Table 8-7. Licensed Waste (Recycling / Disposal) Facilities located near Bartın Province

Facility Name	Facility Address	License Type	License Due Date
Zonguldak İl Özel İdaresi ve Belediyeler Birliği Tıbbi Atık Sterilizasyon Tesisi	Sofular Köyü Tombaklar Mevkii Zonguldak Tel:05056860072 Fax:03124474012	Medical Waste Sterilization	28.09.2016
Oyka Kağıt Amb.San.Tic.A.Ş Çaycuma Şubesi	Perşembe Yolu Üzeri Zonguldak Tel:03726151182 Fax:03726151181	Packaging Waste Recovery	21.06.2017
Cantekinler Geri Dönüşüm Hurdacılık Taşımacılık Metal San. ve Tic. Ltd. Şti. Hışıroğlu Mevkii Şb.	İsmetpaşa Mahallesi Dibek Çayı Yöresi Devrek, Zonguldak Tel:03725564885 Fax:03725567223	Packaging Waste Collection and Separation	03.07.2017
Ünlüler Geri Dönüşüm Kağıt Petrol Ürünleri Hurda Plastik Kauçuk Nak. San. ve Tic. Ltd. Şti.	Sofular Köyü Tombaklar Mevkii Zonguldak Tel:03722513358 Fax:03722513358	Packaging Waste Collection and Separation	31.07.2017
Lafarge Ereğli Çimento Sanayi Ve Ticaret A.Ş.	Kırmacı Mah. Hasan Canver Cad. No:51 Ereğli/Zonguldak Tel:3723151500 Fax:3723151515	Non-hazardous Waste Recovery	14.11.2018
Ervaksan Erdemir Vakfı Metal San. ve Tic. A.Ş. Demir Çelik Yan Sanayi Ve Depolama Tesisi - Alaplı Şubesi	Aşağıdoğancılar Köyü Aktarılan Köy Sokağı 6. Cadde No: 89 Zonguldak Tel:03723785053 Fax:03723785052	Scrap Metal Recovery	04.04.2019
Albin-O Geri Dönüşüm San.İth.ve İhr. Ltd.Şti.	Baraj Yolu 3.Km. Kastamonu Tel:03662122137 Fax:03662122138	Packaging Waste Collection and Separation	13.02.2018
Tayaş Alternatif Yakıtlar Pazarlama Sanayi Tic A.Ş.	Samsun Karayolu 5.Km Yok Tosya Kastamonu Tel:3663130411 Fax:3663130412	Waste Vegetative Oil Recovery	25.04.2018
Beste Geri Dönüşüm İnşaat Nak.San.Ve Tic .Ltd.Şti.	İnönü M. Sanayi S.Sitesi 4.Sk. 1 Merkez Kastamonu Tel:3662145869 Fax:3662144303	Packaging Waste Collection and Separation	03.10.2018
Era Çevre Teknolojileri Anonim Şirketi (Kasmib Tıbbi Atık Sterilizasyon Tesisi)	Katı Atık Depolama Sahası Sarıyonca Köyü Harmanarkası Mevkii Kastamonu Tel:3666383800 Fax:3666383801	Medical Waste Sterilization	27.12.2018

Facility Name	Facility Address	License Type	License Due Date
Safran Ambalaj Atığı Toplama Ve Ayırma	Safranbolu Küçük Sanayi Site Bitişiği Karıt Köyü Ğirişi Safranbolu/Karabük Tel:05445757710 Fax:05445757710	Packaging Waste Collection and Separation	12.07.2017
Efe Endüstriyel Girişim Evrensel Temizlik İnşaat Peyzaj Gıda Turizm Kimya Nakliye Sanayi Ve Ticaret Limited Şirketi Safranbolu Şubesi	Bostanbükü Köyü Adalar Mevkii 3 Nolu Bölüm Karabük Tel: 3704132880 Fax:3704130404	Packaging Waste Collection and Separation	28.11.2018
Marzinc Marmara Geri Kazanım Sanayi Ve Ticaret Anonim Şirketi-Karabük Şubesi	Organize Sanayi Bölgesi Akören Mevkii No:4 Karabük Tel:3704476018 Fax:3704476019	Hazardous Waste Recovery	14.01.2019
Orhan Plastik - Fahri Orhan	Cumayanı Küçük San. Site.2.Blok No:11 Karabük Tel:03704422137 Fax:03704422137	Packaging Waste Collection and Separation	05.02.2019

8.5 Waste Generation and Waste Management during the Construction Phase

The waste generation including the waste rocks which are currently being deposited in spoil areas and the on-going disposal practices in the Project sites are presented in this section. Information was collected using the following sources:

- Project information provided by HEMA (2014)
- Environmental Impact Assessment Report for HEMA Port (Reclamation Area and Quay) prepared by Dokay-ÇED Ltd. (April 2013),
- Project Introduction File for HEMA Coal Washing Plant prepared by Dokay-ÇED Ltd. (January 2014).

The waste classes that are being generated during the construction phase include:

- waste rock /excavation waste (from mining),
- hazardous waste,
- special waste,
- domestic waste,
- domestic wastewater and treatment sludge
- packaging waste,
- non-hazardous waste, and
- medical waste

For all components of the Project (e.g. mining, coal washing, and port), all types of wastes will be stored in the temporary waste storage area at separate sections according to their classes. Waste storage will have an impermeable base against leakage, a closed cover to protect the waste drums from rain and sun light, and spill kits to respond to any spill in order to prevent soil contamination. More specifically, there will be separation between hazardous and special wastes with other waste classes.

The following waste management options are applicable for all components of the Project during the construction phase, which are; mining, coal washing plants, and port facility. The list of waste which is currently being generated during the construction phase of the Project, proposed management practices and relevant information is given in Table 8-8.

Table 8-8. Types of waste and proposed management practices during construction phase of the Project

Waste Class	Waste Type	Waste Code	Characteristics	Governing Regulation	Storage and Treatment Prior to Disposal	Final Disposal	Risks
DOMESTIC WASTE	Solid Waste	20 03 01	Non-hazardous-Household waste from the camp sites	Solid Waste Control Regulation (OG Date/Number: 14.03.1991/20814)	Being collected in waste containers on-site (400 L or 800 L) and then hauled to Bartın Dump Site	Solid Waste trucks/ Bartın Dump Site	Medium Risk. Hauling of the waste needs to be organized
	Domestic Wastewater	20 03 01	Generated by workers at the campsites and during construction activities (estimated as 190 m^3/day)	Water Pollution Control Regulation (OG Date/Number: 31.12.2004/25687)	Currently being discharged to septic tanks. Will be treated in Package biological wastewater treatment plants (WWTP) to be installed at a later stage.	The effluent of the WWTP will be discharged to the point where Capak and Gomu Creeks merge.	Medium Risk. WWTPs are still not in operation.
	Domestic wastewater treatment sludge	19 08 05	Semi-solid slurry due to treatment of domestic wastewater	Water Pollution Control Regulation (OG Date/Number: 31.12.2004/25687) Law of Aquaculture No. 1380 (OG Date/Number: 04.04.1971/13799) Regulation on Aquaculture (OG Date/Number: 10.03.1995/22223)	Will be dried on drying beds and stored	Appropriate disposal method in compliance with the related regulations will be decided later on.	Medium Risk. Planning should be made before the construction of the plants are completed.

Waste Class	Waste Type	Waste Code	Characteristics	Governing Regulation	Storage and Treatment Prior to Disposal	Final Disposal	Risks
INDDUSTRIAL WASTEWATER	Industrial wastewater		Generated due to gallery advancement, drilling equipment, concrete spraying, etc. (estimated to be 257 m^3/day)	Water Pollution Control Regulation (OG Date/Number: 31.12.2004/25687) Law of Aquaculture No. 1380 (OG Date/Number: 04.04.1971/13799) Regulation on Aquaculture (OG Date/Number: 10.03.1995/22223)	%30 of the industrial is recovered and the rest is absorbed in the excavated material	Recovered wastewater is reused in the mining activities	Medium risk. The industrial wastewater leach to the soil when disposed onto the grounds near shaft areas.
PACKAGING WASTE	Metal, Glass, Plastic packaging waste	15 01 04 (metal) 15 01 07 (glass) 15 01 02 (plastic)	Non-hazardous - Generated from packaging of products brought to the site that will include certain plastic materials, Non-hazardous- Metal waste shall be disposed separately for reuse and recycling.	Packaging Waste Control Regulation (24.07.2007/26562) Communiqué on Non-hazardous and Inert Waste Recycling (OG Date/Number: 12.05.2010/27579)	Being collected in waste bins	HEMA Çerkezköy Facility	Low Risk. Facility is already in use and has adequate capacity to receive the waste.
HAZARDOUS WASTE	Chemicals		Hazardous waste can mainly be generated during maintenance of vehicles.	Hazardous Waste Control Regulation (OG Date/Number: 14.03.2005/25755)	Separately being collected in waste drums/ containers, labeled, stored in waste storage area at dedicated section, and delivered to licensed companies. Maximum temporary storage period is 6 months.	Petder (Petroleum Trade Association)/ Çetinkaya Automobile Accessories and tires	Low Risk. Hazardous waste collection, transport and disposal are common practice that is well regulated by MEUP.
	Contaminated filters, fabrics	15 02 02*					

Waste Class	Waste Type	Waste Code	Characteristics	Governing Regulation	Storage and Treatment Prior to Disposal	Final Disposal	Risks
	Contaminated packaging	15 01 10*					
SPECIAL WASTE	Waste Mineral Oils	13 01 … 13 02 … Code to be defined based on type of waste oil	Hazardous materials-Generated from upkeep and use of construction equipment	Waste Oil Control Regulation (OG Date/Number: 30.07.2008/26952)	Waste oils are analyzed to be segregated and stored based on their categories and delivered to licensed company.	Golteks Petrol ve Kimya San. Tic. Ltd. Şti.	Low Risk. Waste oil collection, transport and disposal recycling are common practice that is well regulated by MEUP.
	Waste Batteries	20 01 33*	Generated from construction equipment used at the site	Regulation on Control of Waste Batteries and Accumulators (OG Date/Number: 31.08.2004/25569)	Being separately collected in battery box and then delivered to a licensed company	TAP (Transportable Battery Producers Association)	Low Risk since this is an established practice and the waste batteries and accumulators will not represent a large increase in the existing waste stream.
	Waste Accumulators	16 06 01*			Being separately stored in on-site hazardous waste storage area up to 90 days and then delivered to a licensed company	TAP (Transportable Battery Producers Association)	
	Waste Vegetable Oils	20 01 25	Generated from food processing in the cafeterias	Regulation on Control of Waste Vegetable Oils (OG Date/Number: 19.04.2005/25791)	Contractor which provides the food service takes care of the waste vegetable oils	Balaban Tekstil, Mak. Nak. Kimya, Gıda, İnş. San. ve Tic. Ltd. Şti.	Low Risk. Recycling companies has an effective collection and processing system.

Waste Class	Waste Type	Waste Code	Characteristics	Governing Regulation	Storage and Treatment Prior to Disposal	Final Disposal	Risks
EXCAVATION WASTE	Waste rock / Excavated soil *Source:* Levelling and excavation for foundations	01 01 02 17 05 04	Non-hazardous material- Generated during shaft constructions and gallery advancements	Regulation on Control of Excavated Soil, Construction and Demolition Wastes (OG Date/Number: 18.03.2004/25406) Regulation on General Principles of Waste Management (OG Date/Number: 05.07.2008/26927)	Some part was used for levelling of the Project site Currently being placed in waste rock dump sites.	Waste rock dump sites	Major Risk. Forestlands around Shaft-1 has been used as waste rock dump sites without an environmental permit. The waste rock consisting of mining debris may have acid generating potential since during the mining of coal, sulphides may oxidized with air and water and generate sulphuric acid. The resulting mine drainage is generally characterized by highly acidic waters with elevated metal and sulphate concentrations. Therefore environmental permit should be applied and necessary precautions should be taken at once.
MEDICAL WASTE	Infectious waste, Sharps waste	18 01 01* 18 01 03* 18 02 01* 18 02 02*	Generated from infirmary during construction	Medical Waste Control Regulation (OG Date/Number: 22.07.2005/25883)	Stored in medical waste bags.	Collection by Ilke Temizlik / Sending to Ilke-Rohan Sterilization Facility in Zonguldak	Low Risk. Waste generation amounts are negligible and waste is already being delivered to the sterilization facility.

Waste Rock /Excavation Waste

Waste rock is generated during pre-mining activities while driving and approaching the shafts and the galleries in order to reach the target mineral. The construction of the shafts has already been completed and the galleries are being advanced presently. Part of the excavated material was used for filling and construction of the Project site whereas the remaining part is currently being deposited into the waste rock dump sites in accordance with the topography of the surroundings. Total volume of the waste rock excavated during construction of the shafts, excluding the gallery advancements are given in Table 8-9 below.

The waste rock which consists of mining debris can have acid generating potential due to the natural deposition of coal within the environment. During coal mining, sulphides may oxidized with air and water and sulphuric acid might be generated. The resulting mine drainage is generally characterized by highly acidic waters with elevated metal and sulphate concentrations. Therefore, management of these dumpsties during the mine life cycle is important to protect human health and safety, and the environment. The permit for waste rock dumping has not been obtained from Ministry of Environment and Urban Planning yet.

Table 8-9. Excavated volume during shaft constructions

	Shaft-1	Shaft-2	Shaft-3
Total excavation volume (m^3)	44,510	46,417	38,879

Detailed recommendations for proper management of waste rock are given as mitigation measures in Section 8.7.

Additional excavation material will be generated during the construction of coal washing plants (CWPs) and the reclamation area of the port due to site preparation and sloping activities. Top soil will be skimmed and reused for landscaping. Part of the total of 11,406.7 m^3 excavated soil will be used for filling and the remaining part will be deposited at Spoil Dump Site-1 and/or Dump Site-2 during the construction of CWPs. On the other hand, the total excavation waste volume will be 50,874 m^3 for the reclamation activities of the port. This waste will be sent to the nearest waste rock dump site. Detailed information can be found in Excavation/ Reclamation section in *Chapter 2: Project Description.* Table 8-10 shows the details of the excavation waste for CWPs constructions and reclamation activities.

