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Environmental and Social Consideration of a Geothermal Project in Arta Region, Djibouti Country

Abdek Mahamoud ABDI

Djiboutian Office of Geothermal Energy Development , PK20 , Arta Road , Djibouti

abdek.mahamoud@oddeg.dj/abdekmoud.segrc@gmail.com

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ABSTRACT

The Surface Study of Arta Prospect, funded by the Geothermal Risk Mitigation Facility , was carried out in 2018 by Djiboutian Office of Geothermal Energy Development (ODDEG) with an International Expert Team from Japan, in order to target boreholes (drillings targets) and to determine the potentialities in terms of development of geothermal energy in the Arta region by which an Exploration Drilling Project is planned to be carried out by ODDEG . In view of the possible impacts caused by a geothermal energy development project including exploration drilling phase in Djibouti, a Detailed Environmental and Social Impact Assessment (ESIA) is required in accordance with national regulation specially the Environmental Code (Law No. 51/AN/09/6L) and the Decree No. 2011-029 / PRE of the Ministry of Housing, Urban Planning and the Environment (MHUE). The Arta region is a new geothermal prospect area in the Republic of Djibouti for the development of geothermal energy , but Arta is also well known for its touristic activities, the military training activities, the fishery activities, and the protected area; especially Arta Beach, foreign military training activities, and protected whale shark migration paths. All of these activities make Arta extremely sensitive to geothermal development projects. In this paper, the environmental and social considerations for an exploration drilling project in Arta region will be presented in order to facilitate environmental and social assessment study.

1. INTRODUCTION

The Republic of Djibouti plans to shift to a 100 % green energy policy together with achieving energy security by developing indigenous geothermal energy. In order to facilitate the access of electrical energy and to improve the energy transition in Djibouti, the development of geothermal energy by the Djibouti Government has been ongoing since the 1970's. However, the development was suspended by the civil war of the 90's as well as the high salinity of ASSAL geothermal wells, the first geothermal project in Djibouti. To this, the Government has expressed its willingness to continue the development of geothermal energy through an official assistant of the Geothermal Risk and Mitigation Facility (GRMF) of the African Union (AU).

The Djiboutian Office of Geothermal Energy Development (ODDEG) is a state-owned company under the law No 32/AN/13/7ème L which has a mandate to develop geothermal energy in Djibouti. ODDEG has managed several projects such as Assal Galla la Koma Geothermal Project, Hanle Garabayis Geothermal Project, and Surface Study of Arta Prospect.

The Arta geothermal project has been planned in line with the "100 % green energy policy" for which ODDEG has started to manage the Surface Study of Arta Prospect since the beginning of 2018, financially supported by GRMF (See Figure 1.)

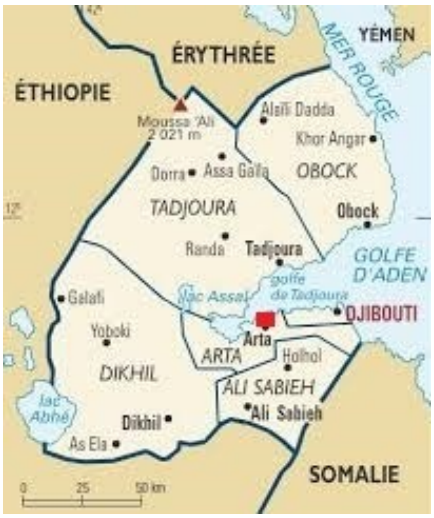

Figure 1: Map of Djibouti and Arta , Source of Base Map : Wikipedia

2. ESIA SYSTEM AND RELEVANT LAWS

2.1 ESIA System

The competent official entity in charge of Environmental Management in Djibouti is the Ministry of Housing, Urban Planning and the Environment (MHUE: Ministère de l'Habitat, de l'Urbanisme et de l'Environnement) consists of the four Directorates: (1) the Environment and Sustainable Development Directorate , (2) the Directorate of the territory planning habitat and urbanism , (3) the administrative and financial directorate , and (4) the Directorate of training documentation and communication. Among those, the Directorate of Environment and Sustainable Development (DEDD: Direction de l'Environnement et du Développement Durable) handles ESIA procedures in MHUE. With regard to the Screening for the Exploration Drillings in the Arta Geothermal Prospect, in accordance with the Decree No. 2011/29/MHUE, ODDEG initiated the process by officially communicating with DEDD/MHUE on April 2018. According to the decree mentioned above, there is two type of ESIAs , (1) Full ESIA and (2) Short ESIA.As a result, the Exploration Drillings in the Arta Geothermal Prospect is categorized as "Full ESIA" by DEDD/MHUE (See figure 2).

