

APPENDIX-D

Environmental and Social Management and Monitoring Plan (ESMMP)

TABLE OF CONTENTS

Environmental and Social Management and Monitoring Plan	1
Construction Stage	1
Operation Stage.....	8

LIST OF TABLES

Table 1 Environmental and Social Management and Monitoring Plan for the Construction Stage.....	1
Table 2 Environmental and Social Management and Monitoring Plan for the Operation Stage	8

Environmental and Social Management and Monitoring Plan

Construction Stage¹

Table 1 Environmental and Social Management and Monitoring Plan for the Construction Stage

E&S Issues	Potential Impacts and Risks	Mitigation Measures	Monitoring Indicators and Frequency	Responsible Entity	Legal Framework
EBRD Performance Requirement 2: Labour and Working Conditions					
Labour and Working Conditions	Employment Opportunities	Gurmat and its contractors must continue to meet the labour force need from the local community. Gurmat and its contractors will implement the HR related policy and procedures Retrenchment Plan will be developed	Number of community complaint relating to recruitment or employment opportunities Worker grievances - open, closed, number per category, Number of skilled and unskilled local people Annual E&S reports Ratio of local employees; Ratio of women/men workers	Public Relations officer and HR Department	Turkish Labour Law 4857 EBRD PR-2 Human Resources Policy; Human Resource Procedure; Request and Complaint Form; Records of workers including; age, sex, job description, birth place; Personnel Regulation; Workers' Contract;
	Local Procurement and Indirect Employment	An inventory of the local suppliers will be prepared by Gurmat and it will be provided to the contractors; Revised Procurement Management Plan will be implemented. Gurmat will revise Supplier Evaluation form and implement it.	Percentage of goods procured locally Percentage of services that are procured locally Number of complaints relating to the procurement process Number of complaints received from suppliers regarding payment from Contractors for goods or services	Purchasing Unit	EBRD PR-2 Procurement Procedure Supplier Evaluation Form

¹ Among Gurmat-1 Project, Gurmat-2 Project and the Efeler GPP Capacity Extension Project, Galip Hoca, Efe-1, Efe-2, Efe-3, Efe-4, Efe-6 and Efe-7 GPPs are in operation. For the Efe-8 GPP Project, land preparation works including ground improvement have been completed while drilling works for the production and reinjection wells are partly completed. Construction of Efe-8 Binary Unit and piping between production wells, binary unit and reinjection wells are remaining activities of the Efe-8 GPP Project.

E&S Issues	Potential Impacts and Risks	Mitigation Measures	Monitoring Indicators and Frequency	Responsible Entity	Legal Framework
EBRD Performance Requirement 3: Resource Efficiency and Pollution Prevention and Control					
Geothermal fluid	Groundwater contamination	The reject fluids will be reinjected back into the reservoir through the reinjection wells. The production and reinjection wells will be insulated from the hydrogeological environment by means of the drilling mud containing bentonite used during the drilling. The Project will utilize impermeable emergency ponds to collect geothermal fluids in case of equipment failure and other emergencies such as well blow-outs or pipeline failures. The collected fluids will later be reinjected to the reservoir and no discharge will be made to receiving environments. In case of emergencies that may potentially last longer than the time it takes for these emergency ponds to reach their capacities, all generation activities will be stopped.	Visual inspection to ensure the effectiveness of the mitigation measures Groundwater quality monitoring at 4 observation wells (quarterly/semi-annually)	Project Company	Water Pollution Control Regulation Regulation on Monitoring of Surface water and Groundwater Regulation on Monitoring of Groundwater Against Pollution and Deterioration
Drilling mud	Soil and groundwater contamination	Drilling mud will be collected in the mud ponds covered with impermeable geomembrane layers. The drilling mud collected in these ponds will be analysed by licensed laboratories for identification of their storage classes. Depending on the analysis results (i.e. the drilling mud identified as non-hazardous waste or hazardous waste), the collected drilling mud is either left on site or removed in accordance with related legislation. Under no	Visual inspection to ensure the effectiveness of the mitigation measures Analysis results of the drilling mud	Project Company and Subcontractors	Water Pollution Control Regulation Circular on the Disposal of Drilling Mud and Wastes Generated from the Physical Treatment of Chromium Minery, Waste Management Regulation Regulation on Monitoring of Surface