Table 8-10. Excavation volume during Coal Washing Plant construction and reclamation activities

	Amasra Coal Washing Plant (2x500 tons/h)	Shallow Coal Washing Plant (200 tons/h)	Port Reclamation Area
Total excavation volume (m^3)	14,939.3	1,913.7	1,488,412
Total filling volume (m^3)	5,446.3	-	1,437,538
Net excavation waste (m^3)	**11,406.7**		**50,874**

Industrial Wastewater

Industrial wastewater is generated from underground mining activities such as; gallery advancements (drilling equipment), concrete spraying, etc. Water required for these activities is supplied from HKS1 and partially from the water drained from galleries. Some portion of the water

absorbed in the excavated material and approximately 30% is recovered as industrial wastewater. This recovered wastewater then reused for the mining activities. Industrial wastewater generation during the construction phase is given in Table 8-11.

Table 8-11. Industrial Wastewater generation during the construction phase

	Water drained from HSK1	Water drained from galleries	Total
Water required for underground mining activities (m^3/day)	207	50	257
Recovered industrial wastewater (m^3/day)		257*30%= 77	

Domestic Wastewater

Domestic wastewater generated in Shaft-1, Shaft-2 and accommodation facilities is collected in septic tanks and periodically transported via vacuum truck by the Special Provincial Administration. Domestic wastewater of Shaft-3 is currently discharged into the Amasra sewer system which ends up in a receiving water body. Suction and discharge records of the vacuum truck will be kept in order to present to the authorities when required.

In order to manage the domestic wastewater amount that will gradually increase as the Project progresses, three on-site package biological wastewater treatment plants (WWTP) were planned. One of the WWTPs will be located in Gomu, near Shaft-1 and accommodation facilities with a treatment capacity of 300 m^3/day, a second one is already located in Kazpinari, near Shaft-2 with a treatment capacity of 90 m^3/day. The construction of the WWTP in Kazpinari was completed and it will be in operation shortly; while the one in Gomu will be constructed and be in service as soon as it is completed. Effluents of the Gomu and Kazpinari WWTPs will be discharged in Gomu and Buyukdere Creeks, respectively. The Temporary Operation Permit for wastewater discharge, obtained from the Provincial Directorate of Environment. Domestic wastewater generated during the construction and operation phases of CWPs will be also transferred to Gomu WWTP via a pipeline. An additional package treatment will be constructed on a piece of land with a surface area of 350 m^2 during the construction of the port and will continue to be used along the operation if deemed necessary. The scheme of the package wastewater treatment to be used for the treatment of the generated domestic wastewater during the construction and operation phases of the port is shown in Figure 8-1.

Domestic Wastewater Treatment Sludge will be collected when the microbial mass is over-grown, dried at the sludge drying beds and stored temporarily. The dried domestic wastewater treatment sludge will be properly disposed of according to the related regulations (Solid Waste Control Regulation (OG Date/Number: 14.03.1991/20814); Regulation on Sanitary Landfills (OG Date/Number: 26.03.2010/27533) after the necessary analyses are conducted.

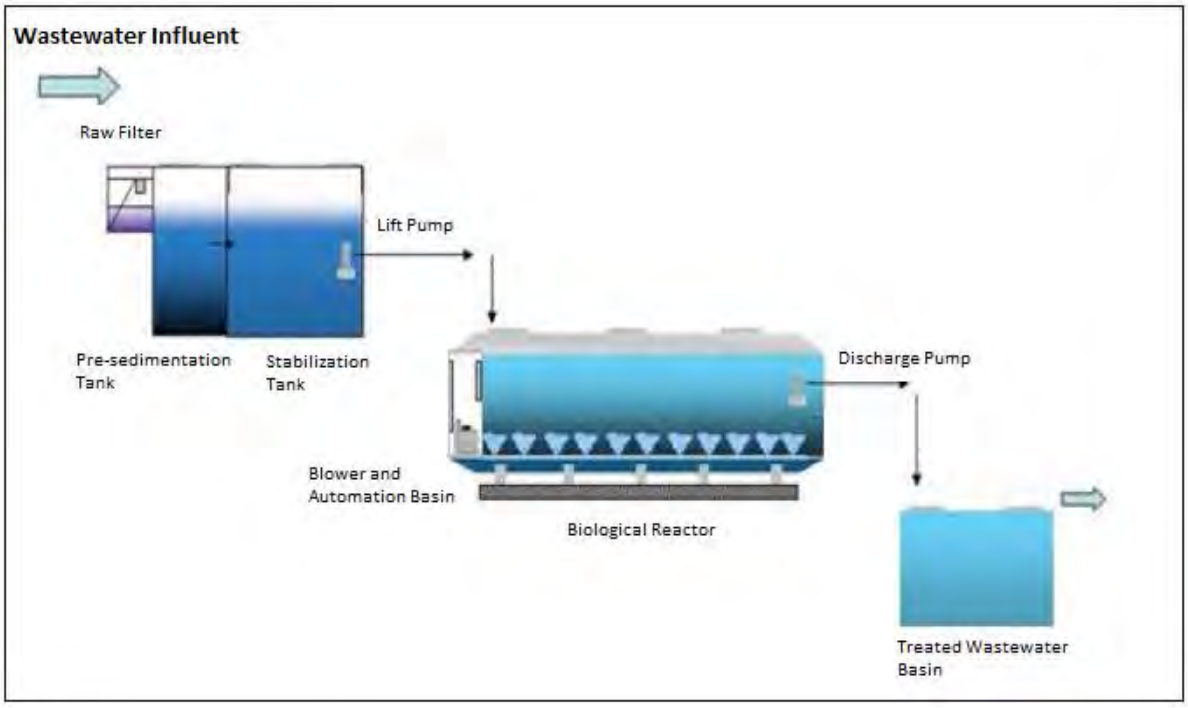


Figure 8-1: On-site Package Wastewater Treatment Plant at the Port

8.6 Waste Generation and Management during the Operation Phase

The expected waste generation and the disposal practices during the operation phase of the Project are presented in this section. Information was identified using the following sources:

- Project information provided by HEMA (2014)
- Turkish EIA Report of the port by Dokay (2013)
- Turkish Project Introduction File of the coal washing plant by Dokay (2014)

The waste classes that will be generated during the operation phase include:

- excavated materials (waste rock);
- coal processing waste (spoil),
- hazardous waste,
- special waste,
- domestic waste
- domestic wastewater and treatment sludge,
- packaging waste,
- non-hazardous waste, and
- medical waste
- ship-generated waste

For all components of the Project (e.g. mining, coal washing, and port), all types of waste will be stored in the temporary waste storage area at separate sections according to their classifications. Waste storage will have an impermeable base against leakage to soil, a closed top to protect the waste drums from rain and sun light, and spill kits. There will be separation between hazardous and special wastes with other waste classes.

The following waste management options are applicable for all components of the Project during the operation phase, which are; mining, coal washing plants, and port. The list of waste which is anticipated to be generated during the operation, proposed management practices and relevant information are given in Table 8-12.

Table 8-12. Waste types and proposed management practices during operation phase of the Project

Waste Class	Waste Type	Waste Code	Characteristics	Governing Regulation	Storage and Treatment Prior to Disposal	Final Disposal	Risks
DOMESTIC WASTE	Solid Wastes	20 03 01	Non-hazardous-Household waste from the camp sites	Solid Waste Control Regulation (OG Date/Number: 14.03.1991/20814)	Will be collected in waste containers on-site (400 lt or 800 lt) and then hauled to Bartın Dump Site	Solid Waste trucks/ Bartın Dump Site	Medium Risk. Hauling of the waste needs to be organized.
	Domestic Wastewater		Generated by workers at the campsites and during construction activities (estimated as 533 m^3/day)	Water Pollution Control Regulation (OG Date/Number: 31.12.2004/25687)	Will be treated in Package biological wastewater treatment plants (WWTP).	The effluent of the WWTP will be discharged to the point where Capak and Gomu Creeks merge.	Medium Risk. WWTPs are still not in operation.
	Domestic wastewater treatment sludge	19 08 05	Semi-solid slurry due to treatment of domestic wastewater	Water Pollution Control Regulation (OG Date/Number: 31.12.2004/25687) Law of Aquaculture No. 1380 (OG Date/Number: 04.04.1971/13799) Regulation on Aquaculture (OG Date/Number: 10.03.1995/22223)	Will be dried on drying beds and stored	Appropriate disposal method in compliance with the related regulations will be decided later on.	Medium Risk. Planning should be made before the construction of the plants are completed.

Waste Class	Waste Type	Waste Code	Characteristics	Governing Regulation	Storage and Treatment Prior to Disposal	Final Disposal	Risks
INDDUSTRIAL WASTEWATER	Industrial wastewater		Generated due to gallery advancement, drilling equipment, concrete spraying, etc. (estimated to be 1201 m^3/day)	Water Pollution Control Regulation (OG Date/Number: 31.12.2004/25687) Law of Aquaculture No. 1380 (OG Date/Number: 04.04.1971/13799) Regulation on Aquaculture (OG Date/Number: 10.03.1995/22223)	Will be treated in four serial tanks with each has 250 m^2 area in the Shaft-1 area.	Details of the Industrial Wastewater Treatment Plant will be decided later on.	Major Risk. Discharge values should be complied with the limits defined in the regulation (Table 7.2).
PACKAGING WASTE	Metal, Glass, Plastic packaging waste	15 01 04 (metal) 15 01 07 (glass) 15 01 02 (plastic)	Non-hazardous - Generated from packaging of products brought to the site that will include certain plastic materials, Non-hazardous-Metal wastes shall be disposed separately for reuse and recycling.	Packaging Waste Control Regulation (24.07.2007/26562) Communiqué on Non-hazardous and Inert Waste Recycling (OG Date/Number: 12.05.2010/27579)	Will be collected in waste bins	HEMA Çerkezköy Facility	Low Risk. Facility is already in use and has adequate capacity to receive the waste.
HAZARDOUS WASTE	Chemicals		Hazardous wastes can mainly be generated during maintenance of vehicles.	Hazardous Waste Control Regulation (OG Date/Number: 14.03.2005/25755)	Will be separately collected in waste drums/ containers, labeled, stored in waste storage area at dedicated section, and delivered to licensed companies. Maximum temporary storage period is 6	Petder (Petroleum Trade Association)/ Çetinkaya Automobile Accessories and tires	Low Risk. Hazardous waste collection, transport and disposal are common practice that is well regulated by MEUP.
	Contaminated filters, fabrics	15 02 02*					

Waste Class	Waste Type	Waste Code	Characteristics	Governing Regulation	Storage and Treatment Prior to Disposal	Final Disposal	Risks
	Contaminated packaging	15 01 10*			months.		
SPECIAL WASTE	Waste Mineral Oils	13 01 … 13 02 … Code to be defined based on type of waste oil	Hazardous materials-Generated from upkeep and use of construction equipment	Waste Oil Control Regulation (OG Date/Number: 30.07.2008/26952)	Waste oils will be analyzed to be segregated and stored based on their categories and delivered to licensed company.	Golteks Petrol ve Kimya San. Tic. Ltd. Şti.	Low Risk. Waste oil collection, transport and disposal recycling are common practice that is well regulated by MEUP.
	Waste Batteries	20 01 33*	Generated from construction equipment used at the site	Regulation on Control of Waste Batteries and Accumulators (OG Date/Number: 31.08.2004/25569)	Will be separately collected in battery box and then delivered to a licensed company	TAP (Transportable Battery Producers Association)	Low Risk since this is an established practice and the waste batteries and accumulators will not represent a large increase in the existing waste stream.
	Waste Accumulators	16 06 01*			Will be separately stored in on-site hazardous waste storage area up to 90 days and then delivered to a licensed company	TAP (Transportable Battery Producers Association)	
	Waste Vegetable Oils	20 01 25	Generated from food processing in the cafeterias	Regulation on Control of Waste Vegetable Oils (OG Date/Number: 19.04.2005/25791)	Contractor which provides the food service will take care of the waste vegetable oils	Balaban Tekstil, Mak. Nak. Kimya, Gıda, Inş. San. ve Tic. Ltd. Şti.	Low Risk. Recycling companies has an effective collection and processing system.

Waste Class	Waste Type	Waste Code	Characteristics	Governing Regulation	Storage and Treatment Prior to Disposal	Final Disposal	Risks
EXCAVATION WASTE	Waste rock / Excavated soil	01 01 02 17 05 04	Non-hazardous material- Generated during shaft constructions and gallery advancements	Regulation on Control of Excavated Soil, Construction and Demolition Wastes (OG Date/Number: 18.03.2004/25406) Regulation on General Principles of Waste Management (OG Date/Number: 05.07.2008/26927)	Will be placed in waste rock dump sites.	Waste Rock Dump Sites near Shaft-1 and Shaft-2	Major Risk. Forestlands around Shaft-1 has been used as waste rock dump sites without an environmental permit. The waste rock consisting of mining debris may have acid generating potential since during the mining of coal, sulphides may oxidized with air and water and generate sulphuric acid. The resulting mine drainage is generally characterized by highly acidic waters with elevated metal and sulphate concentrations. Therefore environmental permit should be applied and necessary precautions should be taken at once..
MEDICAL WASTE	Infectious waste, Sharps waste	18 01 01* 18 01 03* 18 02 01* 18 02 02*	Generated from infirmary during construction	Medical Waste Control Regulation (OG Date/Number: 22.07.2005/25883)	Will be stored in medical waste bags.	Collection by Ilke Temizlik / Sending to Ilke-Rohan Sterilization Facility in Zonguldak	Low Risk. Waste generation amounts are negligible and waste is already being delivered to the sterilization facility.
COAL PROCESSING WASTE (SPOIL)	Coal Processing Waste	01 04 .. Code to be defined based on waste type	Non-hazardous- Inert materials such as earth and rock Non-hazardous /Hazardous- Cake material from thickener and filter press	Regulation on General Principles of Waste Management (Official Gazette (OG) Date/ Number: 05.07.2008/26927)	Will be placed on the spoil dump sites which will be equipped with low-permeability landfill liners a leachate drainage and collection system, and landfill cover	Spoil Dump Site 1 and 2	Major Risk. The spoil, resulting from the coal processing consists of mining debris which may have acid generating potential since during the mining of coal, sulphides may oxidized with air and water and generate sulphuric acid. The resulting mine drainage is generally characterized by highly acidic waters with elevated metal and sulphate concentrations. Soils on which the spoil dump sites located are

Waste Class	Waste Type	Waste Code	Characteristics	Governing Regulation	Storage and Treatment Prior to Disposal	Final Disposal	Risks
							mostly sensitive forest lands. Therefore, necessary protection should be provided.
SHIP-GENERATED WASTE	Bilge water Contaminated water Remains of bulk cargo	Code to be defined based on waste type	Generated due to engine of the ship and shipping activities	Regulation on Reception of Ship-Generated Wastes and Waste Control (OG Date/Number: 26.12.2004/25682)	Will be accepted by HEMA port, segregated and stored based on their categories in the 'waste reception facility' and then delivered to a licensed company	The procedures of Bartın Port will be followed.	Low Risk. An Environmental Permit is necessary for the Waste Reception Facility.