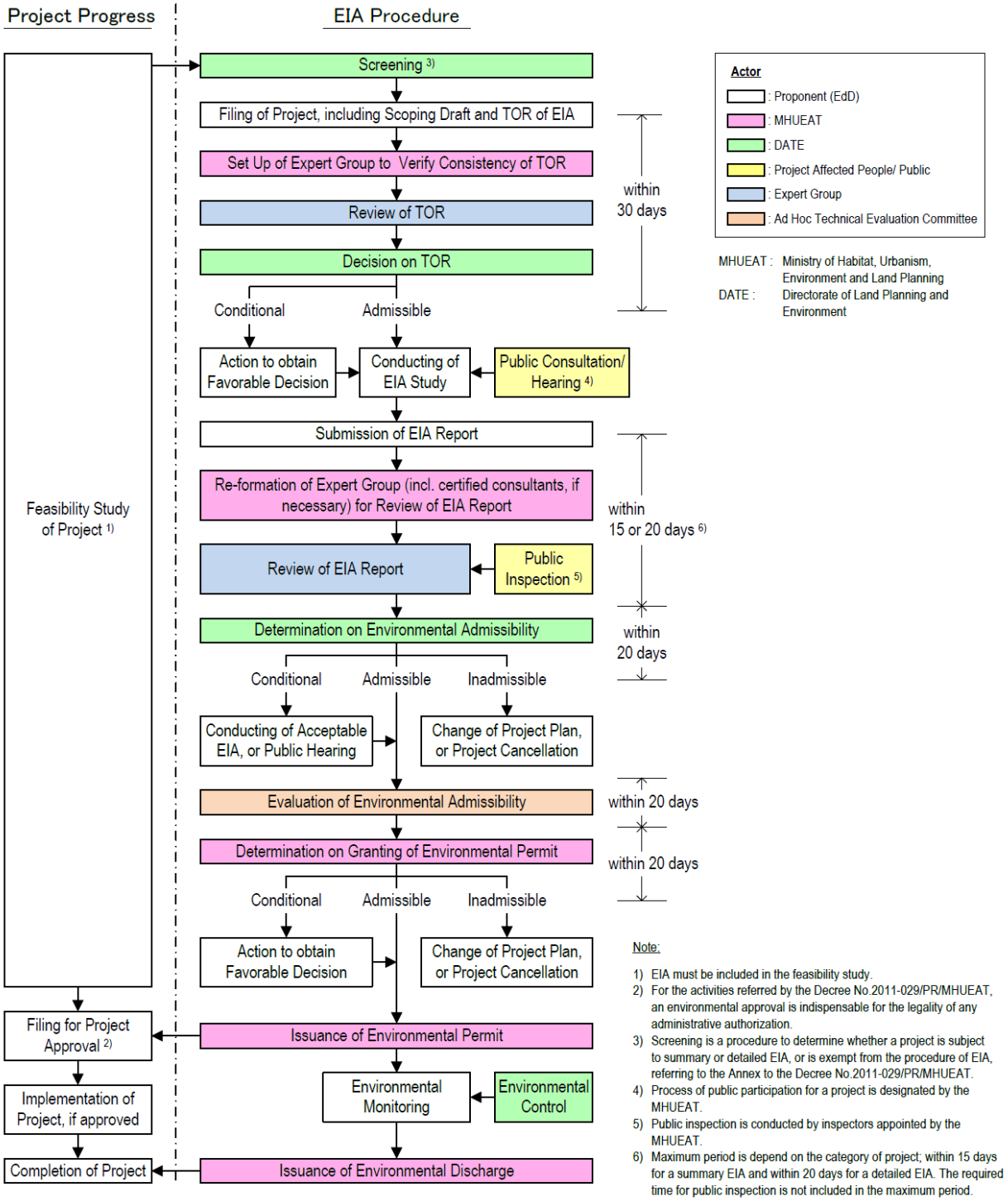

Figure 2: ESIA Chart, Decree No. 2011/29/MHUE

2.2 Relevant Laws and Regulation

As an international development project, geothermal exploration in Arta Prospect has to fulfill the national and international requirements and standards in order to reduce complaints, social risks, and environmental risks.

