water body 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 in accordance with 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 in accordance with 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
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 water body 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 soil and into the sea will be prevented.	If the mitigation measures are taken in accordance with 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 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 company or other authorized carriers. Then, it should be provided to the companies that have environmental license.	If the mitigation measures are taken in accordance with the national and international regulations, the impact level will be “Negligible”.
Scrap Waste	Soil, water	Chemical substances in scraps can be dissolved with rain water, etc. and can be leach into water and soil.	For Water Quality: Any water body 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 in accordance with the national and international regulations, the impact level will be “Negligible”.
Domestic waste water (Personnel Originated)	Living Creatures, Soil, water	When stored in unsuitable conditions, it can be mixed with surface and groundwater and the quality of the water is deteriorated. In 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 water body 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. Opinion was received from the relevant municipality. (opinion that these wastes may be withdrawn by the municipality) Discharge of wastewaters into the receiving environment will be prevented.	If the mitigation measures are taken in accordance with 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 is deteriorated. Air quality may also be adversely affected if liquid wastes evaporate. It is possible that the water will 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 water body 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 in accordance with best practices. Drilling fluid shall be recirculated as much as possible. Drilling fluids (drilling mud) will be collected in mud pit in well location. Bottom of the mudpit and closure of the mud pit will be established ensuring impermeability and provided according to Regulation on the Landfill of Wastes. Waste analysis will be done by licensed laboratories. According to the analysis results, it will be determined if the waste is hazardous, inert and/or non-hazardous waste. Geothermal drilling muds will be disposed according to the n regulation (i.e. Regulation on Landfilling of Wastes and Regulat Waste Management) **Project company does not plan to estab landfill.** After the drilling is finished, the remaining solids and liquids v analyzed in a licensed laboratory to identify the waste type and	If the mitigation measures are taken in accordance with 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
				After identification of the waste code, the drilling mud will be di of in accordance with the national regulation. Landfills have di classes that accept wastes in accordance with their haz properties/inertness. Accordingly, the drilling mud will be carried o with licensed tankers to an appropriate landfill facility. There will solid or liquid waste left in the mud pit. During well testing, the brine that comes during the well tests will be stored in the mud pit which will be formed according to criterias 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 suitable 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 ground water, 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 water body 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 in each Project Site. Mud pit volume will be enough to collect all liquid drilling wastes **Bottom of the mud pit and closure of the mudpit 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 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 geo membrane. 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	If the mitigation measures are taken in accordance with 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
				material shall not be less than 0.5 meters. 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 according to the n regulation (i.e. Regulation on Landfilling of Wastes and Regulat Waste Management) **Project company does not plan to estab landfill.** After the drilling is finished, the remaining solids and liquids v analyzed in a licensed laboratory to identify the waste type and After identification of the waste code, the drilling mud will be di of in accordance with the national regulation. Landfills have di classes that accept wastes in accordance with their haz properties/inertness. Accordingly, the drilling mud will be carried o with licensed tankers to an appropriate landfill facility. There will solid or liquid waste left in the mud pit. 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.	
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 destroy 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 taiken 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, geo membrane, etc., to provide impermeability to spills. Maintenance / oil change will be made on the leak-proof surface in the operating area, protected from 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 with absorbent materials on the concrete floor before reaching the receiving environment and disposed in accordance with the provisions of the Waste Oil Control Regulation. Waste oil will be prevented from pouring into water sources, sewer system or soil. The burning of waste oils will be prevented. Analyzes will be made in accordance with the Waste Oil Control	If the mitigation measures are taken in accordance with 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
				Regulation. Waste oils will be disposed of by sending 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, it is possible for geothermal fluid to contaminate the aquifers through leaks in 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.	Applications related to drilling fluids and well coverings of geothermal drilling operations will be carried out in accordance with best practices. According to the latest technology, the wells 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 suitable 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. A contract will be signed with a treatment company for 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 underground water will not be mixed into the mud pit. In compliance with the Article 16-4 of the Regulation on Landfill of Wastes, drainage channels will be established around the borehole 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 in accordance with 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. Land: Dust emission may affect nearby farmland and production in these fields if mitigation measures are	In order 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 in accordance with 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
		In addition, dust can accumulate in the places where the vegetative organs of the plant, such as flowers, can accumulate and prevent the plant from reproduction and growth.	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. Unloading will be done carefully. 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 IFC 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 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 in accordance with the national and international regulations, the impact level will be “Negligible”.
Gas Emissions	Living Creatures, air	H2S 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. Hydrogen sulphide monitoring will be done by using portable or	If the mitigation measures are taken in accordance with 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
				fixed dedectors which have warning system Carbon dioxide monitoring will be done with portable dedectors by measuring its levels in air	
Exhaust Emissions	Living Creatures, Air	They have a negative impact on air quality and 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 in accordance with 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 (eg 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 well head 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 there are people living nearby, they can be socially affected negatively	Drilling location	Vegetable soil 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 a good management practice. Existing roads will be used and no new roads will be constructed unnecessarily.	If the mitigation measures are taken in accordance with the national and international regulations, the impact level will be “Less Important”.
Sensitive Areas	Cultural areas Sensitive Areas Protected Areas Historic areas	Deterioration/destruction of unknown sensitive areas	Drilling location and surroundings	There is no protected area or sensitive area and cultural heritage sites in the vicinity of the drilling area and in the license area. 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.	If there is no sensitive area within the working area, In case of taking mitigation, measures and working in accordance with the national and international legislation, the impact level will be at a level of “Insignificance”.