Industrial wastewater

When coal extraction initiates, there will be a significant increase in water usage in mines and the recollected water will need to be purified prior to reuse. For this purpose, four serial impoundments were planned to be constructed in order to provide settling of the impurities in the wastewater. Process details, however, are not decided at current stage of the Project yet.

Moreover, during the enrichment processes; 240 m^3 of water was estimated to be required in coal washing plants, daily. Recovered industrial wastewater used during the mining activities will be purified and some portion of it will be directed to coal washing plants to be used in the process. Different than the construction phase, water will be supplied from sea water treatment unit. The industrial wastewater cycle is given in Table 8-13.

Table 8-13. Industrial wastewater cycle during the operation phase

	Treated Sea Water	**Industrial Wastewater**		**Total (m^3/day)**
Water required for underground mining activities (m^3/day)	721			1201
Water required for spraying concrete (m^3/day)		480		
			Water drained from galleries	
Water to be directed to industrial wastewater treatment (m^3/day)	721*30% = 216.3	480*30% = 144	400	760
	Treated Sea Water	**Industrial Wastewater**		
Water directed to coal washing plants (m^3/day)	108	132*		240

**recovered industrial wastewater in Shaft-1*

No industrial wastewater will be generated in the coal washing plants; however, water will leave the system by mixing with solid waste material. Both ACWP and SCWP are closed-loop systems, which means that all fine-coal and coarse-coal wash circuits, leakage, slime dewatering and vacuumed disc filters water will be collected and fed to the system for re-use. For conservation of natural resources, research studies continue for optimization of water usage in coal washing plant and waste minimization.

Domestic wastewater

Domestic wastewater of each component of the Project will be treated in on-site package biological treatment plants during the operation phase as described in section 8.5.

Waste Generated from Coal Washing Plants

The spoils are the materials left over after the separating process of the valuable fraction from the not valuable fraction of an ore. Spoils may include inert materials as earth and rock, coal dust and filter press cakes from dewatering or thickening of the residue at the end of the washing process

which contain fine coal particulates. The spoils are low heating value materials and may have market value when mixed with coal. If possible, they will be sent to power plants; otherwise they will be primarily deposited at Spoil Dump Site-1 and 2.

Although the spoil materials are relatively inert, pyrite bearing coal mining activities may result in the oxidation of metal sulphites and thereby reducing the pH. As a consequence of the pH reduction, acidic conditions occur and this cause metals to become penetrable (acid rock drainage). Therefore, in order to estimate the contamination potential of the groundwater and surface water in case of a leak and to ensure that the dumped material has non-hazardous waste properties, kinetic and static analyses should be conducted for heavy metals and sulphur content prior to dumping of the coal processing wastes.

Ship-Generated Waste

Ship-generated waste will be accepted by HEMA Port. A waste Acceptance Permit will be obtained from the Ministry of Environment and Urban Planning and according to the Regulation on Reception of Ship-Generated Wastes and Waste Control (OG Date/Number: 26.12.2004/25682), in order to obtain the permit, a "Waste Reception Facility" is required. Therefore HEMA will apply to have a license for the facility as well, before the port enters into service. The facility will be located on a 350 m^2 site in the reclamation area.

Furthermore, the transportation of processed coal from the coal storage area to the port will be done via conveyor belt which would potentially cause contamination generated from the dust interaction with rainfall. However, the conveyors were designed to be covered to prevent potential contamination.

8.7 Impacts

Noncompliance with storage, transport and final disposal according to the Turkish regulatory framework will lead to major impacts. The existing Turkish regulatory framework has been modelled to be parallel to the EU Waste Legislative framework. The previous discussions indicate that the Turkish regulatory framework is in place for assigning specific waste codes to each of the waste stream to be generated in the construction and operation phases.

The waste disposal infrastructure for domestic, hazardous and wastewater streams is not available nor operational neither in the Amasra District or in the Province of Bartın. Therefore, the impacts of the generated wastes can be considered to be of major significance if HEMA does not comply with the applicable regulations during construction and operation including disposal of the waste stream in licensed facilities given in Table 8-6 and Table 8-7.

- Domestic wastewater generated during both phases of the project, can have significant adverse effects on the environment. According to the Communiqué on Aquacultural Production Area Boundary reports of Ministry of Food and Livestock (OG dated 24.08.1997/numbered:23059), the area from the Kastamanu-Bartın provincial border to the Bartın-Zonguldak provincial border constitutes an 'Aquacultural Production Area'. Therefore, on-site package treatment plants should be constructed and commence into operation as soon as possible.
- On-site hazardous waste management has significant importance to prevent impacts on the environment and to protect the environment from any soil contamination and from

contamination by other classes of waste. Related impacts may vary from minor to major significance depending on the amount of spills, the environment where the spill has occurred and the response time to the incident. Clean-up materials such as spill kits should be managed as hazardous waste and disposed of appropriately. Correct separation of hazardous waste is also of major importance due to the potential adverse reactions in case incompatible wastes are stored together.

- If not managed properly, special waste such as waste mineral oils, waste vegetable oils, battery and accumulators, waste electronic and electronic equipment, can cause adverse impacts to human and environmental health. Any oil and/or chemical spills during maintenance activities may have an impact on the environment because of contamination of soil. These wastes must be managed appropriately and in line with the related Environmental Regulations during the construction and be disposed of in licensed facilities.
- Domestic waste, especially the organic part from foods, attracts vermin and other disease carriers. Also, if not managed properly, the solid waste generates a penetrant odor in and around the Project area. The domestic waste will need to be appropriately collected periodically and on time, stored and disposed of on the site in accordance with the regulatory framework.
- Packaging waste should be separated properly in order to regain its economic value in the market as well as to prevent excessive waste accumulation on-site and in waste containers.

The specific waste during the construction phase of HEMA Project is the waste rock generating from the gallery advancements as described in pervious sections. A major source of acid-mine drainage is iron-sulphide-rich materials associated with coal mining. The analysis of sulphide content of the waste and determination as to whether the sulphides will potentially form acidic conditions is therefore essential. After analysis, the waste rock can be classified as “barren rock” or potentially acid generating (PAG). The waste rock is currently being disposed of in forestlands around Project area. Necessary actions to mitigate the negative impacts of the waste rock are identified in Section 8.8.

Treatment of the industrial wastewater is another important issue during the life cycle of the mine. Approximately 760 m^3 of recovered industrial wastewater will be sent to impoundments for purification and then discharged into the environment. The characteristics of the effluent should be analyzed and monitored on a regular basis to ensure it is below the limits defined in the Water Pollution Control Regulation. Moreover, the rejected material accumulated at the bottom of the impoundments should also be analyzed and sent to a licensed company, since it is likely that the rejected material would have hazardous waste characteristics.

The most significant waste to be generated during operation phase of the Project is the waste generated by the coal washing process. These are the materials left over after the separation of the valuable fraction from the not-valuable fraction of an ore. Wastes of the coal washing plants (spoil) can include heavy metals, sulphides or be extremely acidic. Environmental, health and safety impacts caused by these materials may include:

- Groundwater and surface water contamination due to acidic run-off/leachate;
- Sedimentation of drainage networks
- Dust generation;
- Instability and failure of the dump sites.

Coal processing waste management strategies should consider how these wastes will be handled and disposed of during operation, the site topography, downstream receptors and the physical nature of the wastes (e.g. projected volume, grain size distribution, density, water content, among other issues). According to the Regulation on Sanitary Landfills, it is necessary to apply to the Ministry of Environment and Urban Planning to obtain a "Sanitary Landfill" license in order to be allowed to deposit the coal processing wastes of the two CWPs. Additionally, the characteristics of the waste of the sites should comply with the limit values defined in the mentioned regulation and should be monitored on a regular basis.

8.8 Mitigation Measures

Specific mitigation measures for the management of wastes generated by the Project activities according to the IFC Standards include the following:

- Necessary permits or opinions related to disposal of the waste rocks in dumpsites will be obtained from the Local Environmental Authorities.
- Sanitary Landfill License will be applied and obtained for spoil dumpsites before the CWPs enter into service.
- Waste rock and spoil are Potentially Acid Generating (PAG) wastes since they most likely to have iron-sulphide-rich characteristics. Therefore, these materials will be management as described below:
    - A comprehensive series of accelerated leaching tests will be conducted according to internationally recognized methodologies to evaluate the potential for PAG in all formations,
    - Comprehensive PAG / metals leaching (ML) testing / mapping will be conducted on an ongoing basis with decreasing block size as formations are transferred from long- to medium- and short- term mining plans,
    - PAG and ML preventive actions will be implemented including:
        - Limiting exposure of PAG materials to environment by phasing of development and construction, together with covering, and/or segregating runoff for treatment,
        - Implementation of water management techniques such as diverting clean runoff away from PAG materials, and segregating "dirty" runoff from PAG materials for subsequent treatment; grading PAG material piles to avoid ponding and infiltration; and removing pit water promptly to minimize acid generation.
    - PAG materials (including wastes) will be placed in controlled dumpsites to provide permanent conditions that avoid contact with oxygen or water including:
        - Submerging and/or flooding of PAG materials by placing PAG materials in an anoxic (oxygen free) environment, typically under a water cover,
        - Isolating PAG materials above the water table with an impermeable cover to limit infiltration and exposure to air. Covers are typically less of a concern in arid climates where there is limited precipitation, and should be appropriate for local climate and vegetation (if any),
        - Blending of PAG materials with non-PAG or alkaline materials can also be employed to neutralize acid generation, as appropriate. Blending should be

based on full characterization of each of the blended materials, the ratio of alkaline materials to acid generating materials, the case histories of failed operations, and the need for static and long- term kinetic tests.

- Planning the dumpsite of the PAG materials with appropriate terrace and lift height specifications based on the geotechnical properties of the material and local geotechnical considerations to minimize erosion and reduce safety risks.

- Waste characteristics of the coal processing will be monitored during the lifetime of the mine and the records will be shared with the Ministry of Environment and Urban Planning on annual basis.
- Where controlled dumpsites are located in areas with a high risk of seismic loadings, the independent review should include a check on the maximum design earthquake assumptions and the stability of the structure to ensure that the design is such that during seismic events there will be no uncontrolled release of wastes.
- Diversion drains, ditches, and stream channels to divert surface water from surrounding catchment areas will be built.
- All waste will be collected, segregated, labeled and stored on site according to Turkish Environmental Regulations. Continuous monitoring will be applied of waste minimization, segregation, collection, labeling, storage, transportation and recycling/disposal of all types of waste. Record will be kept on waste generation, storage and transportation to third party waste management facilities will be maintained,
- Domestic and industrial wastewater discharge to receiving bodies will be done according to the Regulatory limits.
- Depending on their toxicity and radioactivity, coal bottom ash, slag, and fly ash in the heating systems will be recycled, if possible, given the availability of commercially and technical viable options such as;
    - Use of bottom ash as an aggregate in lightweight concrete masonry units, as raw feed material in the production of Portland cement, road base and sub-base aggregate, or as structural fill material, and as fine aggregate in asphalt paving and flowable fill,
    - Use of slag as blasting grit, as roofing shingle granules, for snow and ice control, as aggregate in asphalt paving, as a structural fill, and in road base and sub-base applications,
    - Use of fly ash in construction materials requiring a pozzolanic material.
- Whenever possible, off-site management by specialized companies that can recover the heavy or precious metals will be provided through recovery and recycling processes, or by companies that can otherwise manage used catalysts or their non-recoverable materials.
- Port operators will provide collection, storage and transfer and/or treatment services, and facilities of sufficient capacity and type for all wastewater generated by vessels at the port in accordance with MARPOL and national regulations:
    - Oily waste and wastewater will be collected in barges, vehicles, or central collection systems and storage tanks. The capacity of oily waste collection will be established based on applicable MARPOL provisions,

- Wastewater with noxious chemicals from bulk tank cleaning will be collected through appropriate onsite or off-site treatment prior to discharge. Incompatible substances will not be mixed in the collection system,
- Smaller vessels used for harbor services will be equipped with recycling or chemical toilets, or holding tanks, that can be discharged into shore facilities,
- Information will be available for ship captains to identify solid waste reception facilities and acceptable handling procedures at ports,
- Discharge of solid waste from vessels will be prohibited while in port in accordance with MARPOL and related national related regulations. More stringent restrictions may be considered, if necessary, to protect the port environment,
- Oil and chemical-handling facilities will be located with consideration of natural drainage systems and environmentally-sensitive areas (e.g. aquaculture projects, and beaches, providing physical separation / distance whenever possible),
- Fuel dispensing equipment will be equipped with “breakaway” hose connections that provide emergency shutdown of flow should the fueling connection be broken by movement. Fueling equipment will be inspected daily to ensure all components are in satisfactory condition,
- Port operators will prepare a Spill Prevention, Control and Countermeasure Procedure included in Emergency Preparedness and Response Plan of HEMA Port. This procedure will be comprised of the followings:
  - Identifying the areas within the port that are sensitive to spills and releases of hazardous materials and locations of any water intakes,
  - Outlines responsibility for managing spills, releases and other pollution incidents, including reporting and alerting mechanisms to ensure any spillage is reported promptly to the Port Authorities and personnel is informed to take appropriate action,
  - Training the response personnel in deployment of equipment and testing of the contingency plan through regular reporting and alerting exercises and less frequent deployment of the specialized spill.