National laws and regulation	International regulation
Environmental Code/Law No. 51/AN/09/6L, Protected Areas Law No. 45/AN/04/5L , Mining Code/Law No. 66/AN/94/3L , Economic and Social Policy of the Republic of Djibouti Law No.149/AN/02/4L, Public Domain Law No.171/AN/91/2éme L, Expropriation, Law No. 172/AN/91/2ème L , Water Code/Law No. 93/AN/95/3ème L , Labor Code/Law No. 133/AN/05/5éme L, Decree on the ESIA procedures No. 2011-029/PR/MHUEAT, Decree on Protection of Biodiversity No. 2004-0065/PR/MHUEAT, Decree on Approbation of Integrated Coastal Zone Management Plan No. 2005-0056/PR/MHUEAT, Decree on the Approbation of National Program for Conservation and Biodiversity No 2001-0098/PR/MHUEAT.	GRMF Developer Manual (Ninth Edition, 26th March 2018) , World Bank's Safeguard Policies , World Bank's Environmental and Social Framework (ESF) , African Development Bank Policies , JICA Guidelines for Environmental and Social Considerations (April 2010) ,

Table 1: Relevant national and international regulation

3. ENVIRONMENTAL AND SOCIAL CONSIDERATION OF ARTA PROSPECT

3.1 Geology of Arta

The Arta region is considered one of the most esteemed geothermal sites in the Republic of Djibouti. The outcropping volcanic formations are Ribta Rhyolites, Mabla Rhyolites, Dalha Basalt, Afar Stratoides and Basalt Golf. Most of the Arta region consists of acid/rhyolitic rock, very similar to those exposed to Ribta and Dalha basalts; the most important unit in the Arta area. Dalha basalt consists mainly of stacks of various lava flows 20-30 meters high (Geothermica, 1982), and is characterized by basalt and Hawaiite cracks with some detrital and lacustrine sediment intercropping, the rhyolitics are in the upper part. Basalt met by discording with the rhyolites of Mabla. Dalha basalt is intersected by numerous rhyolitic injections (dykes and domes), these injections are aligned on the N0 to N40 fractures. These rhyolitic series emitted after the terminal phase of the Dalha volcanic cycle, covered by the stratum series of the Arta plateau; and also available fracture N20 to N40; this new series is called Ribta rhyolite (O. Richard, 1979) . From a geological point of view, NNE-SSW transforming faults strongly affect the basalts of Dalha (8 to 4Ma) and Ribta rhyolites (3Ma). Gulf basalts are affected by normal NW-SE faults and stratoid basalt. The fumaroles are at the intersection of NNE-NNW faults. Intense vertical fracking of direction N0 to N40 affects the "ante-stratoide" terrain ensemble. These fractures are quite unique for a known region in distention.

- The directions of the dominant faults are N0-N40 which is the major direction of the Rhyolitic injection of Ribta. These acid injections are linked to a deep accident. All dykes, acidic domes follow this direction.
- The N140-160 faults which sometimes share the basalt stratoides and the rhyolite of Ribta as well as the Dalha basalt and the series of Ribta acids.
- The intersection of these two directions of faults is put in place the surface manifestations namely the fumarole 3 and fumarole 4. Different hypotheses on the emanations of the site of Arta:
- The fumaroles are set up on the Dalha basalts which implies the opening of the faults responsible for hydrothermal fluids are as recent as the establishment of the ribta acid series
- These faults predate the emplacement of rhyolitic intrusions suggesting that these faults are reactivated by acid intrusions

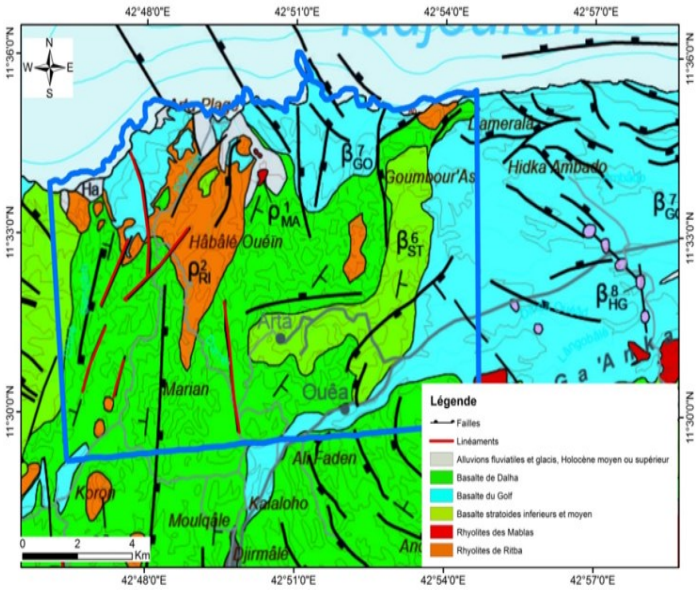

Figure 3: Geological map of Arta region , Arta surface study report , 2018

3.2 Fauna and Flora

(1) Flora

In general, the vegetation at Djibouti consists of steppe forest Acacia mellifera or Acacia tortilis: steppe trees; shrub steppe; bushy steppe, grassy steppe; succulent steppe.