Definition of Impact/Problem	Affected Component	Potential Impacts	Impact Routes	Mitigation Measures	Impact Level
				Employees will be trained on this subject. In addition, There is no intangible cultural heritage (resources) ha observed in the area where the project areas are located. If an acti observed about intangible cultural heritage in the period of the pro in the coming years, these cultural values will be protected. Measur be taken to ensure that the project does not have a negative imp these values.	
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 was 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. In order 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 alowed 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; to avoid disturbance of the local habitat, What to do if they come across any protected or unprotected species	If the mitigation measures are taken in accordance with 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	Layout will be designed in line with the general landscape of the area. Good housekeeping will be implemented. The location area will be revegetated. Although there are no trees originally, trees will be planted to support local ecosystem. Disposal of waste will be done in accordance with the legislation	If the mitigation measures are taken in accordance with the national and international regulations, the impact level will be “Less Important”.
Local people	Living Creatures	Local communities in the environment may have concerns about the activities. Impacts on vulnerable populations may be more intensive than the rest of the population.	Nearest settlements	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 website, notice boards, telecommunication tools and public meetings.	If the mitigation measures are taken in accordance with 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
				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. As far as possible, public land will be used to avoid economic displacement. If it is not possible and private lands are required the investor will acquire land on a willing buyer seller basis. In the future, if the project is observed to impact the livelihood of any stakeholders or public members through land use, good practices and World Bank OP 4.12 standards will be implemented to mitigate and compensate for the impacts.	
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 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. Personnell 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 Emergency drills will be implemented periodically. It will be checked whether all employees attend 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.	Measures must be taken in accordance with national and international regulations. The impact level is significant when there is a case in the area of Occupational Health and Safety.
Local	Humans	Accidents occurring at the project site,	People living in the nearest settlements	Monitoring and warning systems for gas emissions will be used	Measures must be taken in accordance

Definition of Impact/Problem	Affected Component	Potential Impacts	Impact Routes	Mitigation Measures	Impact Level
Community Health and Safety		improperly disposed wastes, noise, gas emissions and other factors may negatively affect the health of local community if not managed properly.		for H2S. Monitoring system will be used for CO2 If noise emissions are determined to exceed the limit values, a suitable noise barrier shall be installed. The perimeter of the activity area and the surroundings of the mud pit will be surrounded by a wire fence. No person shall be allowed to enter the activity area except personnel. The grievance mechanism was established. During the activity period, it will be implemented in order to get the grievances and opinions of the local people. The speed limitation on the roads around the activity area will be observed. Wastes and materials shall be kept inaccessible to the local population. 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.	with national and international regulations. The impact level is significant when there is a case about public health.
Increase in Traffic Load	Living Creatures and Social Life and environment	Increasing of 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. 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.	If the mitigation measures are taken in accordance with the national and international regulations, the impact level will be “Negligible”.
Abandonment of	Living Creatures,	The natural life and social life will be affected	Drilling location	If the exploration activities are positive, the drilling holes will be	If the mitigation measures are taken in

Definition of Impact/Problem	Affected Component	Potential Impacts	Impact Routes	Mitigation Measures	Impact Level
Field of Activity	Natural life	if the rehabilitation is not done properly when the activity area is closed.		valved until the production stage. After all operations are finished, the mud pit will be filled excavation materials and covered with vegetative soil which was st and stored separately during land preparation. The area will be rep in accordance with 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 in accordance with 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 the 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 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.	accordance with the national and international regulations, the impact level will be “Negligible”.