- Periodic inspections will be conducted in the waste storage and disposal facilities to ensure proper disposal practices are implemented.

8.9 Residual Impacts

The residual impact as a result of waste generation is estimated to be moderate when the mitigation measures that are described above are fully implemented throughout the lifetime of the Project.

9.0 MARINE ENVIRONMENT

9.1 Scope

The marine environment includes the sea surface, water column, seabed sediments and littoral zone that occur within these confines. Information on physical oceanographic characteristics, marine chemistry, seabed sediments and biological resources are provided in the following sections of this chapter and *Chapter 13: Ecology*, respectively.

This chapter describes the potential impacts of the construction and operation phases of the Reclamation Area and Quay Project (thereafter referred as HEMA Port) on marine water in the vicinity of the area. The information about the project presented in this chapter is based on the following sources:

- Baseline data based on a thorough review of existing scientific literature
- Hydrographic, Oceanographic, Geologic and Geophysical Investigation Report by MCH Marine Research Ltd. (April, 2011)
- Report of Wave Climate, Wave Transformation and Turbulence Analysis within the Port by Istanbul Technical University Water and Sea Sciences UYG-AR Center (January, 2012)
- Sandblasting Potential Analyses Report by Istanbul Technical University Water and Sea Sciences UYG-AR Center (March, 2012)
- Marine Water Sampling (dating 2013) was undertaken by Segal Environmental Measurement and Analysis Laboratory for HEMA.

The significance criteria that are used related to impacts on marine environment are presented below.

Impact Significance	Description
Negligible	- No contamination of marine environment through site run-off, wastewater discharges and oil spills during construction and operation activities - No turbidity and thereby no risks associated with the increasing levels of suspended solids and and nutrient content - No dishcarge to receiving environment
Minor	- Short-term turbidity may increase the level of suspended solids and nutrient content within the port area boundaries during construction activities such as pile driving, filling operation, construction of reclamation areas, breakwater and other port components - Temporary small-scale oil spills and discharges during construction and operation - Re-suspension of sediments within the small area during construction phase of the project - Contamination of marine environment due to uncontrolled discharges to Gömü and Çapak Creek result in alteration of background conditions by 10 % (by considering sea water quality criteria defined in Turkish Water Pollution Control Regulation)
Moderate	- Long-term turbidity may increase the level of suspended solids and nutrient content within the port area boundaries during construction activities such as pile driving, filling operation, construction of reclamation areas, breakwater and

	other port components - Re-suspension of sediments within the large area during construction phase of the project - Contamination of marine environment through site run-off, wastewater discharges and oil spills during construction and operation activities resulting in alteration of baseline water quality by 50% (according to criteria defined in (according to the criteria defined in in Turkish Water Pollution Control Regulation) - Contamination of marine environment due to uncontrolled discharges to Gömü-Çapak Creek result in alteration of background conditions by 50 % (by considering sea water quality criteria defined in Turkish Water Pollution Control Regulation)
Major	- Contamination of marine environment through site run-off, wastewater discharges and oil spills during construction and operation activities resulting in alteration of baseline water quality by 100 % (according to criteria defined in Turkish Water Pollution Control Regulation) - Contamination of marine environment due to uncontrolled discharges to Gömü and Çapak Creek result in alteration of background conditions by 100 % (by considering sea water quality criteria defined in Turkish Water Pollution Control Regulation)

9.2 Existing Environment

9.2.1 Physical Oceanography

The Port area is located in the shore of the Black Sea which is bounded by Europe, Anatolia and the Caucasus and is ultimately connected to the Atlantic Ocean via the Mediterranean and the Aegean Seas and various straits. It contains narrow shelves and very strong topographic variations around its periphery. The surface area of the Black Sea is 423,000 km^2 and the greatest width is 1,200 km. The average depth and maximum depths are 1,315 m and 2,212 m respectively and the total water volume is 547,000 km^3. The Black Sea shoreline is approximately 4,340 km long and 1,400 km of it located in coast of Turkey[1].

The Port area is located in West-Black Sea Region where open sea conditions prevail. The project area is open to the wave effect from West and North directions due to its location. Looking at the sea side (west-southwest) of the Project Area, coast line and the depth curves of the sea bottom proceed perpendicular to each other. Sea depth in the region increases on north direction and as a result of that, planned breakwater will be located in -19.50 m depth while end of the shore protection parts -3.00 m depth. The generated bathymetry map for the region is given in Figure 9-1.

[1] "Europe's biodiversity, biogeographical regions and seas, The Black Sea", European Environment Agency. (http://www.eea.europa.eu/publications/report_2002_0524_154909)

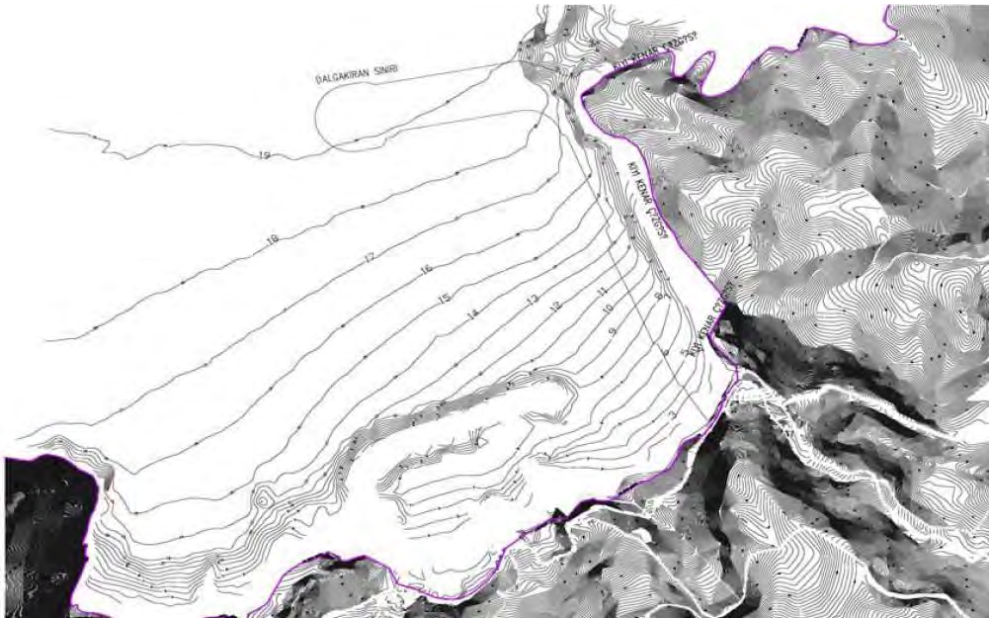


Figure 9-1: Bathymetry Map of the Region

Water depth increases to -21.00 m in approximately 750 m distance to the north-northwest direction from the planned breakwater while the sea depth reaches to -50.00 m at 2.5 km distance and -100.00 m at 4 km distance. The -500 m contour is located at a distance of 5 to 5.5 km distance far the Port area. The general bathymetric properties of the Project Area and its surroundings are shown in Figure 9-2.

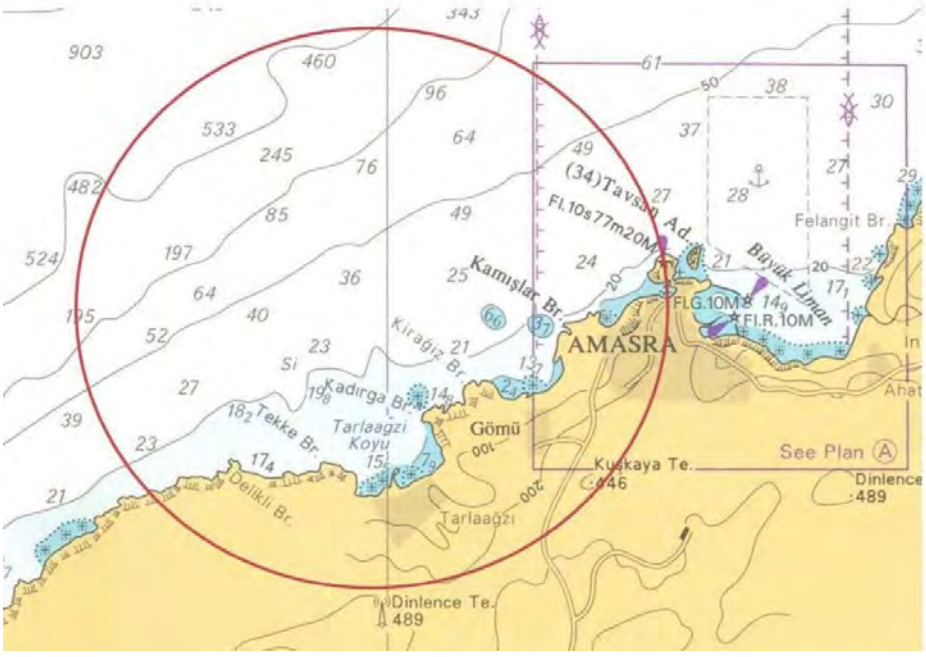


Figure 9-2: General bathymetric properties of the Project Area

Cross-shore and long-shore sanding analysis reflecting boundary conditions in the region were defined through a Sanding Potential Analyses Study which was conducted in 2012 by Istanbul Technical University Hydraulic Laboratory (ITU-HL) and CEC Coastal and Environmental Engineering Consulting Trade Co. Ltd. In addition to thsese, the cross-shore and long-shore sanding modeling were carried out.

The direction of solid material movement along the shore is expected to from Northeast to Southwest and the actual transport is estimated to be roughly 60000m^3/ year. However it might be expected that the morphology of entrance of the Port might be slightly changed in long term by the materials that are transported by the wave and flows. The characteristics of seabed is similar to shore steep topography. The study also specified that the eastern part of the breakwater is expected to have slow-going sand accumulation. Therefore, it is not expected that these changes to effect operation of the Port due to the rocky nature of the surroundings. Shore erosion or scouring is not expected due to the Port construction. Solid material movement is not expected that may affect the Port entrance and basin.

An engineering seismicity study was conducted by sub-bottom profile system in total of 25 routes (as 23 of them lays vertical to the shore and 2 of them are parallel to the shore) to determine ground conditions of the Port area, identify geological structure and determine sediment thickness. The seismic location map is presented in Figure 9-3.

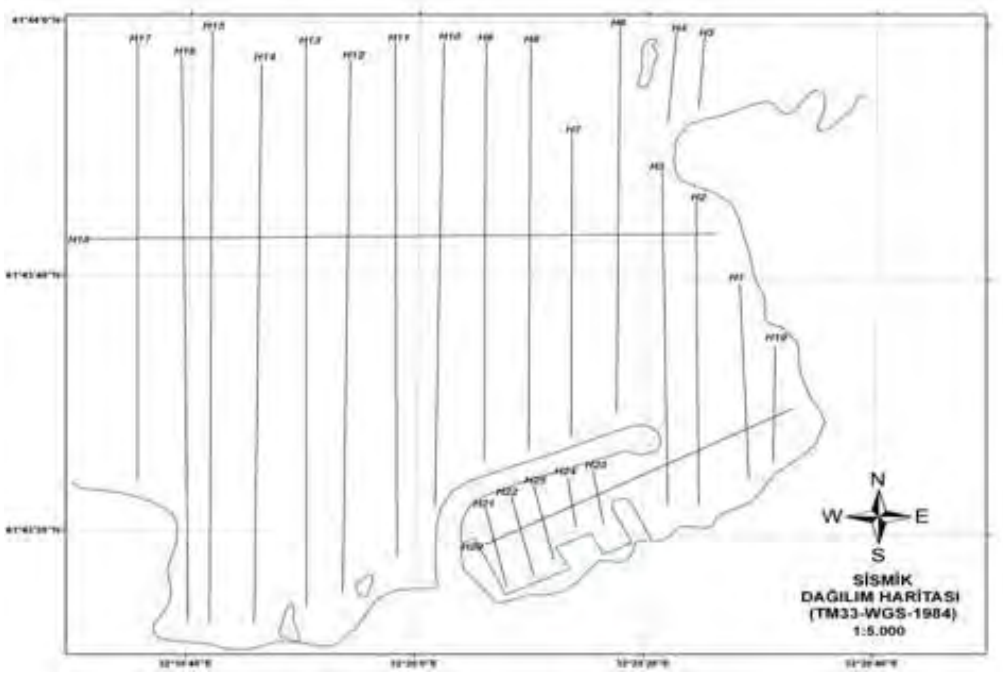


Figure 9-3: Seismic location map

Results of the seismic study is presented by using data of lines H1, H11, H17 and H18 .There were two different seismic lithological formations determined: Upper formation (Unit A) is defined as water logged low reflective characterized unit generating current sediments while lower formation (Unit B) is

not continuous in sections which can be accepted as generating acoustic basis of Port area. Seismic period sections of H1, H11, H17 and H18 routes are presented in Figure 9-4 to Figure 9-7.