E&S Issues	Potential Impacts and Risks	Mitigation Measures	Monitoring Indicators and Frequency	Responsible Entity	Legal Framework
		circumstances, the drilling mud will be discharged to the receiving environment and the mud ponds will be fenced off with related cautionary signs in place. The mud ponds will be closed immediately after completion of the works or necessary actions will be taken to minimize unauthorized access to the areas.			water and Groundwater Regulation on Monitoring of Groundwater Against Pollution and Deterioration Regulation on Landfill of Wastes
Wastewater management	Soil and groundwater contamination	During the construction of Efe 8, wastewater generated by the workers at construction site will be collected in a leak proof septic tank and the waste water will be periodically collected via vacuum trucks by the Metropolitan Municipality of Aydin for a fee to be disposed in the Domestic Wastewater Treatment Plant of the Metropolitan Municipality of Aydin.	Visual inspection to ensure the effectiveness of the mitigation measures Wastewater disposal records	Project Company and Subcontractors	Waste Management Regulation Regulation on the Construction of Septic Tanks at Places Where Sewer Construction is Not Possible
Solid waste management	Soil and groundwater contamination	Improper dumping of solid waste to the environment which can cause soil and groundwater contamination will be prevented. Non-recyclable domestic solid wastes will be collected in closed leak-proof containers located at several points within the power plant sites and transferred by the Germencik Municipality of Aydin and disposed off in the solid waste landfill of the metropolitan municipality. Recyclable domestic solid wastes are collected and disposed off by the licensed recycling companies. The excavated soil will be stored and re-used for backfilling during	Visual inspection to ensure the effectiveness of the mitigation measures Waste disposal records	Project Company and Subcontractors	Waste Management Regulation

E&S Issues	Potential Impacts and Risks	Mitigation Measures	Monitoring Indicators and Frequency	Responsible Entity	Legal Framework
		construction activities. Waste Management Plan will be implemented for the collection, storage and disposal of wastes.			
Handling of hazardous materials	Soil and groundwater contamination	Hazardous materials will be stored in leak proof containers on impermeable ground. Spill kits will be available at the site for immediate response. MSDSs for chemicals will be available for the workers. Hazardous Materials Management Plan will be developed and implemented	Visual inspection to ensure the effectiveness of the mitigation measures Soil quality analysis for heavy metal and hydrocarbons if any contamination risk is observed	Project Company and Subcontractors	Regulation on Soil Pollution Control and Point Source Polluted Areas
EBRD Performance Requirement 4: Health and Safety					
OHS	Poisoning from H ₂ S and odour nuisance. Workers health and safety risks during the construction works	An OHS Management Plan will be developed and implemented for the Project. All workers will be provided with OHS training prior to start working Workers will be provided with appropriate PPE. Emergency Response Plan will be improved including evacuation procedure regarding H ₂ S release	Daily Toolbox meetings. Visual inspections to ensure the effectiveness of the mitigation measures Monthly EHS Reports	Project Company and Contractors	Law on Occupational Health and Safety
Community HS	Nuisance from noise and dust, H ₂ S exposure	Maintenance of construction equipment will be conducted regularly, exhaust mufflers will be applied to the equipment in order to minimize noise emissions and also speed limits will be implemented for the vehicles. Construction works will not be performed at nighttime. Construction site and wells will be surrounded by fences.	Environmental noise measurement at sensitive receptors. (Upon grievance)	Project Company and Contractors	Regulation on Assessment and Management of Environmental Noise Industrial Air Pollution Control Regulation EBRD PR4