5.0 Mitigation Plan

Table 7. Mitigation Plan

Stage	Activity	Impact Definition/Subject	Mitigation Mesaure	Cost	Responsibility	Legal Framework
Preparation for Mobilization	**Preparation**	Preparation of Documentation and Management Plans	• The Hazardous Materials Management Plan, • Emergency Response Plan, • Occupational Health and Safety Plan • Effluent Management Plan will be prepared specific to the site. The baseline measurements will be described in the effluent management plan • Traffic Management Plan and Stakeholder Management Plan to be updated	Included in Project Cost	Drilling Contractor's Site Management	WB OP.4.01
Exploration	**Land Preparation**	Collection of excavated material	• The plant soil 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 plant soil will be kept moist. • The excavation material will be stored in a planned manner, and reused for rehabilitation of the areas. • Excavation soil shall be kept closed. • The land use activity will be carried out with a 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				
	Road Construction Works	Collection of excavated material				
	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.	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 in order 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. • Piggy bank (glass, metal, plastic, paper / cardboard and wood) will be placed in the field of activity where the packaging waste is separated separately. • 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 separate piggy bank, within the	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	Regulation on Waste Management Regulation on Control of Packaging Waste EBRD PR3 EU Waste Framework Directive (2008/98/EC)

Stage	Activity	Impact Definition/Subject	Mitigation Mesaure	Cost	Responsibility	Legal Framework
			working area, then to the companies which have environmental license or to the collection system of the municipality			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 in accordance with 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.	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 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, geo membrane, 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 with absorbent materials on the concrete floor before reaching the receiving environment and disposed in accordance with the provisions of the Waste Oil Control Regulation. • Waste oil will be prevented from pouring into water source, sewer system or soil. • The burning of waste oils will be prevented. • Analyzes shall be made in accordance with the Waste Oil Control Regulation and shall be disposed 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 specific to the site by the Drilling Contractor's Site Management prior to mobilization at the site in line with the principles set out in this document, once the contractor is selected.	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 & Drilling Works**	**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. • Disposal of waste batteries into soil and into the sea will be prevented.	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	Regulation on Control of Waste Batteries and Accumulators Regulation on Waste Management EBRD PR3 EU Waste Framework Directive (2008/98/EC) IFC PS1, PS3 WB OP.4.01
Exploration	**Land Preparation & Drilling**	**End-of-life Tires**	• In the event of end-of-life tires, these tires will be delivered to the tire distributor, selling company or authorized carriers.	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	Regulation on Waste Management Regulation on Control of End-of-Life Tires

Stage	Activity	Impact Definition/Subject	Mitigation Mesaure	Cost	Responsibility	Legal Framework
	Works					EBRD PR3 EU Waste Framework Directive (2008/98/EC) IFC PS1, PS3 WB OP.4.01
Exploration	**Land Preparation & Drilling Works**	**Scrap Wastes**	• These 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 environmental license.	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. • Opinion was received from the relevant municipality. (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 specific to the site by the Drilling Contractor's Site Management prior to mobilization at the site 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 ve 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 in accordance with best practices. • Drilling fluid shall be used as recirculated as possible. • Drilling fluid (drilling mud) will be collected in mud pit in well location. Mud pit volume will be sufficient to collect all liquid drilling wastes. • This mud pit will be covered with impermeable membrane (geosynthetic clay and geomembrane) which have met the appropriate impermeability conditions defined below on Regulation on Landfill of Wastes. • Waste analysis will be done by licensed laboratories. After identification of the waste code, the drilling mud will be disposed of in accordance with the national regulation. • Impermeability conditions: 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 geo membrane. 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 specific to the site by the Drilling Contractor's Site Management prior to mobilization at the site 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 ve PR6 WB OP.4.01 Regulation on Waste Management Regulation on the Landfill of Wastes IFC PS1, PS3