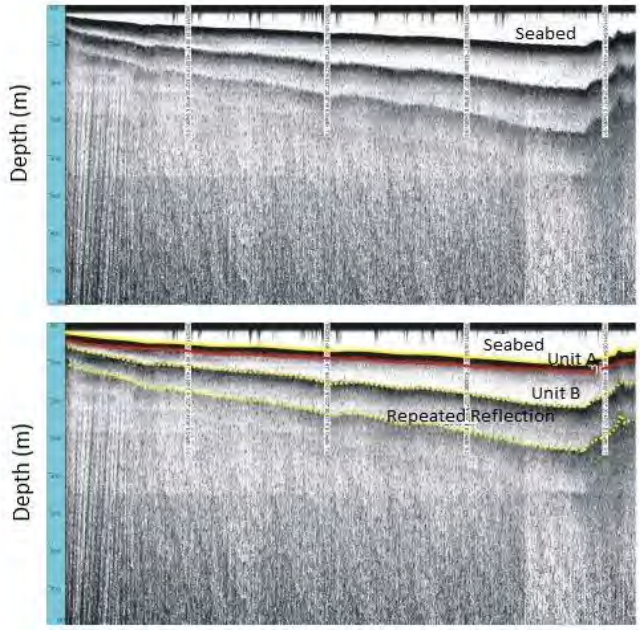


Figure 9-4: Seismic time section and evaluation of H1

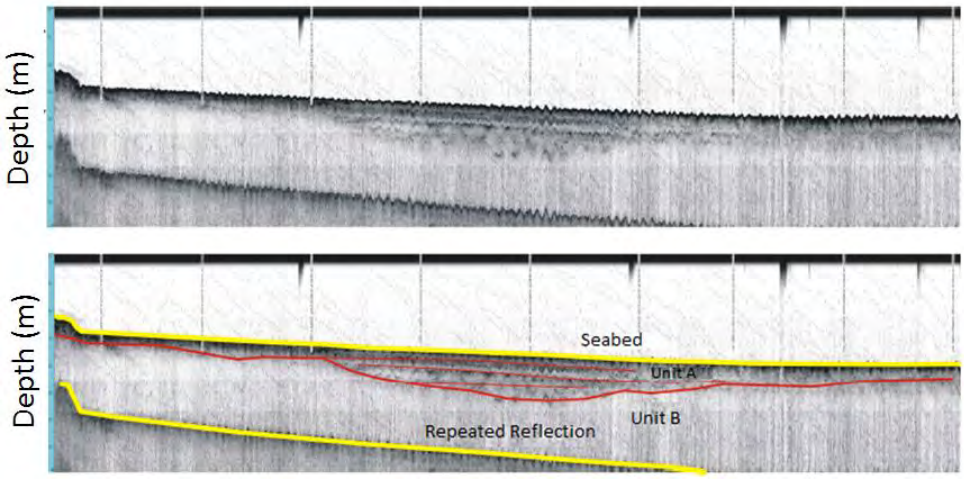


Figure 9-5: Seismic time section and evaluation of H11

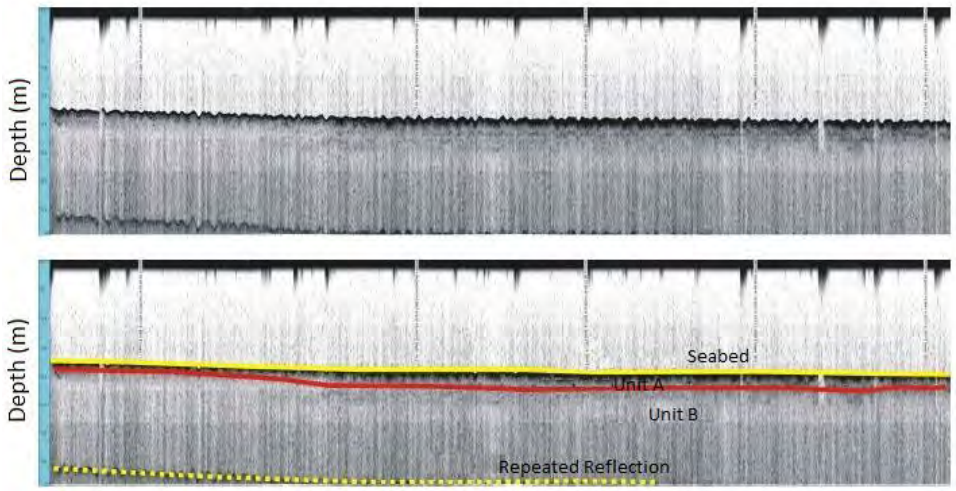


Figure 9-6: Seismic time section and evaluation of H17

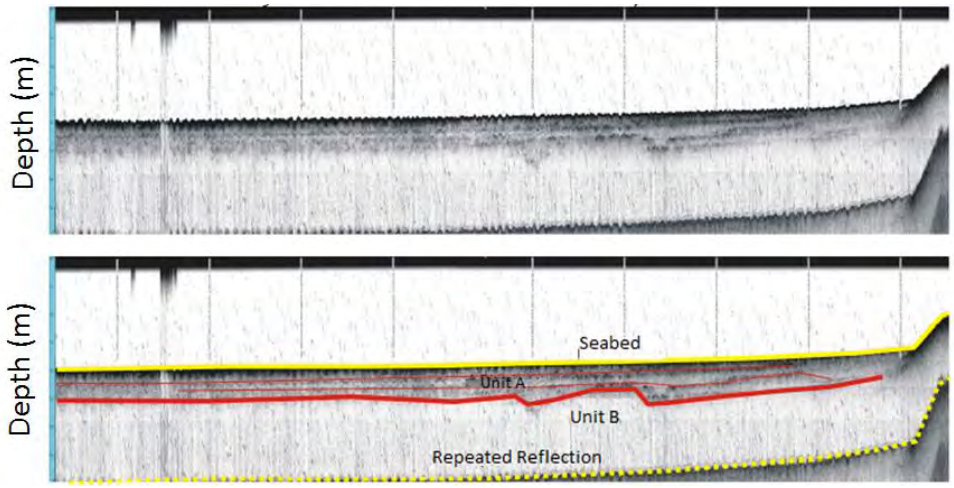


Figure 9-7: Seismic time section and evaluation of H18

Side scan sonar imagery studies was conducted to construct facies and bedform maps which have revealed the type of sediments and bottom morphology, allowing sedimentologists to infer the sedimentation processes. The study was conducted in 24 different routes (S1 to S24) to define natural/unnatural structures and morphology of sea bottom. Each route is scanned in 330 kHz frequency and covering 240 m width. Routes and covering areas are showed in Figure 9-8 below.

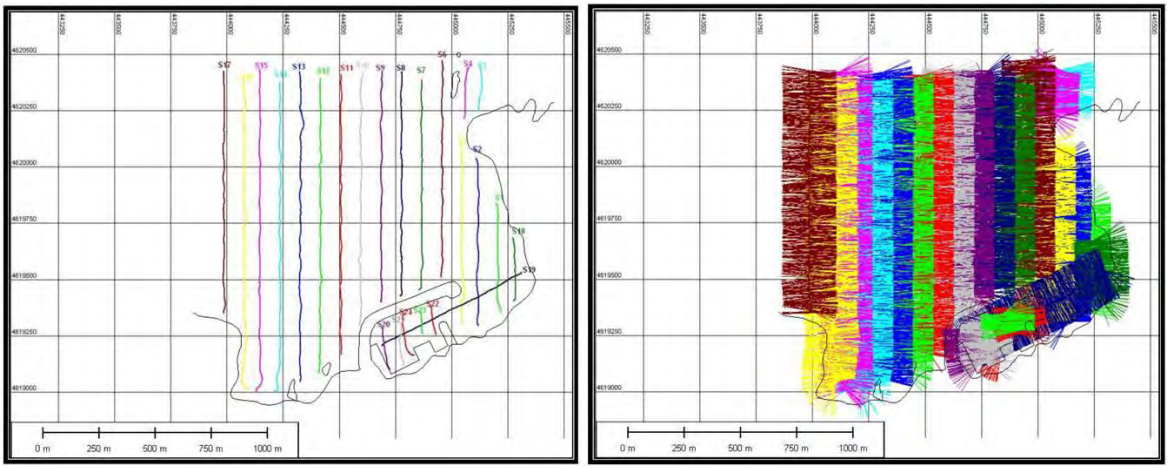


Figure 9-8: Side-scan sonar study routes and covering areas

Results of the survey showed that sea bottom in the Project area shows smooth characteristic while having there are rocky areas near to the shore. There were not any anomalies structures (shipwreck, pipeline etc.) found at the sea bottom.

Sea water

Conductivity, temperature and density (CTD) measurements were performed in order to measure sea water physical parameters. Analysis were conducted in 18 different locations around the Port area (Figure 9-9) by using RBR-CTD system. Measurements were conducted for two days (17 and 18 March 2011) and depth, pressure, density, conductivity, temperature, salinity and sound speed values were recorded for every one meter from surface to 15-20 meters depth. Results of the measurements showed that, as the surface water warmed, a negative gradient water layer is created from surface to the bottom. The temperate at sea water surface varies between 6.88°C and 7.18°C while at 19.78 meter depth (CTD station No.9) temperature is measured as 6.78 °C.

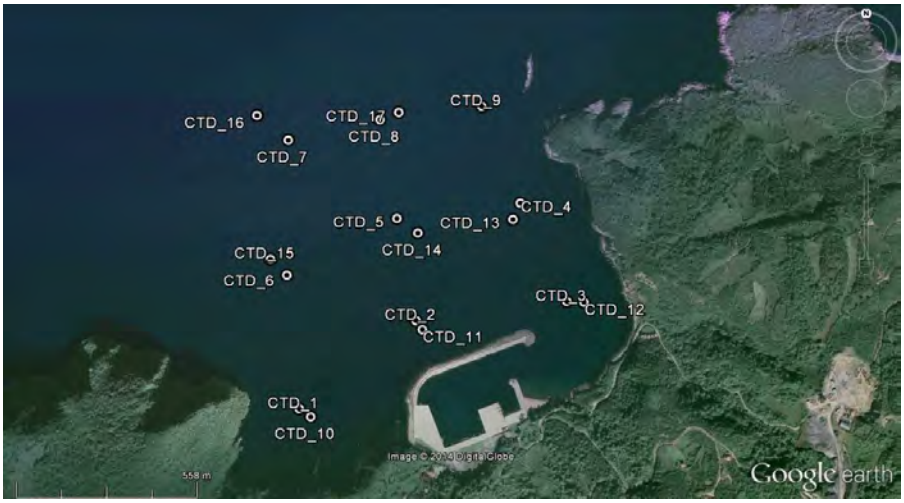


Figure 9-9: Locations of Oceanographic Measurements

The results also showed that salinity values changes at marine surface water between 16.93‰ and 17.09‰, and the salinity values increases with little ratios to the bottom of the sea. At the bottom of the sea (at CTD station No.9 (19.78 meter depth)) salinity reached values of 17.09‰.

The density measurements from surface to bottom of the sea showed similarity with the temperature profile. The density value at water surface was measured as 13.27–13.39 sigma-t while the highest density is measured at the bottom of the sea (in CTD station No.9) as 13.50 sigma-t.

In order to determine the current system within and around the Port area, current measurements were conducted in one current station (see Table 9-1) location on 27 and 28 April 2011, 12 hours during each day.

Table 9-1: Current Station Coordinate

CURRENT STATION	COORDINATE		DEPTH (m)
	N	E	
	$41^0$43’34.40”	$32^0$19’55.74”	17

Doppler current sensor (DCS) 3900 was used to measure current speed and the direction in the sea. Measurements were conducted in 17 m depth and data collection was made with 15 minute intervals. Sea condition was 2, wind was 2-3 kts on 270-360° direction and the wave height was 10 to 15 cm. The results of the current direction/time, velocity/time and current direction and velocity plot are displayed in Figure 9-10, Figure 9-11 and Figure 9-12, respectively. Results of the study showed that, effective current direction average and current velocity for the first day of measurement determined was 312.78° and 4.28 cm/s respectively. Effective current direction average for the second day of measurement was 316.57° and average velocity were determined as 4.10 cm/s. According to the evaluation of two day measurement results, it is observed that the current direction varies between 260° and 360° while the maximum value recorded in 299° direction. Current velocity-direction spread graphic is given in Figure 9-12.

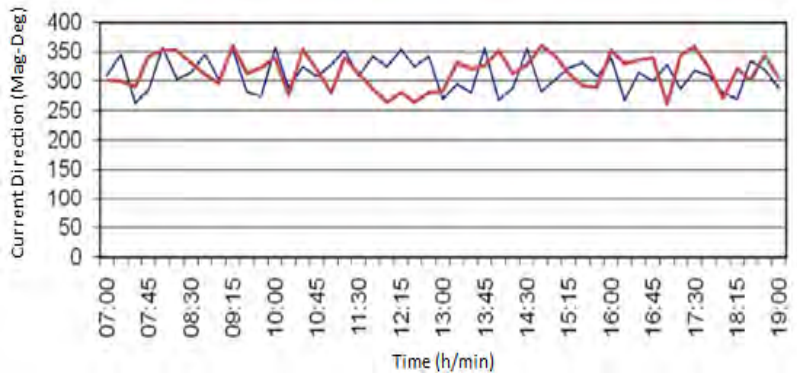


Figure 9-10: Current direction/time

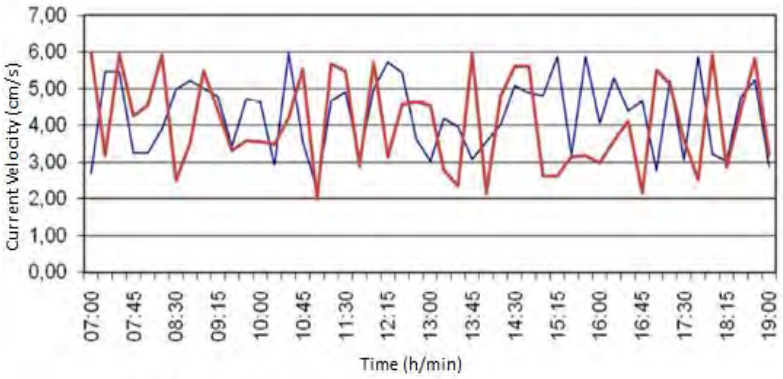


Figure 9-11: Current velocity/time

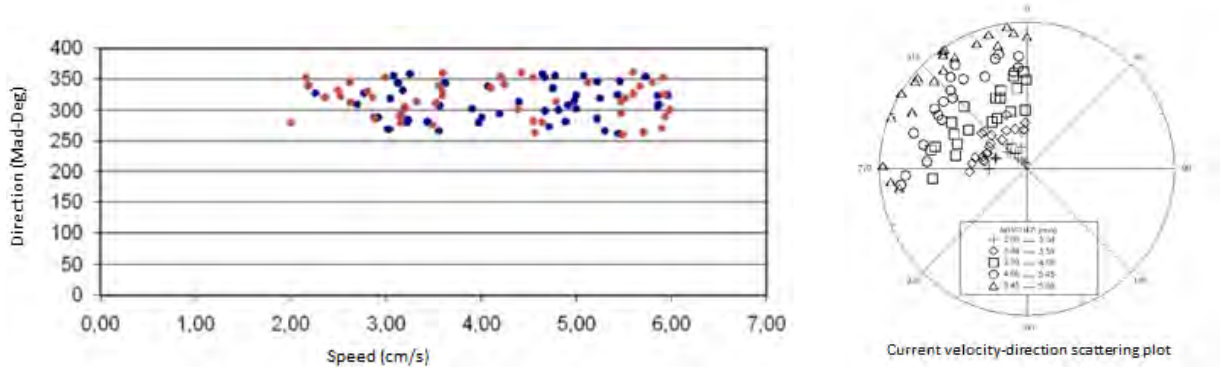


Figure 9-12: Current velocity- direction scattering plot

Wave Climate, Wave Transformation and Turbulence Analyzes study inside the Port was carried out to determine turbulence levels, open sea wind and wave climate characterization of planned Port. The study was conducted on January 2012 by Istanbul Technical University Hydraulic Laboratory (İTÜ-HL) and CEC Coastal and Environmental Engineering Consulting Trade Co. Ltd. Also the numerical wave transformation model set up and modeling works have been carried out at the Port area to show the boundary conditions.

