GAMA ENERGY INC.

KARACAOREN-1 AND 2 HEPP PROJECTS

NON-TECHNICAL SUMMARY

(ENVIRONMENTAL AND SOCIAL DUE DILIGENCE)

ENCON ENVIRONMENTAL CONSULTANCY CO.

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LIST OF ABBEVIATIONS

EBRD	European Bank of Reconstruction and Development
EIA	Environmental Impact Assessment
ESDD	Environmental and Social Due Diligence
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
EUAS	Electricity Generation Company
HEPP	Hydroelectric Power Plant
IFC	International Finance Corporation
MoEU	Ministry of Environment and Urbanization

1. Project Description

Karacoren-1 and Karacoren-2 Hydroelectric Power Plants (HEPPs) are located in Bucak district of Burdur, a province in Mediterranean Region of Turkey. Both plants were constructed in 1970s-1980s and operational since 1990s. They are being operated by the Turkish Electricity Generation Company (EUAS), a state owned company, in the current situation and are considered by Kremna Energy Generation and Trade Co., a subsidiary of GAMA Energy Inc. ("GAMA Energy"), for acquisition in line with the terms of applicable national legislation.

Karacaoren-1 HEPP is a conventional type of hydropower plant located right at the upstream of Karacaoren-2 HEPP, which is a run-of-the-river type[1] of hydropower plant. Karacaoren-2 HEPP includes a little reservoir which is much smaller in area than Karacaoren 2 HEPP'S reservoir. Main components of each Project cover the dam and reservoir, water intake building, penstock, surge chamber, power house and administrative offices, bottom outlets, spillway and switchyard. Karacaoren-2 HEPP additionally includes a power tunnel.

A map, showing the locations of plants and the settlements, other HEPPs and protected areas found in the surroundings is provided in Figure 1.

Karacaoren-1 HEPP

Karacaoren-1 HEPP is a multipurpose facility, constructed to generate electricity by making use of the flow of Aksu River, to provide flood protection and to meet irrigation needs. The facilities in the extent of the Project consist of; radial gate spillway, derivation channels, bottom outlet, valve chamber, penstock and the power plant building. The main characteristics of the plant are summarized in Table 1.

Table 1. Main Project Characteristics for Karacaoren-1 HEPP

Characteristics	Information
Province	Isparta, Burdur
Intended Purpose	Irrigation, Flood Control, Energy Generation
River	Aksu
Installed Capacity	32 MW (2 x 16 MW)
Annual Electricity Generation	142 GWh
Dam Type	Composite Earth Dam
Crest Elevation	275 m
Crest Length	427,4 m
Crest Width	12 m
Height Above Foundation	93 m
Height Above River Bed Elevation	85 m
Maximum Water Level	270 m
Normal Water Level	260 m
Minimum Water Level	245 m
Reservoir Volume (at Normal Water Level)	1.234 hm^3
Reservoir Area (at Normal Water Level)	45,5 km^2
Maximum Reservoir Capacity	1.234.000.000 m^3

Source: DSI, 2016; IO Environmental Solutions, August 2015.

[1] A run-of-the-river type hydropower plant includes little or no water storage unlike conventional hydropower plants.