E&S Issues	Potential Impacts and Risks	Mitigation Measures	Monitoring Indicators and Frequency	Responsible Entity	Legal Framework
		Warning signs will be in place around the Project area, the wells and pipeline in order to inform the locals for Project site associated risks. An emergency preparedness and response plan to be enacted in the event of abnormal operation. Information boards about public safety hazards and emergency contact information will be available in the Project site.			
Transportation / Traffic	Risks to locals and especially to children Damaging Roads	Site specific traffic management will be developed and implemented. If damage on the roads occurs due to Project activities, required maintenance and repair will be performed. Local communities will be informed on the traffic schedule. Warning and safety signs will be in place on the access roads and exit and entrance of the construction site.	Visual inspections to ensure the effectiveness of the mitigation measures Grievance Mechanism	Project Company and Contractors	EBRD PR1, PR4
EBRD Performance Requirement 5: Land Acquisition, Involuntary Resettlement and Economic Displacement					
Land use	Loss of private land	Project company will conduct land acquisition based on willing buyer seller negotiations, at full replacement cost according Corporate Land acquisition policy and procedure.	Land acquisition records Meeting records with land owners Grievance records	Project Company and Contractors	Expropriation Law, EBRD PR5
Improving local economy and livelihoods	Loss of agricultural land	A Community Development Plan (CDP) will be developed to support/enhance agricultural production and marketing in the villages, if possible. SEP will be implemented	Records of CDP activities Meeting records with stakeholders Grievance records	Project Company and Contractors	EBRD PR5 EBRD PR10

E&S Issues	Potential Impacts and Risks	Mitigation Measures	Monitoring Indicators and Frequency	Responsible Entity	Legal Framework
EBRD Performance Requirement 8: Cultural Heritage					
Cultural Heritage	Possible archaeological finds	Construction works will be monitored for archaeological remains. Work will cease in case any archaeological remains are met. A Chance Find Procedure will be in place for use, particularly during the piping works as part of Efe-8 GPP and for managing consultation with affected communities and other stakeholders.	(Upon any chance finds)	Project Company	Law on Preservation of Cultural and Natural Assets
EBRD Performance Requirement 10: Information Disclosure and Stakeholder Engagement					
Improving access to infrastructure (education, roads etc)	Impact on local infrastructure and social issues	Project implements Corporate Social Responsibility (CSR) programs on a wide range of issues depending on the needs and demands of the Project Affected settlements	CSR plan, and budget List of activities, target groups and number of beneficiaries	Project Company	EBRD PR 10 Best practice
Effective stakeholder engagement	Ensure that the community is well informed about the Project Ensure that the community has the opportunity to present their views know the Project Ensure that all sections of the community including vulnerable people/groups have equal opportunity to engage with the Project.	Stakeholder Engagement Plan will be implemented. SEP ensures that Project engages effectively with Project Affected Persons, communities, and identified stakeholders. Project will conduct regular information sharing sessions and obtain PAPs views on Project activities Project will ensure that all stakeholders are aware of the grievance mechanism.	Grievance Records Stakeholder Engagement Activities including CDP and CSR Brochures/information material distributed Minutes of broad based meetings	Project Company	EBRD PR 10 Best Practice
Local economy	Positive impact on local economy	-	Records of local material and service providers	Project Company	-

E&S Issues	Potential Impacts and Risks	Mitigation Measures	Monitoring Indicators and Frequency	Responsible Entity	Legal Framework
			Records of local procurement		

Operation Stage

Table 2 Environmental and Social Management and Monitoring Plan for the Operation Stage

E&S Issues	Potential Impacts and Risks	Mitigation Measures	Monitoring Indicators and Frequency	Responsible Entity	Legal Framework
EBRD Performance Requirement 2: Labour and Working Conditions					
Labour and Working Conditions	HR Policies and Working Relationships	The HR Procedure and Personnel Regulation documents must be integrated. All documents related to HR should be given to the workers as an attachment of the contract. During the orientation process, training on all documents related to HR is required. Personnel regulation needs to be updated including, breast-feeding permit, forced labour and minimum working age, bribery, gifts, conflict of interest, training, and community involvement.	Number of employees received hard copies of HR related documents Number of employees received HR training	HR Department OGS Department	EBRD PR-2
	Workers Organizations	Personnel regulation needs to contain information about right to joining workers organization, The representative should be elected in a yearly basis. The workers that have been consulted via focus group discussions requested to be informed about the right to join to trade unions, this need must be met according to Article 4 of Communiqué on the Qualifications of the Representative of the Employee Regarding Occupational Health and Safety (2013) and according to EBRD PR-2, the Company will not discourage workers from electing their	Records of the election of workers representatives Records of boards meetings	HR Department OHS Department	EBRD PR-2 Communiqué on the Qualifications of the Representative of the Employee Regarding Occupational Health and Safety