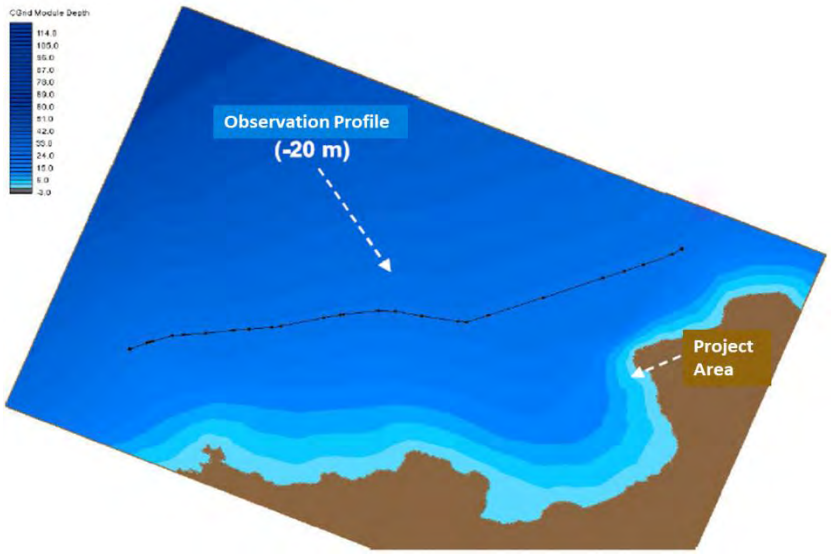


Figure 9-13: Digital bathymetry for wave transformation modelling and observation profile along -20 m contour

Results of turbulence analysis within the Port showed that the operation of the Port might be suspended for total of 12-13 days as 7.5 days due to West direction waves and 5 days due to West-Northwest direction waves. The given number reflects the sum of days that may be occurred in various parts of the year excluding the days with extreme storms that has a return rate more than 1 year. According to the modelling results, this may happen mostly in winter season compared with summer .

Sediments

In order to determine type and distribution of the sediments within the Port area, 11 sediment samples were taken by using Van Veen grab sampler (Figure 9-14). For the purpose of determination of the types of the samples, particle size analysis and screen and hydrometer analysis were conducted.

Figure 9-14: Locations of Sediment Measurements

According to the results of analysis, it was determined that the particle distribution ratio varies as; 1.41-1.56 % gravel, 94.53-96.32 % sand, 2.14-3.93 % silt and 0 % clay in the region. In the frame of the results obtained from the field and laboratory studies, slightly gravelly sand, slightly gravelly sandy mud and slightly gravelly muddy sand units are detected in the region and it is understood that the dominant units are sand and silt.

Table 9-2: Grain Size Analysis Results

Sample	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Soil Definiton (Folk 1954)
SED-1	0,17	98,96	0,87	0,00	(g)S
SED-2	2,24	46,79	46,04	4,93	(g)sM
SED-3	0,07	68,17	29,91	1,85	(g)mS
SED-4	0,06	66,14	31,37	2,43	(g)mS
SED-5	0,09	66,52	30,88	2,51	(g)mS
SED-6	2,80	40,64	48,35	8,21	(g)sM
SED-7	0,17	68,08	29,60	2,15	(g)mS
SED-8	0,21	69,79	27,53	2,47	(g)mS
SED-9	0,09	67,98	29,40	2,53	(g)mS
SED-10	0,23	64,63	32,77	2,37	(g)mS
SED-11	0,07	99,14	0,79	0,00	(g)S

Effects of sea-shore dynamics are effective in distribution of clastic sediments in the sea bottom. As it is known, the coastal areas where coast-marine interactions and the energy is high, generally distribution of coarse-grained gravels and sand materials are observed, while in areas where coast-marine interactions are relatively less and have low energy from the shore to deep sea, fine-grained silty, clayey

and muddy material distribution is observed. Within this context, the Project Area coast line and 1/5000 scale sediment distribution map was prepared (Figure 9-15) and it was determined that the coast line is natural and steep sloped, located in Quarternary segment, containing stream sediments in Pleistocene and alluvia and shore sediments in Holocene. It is also noted that Bartın and Filyos Creeks are located in the region which can change sea bottom materials by seasonally variable flow characteristics.

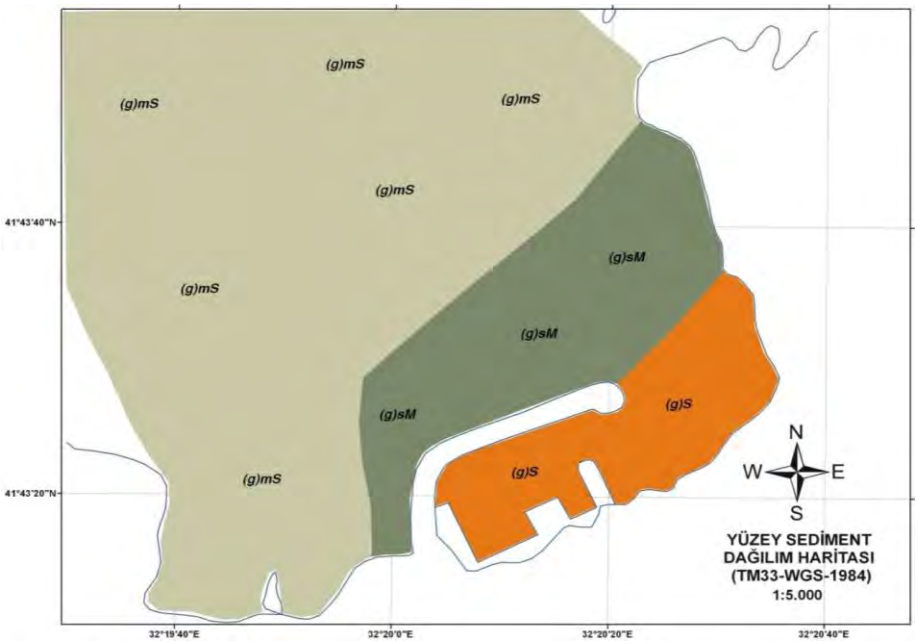


Figure 9-15: Sediment Distribution Map

Following the coastal characteristics, the material distribution was determined as gravelly sand in approximately 0-9 m depth from the shore, less gravelly sandy mud to 9-10 m depth and less gravel muddy sand between 15-20 m depth.

9.2.2 Marine Infrastructure

The Port will be constructed on an area of 163,000 m^2. Port construction will include the reclamation of behind quay, breakwater construction, pile driving and cap concrete installation, concrete pavement of the quay, reclamation overfill, infrastructure and site pavement works, and construction of buildings and facilities. Reclamation material for the quay area will be obtained from the slope protection area. The loading process of coal at the port will be conducted via covered conveyor belt system. HEMA Port general layout is presented in Figure 9-16.

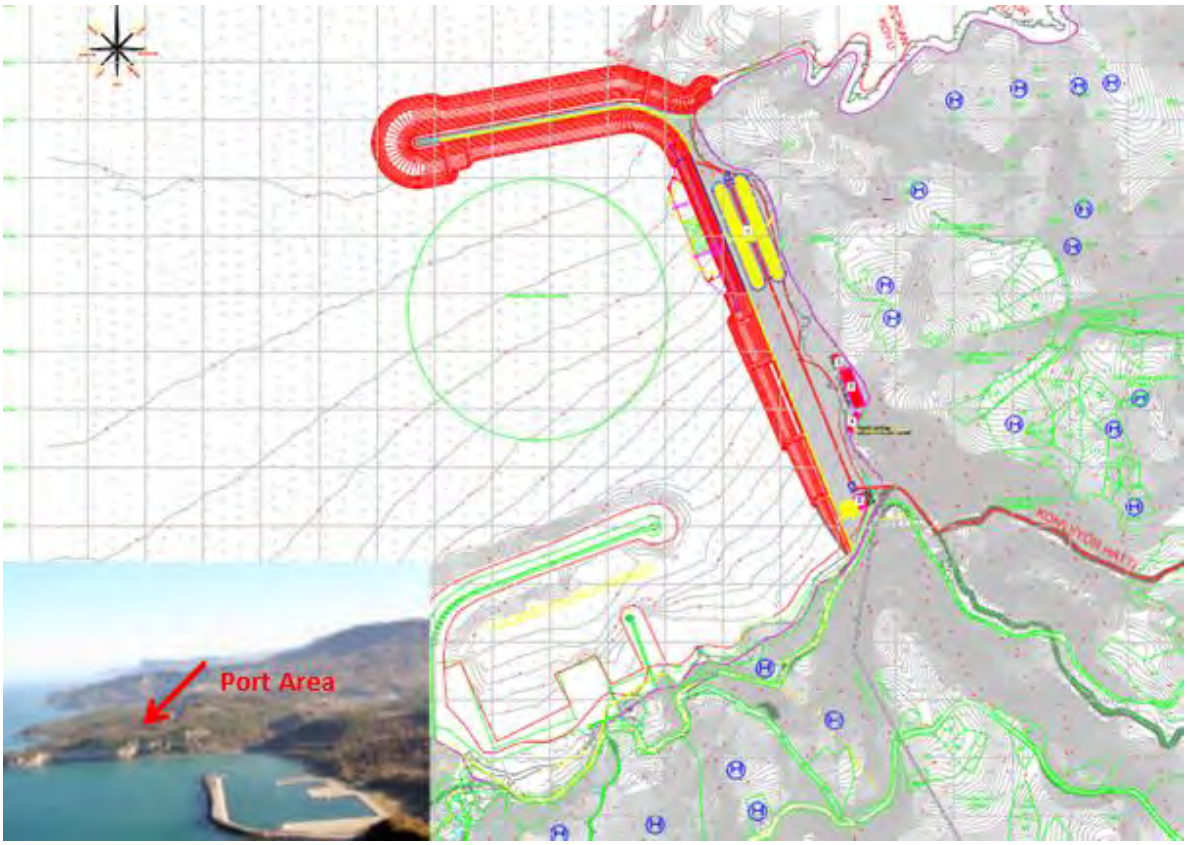


Figure 9-16: HEMA port general layout

A 345 m long breakwater will be constructed. A 250x28 m bulk cargo quay is planned to constructed at the northern end of the reclamation area and design to accommodate 30,000 DWT vessels. Since the area behind the quay structure is very steep rocky cliff, slope protection will be applied for safe backfill conditions and prevent landslides in case of an earthquake. There will be two coal storage area on the proposed port area. The anticipated life of the port project is 50 years.

In the operational phase of the project, two units of 1000 t/h capacity rail quay cranes will be used for dry bulk handling at the port. The transfer of the coal from coal storage area in the vicinity of Shaft 1 to port area will be undertaken by conveyor belt system. An additional 1500t/h capacity stacker-reclaimed will be operated in temporary stocking yard for emergency situations.

During the construction and operational phase of the project, approximately 100 and 65 people are planned to be employed, respectively. The generated domestic wastewater during both construction and operational phase of the project will be treated on-site package biological waste treatment facility from a reinforced concrete or steel construction with a 350 m^2 area. The generated effluent from the wastewater treatment plant will be discharged to Gömü and Çapak creek obtaining relevant discharge limit in line with the Turkish WPCR. Wastewater treatment sludge which are semi-dry slurry, will be treated in line with the appropriate regulation and decided later on whether they will be dried on sludge bed or sent to the licensed facilities.

9.2.3 Marine Chemistry

A number of studies were previously undertaken to establish the water quality in the Project Area and its influence area. The study includes various sea water analyses, for different parameters, conducted by Segal Environmental Measurement and Analysis Laboratory on 2013.

In order to determine the water quality within Project Area and its influence area, three sea water samples (Sample 1,2 and 3) were taken from a location near to the Port area. Sampling stations are given in below Figure 9-17.

Figure 9-17: Sampling Stations

Sea water analyses were conducted in the accredited Segal Environmental Measurement and Analysis Laboratory which is authorized by the Ministry of Environmental and Urban Planning (MEUP). Sampling dates, and selected analytical parameters are as follows;

- Sample 1,2 and 3 were taken on 2013 and analyzed for physicochemical parameters (pH, dissolved oxygen (DO), suspended solids (SS), turbidity, water clarity, phenol, surface activate agents, ammonia, petrol derivatives) microbiological parameters (total and fecal coliform, salmonella, streptococcus) and other parameters referring pollution (copper, cadmium, chromium, lead, nickel, zinc, mercury, arsenic). The analytical results were evaluated for comparison Water Quality with the Mandatory Limit Values for Water Used for the Purpose of Swimming and Recreation stated in Annex 1 of "Swimming Water Quality Regulation (SWQR)" (Published in O.G. dated: 9.1.2006, issue number: 26048) and Table 4 stated in "Water Pollution Control Regulation (WPCR)" (Published in O.G. dated: 31.12.2004, issue number: 25687).

The results of the sea water analyses are given in Table 9-3.