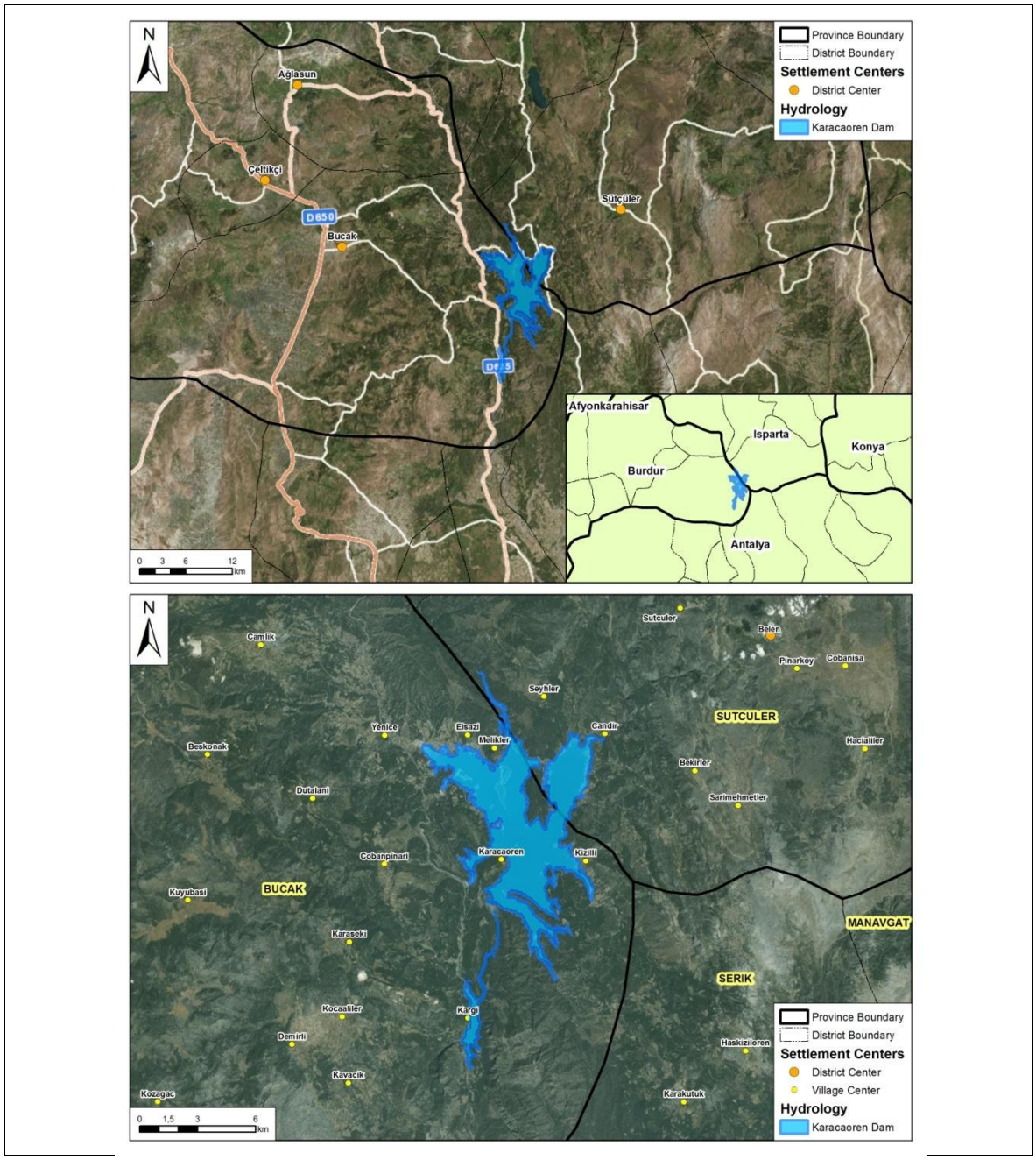

Figure 1. Site Location Map

Karacaoren-2 HEPP

Karacaoren-2 HEPP is a run-of-the-river type of hydropower plant, which conveys the water from the reservoir to the power plant through a power tunnel. The facilities in the extent of Karacaoren-2 Dam and HEPP consist of; derivation channel, free spillway, intake tunnel, head reach, power tunnel, surge chamber, penstock and plant building.

The main characteristics of the plant are summarized in Table 2

Table 2 Main Project Characteristics for Karacaoren-2 HEPP

Characteristics	**Information**
Province	Isparta, Burdur
Intended Purpose	Irrigation, Energy Generation
River	Aksu
Installed Capacity	46,4 (2 x 23,2 MW)
Power Tunnel Length	566 m
Annual Electricity Generation	206 GWh
Dam Type	Concrete Gravity (Arch)
Crest Elevation	190 m
Crest Length	55 m
Thalweg Elevation	145 m
Height Above Foundation	52 m
Height Above River Bed Elevation	45 m
Maximum Water Level	188 m
Normal Water Level	187.5 m
Minimum Water Level	185 m
Reservoir Volume (at Maximum Water Level)	33,767,000 m^3
Reservoir Volume (at Nominal Water Level)	32,767,000 m^3
Reservoir Volume (at Minimum Water Level)	27,767,000 m^3
Reservoir Volume	48 hm^3
Reservoir Area	2.34 km^2

Source: DSI, 2016; IO Environmental Solutions, September 2015.

2. Background

Karacaoren-1 HEPP is located 30 km south of Bucak district of Burdur. The Project was started to be constructed on Aksu River in 1977 and taken into operation in 1990 upon the completion of construction works. Karacaoren-2 HEPP is located near Kargi Kisigi region in Bucak district of Burdur). The Project was started to be constructed on Aksu River in 1988 and taken into operation in 1993 upon the completion of construction works. Both plants are currently being operated by the stated owned EUAS Company.

According to the existing Environmental Impact Assessment (EIA) Regulation, both projects are out of the scope of the regulation because of the dates they were put in public investment program and/or when they started operation. Thus, no full or limited EIA report is required for Karacaoren-1 and 2 HEPP projects. Nevertheless, the projects are subject to the relevant requirements of all national laws and regulations and have been operating since 1990s accordingly.