E&S Issues	Potential Impacts and Risks	Mitigation Measures	Monitoring Indicators and Frequency	Responsible Entity	Legal Framework
		representatives. The selection of the workers' representatives by appointment should not be used as the primary method. It should rather be considered as a second option if the election fails.			
	Wages Benefits and Conditions of Work	6+2 system should be reassessed by management, if this system is found to be unsuitable, the reasons should be explained to the employees; The staff shortage in Efe-6 must be eliminated as soon as possible; Although the application is in compliance with the legislation, short turns between the shifts should be eliminated; The procurement unit must provide work uniforms, shoes and PPEs in accordance with the standards. It is recommended to conduct surveys about the food services.	Records of overtime payment Employee Manuel Results of employee satisfaction survey Overtime agreement form Shift chart	Shift Supervisor HR Department	Turkish Labour Law 4857 Labor regulation on overtime work EBRD PR-2
	Retrenchment	During the demobilization phase, a Retrenchment Plan will be developed for the operational staff.	-	-	-
	Grievance Mechanism	The most appropriate complaint channels should be determined with the consultation with workers, An effective grievance mechanism for workers should be prepared and provided to workers, which also includes anonymous grievances. After finalization of the mechanism, training needs to be performed about the implementation and monitoring.	Total number of employees received training on Grievance Mechanism Records of the complaints Complaints that are responded Complaints that are closed Number of workers strikes	HR Department OHS Department	EBRD PR-2

E&S Issues	Potential Impacts and Risks	Mitigation Measures	Monitoring Indicators and Frequency	Responsible Entity	Legal Framework
		In addition to face-to-face complaints, tools such as mail, telephone, complaint form should be used and all complaints should be recorded in order to follow-up the complaints.			
	Supply Chain	Supplier evaluation form has to cover child labour and forced labour. Subcontractors should be informed/trained in order to ensure that the subcontractors have same understanding about project requirements (all management plans, procedures and project specific standards) with sponsor (Gurmat).	Percentage of goods procured locally Percentage of services that are procured locally Number of complaints relating to the procurement process Number of complaints received from suppliers regarding payment from Contractors for goods or services	Purchasing Unit	EBRD PR-2 Procurement Procedure Supplier Evaluation Form
	Security Personnel Requirements	Human Rights Training should be provided to the security personnel. An effective and culturally appropriate grievance mechanism needs to be established for both Project workers and community for the expression concerns about the security personnel. Security arrangement with the Gendarmerie needs to be assessed with the participation of Gurmat to discuss un-proportional force. A management plan for security personnel needs to be developed and implemented by the Company, outlining expectations around security, in line with Voluntary Principles on Security and Human Rights (VPSHR), the UN Basic Principles on the Use of Force and Firearms by Law Enforcement Officials, the UN Code of Conduct	Records of the trainings on Conflict management and Human Rights Records of grievance mechanism	Site management Security department	EBRD PR-2 Law No. 5188 on Private Security Services