Stage	Activity	Impact Definition/Subject	Mitigation Mesaure	Cost	Responsibility	Legal Framework
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 a good management practice.	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 in accordance with best practices. • According to the latest technology, the wells 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 own packaging. • Chemical materials shall be stored on the 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, 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 the sealed floor that has at least 25 cm thickness. The side walls 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 site in order 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 & Drilling Works**	**Dust Emissions**	• In order 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. • 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	Included in Project Cost and Contruction Cost	**Project** Sponsor through Contractor's Site Manager	Regulation on Air Quality Assessment and Management Regulation on Industrial Air Pollution Control 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 by means of these detectors. Alert systems will be installed by means of programs related to these detectors.) For H2S a monitoring and warning dedector , and for CO2, a monitoring dedector will be used • The maintenance of the systems will be carried out regularly. • Employees will have a training on potential gas emissions, monitoring system and emergencies related to 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

Stage	Activity	Impact Definition/Subject	Mitigation Mesaure	Cost	Responsibility	Legal Framework
			• An Emergency Action Plan will be prepared to control the security planning and uncontrolled gas emissions.			
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 in order 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 noise. • In addition, 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 conductedin case of complaint. Noise measurement equipment will be located on one point around well site and one point nearest receptor (home etc) 5 minutes 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. • During the drilling, if the pressure suddenly flows through the well, the pressure to the well will be increased. If not enough, the well head shall be closed with the closing unit. • An Emergency Action Plan will be prepared and updated specific to the site by the Drilling Contractor's Site Management prior to mobilization at the site in line with the principles set out in this document, once the contractor is selected. • All employees will receive training on emergency conditions. Emergency drills will be implemented periodically.	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	
Pre-Construction	Land Preparation	**Affecting / Destruction of Sensitive Areas**	• The letter from Provincial Directorate of Culture and Tourism was obtained. It is attached to Annex E. • In the official letter of this institution, it was stated that the Kızılkilise was in the third degree natural protected area. In addition, it was stated that neither drilling	Included in Project Cost	**Project** Sponsor	World Bank OP 4.11 IFC PS 8

Stage	Activity	Impact Definition/Subject	Mitigation Mesaure	Cost	Responsibility	Legal Framework
			area was not within the site and protection area of Kızılkilise. Apart from this, it is also stated that since both areas are far away from the site area, there is no objection in conducting exploration drilling in these areas. • In addition, it was stated that the areas where the drilling works will be carried out locate within the responsibility area of the Niğde Province and if any cultural assets are found in future exploration studies, it is obligatory to inform Niğde Provincial Directorate of Culture and Tourism in accordance with the legislation (Article 4 of the Law on Protection of Cultural and Natural Heritage Numbered 2863). • Therefore, 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.			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.	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. • In order 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. In order to prevent this situation, irrigation work will be carried out to suppress dust emission. • 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 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 in order 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. • 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	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 Mesaure	Cost	Responsibility	Legal Framework
			and contracts shall be strictly observed during the activity. • According to Biodiversity Management Plan for this area: • Among the fauna taxa that are detected in the project area and its immediate vicinity, there are species that need to be protected by contracts such as, Bern Convention, Cites Convention, Central Hunting Commission Decisions. However, there are no endemic species in these taxa. In addition, there are no flag species representing Niğde region and the area and no key species to be used in monitoring the ecosystem among the identified plant taxa. Therefore, there is no plant taxon that needs to be monitored. But this place is 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 in order 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. In addition, there are no flag species representing Niğde region and the area and no key species to be used in monitoring the ecosystem among the identified plant taxa. Therefore, there is no plant taxon that needs to be monitored. But this place is 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 in accordance with 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 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 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 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. • 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 the roads, it will be repared by the contractor.	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 & Drilling Works**	**Increase in Traffic Load Social Impacts on Society**	Traffic Management Plan was prepared, but it will be updated by the contractor. The same measures as described for Impact of Traffic Load on Environmental Effects will be applied to mitigate impacts on society as well: • It will be ensured that the traffic management plan is abided by. • 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.	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	Highways Traffic Law Regulation on Road Traffic Regulation on Road Transport EBRD PR4