The commercial management policy of EUAS is straightforward that the power plants in their portfolio are optimized against the demand that EUAS needs to supply. Because of that reason, both power plants are producing minimum energy that satisfies demand with one unit or two units and they are not using the power plants with maximum production capacities. Both plants have been operated by EUAS in compliance with the requirements of the relevant Turkish environmental and social legislation and in accordance with conventional practices applied at similar facilities under the authority of state or state owned companies. Thus, as it is not a legislative requirement, international good practice were not followed in the past operations. Additionally, no significant infrastructural, technological or operational improvement has been done during the period in which plants were operated by EUAS. Currently, Kremna Energy (subsidiary of GAMA Energy) has been considering the plants for acquisition in line with the terms of national legislation applicable to privatization processes. Once the acquisition process is closed, Kremna Energy plans to apply GAMA Energy's corporate level policies, plans, procedures and standards applicable to environmental, social, health and safety and operational aspects of the projects.

As it is with all dam and HEPP projects, the local environmental and social conditions were mostly altered during the construction of Karacaoren-1 and 2 HEPPs. Since the reservoirs are in place since 20-25 years, a new balance has been established at the area. Safe operation of plants is the primary concern for the operation phase of dam and HEPP projects and accordingly environmental and social impacts of Karacaoren-1 and 2 HEPPs have remained mostly local and not highly significant, with the exception of the flood incident that occurred in 1995 as a result of opening of the spillway gates. On the other hand, existing environmental, social and operational practices, and conditions of plant components/equipments require improvement to ensure safe operation of HEPPs without causing any significant risk on environment and community and personnel health and safety. GAMA Energy will take over the plants with these existing conditions and it plans to enhance the existing conditions by implementing necessary measures/improvements to ensure safe and efficient plant operation and full compliance with not only national legislation but also applicable international environmental and social standards, which would indirectly prevent and/or mitigate some of the existing environmental and social risks/impacts especially in the field of personnel and community health and safety. Key information on the pre-project and/or existing conditions, which will be the baseline for GAMA Energy operations after hand over is summarized below.

Land Use and Material Assets

The existing land use at the surroundings of the Karacaoren-1 and 2 project areas are mainly covered with forest lands and farmlands to a limited extent, which also reflects the pre-project land use characteristics of the area corresponding to Karacaoren-1 and 2 project units including the reservoir and the HEPPs. Due to the mountainous location of the project areas, agricultural activities are very limited and some small agricultural lands are common in the north-east bank of the Karacaoren-1 dam reservoir.

Acquisition/allocation of land use rights (i.e. forestry permits for the forest lands; expropriate of privately owned farm lands) had occurred before the implementation of both projects. No further changes on the land use had happened after the construction and inundation.

There are social facilities including a school, mosque and dwelling houses located at Karacaoren-1 project area. Materials, buildings, equipments, etc. are generally not in good condition. There are also unused construction containers, a personnel transportation bus, construction equipments, storage tanks, etc. stored at the Karacaoren-2 HEPP site since about 20 years, which are in extremely poor condition and needs to be removed from the site. As stated by workers, no significant renewal activity has been conducted since plants' installation.

Topography and Soils

Topography and soil alterations had occurred during the construction and impoundment phases of Karacaoren-1 and 2 HEPP projects. During the operation of both HEPPs by EUAS since 1990s, due to improper management of chemicals and wastes, local contamination of soils might have also occurred in the past.

Erosion along the unvegetated shorelines of the reservoirs seems to have occurred to a certain extent at Karacaoren-1 reservoir's lower slopes, but since both reservoirs are mostly surrounded by forests, erosion is not a significant issue for the wider reservoir areas of Karacaoren-1 and 2. Reservoirs are in operation since 20-25 years, thus a certain level of sedimentation is expected.

Geomorphology and Geology

Karacaoren-1 and 2 dam and HEPPs are located in 2nd degree earthquake zone. The relatively important faults in the area are Burdur Fault (closest section located approximately 65 km northwest of the projects), faults of Davras Fault Zone(closest section located approximately 42 km northwest of the projects and Kovada Fault (closest section located approximately 65 km north of the projects) to a less extent. There may be risk of landslide along the access road to Karacaoren-2 HEPP, which is currently not in good condition

Biological Environment

The vegetative structure of Karacaoren-1 and 2 project areas had altered during the construction and impoundment phases in 1980s-1990s. As the pre-project land use character of the project areas was mainly formed of forest lands and agricultural lands in limited amounts, forest habitats were lost and loss/disturbance of certain terrestrial and aquatic fauna species that depend partly or totally on those habitats had occurred in the past.

In the existing situation, there are alternative forest habitats located in the surroundings of the reservoirs and the HEPPs. Close vicinity of the project area (especially Aksu River) are covered with rather homogeneous vegetation, mainly composed of trees and shrubs. Scattered trees exist at small villages along streams and there are red pine trees on mountainsides. Being not much valuable as the lost forest habitats, new aquatic habitats have also been created by the Karacaoren-1 and 2 reservoirs.

The area covered by the reservoir before the projects' construction is no longer a river habitat and/or terrestrial ecosystem, but had become an artificial lake ecosystem. It is assumed that the composition of aquatic species in the reservoirs had changed in the past 20-25 years and the existing fish community at both areas is likely to be formed by species that tolerate the existing conditions. Consequently, a new ecosystem balance has been established and different types of habitats have developed at Karacaoren-1 and Karacaoren-2 reservoirs and their downstream in the past operation period as a result of the transformation of the riverine environment into reservoirs.