- The plains and depressions are covered with vegetation, grassy grass steppes (Lasiurus, Panicum, Cymbopogon).
- The highlands are characterized by the presence of succulent steppes.
- In the mountains, forest formations with plants of Mediterranean and Ethiopian affinity (Juniperus procera, Terminalia Brownii, Olea Africana and etc.) is develop.

The Arta coastal region (geothermal project area) is dominated by Acacia mellifera, steppes and grassy steppes Cyperus conglomeratus.

(2) Fauna

Djibouti has rich and varied terrestrial and aquatic ecosystems. Despite the aridity, the territory nevertheless contains a large fauna that has adapted to the country's climatic conditions.

The principal Fauna in Arta Region are Djibouti Francolin (endemic species), Djibouti beaumarquet (bird, endemic), Beira (bovid), Ostrich, Panther, Chameleon, Gazelles, Green monkes, and etc. (Source: National Monograph 2009).

3.3 Marine and Coastal Ecosystem

The Region of Arta and the bay of Ghoubet are characterized by a great wealth of biological and animal heritage and host a breeding area for most of the pelagic and reef fish of Djibouti (Source: National Monography 2009).

Although the corals are relatively few in number and little developed, the filter species, consisting of barnacles, sponges, filtering mollusks etc., are very diverse. The area has more than 454 species of fish and 9 species of mammals, the majority of which are endemic and belong to the waters of the surrounding seas such as the Gulf of Aden and the Arabian Sea and the Red Sea.

The Arta-beach area is home or near to several marine species that are mentioned in the Decree No. 2004-0065/PR/ MHUE protecting biodiversity in the country, including dugong, dolphin, turtles, sharks and whale sharks (Rhincodon typus) that deserve special protection. The study area covers the main migration trajectory of the whale shark, that migrate twice a year near to the Arta Beach.

(1) Shark

There are also 27 species of sharks (hammerhead shark, whale shark, nurse shark, sea tiger, blue shark) and two species of small whale, a species of giant skate and orcas, dugongs and six species (Djiboutian Whale Shark; See Figure 4).

Figure 2: Djiboutian whale shark. Source: Inception Report for the Environmental and Social Impact Assessment, Arta Geothermal Development Project (Detailed Surface Surveys) in the Republic of Djibouti, November 2016, ODDEG

(2) Dolphin

Endemic Dolphin species endemic to the Red Sea (bottlenose dolphins, humpback dolphins, spotted dolphins, Indian dolphins) have been observed in the area.

(3) Turtle

The waters of this inner gulf are home to 4 species of turtles such as the lute tortoise, tortoise shell, Ridley turtles, green turtles that usually migrate to the northwestern Gulf for breeding between October to February, 13 species of seabirds and, among marine mammals, dugongs and dolphins (source: MHUE 2005). (Dugong dugong) and the whale shark (Rhincodon typus) are on the Red List of the World Conservation Union (IUCN) for Threatened Species.

(4) Coral and Others in Gulf of Tadjourah

As the Gulf of Tadjourah comes from the confluence of the waters of two seas (Red Sea and Indian Ocean), we find the strong presence of 150 species of corals with very diverse colors but also other wildlife creatures such as the crustaceans, mollusks, lobsters, crabs, and two species of pearl oysters are gradually filling the list of the inventory of small soft species in the Gulf.

3.4 The Social Environment

(1) Demography of Arta Region

According to data from the last general census of the population of 2009 and conducted by the DISED (Djibouti Directorate for Statistics and Demographic Studies, DISED), and secondarily sourced from the prefecture, the population is 42,380 inhabitants. The population of the region is mainly concentrated on the main villages such as Arta City, Wea, Damerjog and Chebelleh and its outskirts (14,000 habitats).

This population is characterized by a marked disparity between men and women, in favor of women with regard to infant mortality, life expectancy and the literacy rate (DISED).

The rest of the region is inhabited by a transhumant nomadic population depending on the season (17,700 habitats); it is the population who lives or transits through the area of the prospect. In recent years, there has been a strong rural exodus due to the loss of livestock.

(2) Human Habitation

In Djibouti, a detailed census is undertaken every ten or twenty years. In 2009, the DISED; the national body in charge of those activity conducted the last national census study. The inhabitants of the project area are Somali peoples, the majority are from the Issa clan. They are mainly pastoralists or agro-pastoralists and a few fishermen. A small group of these people is involved in commercial activities in urban and market centers at Arta and Weah the two nearest cities. Based on the ODDEG Environmental and Social Survey the total population of the Study Area in Arta is around 100 households. The Arta prospect area is not known as a site of permanent habitat, due to the weather conditions, and difficult access in the mountain zone, there are only 60 sedentary household in Ali-Faren site and near the Arta beach. In addition to the sedentary population, 18 "semi-nomadic" (transhumance) households live in the area of prospect in the mountain zone.