Stage	Activity	Impact Definition/Subject	Mitigation Mesaure	Cost	Responsibility	Legal Framework
			• 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. • 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. • Any situation such as smoke, unburned gas, dust will be danger the traffic safety. In case of any damage to these structures, the cost of damage will be paid by the contractor.			IFC PS4
Exploration	**Land Preparation & Drilling Works**	**Socio-economic impacts**	• Grievance Mechanism was established. It will be developed and updated according to needs. • In order to receive feedback from affected communities, a well-designed and structured questionnaire was prepared. • There have been no complaints so far, ıf there is 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 equipments 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 firstly. If it is not possible, the investor will acquire land on a willing buyer seller basis.	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	EBRD PR7 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. • Staff will be provided first aid training • Staff will be trained about fire extinguishing system • Occupational Health and Safety Plan will be prepared specific to the site by the Drilling Contractor's Site Management prior to 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.	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 & Drilling Works**	**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. • The perimeter of the activity area and the surroundings of the mud pits will be surrounded by a wire fence. • No person shall be allowed to enter the activity area except personnel. • The grievance mechanism was established. During the activity period, a grievance mechanism will be continued in order to get the opinions of the local people.	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	EBRD PR4 IFC PS1, PS4

Stage	Activity	Impact Definition/Subject	Mitigation Mesaure	Cost	Responsibility	Legal Framework
			• The speed limitation 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.			
Exploration	**Land Preparation & Drilling Works**	**Employment and Working Conditions**	• Construction site will be installed within the drilling location area • The living conditions of the workers will be in accordance with 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 in accordance with 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 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 Standarts IFC & EBRD EBRD PR2 IFC PS2
Exploration	**Land Preparation & Drilling Works**	**Stakeholders and Impacts on this Sector**	• 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. • The grievance mechanism was established in order to collect the opinions and resolve the complaints of the affected communities. The grievance box was placed at the village Muhtar office in Ulukışla village. It will be developed and updated according to needs. • In order 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. • In order to receive feedback from affected communities, a well-designed and structured questionnaire will be prepared in future stakeholder engagements.	Included in Project Cost	**Project** Sponsor through Contractor's Site Manager	IFC PS1 EBRD PR7, PR10
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 the concrete and rehabilitation will be carried out in accordance with the characteristics of the land. • 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	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)

Stage	Activity	Impact Definition/Subject	Mitigation Mesaure	Cost	Responsibility	Legal Framework
			will be abandoned by taking necessary security measures.			

6.0 Monitoring Plan

Tablo 8. Monitoring Plan

Stage	Which Parameter	Where	How/Monitoring Equipments	Monitoring /Reporting Time/Frequency	Why	Cost	Responsibility
LAND PREPERATION & 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 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 specific to the site by the Drilling Contractor's Site Management prior to mobilization at the site in line with	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 Equipments	Monitoring /Reporting Time/Frequency	Why	Cost	Responsibility
				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 specific to the site by the Drilling Contractor's Site Management prior to mobilization at the site in line with the principles set out in this document, once the contractor is selected.	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 (Each of mud pits have 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 specific to the site by the Drilling Contractor's Site Management prior to mobilization at the site in line with the principles set out in this document, once the contractor is selected. 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 & Drilling**	**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 noncompliance terminated before the	Included in Project Cost	Site Manager of Contractor with support from Environmental Manager

Stage	Which Parameter	Where	How/Monitoring Equipments	Monitoring /Reporting Time/Frequency	Why	Cost	Responsibility
					environmental impact begins.		
Exploration (Drilling)	**Drilling Mud**	**Drilling Location Mud-pit**	Analysis Reports will be checked. Check Whether the treatment tanks are working properly Check whether a foreign substance (packaging etc.) has fallen into mud-pit. Check whether the edges of the fence around mud-pit are in a correct way (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. It will be prepared specific to the site by the Drilling Contractor's Site Management prior to mobilization at the site in line with the principles set out in this document, once the contractor is selected.	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 nearest surface waters (intermittent stream) and ground water (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 mud pit and at the early stages of drilling (when the drilling starts), in case of complaint	Dust Emission 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 to 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 transportatio n 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 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 & Drilling	**Noise**	**The closest sensitive structure (home) and Around the**	Control of complaints mechanism related to noise complaints. Measurements will be done with Noise Measurements Equipments during five minutes at defined places by licensed laboratories. Then they will be	In case of 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 Equipments	Monitoring /Reporting Time/Frequency	Why	Cost	Responsibility
		site	compared 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 a there is a problem	Emergency Action Plan will be checked before work starts. It will be prepared specific to the site by the Drilling Contractor's Site Management prior to 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 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 Control of grievance mechanism records related to traffic complaints	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 Equipments	Monitoring /Reporting Time/Frequency	Why	Cost	Responsibility
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. Occupational Helath and Safety Plan will be checked before work starts. It will be prepared specific to the site by the Drilling Contractor's Site Management prior to 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:** 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 Personel Protecting Equipment	Daily. Occupational Helath and Safety Plan will be checked before work starts. It will be prepared specific to the site by the Drilling Contractor's Site Management prior to 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 & Drilling	**Local People's Health and Safety**	**Nearest Settlements**	Field Observations Inspection of accident / event records. Control of Grievance Reports	Weekly	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 &	**Employment and Working Conditions**	**Drilling Location**	Field observations Control of Grievance Reports Control of Contracts	During Drilling Operations	In order to ensure that the employees are not get harmed, the working	Included in Project Cost	Site Manager of Contractor and Grievance Response Officer