As a result of the combined operation of Karacaoren-1, Karacaoren-2 and the downstream Eskikoy reservoirs, downstreams of Karacaoren-1 and 2 HEPP are in the form of lakes, thus there is always water available for the aquatic life at the downstream of both HEPPs.

On the other hand, Karacaoren-2 HEPP uses a power tunnel bypassing about the 4 km riverbed (former riverbed). The observation showed that the upstream section of the former river bed, which runs through a narrow rocky canyon-type valley at the location of the Karacaoren-2 dam axis, is dry and thus aquatic habitats and species had already been lost in this section within the past operation period. Nevertheless, there is still water in the form of a stream flowing at the downstream section of the river bed, which is sustained by the influent streams found along the former riverbed route and merges with the discharge flow from Karacaoren-2 HEPP. Thus, aquatic life would still be existing at the downstream sections of the former river bed.

Water Resources

Karacaoren-1 and Karacaoren-2 reservoirs and HEPPs are constructed on Aksu River within the borders of the Antalya Basin, Aksu Creek Subbasin. Natural flow regime of Aksu River has already been disturbed starting from the impoundment of Karacaoren-1 and 2 reservoirs and HEPPs and other water storage developments. Upstream and downstream of both HEPPs has been transformed from a running natural river into reservoirs/water bodies having no notable running sections.

There are existing fish farms operating at Karacaoren-1 and 2 reservoirs, in which the water quality is anticipated to be poor/not good due to potential pollution sources including these fish farms and also industrial wastewaters discharged from sources located in Isparta province. There is a possibility that the capacity of these farms may be reduced by related governmental authorities in the near future.

There are also groundwater resources in the area, which are used to meet utility water requirements.

Air Quality

Air quality in Burdur province is in general good. There are no significant air emission sources in the close vicinity of the Karacaoren-1 and 2 HEPPs. The HEPPs themselves do not emit any significant pollutant into air via any stack or intensive traffic movements.

Karacaoren-1 and 2, since the start of their operation, would be naturally emitting greenhouse gases to a certain extent because of the forest sections (which were not salvaged or economically utilized by Forestry Directorate) and other biomass flooded during impoundment in 1990s But the level of such greenhouse gas emissions from Karacaoren-1 and 2 reservoirs would still be low when compared to other power generation technologies,

Climate

Climatic conditions of Burdur province can be defined as cold and rainy during winter and hot and arid during summer. Its characteristic can also be defined as transition climate between Central Anatolia, Mediterranean and Aegean. Most of the annual precipitation precipitates as rain and snow during winter time. First frosts can be seen during November and last frosts can be seen until second half of April.

Including Karacaoren-1 and 2 reservoirs, there are several existing and planned reservoirs in the Antalya Basin. It is possible that changes in microclimate have occurred with the contribution of all these reservoirs, leading to a trend to milder conditions with increased average winter temperatures and less hot conditions in summer with higher humidity levels.

Waste Management

Wastes including domestic wastes, packaging wastes, waste oils, scrap metals, waste wood, hazardous wastes, waste batteries accumulators, etc. are being generated at Karacaoren-1 and 2 site in relatively limited amounts both because of the nature of operations and number of personnel employed.

Existing waste management practices of EUAS are not fully proper and pose environmental risks on soil and water resources at certain locations. Preliminary Waste Management Plans are available at both sites, but they do not meet the requirement of international good practice/standards.

Karacaoren-1 HEPP does not have a proper (covered, impermeable ground, separate containers, etc.) temporary waste storage site and housekeeping practices need substantial improvement. Karacaoren-2 HEPP has a temporary waste storage site with top cover and impermeable ground, but the drainage structures need further improvement. Scrap metals and dismantled construction facilities are still being stored at site and this brings the risk of soil and water contamination.

Noise

There is no significant source of noise existing at Karacaoren-1 and 2 sites that may cause adverse impacts on nearby receptors. There are only greenhouses and other receptors (identified as Cobanlar neighborhood of Kargi village) located along the route to Karacaoren-2 HEPP site, which may be subject to traffic-induced noise from time to time depending the level of activity.

From the occupational health and safety point of view, noise levels and/or vibrations perceived during the operation of turbines/generators may be relatively high for the related personnel inside the power house/building during the plant operation and thus should be given consideration.

Protected Areas/Cultural Heritage

There are seven Key Biodiversity Area (KBA) in the vicinity of Burdur Province. The Project Area overlaps with one small portions of the Aksu Valley KBA and Koprucay Valley KBA is located 6 km away from the Project Area. There are also registered archaeological sites in the area, the closest one being near Kargı settlement located rigth at the western border of Karacaoren-2 Dam. There are other nearby archeological sites located in the vicinity of Kizilli and in Sehler settlements.