(3) Ethnic and Nomadic People

At the national level the two main ethnic groups of the country are the Afars and the Issas, both nomadic and Muslim. The regions of Obock, Tadjoura and Dikhil are the regions mostly inhabited by the group of Afar, while the regions of Ali Sabieh, Arta and Djibouti are inhabited by the Somalis mostly belonging to the group of Issas. Recently, the rural nomadic population of Djibouti was a subsistence pastoral society with a nomadic lifestyle and close ties to neighboring countries (Ethiopia, Eritrea and Somaliland). Afar from northern Djibouti followed transhumance routes in the Afar areas of Eritrea and Ethiopia, while Issa / Somalis groups led their flocks in the Somalia area. Most of them have become sedentary since then, but the traditions of pastoral society and transhumance on a smaller scale continue through today. A number of 2,000 pastoralist lives in the Arta region. The inhabitants of

the project area are Somali peoples, the majority are from the Issa clan. They are mainly pastoralists or agro-pastoralists and a few fishermen.

(4) Public Infrastructure

In the area of Arta geothermal prospect, there is no school so that students from the local community of the area go to the nearest school in Weah (15 km) or at kilometer point (PK) 48. Due to no school bus services, children must walk all the way back and forth. In addition, there are no health posts, public markets, solid waste disposal sites, drainage and sewage treatment facilities, high-voltage electric cables, water pipelines, gas pipes or telephone cables.

(5) Livelihood farming

Livestock farming remains the predominant activity in the rural area of the country, including Arta which is practiced in two forms: extensive (traditional) especially on collective courses in the north and south of the country. The aridity of the climate favors the establishment and development of pastoral farming of small ruminants and camels. The sale of livestock is based on cash requirements and not on the stage of growth and development of the animals. There is no rational lifecycle exploitation of the herds, across the sector. Livestock tending is the primary occupation of the majority of the rural population of the region, who may either practice transhumant or sedentary livestock farming.

(6) Fishing and Tourism

The Study Area of the prospect is characterized, for the population and the local economy by the practice of fishing, and a fishing village where the base camp of ODDEG is installed in this area, known as the beach of Arta (See Figure 5).

Figure 5: Fisherman village in Arta Source : ODDEG Arta PMU Environmental Team April 2018

However, these important and renewable marine resources, remain underexploited because of the constraints like the lack of financing in the sector, the non-mastery of the adapted techniques of fishing, the low levels of training of the fishermen - which do not exceed their twenties, and the limited number of boats (a fishing fleet of less than 10 motorized 4 to 7-meter boats and limited to artisanal fishing (handlines, gill nets and traps, etc.) (Source: ODDEG, Field Survey May 2018). Fishermen have developed tourist guide activities and rent their boats because of the attractiveness of the sea in this area for tourists flocking from all over the world and the country to see the whale shark. The whale shark is well recognized in this region of the country and represents a renowned attraction.

(7) Cultural Aspect, and Protected Cultural Area

There is neither cultural heritage nor protected cultural areas around the Study Area of Arta identified by the environmental and social survey.

(8) Public Health

Based on data obtained from the Arta regional health offices for 2017 (2017 Health annual report), the major prevalent diseases are; malaria, diarrhea, pneumonia, anemia, urinary tract infections, sexually transmitted diseases, fever, measles, tuberculosis and malnutrition. The major causes of diseases in the area are lack of potable water, malnutrition and lack of latrines. Most of the rural communities in Ali-Faren or households nears the Arta beach such as the pastoralist or agro-pastoralist in this geothermal prospect area do not vaccinate their children because of lack of awareness. Data was collected on diseases that affect children under five years old. The most dominant diseases are measles, malaria, diarrhea and pneumonia as reported by more than 60 percent of the total respondents.

Data was collected regarding knowledge on the mode of transmission of HIV/AIDS in the region level. The results of the study show that 308 (43 per cent) of the respondents said they have knowledge about mode of transmission of the epidemic. About 411 (57 per

cent) responded that they don't have knowledge of the mode of transmission of HIV/AIDS. Therefore, more than half of the total respondents do not have knowledge of the mode of transmission of the disease. There are no statistics on the health situation in the prospect area. The public health sector is not developed. There is no dispensary / health center in this area. An ambulance service exists in the city of Arta (region level), but because of the great distance it is expensive and de facto not available to the communities.