Stage	Which Parameter	Where	How/Monitoring Equipments	Monitoring /Reporting Time/Frequency	Why	Cost	Responsibility
Drilling					conditions must comply with the standards.		
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 In addition, 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 in order 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

In order 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 in order to obtain the opinions and complaints of the local community during the activity
- Provides Ccntinuous 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 with respect to. 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 Kitreli-1 and Çömlekçi-3 Geothermal Exploration Wells Project, located Niğde, Altunhisar District, Ulukışla Village, was held in Altunhisar District Governorship Meeting Room on April 18, 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. In addition, 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, Ulukışla Village, to the meeting place of the local people.

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

36 people participated in the meeting from Ulukışla Village, Altunhisar 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 open meetings. In addition, 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 Central Anatolian in Turkey.

But there will be future efforts to engage the local women more. In order for more women to participate, the next meetings will be held in different environments like homes, if possible.

- **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 received by the participants.

In addition, the social projects planned to be made were explained by Mevlüt Alp Gürün, general manager of 3S Kale Niğde Energy Production Inc. These social projects include greenhouse construction, recreation area, drilling water well, granting scholarships to young people living in Ulukisla Village for university education. In addition, the wish to providefinancial assistance for the debts of the village was also expressed.

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

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

In the meeting, the opinion / complaint form was distributed to enable the public to present their opinions, suggestions and complaints in writing. Some participants stated that they would fill in the forms and put them into the complaint boxes later. These forms will be recorded in 3S Kale Niğde Energy Production Inc.

At the meeting, participants asked whether the road to the sites will be surfaced with asphalt. Otherwise, it was stated a dust problem might arise. 3S Kale Niğde Energy Production Inc. stated that this situation will be discussed with and acted upon following evaluation by highway authorities.

At the meeting, the participants asked whether there was an EIA report. 3S Kale Niğde Energy Production Inc. stated that they received all legal permits.

They were also asked how far the hot water could be transported to be used in greenhouses for agricultural cultivation. 3S Kale Niğde Energy Production Inc. stated that this distance is about 1000 - 1200 m. In addition, it was asked to company how the waste will be disposed of and the company told that the wastes would be disposed of inline with legal requirements.

The participants asked whether the personnel to be employed in the projects would be qualified or unqualified and when the personnel would be recruited. The company management said that there might be unskilled workers in the job such as security, but in time other opportunities can be evaluated to provide more employment to local people.

Apart from the questions, local people expressed their requests at the meeting. They expressed their wish that a water well be drilled by the company.

They also stated that it would be appropriate to provide more financial support to them instead of the greenhouse project. 3S Kale Niğde Energy Production Inc.has announced that the greenhouse projects are approved by the state and that the state supports greenhouse projects. It was stated by a participant that drilling should not be carried out outside the location. 3S Kale Niğde Energy Production Inc. stated that all of its works will be transparent and will not work outside the mentioned areas.

- **Agreed actions.**

The people who live in village and attended the meeting demanded that all roads to be used in the activity be covered with asphalt. The company management stated that this issue will be discussed and taken into account with the highway authorities and all necessary measures will be taken to prevent dust.

On the other hand, it was seen that the project was supported by the local people and the people of the district wanted to be useful.

Annex A

Stakeholder Management Plan

Annex B

Biodiversity Management Plan

Annex C

Traffic Management Plan

Annex D

Preliminary Emergency Response Plan

Annex E

Official Letters

Annex F

Waste Management Plan

Annex G

Social Review Format

Annex H

Preliminary Occupational Health and Safety Plan