Landscape and Visual Aspects

Major changes in the existing landscape characteristics had occurred during the construction and impoundment phases of Karacaoren-1 and 2 HEPP projects. The reservoir and HEPP site are surrounded mostly by forests and rocky hills. The reservoir itself creates a landscape value. Non-rehabilitated borrow pits are observed at the surrounding hills. Fish farms and recreational facilities are other factors influencing the existing landscape. Access road to Karacaoren-2 HEPP is not in good condition and may cause adverse visual impacts to certain receptors. There are also settlements located around the reservoirs.

Karacaoren-1 Reservoir | Karacaoren-1 Reservoir

Figure 2. Views from Karacaoren-1 and 2 Reservoirs

Socio-economic Environment

The main economical activities of the settlements located in the vicinity of Karacaoren-1 and Karacaoren 2 are husbandry and agriculture. According to the information obtained from the headman of Karacaoren, the prominent agricultural products of the settlements are; barley, wheat, corn (these are mostly produced as animal feed), cotton, peanuts and sesame. The household members of Kargi, Cobanpinari and Karacaoren are also employed in the facilities (restaurants and fish farms) located at the shore of the reservoir. The economy of Kargi village is especially dependent on these facilities. Approximately 20 households of Cobanlar village (belongs to the Kargi Village), which is located near to Karacaoren 2, are involved in greenhouse cultivation. There are also fish farms operating in the both reservoir.

Some of the local people have been working at Karacaoren-1 and 2 HEPPs for long periods of time as workers, maintenance personnel, civil servants, sanitation staff and security personnel. Total number of personnel (including employee and non-employee workers) employed at both plants is currently around 100. Recruitment has been done by the General Directorate of EUAS through examinations and interviews in the past. Requirements of the national labor related legislation and general state rules and procedures have been applied during recruitment and employment. Employees are generally content with the existing working conditions.

3. Process

Karacaoren-1 and 2 HEPPs are out of the scope of Turkish EIA Regulation, thus no EIA process was conducted for both projects in the past. On the other hand, besides ensuring full compliance with the requirements of national legislation, GAMA Energy plans to operate the plants, in line with the environmental and social standards of international financing institutions, which consider providing finance for the improvements planned to be done by GAMA Energy at both HEPPs after acquisition/hand over. Thus, to meet the requirements of potential international financiers, GAMA Energy has initiated an Environmental and Social Due Diligence (ESDD) study and have the study conducted by environmental and social expert in order to identify the key environmental and social issues and risks at both HEPPs and define the actions to be taken to improve the existing conditions and prevent and/or minimize potential risks throughout the operation period. The study has mainly taken the International Finance Corporation's (IFC) Performance Standards on Environmental and Social Sustainability and European Bank for Reconstruction and Development's (EBRD) Performance Requirements into consideration, which have become the industry standards providing guidance for the management of environmental and social aspects of projects.

As it is not required by national legislation, EUAS has not performed systematic stakeholder engagement activities (under a SEP) meeting the requirements of relevant international standards in its past operations. But, as employees of both plants are mostly from the local and the plants have been operated by a state owned company, EUAS, relations with stakeholders have been generally good and no tension causing significant issues with the local community or other stakeholders had occurred. GAMA Energy has a corporate-level Stakeholder Engagement Plan (SEP), which is applied in all projects it is involved in and a project-specific SEP has also been developed in line with IFC and EBRD standards/requirements for being implemented in Karacaoren-1 and 2 HEPP projects. GAMA Energy plans to initiate the activities under this SEP, starting from the hand over and continue them through the whole operation period under GAMA Energy's authority.

4. Environmental Benefits, Adverse Impacts and Mitigation Measures

As in many other investment projects, environmental and social impacts of dam and HEPP development emerge in construction, operation and post-operation phases, if relevant management measures are not taken.

Construction of Karacaoren-1 dam and HEPP started in 1977 and the plant was taken into operation in 1990 while construction of Karacaoren-2 HEPP started in 1988 and the plant is operational since 1993. Therefore, construction phase impacts of both projects, such as changes in existing land uses, excavation, dust emissions etc., occurred between 1977 and 1993. Due to the temporary nature of the construction activities, some of the adverse as well as positive impacts of the construction phases had already been removed.

With the filling of the reservoir (impoundment) following the completion of construction, the area upstream of a dam has been converted to a water body/reservoir and the pre-project environmental and social conditions changed. Since Karacaoren-1 and Karacaoren-2 dam and HEPP projects are in operation since 1990s, some of the operation phase impacts already exist in the area.