E&S Issues	Potential Impacts and Risks	Mitigation Measures	Monitoring Indicators and Frequency	Responsible Entity	Legal Framework
		for Law Enforcement Officials and the International Code of Conduct on Private Security Providers. Conflict Management and Human Rights training will be provided to armed security personnel. The grievance mechanism for the Project will capture all grievances raised in relation to security and safety issues. These will be addressed promptly and actions will be taken.			
EBRD Performance Requirement 3: Resource Efficiency and Pollution Prevention and Control					
Geothermal fluid	Groundwater contamination	The reject fluids will be reinjected back into the reservoir through the reinjection wells. The production and reinjection wells will be insulated from the hydrogeological environment by means of the drilling mud containing bentonite used during the drilling. In order to monitor the interaction with the hydrogeological environment during the energy production activities, In addition to these four monitoring wells, additional groundwater monitoring well(s)² will be drilled in coordination with 21st Regional Directorate of State Hydraulic Works.. Analyses results of well(s) will be shared with the 21st Regional Directorate of the State Hydraulic Works. Changes in the parameters will be monitored on a regular basis.	Visual inspection to ensure the effectiveness of the mitigation measures Groundwater quality monitoring at observation wells (quarterly)	Project Company	Water Pollution Control Regulation Regulation on Monitoring of Surface water and Groundwater Regulation on Monitoring of Groundwater Against Pollution and Deterioration

² Number and exact coordinates of the monitoring wells are subject to approval of 21st Regional Directorate of State Hydraulic Works. In this respect, monitoring well(s) will be drilled after approval process.

E&S Issues	Potential Impacts and Risks	Mitigation Measures	Monitoring Indicators and Frequency	Responsible Entity	Legal Framework
		The Project will utilize impermeable emergency ponds to collect geothermal fluids in case of equipment failure and other emergencies such as well blow-outs or pipeline failures. The collected fluids will later be reinjected to the reservoir and no discharge will be made to receiving environments. In case of emergencies that may potentially last longer than the time it takes for these emergency ponds to reach their capacities, all generation activities will be stopped.			
H ₂ S emissions	Temporary odour problem due to H ₂ S release from test waters	The most appropriate applications to reduce odour problems will be assessed.	Monthly ambient air quality measurements for monitoring of H ₂ S concentrations at locations in or near the neighbourhoods of Alangullu, Kizilcagedik, Omerbeyli and the District of Germencik	Project Company and Subcontractors	Industrial Air Pollution Control Regulation
Greenhouse gas (GHG) emissions	Gas release from steam separation	Measurements of GHG emissions will be conducted at wells.	Analysis of the non-condensable gases (NCGs) will be performed by accredited laboratories at the Galip Hoca GPP, Efe-1 GPP, Efe-2 GPP, Efe-3 GPP, Efe-4 GPP, Efe-6 GPP and Efe-7 GPP locations. Through use of the NCG ratios, which are measured by a chemist on a regular basis, the emission rates of CO ₂ will be calculated and monitored (annually).	Project Company	Good International Practice, PR 3
Wastewater management	Soil and groundwater contamination	There are four domestic wastewater treatment plants within the sites of the operating GPPs, one of which is the Efeler Wastewater Treatment	Wastewater disposal records	Project Company	Waste Management Regulation Regulation on the

E&S Issues	Potential Impacts and Risks	Mitigation Measures	Monitoring Indicators and Frequency	Responsible Entity	Legal Framework
		Plant with a capacity of 80 m ³ /day, and the second one is for the use of Galip Hoca GPP with a capacity of 10 m ³ /day. The third one is for Galip Hoca and Efe-6 GPPs and the fourth one is for the use of Efe-1, Efe-2, Efe-3 and Efe-4, each of which has a capacity of 6 m ³ /day. The treated domestic wastewater will be collected in impermeable tanks and used for irrigation of the plantings within the sites for the GPPs.			Construction of Septic Tanks at Places Where Sewer Construction is Not Possible
Solid waste management	Soil and groundwater contamination	Improper dumping of solid waste to the environment which can cause soil and groundwater contamination will be prevented. Non-recyclable domestic solid wastes will be collected in closed leak-proof containers located at several points within the power plant sites and transferred by the Germencik Municipality of Aydin and disposed off in the solid waste landfill of the metropolitan municipality. Recyclable domestic solid wastes are collected and disposed off by the licensed recycling companies. Waste Management Plan will be implemented for the collection, storage and disposal of wastes.	Visual inspection to ensure the effectiveness of the mitigation measures Waste disposal records	Project Company and Subcontractors	Waste Management Regulation
Handling of hazardous materials	Soil and groundwater contamination	Hazardous materials will be stored in leak proof containers on impermeable ground. Spill kits will be available at the site for immediate response. MSDSs for chemicals will be	Visual inspection to ensure the effectiveness of the mitigation measures Soil quality analysis for heavy metal and hydrocarbons if any contamination risk is observed	Project Company and Subcontractors	Regulation on Soil Pollution Control and Point Source Polluted Areas