(9) Aesthetics of the Area

The project is located in the Arta region, 8 km from the city of Arta and 42 km from the capital. The distance to the border of the Arta-beach and the RN1 is 17 km by rural road.

The landscape of Arta is dominated by a series of high, arid plateaus and low coastal plains, formed by the volcanic action that accompanied the uplifting and faulting of the East African shield and the Rift Valley system, with many areas exhibiting thick layers of lava flow. An extensive alluvial delta extends across between the Project site and along the way, formed from the outflow from the wadies. The area around the Project site is composed of one major physiographic region that is made up of lowlands. The lowlands are also bounded by relatively less conspicuous and discontinuous mountains that are occasional starting points of stream and flood flows. (See Figure 6)

The general altitude of those areas is below 500 meters above sea level (masl) and in the most parts of the Arta region.

Figure 6:Landscape around Arta Prospect

Source : ODDEG Arta PMU Environmental Team April 2018

(10) Traffic

Currently, the area is frequented by military in the major case, by tourists and technicians who work on the geothermal prospect or for the regional authority. It is estimated that the traffic volume of vehicles is around 20 per day on the principal road from Maryam zone entrance after RN 1 until Arta-beach direction (17 km/distance), those vehicles are military for the most part.

(11) Public Consultation

During the Surface Study of Arta Prospect in 2018, ODDEG conducted consultation meetings on the Exploration Drillings in Arta Geothermal Prospect with the stakeholders. During the public consultations, and the stakeholder meeting the main issues were:

- Access to water: the community living around the target area, the local authorities (Prefecture of Arta), and the elders have highlighted the poor access to water and have requested to ODDEG to facilitate the access to water for the local community. And due to those meeting, ODDEG have given drinking water to the community living around ODDEG camp.

- Transport: The local communities in Arta have no transport facilities in the target area, for those issues the local authorities, the fisherman and the elders have requested ODDEG to construct the access road. And ODDEG will arrange the roads to Arta beach before the drilling operations.

- Energy: The fisherman, the local community, the elders, and the local authorities have expressed their high interest in the electricity generation by developing the geothermal energy in the target area. The private companies in Arta have also expressed their high interest in the development of geothermal energy in Arta Region.

- Environment: All the stakeholders even the Ministry of Environment have expressed their high preoccupation about the environmental management of the drilling activities, and the environmental impact of the geothermal development in the target Area , because Arta beach is the migratory way of the whale shark , and all the migratory way is protected by the Ministry of Environment (MHUE) . The issue of waste management was also discussed because there is no waste disposal

facility in the target area and ODDEG has expressed that all national and international requirements for the environment will be respected during the geothermal development project in Arta .

- ❖ Living conditions: The people living in the target area live in hard conditions. There are no water facilities, no commercial shops, no clinic, no hospitals , no schools, and there are no jobs . The local community, the elder, and the fishermen have expressed their needs to live in better conditions. They have requested that ODDEG engages the local community during the whole project. According to this, ODDEG will do a preferential hiring of workers coming from the local community and ODDEG will engage the community through corporate social responsibility projects during the drilling activities.

4. SCOPING

This scoping study focuses on the Exploration Drillings in the Arta Geothermal Prospect planned in the Surface Study of Arta Prospect. Therefore, for the scoping the drilling phase and the post-drilling phase are studied below.

Category/ No.		Topics (Environmental and Social Items)	Rating		Rating Basis (Reasons)
			Drilling Phase	Post-Drilling Phase	
Pollution	1	Air Quality	B-	C	**Drilling Phase:** • Worsening of surrounding ambient air caused by exhaust gases and dusts emitted from operation of heavy vehicles, equipment and trucks is predicted during drilling phase. • In addition, some gases such as H_2S may be released from drilling positions.
					Post-Drilling Phase: • Worsening of surrounding ambient air caused by exhaust gases and dusts emitted from vehicles and any equipment for testing by ODDEG. However, a total number of those vehicles input for the testing may be small. • In addition, even though a wellhead is planned to cover each drilling structure, some toxic gases such as H_2S may be released from the drilling structure into the surrounding ambient environment.
	2	Water Quality	B-	D	**Drilling Phase:** • Water pollution caused by construction work, operation of heavy vehicles, equipment and trucks, and wastewater of workers and labors is predicted.
					Post-Drilling Phase: • Use of water after the drilling is not planned.
	3	Wastes	B-	D	**Drilling Phase:** • Generation of waste soil and rocks, demolition waste and debris, and litters from workers are predicted.
					Post-Drilling Phase: • Wastes will not be generated after the drilling activities.
	4	Soil Pollution	B-	D	**Drilling Phase:** • There is possibility of soil contamination due to oil spills from relevant construction vehicles and equipment, and transport trucks.
					Post-Drilling Phase: • There is no soil pollution after the drilling phase due to no construction activities.
	5	Noise/Vibration	B-	D	**Drilling Phase:** • Generation of noise/vibration caused by construction vehicles and heavy equipment is predicted.
					Post-Drilling Phase: • After the drilling, the wells are planned to be tested and to discharge fumes by which noise is discharged to the surrounding environment.
	6	Ground Subsidence	C	C	**Drilling Phase:** • Construction work of drilling which causes subsidence or caving may be predicted.
					Post-Drilling Phase: • Testing which causes subsidence or caving may be predicted.
	7	Offensive Odor	B-	B-	**Drilling Phase:** • Construction work of drillings which causes bad odor of H_2S is expected.
					Post-Drilling Phase:

Category/ No.		Topics (Environmental and Social Items)	Rating		Rating Basis (Reasons)
			Drilling Phase	Post-Drilling Phase	
					• Testing wells which cause bad odor of H_2S are predicted.
	8	Sediment Quality	C	C	**Drilling Phase:** • By use of drilling fluids for drilling, sediment is predicted.
					Post-Drilling Phase: • During the testing, sediment is expected by geothermal fluids
Natural Environment	1	Protection Area	D	D	**Drilling Phase:** • Important wildlife habitat areas including Special Protected Areas (SPAs) and statutorily designated or qualifying International or National sites for nature conservation are not existed in and around the drilling sites.
					Post-Drilling Phase: • Important wildlife habitat areas including Special Protected Areas (SPAs) and statutorily designated or qualifying International or National sites for nature conservation are not existed in and around the exploration well areas.
	2	Ecosystem/Flora and Fauna	D	D	**Drilling Phase:** • Presence and/or proximity to wildlife migration corridors and presence of protected/endangered plants or animals have not been identified in and around the drilling areas.
					Post-Drilling Phase: • Presence and/or proximity to wildlife migration corridors and presence of protected/endangered plants or animals have not been identified in and around the exploration well areas.
	3	Hydrology • Water resources (surface water, ground water)	B-	D	**Drilling Phase:** • Ground water and/or sea water is planned to be used for drilling construction.
					Post-Drilling Phase: • Ground water and/or sea water is not planned to be used for testing exploration wells.
	4	Topography/ Geology	D	D	**Drilling Phase:** • Large scale excavation and earth fill are not predicted by drilling works.
					Post-Drilling Phase: • Large scale excavation and earth fill are not predicted by the well testing.
Social Environment	1	Involuntary Resettlement	C	D	**Drilling Phase:** • Land acquisitions/Involuntary resettlements for the drilling area are not required at all. • However, locations of access road(s), worker camp and associated facilities for the drilling are planned before the drilling activities.
					Post-Drilling Phase: • Land acquisitions/Involuntary resettlements for the exploration well areas are not required for the post-drilling phase at all.
	2	Poor People	D	D	**Drilling Phase:** • Drilling activities do not impact on poor population such as nomadic herding around the drilling areas.
					Post-Drilling Phase: • Exploration well testing activities do not impact on poor population such as nomadic herding around Drilling areas.
	3	Ethnic Minority/ Indigenous People	C	D	**Drilling Phase:** • Ethic minority and indigenous people have not been identified other than the nomadic herding.
					Post-Drilling Phase: • Ethic minority and indigenous people have not been identified other than the nomadic herding.
	4	Local Economy and Livelihood	B+	B+	**Drilling Phase:** • A temporary and priority employment from the surrounding area is expected for the drilling work.
					Post-Drilling Phase:

Category/ No.	Topics (Environmental and Social Items)	Rating		Rating Basis (Reasons)
		Drilling Phase	Post-Drilling Phase	
				• A temporary and priority employment of from surrounding area is expected for the exploration well testing.
5	Land Use and Utilization of Local Resources	D	D	**Drilling Phase:** • There is no possibility of negative impact on surrounding land use and regional resources caused by the drilling work.
				Post-Drilling Phase: • There is no possibility of negative impact on surrounding land use and regional resources caused by the exploration well testing.
6	Water Use	C	D	**Drilling Phase**: • There is no surface stream around the drilling areas. However, ground water or sea water is planned to be used for the drilling work.
				Post-Drilling Phase: • During the post-drilling phase, water is not used.
7	Social Infrastructures and Services • Proximity to closest residence/neighborhood, public health and safety • Traffic flows • Recreation and tourism	C	D	**Drilling Phase:** • Negative impacts on surrounding road traffic, traffic congestion, and Arta beach tourism by increase in the number of heavy vehicles, equipment and transport trucks are temporally predicted during the drilling work.
				Post-Drilling Phase: • Negative impacts on surrounding road traffic, traffic safety, and Arta beach tourism by necessary vehicles are temporally predicted during the well testing activities. However, a total number of the vehicle inputs for the testing may be small.
8	Social Institutions and Local Decision- making Institutions • Any public meetings held with nearby residents and issues that arose.	D	D	**Drilling Phase:** • Any impacts on social institutions and decision-making institutions are not expected by the drilling. • Stakeholder Engagement Plan (SEP) is planned by ODEEG. • For the exploration well drilling work, ODEEG held public consultation meetings and stakeholder discussions in 2018.
				Post-Drilling Phase: • Stakeholder Engagement Plan (SEP) is planned by ODEEG.
9	Misdistribution of Benefits and Damages	D	D	**Drilling Phase:** • Such inequality of benefit and damage and benefit is not predicted around the drilling areas by the drilling work.
				Post-Drilling Phase: • Such inequality of benefit and damage and benefit is not predicted around the exploration well areas by the testing work.
10	Local Conflicts of Interest	D	D	**Drilling Phase:** • Such Conflicts of Interest is not predicted around the drilling areas by the drilling work.
				Post-Drilling Phase: • Such Conflicts of Interest is not predicted around the exploration well areas by the testing work.
11	Cultural and Historical Heritages • Proximity to protected area or area of cultural significance	D	D	**Drilling Phase:** • There is no cultural and historical heritage around the drilling areas.
				Post-Drilling Phase: • There is no cultural and historical heritage around the exploration well areas.
12	Landscape • Aesthetics and sense of place	D	D	**Drilling Phase:** • Necessary facilities for drilling are planned to be constructed.
				Post-Drilling Phase: • Exploration wells are planned to be installed which will be covered by wellheads.
13	Gender	D	D	**Drilling Phase:** • Any impacts on gender are not predicted during the drilling phase by the drilling work.

Category/ No.		Topics (Environmental and Social Items)	Rating		Rating Basis (Reasons)
			Drilling Phase	Post-Drilling Phase	
					Post-Drilling Phase: • Any impacts on gender are not predicted during the post-drilling phase by the testing work.
	14	Children's Rights	D	D	**Drilling Phase:** • Any impacts on rights of the child are not predicted during the drilling phase.
					Post-Drilling Phase: • Any impacts on rights of the child are not predicted during the post-drilling phase.
	15	Infectious Diseases (such as HIV/AIDS) • Heath and disease vectors	B-	D	**Drilling Phase:** • Temporary influxes of migrant labors increase the risks of STD such as HIV/AIDS during the drilling phase.
					Post-Drilling Phase: • Such risks of HIV/AIDS are not expected after the drillings.
	16	Occupational Environment (including Occupational Safety) • Occupational H&S • Security implications	C	C	**Drilling Phase:** • Deterioration of occupational safety and working condition associated with the drilling work is anticipated if not properly managed.
					Post-Drilling Phase: • Deterioration of occupational safety and working condition associated with the well testing work is anticipated if not properly managed.
Others	1	Accidents	B-	C	**Drilling Phase:** • Accidents associated with the drilling work are predicted.
					Post-Drilling Phase: • Accidents associated with the exploration well testing work are predicted.
	2	Climate Change	D	D	**Drilling Phase:** • This drilling is the construction of the new testing wells by which such impacts on climate change are not predicted.
					Post-Drilling Phase: • Activities of the post-drilling phase are the exploration well testing by which such impacts on climate change are not predicted.

Note:
- Drilling Phase: includes preparation for access roads and other necessary facilities for the drillings
- Post-Drilling Phase: After finishing the drillings (before possible future geothermal development project)

A+/-: Significant positive/negative impact is expected.
B+/-: Positive/negative impact is expected to some extent.
C+/-: Extent of positive/negative impact is unknown (further examination is needed, and its impact could be clarified as the study progresses).
D: No impact is expected

5. CONCLUSION

The environmental and social scoping of the Arta geothermal prospect demonstrated that this prospect has numerous environmental and social issues to be taken into consideration during a test well drilling project. The scoping will only help to draft a Term of Reference for the realization of an environmental and social impact assessment study according to national and international regulation, specially the Decree on the ESIA procedures No. 2011-029/PR/MHUEAT. Internal policies have to be fulfilled also as the environmental and social consideration policy; the health safety and environment policy, and the corporate social responsibility policy of ODDEG.

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