GAMA Energy activities will not include any spatial expansion including construction of new major components or units requiring additional land use. The process being conducted currently will be continued under GAMA Energy's operational policies. Technical, environmental and social due-diligence studies have been conducted by experts commissioned by GAMA Energy to identify the dam and HEPP facilities, equipments and areas that would need technical, environmental or operational improvements for the effective management of environmental and social impacts/risk of plants. In consideration of the identified issues, GAMA Energy plans to implement necessary measures/improvements to ensure safe and efficient plant operation and effectively manage the environmental and social impacts caused by its activities. Some of these improvements are expected to prevent or mitigate some of the existing environmental and social impacts, while some of them are likely to create benefits as a result of the enhancement of the existing conditions. Additionally, GAMA Energy will establish and implement an Environmental and Social Management System meeting the requirements of international standards to ensure effective management of all planned avoidance and mitigation measures in the scope of its activities and operations.

Land Use, Material Assets and Soils

Permanent changes in the land use characteristics and soils had occurred in the construction and impoundment phases of Karacaoren-1 and 2 HEPP projects. No further changes on the land use have happened after the construction and inundation but sedimentation has occurred in both reservoirs to a certain level.

GAMA Energy will not make any further spatial expansion or use of land once it takes of the operation of plants. Thus, no change/incremental impact in the existing land use and soil conditions are anticipated due to GAMA Energy activities/operations. The access road improvements to be made at Karacaoren-2 HEPP access road may cause local impacts, if material supply from borrow sites is required.

Renewal works planned to be done by GAMA Energy at HEPP facilities are anticipated to improve the existing conditions. GAMA Energy plans to improve the conditions of existing tanks and other storage components and remove any unused/obsolete materials, equipments, etc. present at both HEPP sites. This would remove/minimize the existing contamination risks on soils. To mitigate the sedimentation related impacts, GAMA Energy will conduct relevant baseline assessments, establish necessary monitoring stations and implement additional management measures in line with its corporate plans.

Geomorphology and Geology

The earthquake risks at the area where Karacaoren-1 and 2 dam and HEPPs are located will continue to exist throughout the operation of the project. Access road to Karacaoren-2 HEPP is not in good condition and there may be risk of landslide along its route in case of heavy traffic or uncontrolled surface run-off that may occur during storm events. GAMA activities/operations are not anticipated to trigger landslide risks at any location other than this road section.

Biological Environment

The flora and fauna components in dam and HEPP projects are mainly affected during the construction and impoundment phases. The major impacts on terrestrial and aquatic habitats and related impacts on flora and fauna species are caused by the land take and inundation. Construction and impoundment phase impacts of Karacaoren-1 and 2 projects on flora and fauna components occurred in 1980s-1990s. Since the pre-project land use type for both projects is mainly forest; the main impact of both projects was the loss of forest habitats and disturbance of fauna species that depend on these habitats.

During operation of the dam and HEPP projects, the impacts on biological environment are associated with the reservoir itself, which forms a barrier for some species, and the downstream discharges in the reservoir. For both Karacaoren-1 and Karacaoren-2 projects, the area covered by the reservoirs is no longer river habitats and/or terrestrial ecosystems, but had become an artificial lake ecosystem.

Even though GAMA activities/operations are not anticipated to result in any significant change/adverse impact (i.e. loss of habitats or species, disturbance of fauna species due to air emissions, noise generation etc.) in the existing aquatic and/or terrestrial ecosystem conditions, which have reached a balance since the last 20-25 years of operation, the Company plans to commission competent experts to conduct a baseline flora and fauna survey to characterize the existing biodiversity conditions and identify any area that may need improvement.

Water Resources

Natural flow regime of Aksu River has already been disturbed starting from the impoundment of Karacaoren-1 and 2 reservoirs and HEPPs and other water storage developments. Water quality within the reservoirs has changed from time to time depending on pollutant inflows.

GAMA Energy operations are not anticipated to result in any significant change/adverse impact on the water resources. As the number of personnel to be employed at both sites is anticipated to decrease under GAMA Energy operation and GAMA Energy is likely to apply its resource efficiency principles at these plants, amount of water use and related domestic wastewater generation will likely to decrease. Similarly, improved site waste and materials/chemicals management practices to be applied by GAMA Energy would remove/minimize the risk of water pollution posed by the existing improper waste storage practices.

Water quality in reservoirs may continue to positively or negatively change due to anthropogenic and/or natural factors, which may be out of GAMA Energy's influence or control. For example, water quality upstream and downstream the HEPPs may improve in time, if the capacity of existing fish farms at Karacaoren-1 Reservoir is reduced and fish farms at Karacaoren-2 are closed by authorities; or reservoir water quality may deteriorate due to uncontrolled wastewater and/or waste discharges done by third parties. GAMA Energy will conduct periodical water quality monitoring including sampling and analyses and implement necessary wastewater management measures to ensure that its activities do not pose any impact on the quality of nearby water resources.

Domestic wastewaters will continue to be managed by means of septic tanks and package wastewater treatment plant (only at Karacaoren-1 site). GAMA Energy will make necessary arrangements for safe disposal of wastewaters and obtain necessary permits in line with applicable national legislation.