E&S Issues	Potential Impacts and Risks	Mitigation Measures	Monitoring Indicators and Frequency	Responsible Entity	Legal Framework
		available for the workers. Hazardous Materials Management Plan will be developed and implemented. The storage tanks of n-pentane (the secondary working organic fluid) will be provided with appropriate secondary containment structures capable of containing the larger of 110 percent of the largest tank or 25% percent of the combined tank volumes and made of impervious, chemically resistant material.			
EBRD Performance Requirement 4: Health and Safety					
OHS	Poisoning from H₂S and odour nuisance. Workers health and safety risks during the construction works	OHS Management Plan will be developed and implemented Emergency Response Plan will be improved including evacuation procedure regarding H₂S release Appropriate PPEs will be provided for workers Appropriate Training will be provided for the workers	Visual inspection to ensure the effectiveness of the mitigation measures (Daily)	Project Company	Law on Occupational Health and Safety
Community HS	Nuisance from noise and dust, H₂S exposure Accident risk at the project site	Maintenance of construction equipment will be conducted regularly, exhaust mufflers will be applied to the equipment in order to minimize noise emissions and also speed limits will be implemented for the vehicles. Construction works will not be performed at nighttime. Construction site and wells will be surrounded by fences in order to prevent unauthorized entrance. Warning signs will be in place around the Project area, the wells	Continuous monitoring of Odor from H₂S. Noise measurements before start of the operation and upon complaint. Environmental noise measurement at sensitive receptors. (Upon grievance)	Project Company	Regulation on Assessment and Management of Environmental Noise Industrial Air Pollution Control Regulation EBRD PR4

E&S Issues	Potential Impacts and Risks	Mitigation Measures	Monitoring Indicators and Frequency	Responsible Entity	Legal Framework
		and pipeline in order to inform the locals for Project site associated risks. - Community will be informed immediately in case of high levels. An emergency preparedness and response plan to be enacted in the event of abnormal operation. Information boards about public safety hazards and emergency contact information will be available in the Project site.			
EBRD Performance Requirement 5: Land Acquisition, Involuntary Resettlement and Economic Displacement					
Land use	Loss of agricultural land	A Community Development Plan (CDP) will be developed to support/enhance agricultural production and marketing in the villages, if possible.	CDP Meeting records with stakeholders Grievance records	Project Company	Expropriation Law, EBRD PR5
National economy	Positive impact on national economy	-	Annual energy production	Project Company	-
Employment	Positive impact on local employment	-	Number of local workers employed	Project Company	-
Local economy	Positive impact on local economy	-	Records of local material and service providers Records of local procurement	Project Company	-
EBRD Performance Requirement 10: Information Disclosure and Stakeholder Engagement					
Effective stakeholder engagement	Ensure that the community is well informed about the Project Ensure that the community has the opportunity to present their views know the	Stakeholder Engagement Plan will be implemented. SEP ensures that the Project engages effectively with the Project Affected Persons, communities, and identified stakeholders. The Project will conduct regular information sharing sessions and	Grievance Records Stakeholder Engagement Activities including CDP and CSR Brochures/information material distributed Minutes of broad based	Project Company	EBRD PR 10 Best Practice

E&S Issues	Potential Impacts and Risks	Mitigation Measures	Monitoring Indicators and Frequency	Responsible Entity	Legal Framework
	Project Ensure that all sections of the community including vulnerable people/groups have equal opportunity to engage with the Project.	obtain PAPs views on Project activities The Project will ensure that all stakeholders are aware of the grievance mechanism.	meetings		