Table 9-3: Analysis Results of the Parameters

Parameter		Unit	Sample 1	Sample 2	Sample 3	Limit Value (WPCR)	Mandatory Limit Value (SWQR)	
Physico-Chemical Parameters	pH	-	8.42	8.43	8.4	6-9	6-9	
	DO	mg/L	8.44 (104.2%)	8.41 (103.9%)	8.36 (103.3%)	Above 90% of the saturation value	-	
	SS	mg/L	<10	<10	<10	30	-	
	Turbidity	NTU	0.86	0.58	0.49	Natural	-	
	Water clarity	m	5	5	5	-	1*	
	Phenols	mg/L	<0.001	<0.001	<0.001	0.001	≤0.005	
	Surface Active Agents	mg/L	<0.025	<0.025	<0.025	-	-	Impermanent foam
							≤3	-
	Ammonia	mg/L	<0.01	<0.01	<0.01	0.02	-	
	Petrol Derivatives	mg/L	<0.003	<0.003	<0.003	0.003	-	
Other parameters referring pollution	Copper (Cu)	mg/L	<0.01	<0.01	<0.01	0.01	-	
	Cadmium (Cd)	mg/L	<0.003	<0.003	<0.003	0.01	-	
	Chromium (Cr)	mg/L	<0.02	<0.02	<0.02	0.1	-	
	Lead (Pb)	mg/L	<0.01	<0.01	<0.01	0.1	-	
	Nickel (Ni)	mg/L	<0.02	<0.02	<0.02	0.1	-	
	Zinc (Zn)	mg/L	<0.01	<0.01	<0.01	0.1	-	
	Mercury (Hg)	mg/L	<0.0005	<0.0005	<0.0005	0.004	-	
	Arsenic (As)	mg/L	<0.001	<0.001	<0.001	0.1	-	
Microbiological Parameters	Total coliform	KOB/ 100 mL	250	300	300	-	500	10000
	Fecal Coliform	KOB/ 100 mL	0	0	0	-	100	2000
	Salmonella	KOB/ 100 mL	0	0	0	-	0	
	Streptococcus	KOB/ 100 mL	0	0	0	-	1000	

* Limit values can be exceeded where the extraordinary geographic and/or meteorological conditions are exist.

Water Quality Comparison with Turkish Water Pollution Control Regulations

The Turkish Water Pollution Control Regulation provides the General Quality Criteria of Sea Water pursuant to the Table 4 of the regulation. The sampling data was compared with the WPCR limits and is shown in Table 9-3. The results indicate that all the parameters that has been analyzed, are below the limit values of the standards which are stated in Table 4 of the "Water Pollution Control Regulation".

Water Quality Comparison with Obligatory Limit Values for Water Used for the Purpose of Swimming and Recreation

In terms of microbiological parameters and physico-chemical parameters (e.g. pH, water clarity, phenols and surface active agents), the analyzed samples were compared with the mandatory limit values defined in the SWQR. The results of the analysis are in compliance with the limit values of the parameters which are defined in the Swimming Water Quality Regulation (SWQR)" (Published in O.G. dated: 9.1.2006, issue number: 26048).

9.3 Impacts during Construction and Operation

- The existing water quality of the port and the nearby areas were assessed through a water quality analysis. The results of the water quality analysis indicate that the current sea water quality is within the limits stated in Table 4 of the Turkish WPCR and SWQR. The water quality of the port is likely to be affected by the construction activities and ongoing activities during hard coal mine project. The main potential source of pollution track is Gömü and Çapak creek which is flowing into the inner port area coming from the east and west edge of Shaft 1. The impacts are expected to be moderate to high due to the construction activities and uncontrolled discharges to those creeks unless mitigations are properly undertaken. A number of adverse impacts on water quality may occur as a result of: any direct or indirect discharge of polluting substances to receiving water such as litter from both mining and port operations and construction.
- During construction phase of the proposed project, increased sediment suspension called as turbidity in marine waters during pile driving, filling operation, construction of reclamation areas, breakwater and other port components has the potential to reduce light penetration and reduce water quality. The most important considerations related with the construction activities will be the placement of rock layers into the seabed it will create suspension in the water body. Re-suspension of contaminants in sediments during project construction activities may remobilize metals from the sediments and ease the penetration into the water column. Indirect effects of increased turbidity include reduced light penetration, preventing marine vegetation from grooving and smothering of benthic fauna. This impacts are discussed further in Chapter 13 Ecology.
- Slight changes in long term may occur due to the transportation of materials by means of wave and flow. Only sand accumulation is expected on the coast of breakwater by time. The impacts related with this situation is considered as minor of significance.
- Wave current modelling studies in the vicinity of proposed port area showed that the likelihood of significant sedimentation or corrosion appears unlikely and pollution deposition is generally unlikely to be an issue in the absence of major pollutant inputs.
- There will not be any impact expected on shore erosion or scouring due to the port construction activities.
- For the marine transportation of the coal, maximum of 2 vessels are expected to anchor at HEMA Port in a week. Therefore, no major regulations are necessary for the vessel traffic, however; a Maneuvering Simulation Report was prepared to identify the risks regarding the

vessel movements at the port. Details of the report is given in *Chapter 15: Community Health and Safety*.

- The marine water quality is currently considered to be uncontaminated (See Section 9.2.3 Marine Chemistry) in line with the relevant regulations.
- A waste reception facility will be constructed on-site and relatedly wastes will be received, stored and transferred the operational ship waste according to the Regulation of Reception of Ship-Generated Wastes and Waste Control (Official Gazette Number /date: 25682/ 26.12.2004). Therefore no negative impacts are foreseen on the marine environment.
- Uncontrolled discharge of the sewage to the marine environment will have an adverse impact on the water quality of the receiving environment. In order to avoid this, the generated wastewater will be treated in a package biological waste treatment facility. The effluent of treatment plant will be discharged to Gomu and Capak Creek in line with the Turkish WPCR. The discharge parameters will be monitored as per the WPCR are limited. The generated wastewater sludge will be sent to appropriate licensed waste reception facilities later on. As a result, the impact can be considered as negligible if proper mitigation is in place.
- Discharges and spills as a result of machinery and vessel collisions (e.g. accidental circumstances) may occur and the related impact will be minor to major significance depending upon the amount of the discharge and timely response to the accidents in line with the Emergency Response Plan.

The overall impact on marine water quality due to project activities including both the construction and operational phase is considered to be of moderate significance unless mitigation measures undertaken.

9.4 Mitigation Measures

Mitigation measures to avoid and/or mitigate the potential impacts will include the following:

- All the results of the sea water sample analytical parameters are consistent with the limit values stated in Table 4 in WPCR. Water quality will be monitored during both operation and construction phase of the project and the levels of contamination will be monitored as well with the specified parameters as defined in Table 4 in WPCR. Necessary precautions will be taken to not to place burden to current situation of the water quality.
- During the construction phase of the project, sea water analysis will be conducted in every three months in accordance with the criteria stated in ""Swimming Water Quality Regulation (SWQR)" and one copy of the analysis report will be submitted to Bartın Provincial Directorate of Health.
- Contingency measures will be taken and emergency response procedures against to accidental release of chemicals or other hazardous materials and relatively care will be paid to minimize the damage to marine habitat and fauna during construction activities both for Port and Mine. Emergency Preparedness and Response Plan for the port will be in line with the law on "Response to emergencies and compensation of losses in case of pollution of the marine environment from oil and other harmful substances " (Law no: 5312, Official Gazette issue number and date: 26326/21.10.2006). This plan will include the incidents of oil spills, vessel collisions, fire etc.

- Due to the rocky and steep slope nature of the seabed characteristics, the only sand accumulation is expected the outer and eastern part of the breakwater. Since the marine biota is sensitive and subject to environmental stress more quickly, the impact associated with the sediment deposition will be minimized with the placement of enrockment screen.
- In order to prevent runoff and dust emissions during construction and operation phases, raw material and coal storage areas will be equipped in a diligent manner. Dust suppression will be applied with the proper chemicals onto the coal storage area to prevent dust emissions.
- Marine biota losses will be minimized with appropriate housekeeping to prevent litter and other waste associated with site activities.
- Ship generated wastes such as "bilge water" (contaminated water remains after bulk cargo) will be accepted by HEMA port and stored in waste reception facilities and delivered to a licensed company in line with the Regulation of Reception of Ship-Generated Wastes and Waste Control and MARPOL Convention.

9.5 Residual Impacts

The residual impact on water quality from increased turbidity as a result of construction activities mentioned above and the re-suspension of sediments, is estimated to be insignificant assuming that the relevant mitigation measures mentioned above and mentioned in *Chapter 9: Marine Environment* are implemented.

Implementation of good site practices in line with the international and national standards will minimize the probability of occurrence of accidental spills and the residual impact estimated to vary from insignificant to of minor significance. On the other hand, the residual impact may be of moderate significance in the event of large accidental spills.

In the event of discharge of pollutants with high concentration from Gömü and Çapak creek, the residual impact on the water quality of the port may be of moderate significance. With the implementation of the appropriate mitigation which are mentioned above, the residual impact is estimated to be insignificant.

As the wastewater discharges are managed properly both during the construction and operation phase of the project and necessary limits are provided, the residual impact on water quality as a result of discharge of sanitary wastewater is estimated to be insignificant.

10.0 AIR QUALITY

10.1 Scope

Emissions during construction and operation of the Project will contribute to regional air pollutant levels and thereby may impact health of nearby communities, workers and other sensitive receptors. This chapter presents the assessment of the impacts of Project-related emissions on air quality and sets out the mitigation measures to avoid or minimize the risks together with the residual impacts that are foreseen to remain.

The most significant direct or indirect sources of air pollutants from the mining operations will include emissions from mine ventilation system (containing mainly methane gas), dust emissions from coal handling, storage and transportation, exhaust emissions from boilers and coal washing plants, and exhaust emissions from ship traffic and increased road traffic.

In addition to impacts on air quality during the operation of the Project, the assessment also considers short term effects from construction activities. Adverse effects can be caused by exhaust emissions from construction machinery and vehicles and also from activities generating particulate matter (such as earthworks, stockpiling/handling of excavated materials and operations of concrete plants). In addition to affecting health, dust can lead to unsightly and potentially harmful deposits on property and vegetation if not managed properly.

The following sources of information have been used during the assessment:

- Literature survey
- Bartın Province Environmental Status Report (2013)
- Air Quality Modeling Report by Ennotes Ltd. (2015)
- Data provided by the General Directorate of Meteorology
- Amasra Hard Coal Production Project Report by SRK (October 2013)
- An Independent Technical Report on the Amasra B Coal Mine, Bartin Province/Turkey by SRK Consulting UK (Draft report, February 2014)
- Environmental Impact Assessment Report for HEMA Thermal Power Plant, Limestone Quarries and Ash Deposition Site prepared by MGS Proje Ltd. (January 2013)
- Environmental Impact Assessment Report for HEMA Port (Reclamation Area and Quay) prepared by Dokay-ÇED Ltd. (April 2013)
- Project Introduction File for HEMA Coal Washing Plant prepared by Dokay-ÇED Ltd. (January 2014)

The significance criteria that are used related to impacts on air quality are presented below.

Impact Significance	Description
Negligible	- No perceptible change in baseline conditions
Minor	- Temporary dust and gas emissions within the Project area during construction and operation activities - Temporary emissions due to construction equipment and vehicle movements resulting in change in baseline air quality by 20% - Emissions during operation resulting in change in baseline air quality by 20%
Moderate	- Temporary dust and gas emissions extending the project area during construction and operation activities - Temporary emissions due to construction equipment and vehicle movementsresulting in change in baseline air quality by 40% but still below regulatory and IFC air emission limits

Impact Significance	Description
	- Emissions during operation resulting in change in baseline air quality by 40% but still below regulatory and IFC air emission limits
Major	- Temporary emissions due to construction equipment and vehicle movements, and during operation resulting in change in baseline air quality by 70% or above regulatory and IFC air emission limits - Emissions during operation resulting in change in baseline air quality by 70% or above regulatory and IFC air emission limits

10.2 Legal Context

This section provides an overview of Turkish and international ambient air quality standards. In Turkey, ambient air quality is regulated under the Regulation on Assessment and Management of Air Quality - RAMAQ (Official Gazette Date/Number: 06.06.2008/26898) and Industrial Air Pollution Control Regulation – IAPCR (Official Gazette Date/Number: 03.07.2009/27277), which both set up a tiered system to reduce air quality limits (general air quality limits and limits applicable to industries) over time and both provide mostly identical ambient air quality limits for pollutants.

Annexes of these regulations specify air quality targets as summarized in Table 10-1 below. As Turkey is a candidate for accession to the EU, standards set out in the EU Council Directive 2008/50/EC on ambient air quality, which are generally equivalent to IFC and WHO targets, are also considered to be relevant and included in Table 10-1.

Table 10-1: EU Council Directive 2008/50/EC, Turkish ambient air quality standards (as per RAMAQ Annexes 1 and 1A and IAPCR Annex 2) and IFC standards

Parameter	Concentration in µg/m^3								
	Hourly average			Short-term value, STV (Daily average)			Long-term value, LTV (Annual average)		
	EU standards	Turkish standards	IFC	EU standards	Turkish standards	IFC	EU standards	Turkish standards	IFC
Nitrogen dioxide (NO_2)	200	2014[a,b] =300 2024[a] =200	200	-	-	-	40	2014[a,b] = 60 2024[a] = 40	40
Sulfur dioxide (SO_2)	350	2014[a,b] =500 2019[a] =350	-	125	2014[a,b] =250 2019[a] =125	20	-	-	-
Carbon monoxide (CO)	-	-	-	10,000 (8-hr)	2014[a] = 10,000 2014 (8-hr)[a,b] =16,000 2017 (8-hr)[a] =10,000	-	-	-	-
Particulate matter with diameter of 10 µm or less (PM_{10})	-	-	-	50	2014[a,b] = 100 2019[a] = 50	50	40	2014[a,b] = 60 2019[a] = 40	20
Fine particles <2.5µm ($PM_{2.5}$)	-	-	-	25	-	25	25 (2015) 20 (2020)	-	10

[a]as provided in RAMAQ Annex 1.

[b]limit value will decrease equally each year to reach the next limit value

10.2.1 Air Quality Index

Air quality index is a scale defined by the Ministry of Environment and Urban Planning (MEUP) to identify air quality. The index classifies ambient air quality into 6 categories from 1 (very good) to 6 (very bad) and every category is visualized by colors. The index is based on the concentrations of five pollutants; these pollutants and their air quality index levels are shown in Table 10.2.