Air Quality

Impacts on air quality had occurred during the construction phase of the projects and been removed upon the completion of activities. No significant source of air pollution (i.e. stack, traffic) was included in the operations conducted at Karacaoren-1 and 2 sites. Thus, GAMA Energy activities will not cause any significant change/adverse impact on the local air quality during its operational period.

Road improvements to be made at Karacaoren-2 HEPP access road may result in air emissions for a temporary period. These emissions may affect greenhouses and receptors (identified as Cobanlar neighborhood of Kargi village) located along the route. To mitigate any potential adverse impact, dust control measures, including watering of work sites and routes, stipulation of speed limits for mobile vehicles and use of well maintained vehicles/machinery will be implemented during road improvement works and materials delivery stages.

Waste Management

In both sites, existing improper waste management practices pose environmental risks on soil and water resources. Karacaoren-1 HEPP does not have a proper temporary waste storage site and housekeeping practices need substantial improvement. Karacaoren-2 HEPP has a temporary waste storage site with top cover and impermeable ground, but the drainage structures need further improvement.

As a result of the improvement works to be conducted by GAMA Energy after hand over, it is likely that additional amounts of hazardous and non-hazardous wastes would be produced. GAMA Energy would implement its own waste management practices in line with its corporate-level Waste Management Plan fulfilling the requirements of international best practice/standards and employ relevant trainings covering proper waste management aspects so that the amount of waste to be generated may be minimized. Additionally with the development of proper temporary waste storage sites and removal of existing scrap/unused materials from the site, in general, the existing waste management practices/conditions are anticipated to be improved under GAMA Energy's operation.

Traffic and Noise

Existing site operations do not involve intense traffic movements that would cause dust, noise and/or accidents risk. Improvement activities to be done at Karacaoren-2 access route would bring typical risks and impacts involved in such activities for a short period of time. On the other hand, once the road improvement works are completed, risk of traffic accidents and dust and noise emissions due to traffic movements on this route will be reduced. Similarly, risk of traffic accidents and traffic loads on the routes to be used may increase for a limited time during the delivery of materials through main access and village roads. To mitigate the potential impacts, trainings will be provided to related personnel, speed limits will be applied, warning signs will be posted at necessary locations and materials to be required for improvement works will be delivered during low traffic hours to the extent possible. Additionally, there is an existing risk of accidents at the access point of the Karacaoren-2 dam site, which is on Antalya-Isparta road, which will be minimized by GAMA Energy by developing and implementing a procedure/mechanism ensuring safety regarding the access to this site.

Dam body and the spillway of the Karacoren-2 are located at a site adjacent to the Antalya-Isparta road. In order to access the site where these facilities are located, side barriers of the highway needs be opened manually by the driver or his attendant(s) (if the site is unmanned at that moment) approaching to the site for any maintenance, inspection, etc. work. Additionally, warning signs will be provided for each side of the Antalya-Isparta highway near dam and spillway entrance.

As with impacts on air quality, noise impacts are also mainly of concern during construction phase of dam and HEPP projects. No significant source of noise was identified at Karacaoren-1 and 2 sites. Only, turbines/generators may be a source of noise and/or vibration, but GAMA Energy will conduct necessary indoor measurements and take relevant occupational health and safety measures (i.e. personal protective devices) to avoid/minimize impacts on the health and safety of the related personnel during their operation.

Protected Areas/Cultural Heritage

Major impacts on cultural heritage had occurred during the construction and inundation phases of Karacaoren-1 and 2 HEPP projects, if there were any. No significant change/additional impact is anticipated on discovered/undiscovered cultural heritage and protected areas under GAMA Energy activities/operations.

Landscape and Visual Aspects

Major changes in the existing landscape characteristics had occurred during the construction and impoundment phases of Karacaoren-1 and 2 HEPP projects. No significant change/additional impact are anticipated in existing landscape characteristics under GAMA Energy operation. Better site waste and materials management practices and road improvement activities to be conducted by GAMA at Karacaoren-2 access road may result in positive impacts for nearby receptors.

Personnel and Community Health and Safety

Plant operations are not anticipated to pose significant risks on personnel and community health and safety under normal operating conditions. Existing risks caused by the current housekeeping and health and safety management practices, insufficiency of inspections, tests and analyses, presence of old electrical systems and lack of SCADA systems, lack of proper fire preparedness and fighting systems, need for repair and maintenance works for certain equipments and facilities, system parts, materials, etc. are anticipated to be minimized under GAMA Energy's operations as several improvements are planned to be made at HEPP facilities and components, which are not assessed to be in safe operating conditions. Additionally, GAMA Energy has its own health, safety and security standards and will apply its corporate-level Security Policy at Karacaoren HEPPs as well. Moreover, site-specific Occupational Health and Safety and Emergency Preparedness and Response Plans will be developed and implemented for Karacaoren-1 and 2 HEPP sites in line with the international standards/requirements, fire preparedness and fighting systems will be improved and special trainings will be provided to the personnel. Additional measures will also be taken based on dam safety experts' assessments and in cooperation with related/responsible governmental agencies to ensure safety of dams. Accordingly, the existing conditions are anticipated to be improved under GAMA's operation and existing risks on personnel and community health and safety are likely to be reduced.

Cumulative Impacts

Cumulative impacts represent the total impact on environmental and social components caused by all past, present, and future activities. For dam and HEPP projects, cumulative impacts may emerge when more than one project is implemented in the same basin. Karacaoren-1 and 2 HEPPs are located in Aksu Creek Sub-Basin and there are 22 other dam and HEPP projects located in the same sub-basin which are either operating or under construction or planning (16 of which are currently operating or under construction and 6 of which are in planning stage).

Cumulative impact assessment in the scope of Karacaoren-1 and 2 HEPP projects have been done based on the "Cumulative Environmental Impact Assessment for Hydropower Projects in Turkey", a guideline prepared with the support of World Bank. The dam and HEPP projects located in the Aksu Creek Sub-Basin, including Karacaoren HEPPs, when operated together (construction phase cumulative impacts of projects will be temporary and would occur only if the construction stages overlap) have the potential to cause cumulative impacts on flow rates and water quality of surface water resources, land use characteristics (loss of forest and agricultural lands), terrestrial and aquatic ecosystems and air due to greenhouse gas emissions.

5. Social Benefits, Adverse Impacts and Mitigation Measures

Major social impacts of Karacaoren-1 and 2 HEPPs had occurred during the land acquisition, resettlement and construction phases of the projects. There will be no additional land acquisition or resettlement within the scope of GAMA Energy activities and operations.

As a result of the privatization process, some of the existing workforce will be retrenched by EUAS. Some of the employee workers will not be significantly affected as the government will assign new work place to them but non-employee workers will not have the same opportunity. To mitigate the impacts of acquisition of plants by GAMA Energy on the existing workforce, the Company has started consultations with the existing personnel to inform them about the opportunities to be provided by its operations once the plants are handed over by EUAS to GAMA Energy.

There may be impacts on some of the existing local suppliers/service providers of the plants as it is likely that the common procurement methods may change once GAMA Energy takes over the operations. To avoid/minimize the risk of tensions between local service providers and GAMA Energy, the company will apply Stakeholder Engagement and Supply Change Management plans.

There may be access restrictions to be applied by GAMA Energy at certain plant areas and on-site roads. But these restrictions will minimize the risks on community health and safety caused by plant facilities.

GAMA Energy will maintain stakeholder relations including local people and employees in line with the SEP developed according to international standards/requirements. In this scope, all the stakeholders will be provided with proper mechanisms by which they can be accurately/sufficiently informed by project operations, easily communicate with GAMA Energy and deliver all their potential grievances to responsible GAMA Energy personnel, if there is any. GAMA Energy plans to initiate the activities under the SEP, starting from the hand over and continue them through the whole operation period under GAMA Energy's authority.

6. Monitoring of Impacts

GAMA Energy will monitor effective implementation of all planned environmental and social measures by means of appropriate tools including site audits, sampling and laboratory analyses, etc. Monitoring will cover all environmental and social aspects (i.e. soil, water, wastes, health and safety, flora and fauna, etc.) relevant to the projects. The Company will assign responsibilities and provide the necessary financial resources for this purpose. Certain performance indicators will be used in the scope of monitoring to verify that relevant management measures have been taken properly.

Monitoring will be done quarterly during the planning, preparation, transition and improvement phases and first year of the operation (following the completion of improvement works) by GAMA Energy. Frequencies would be increased in the upcoming years of operation once the results of monitoring activities confirm good/sufficient environmental and social performance in projects. Performance review and monitoring reports will be prepared following the monitoring effects to compile all the findings including any significant environmental and social impacts and issues relevant to the projects, grievances received from workers and external stakeholders, and how they were resolved; regulatory monitoring activities, etc.

Based on the monitoring results, relevant corrective and preventive actions will be planned and implemented by GAMA Energy, where necessary. Senior management of the Company will also be informed about the monitoring results and receive environmental and social performance reviews in line with the frequency of the monitoring studies.

GAMA Energy will involve independent experts in monitoring activities, where required depending on the nature and necessities of the issue. In addition to the internal monitoring, local authorities and the Ministry of Environment and Urbanization (MoEU) will have the authority to execute monitoring and inspection activities to follow-up the conformity of the Project activities with the environmental requirements as per the relevant legislation.

An Environmental and Social Management System is a set of policies, procedures, tools and internal capacity to identify and manage a financial institution's exposure to the environmental and social risks. In parallel to this ESDD study, an Environmental and Social Management Plan is prepared which identifies the actions proposed to be taken to decrease effects of the impacts and risks of Karacaoren-1 and 2 HEPP projects. So, Monitoring results will be documented with Monitoring Reports as mentioned above and necessary corrective and preventive actions will be reflected to the Environmental and Social Management Plan for addressing any issues arising.