Table 10-2: Air quality index of main pollutants)

Air Quality Index	SO_2	NO_2	CO	O_3	PM_{10}
	Hourly Average	Daily Average	Daily Average	Hourly Average	Daily Average
	[µg/m³]	[µg/m³]	[mg/m³]	[µg/m³]	[µg/m³]
1-(Very Good)	0 - 50	0 - 45	0 – 1.9	0 - 35	0 - 25
2 (Good)	51 - 199	46 - 89	2.0 – 7.9	36 - 89	26 - 69
3 (Moderate)	200 - 399	90 - 179	8.0 – 10.9	90 - 179	70 - 109
4 (Medium)	400 - 899	180 - 299	11 – 13.9	180 - 239	110 - 139
5 (Bad)	900 – 1,499	300- 699	14.0 - 39.9	240 - 359	140 - 599
6 (Very Bad)	>1,500	> 700	> 40.0	> 360	> 600

10.3 Climate and Meteorological Conditions

Amasra is under the influence of a climate typical of coastal Black Sea, which is wet, humid and warm, with large amounts of rainfall received throughout the year.

Meteorological data on temperature, precipitation, relative humidity, pressure and wind flow, as recorded at the Amasra meteorological station which is the nearest meteorological station to the Project (Elevation: 73 m, Latitude: 41.45 N, Longtitude: 32.23 E), are described in the following sections. The data have been provided by the General Directorate of Meteorology.

10.3.1 Temperature

Monthly average values of temperature parameters based on data collected in Amasra meteorological station for a period of 41 years (1970-2011) are provided in Table 10-3.

Table 10-3: Average temperature data for a period of 41 years (1970-2011)

Temperature parameters	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean temp.(°C)	6.3	6.1	7.5	10.9	15.0	19.5	22.0	22.1	19.1	15.5	11.5	8.2
Mean high temp.(°C)	9.4	9.4	10.9	14.5	18.4	22.9	25.2	25.4	22.5	18.8	14.9	11.3
Mean low temp. (°C)	3.7	3.4	4.6	8.0	12.0	16.3	18.7	18.9	16.0	12.7	8.7	5.6
Max. recorded temp.(°C)	23.8	25.0	29.8	32.9	35.0	38.2	38.4	36.6	34.8	36.4	29.0	25.0
Min. recorded temp. (°C)	-7.9	-8.4	-5.4	-0.2	4.0	9.0	10.2	9.3	7.1	1.3	-1.2	-4.0

The annual mean temperature, annual mean high temperature and annual mean low temperature observed in Amasra are 13.64°C, 16.97°C and 10.72°C, respectively. The minimum and maximum temperatures that occurred in Amasra during the 1970-2011 period are -8.4°C and 38.4°C.

10.3.2 Precipitation

Based on the meteorological data obtained from the Amasra meteorological station for the period between 1970-2011, the total average annual precipitation in the region is 1000.7 mm with average monthly precipitations ranging from 46.7 mm in May to 124.7 mm in December (Table 10-4).

Table 10-4: Average precipitation data for a period of 41 years (1970-2011)

Precipitation parameters	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean number of days with precipitation	15.7	13.7	12.8	11.2	9.6	7.9	6.2	6.3	8.6	11.5	13.0	16.2
Mean total monthly precipitation (mm)	99.8	72.5	70.6	51.7	46.7	62.3	60.7	72.4	95.6	121.0	122.7	124.7
Maximum precipitation (mm)	49.4	44.4	44.0	30.8	71.8	88.4	90.2	95.6	86.6	77.3	84.8	60.6

10.3.3 Humidity and Pressure

Based on the meteorological data obtained from the Amasra meteorological station for a period of 41 years (1970-2011), the average monthly humidity in the region ranges from 68.2% in December to 76.1% in May (Table 10-5).

Table 10-5: Relative humidity and pressure data for a period of 41 years (1970-2011)

Humidity and pressure parameters	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average humidity (%)	70.3	70.5	71.4	72.9	76.1	73.5	75.1	75.1	72.4	72.7	68.9	68.2
Minimum humidity (%)	13	7	7	7	10	20	27	14	19	14	11	11
Mean pressure (kPa)	101.1	100.9	100.8	100.6	100.6	100.5	100.4	100.5	100.7	101.0	101.0	101.1
Max. pressure (kPa)	103.1	102.9	103.1	102.4	101.7	101.6	101.3	101.4	102.0	102.3	102.5	102.7
Min. pressure (kPa)	97.9	98.7	98.3	98.9	99.3	99.2	99.2	99.4	99.2	99.6	98.3	98.9

10.3.4 Wind Characteristics

The primary prevailing wind direction in Amasra is to the south-southeast (SSE); secondary prevailing wind direction is east-northeast (ENE); and the third prevailing wind direction is south (S). The average annual wind speed is 4.1 m/s. Maximum wind speed is recorded as 42 m/s in November in the west-southwest (WSW) direction.

Table 10-6: Monthly average wind speed between the years 1970-2011

Wind speed (m/s)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual ave.
Ave. wind speed	4.6	4.7	4.3	3.9	3.4	3.3	3.6	3.7	3.9	4.3	4.4	4.8	4.1
Max. wind speed and direction	-	37.0 WNW	41.0 WSW	38.0 WSW	28.5 WSW	33.4 W	38.1 W	29.9 ESE	34.3 SSE	38.8 W	42.0 WSW	38.0 WSW	42.0 WSW

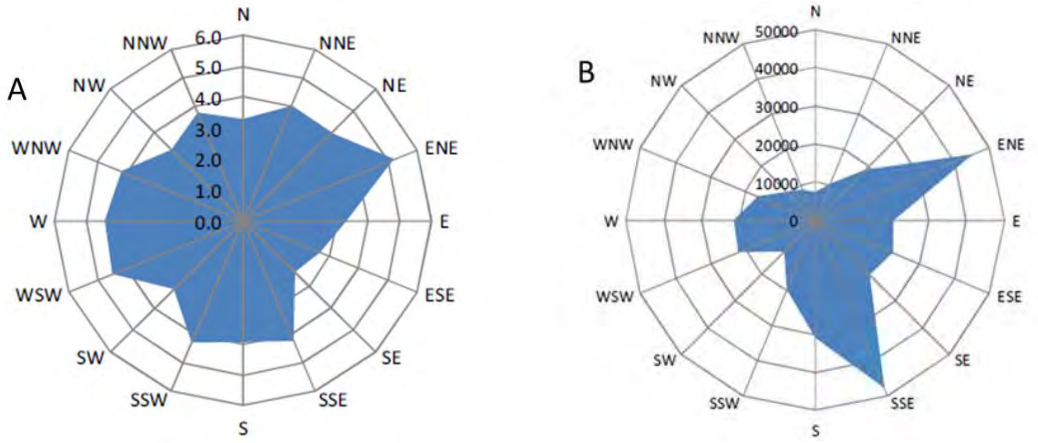


Figure 10-1: Annual wind diagram(A) and number of long-term wind blowings (B)

10.4 Air Quality Baseline Conditions

10.4.1 Background

The land use around the Project Areas is described in *Chapter 5: Land Use and Zoning*. There are no industrial facilities within the close proximity of the Project. According to the assessments conducted by the relevant authority at the end of 2013, the main causes of the air pollution in the province are identified as traffic related emissions (due to increase in population) and heating emissions (due to use of fossil fuels). The nearest air quality monitoring station established by the MEUP is in Bartın (Latitude: 41.62 N, Longtitude: 32.36 E) located approximately 12 km south of Amasra. Annual average air pollutant concentrations measured at the station for the year 2013 are 66 µg/m^3 for PM_{10} and 15 µg/m^3 for SO_2. Monthly average concentrations recorded in 2013 are given in Table 10-7.

Table 10-7: Average concentrations of air pollutants (SO_2 and PM_{10}) in Bartın province in 2013 [1]

Air Pollutants (*µg/m^3*)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual ave.
SO_2	-	37	31	13	3	4	3	3	4	10	26	47	15
PM_{10}	105	93	85	68	60	38	35	40	32	64	92	111	66

[1] *:No other pollutants are measured in Bartın air quality monitoring station*

10.4.2 Baseline Air Quality Measurements

Environmental baseline information on air quality formerly gathered for the port project (reclamation area and quay) and other investments of HEMA has been utilized for this ESIA study.

In order to determine and assess the baseline air quality of the Project area, air quality monitoring measurements were conducted using passive sampling tubes in 3 seperate periods of 20 days in July-September of 2013 to measure NO_2 and SO_2 parameters. PM_{10} measurements were also conducted with three times of 24-hours sampling in two locations in the Project impact area. Furthermore, PM deposition sampling was conducted in four locations for two months.

Upon obtaining the sampling results, the following values were calculated for each parameter, as per the related regulations:

Long-Term Value (LTV): Arithmetical mean of the sampling results
Short-Term Value (STV): Maximum daily average value or the value remaining below 95% of all measurements when sorted in numerical order
Total Pollution Value (TPV): Sum of Air Pollution Contribution Value (APCV) and LTV, which is considered for proposed projects/new facilities.

The results of PM deposition sampling and comparison of the calculated STV values with Turkish regulatory limits are presented in Table 10-8 below.

Table 10-8: PM deposition sampling results

Sampling Location	PM deposition (mg/m^2.day)	National Short Term Limit Value for 2024 (µg/m^3)[1]
1	79.2	390
2	226	
3	9.7	
4	31	

[1]: as per IAPCR Annex 2, Table 2.2

Results of PM_{10} sampling in Project area, including a comparison with Turkish regulatory limits, are presented in Table 10-9.

Table 10-9: PM_{10} sampling results

Sampling Location	PM_{10} (µg/m^3)			Average value	National Short Term Limit Value for 2024 (µg/m^3)[1]
	1	2	3		
1	1.82	1.84	**2024**	1.55	50
2	1.58	1.82	1.48	1.63	50

[1] :as per IAPCR Annex 2, Table 2.2

Results of baseline gas sampling in 20-day periods and their comparison with the LTV values with Turkish regulatory limits are presented in Table 10-10.

Table 10-10: Gaseous pollutant sampling results

Sampling Location	NO_2 (µg/m^3)			SO_2 (µg/m^3)		
	1st Period	2nd Period	3rd Period	1st Period	2nd Period	3rd Period
1	1.26	*	4.01	<LOD	3.33	<LOD
2	1.68	2.26	3.54	<LOD	<LOD	<LOD
3	1.88	2.99	3.31	<LOD	<LOD	<LOD
4	6.99	5.61	7.41	<LOD	<LOD	<LOD
5	3.17	3.20	5.95	<LOD	<LOD	<LOD
6	2.02	3.02	4.94	<LOD	<LOD	<LOD
7	5.44	6.30	9.29	<LOD	<LOD	<LOD
8	4.80	4.17	6.18	<LOD	<LOD	2.71
	Long Term Limit Value[1]: 30 µg/m^3			**Long Term Limit Value[1]: 20 µg/m^3**		

LOD: Limit of Detection
* Passive sampling tube lost in the field, therefore analysis not conducted 1:as per RAMAQ Annex I limit values
[1]:as per RAMAQ Annex I limit values

As can be seen in the results, pollutant concentrations did not change much throughout the measurements. All of the parameters are below the limits defined in the related regulations.

In Table 10-10, SO_2 parameter of the region was below the limit of detection since the measurements were conducted in summer period. On the other hand, Table 10-7 shows that along the winter period, SO_2 emissions are even higher than the limit values because of coal burning for heating purposes. As for NO_2 parameter, considering the touristic value of the region and the sampling locations, the emission values are believed to be caused by traffic.

10.5 Air Quality Modeling

Air quality modelling study was conducted by Ennotes Environmental Engineering Consultancy Contracting Co. (Ennotes) and results are provided in the Air Quality Assessment and Modeling Report by Ennotes (2013) which is provided in Annex I-1.

10.5.1 Methodology

Modeling studies were carried out for both construction phase dust emissions (PM_{10} and PM deposition) and operation phase NO_X emissions. While the impact area defined in the IAPCR for the modeling study is an area with a radius of 50 times of the stack height (which makes 2 km x 2 km), an area of 10 km x 10 km covering the required impact area of 4 km x 4 km by the IAPCR, was used in this modeling study.

Definition of the Dispersion Model

AERMOD model is one of the most developed computer models estimating hourly, daily and yearly GLC's on the basis of the real time values. Model comprises the calculations of different dispersion models for different sources (point, volume, line) from isolated stacks to fugitive pollutants. Additionally, it considers conditions like aerodynamic waves and turbulence.

AERMOD model works in a network system defined by the user and calculations are made for corner points of each receiving environment segments forming the network. The network system used by AERMOD model can be defined as polar or Cartesian. Additionally, detailed calculations can be made at the discrete receptor points, which can be determined out of the network system. In the dispersion calculations, Planetary boundary layer theory is used. In the model, there is also an option for hilly areas. AERMOD model uses four different data given below:

- Wind direction, wind speed, temperature, mixing height, (depends on user's choice) hourly meteorological data set including wind profile exponential and potential vertical temperature difference.
- Coordinates and heights of each element in the network system defined as receiving environment.
- Data sets including source coordinates based on a starting point determined by the user, source height, diameter, emission rate, temperature and flow rate.

The results of the model are suitable for the preparation of dispersion maps including whole dispersion area. Therefore, the assessment of regional air quality under different scenarios (e.g. different treatment conditions, various pollution sources or varying seasonal conditions) is possible.

The modeling study that estimates gas pollutants and dust concentrations in ambient air by the help of mathematical calculations is comprised of following items:

- "Dispersion Area" for analyzed source is determined.
- A rectangular grid system for the determined dispersion area is prepared with a grid system of 500 m x 500 m and information on latitude, longitude and elevation is obtained. The corners of these grids are nodes.
- Information about the pollutant sources in the dispersion area is obtained.
- Hourly meteorological data of a representative year is obtained.

Hourly, daily and annual average GLC values of pollutants in the ambient air can be estimated by running the model after transferring the information stated in the above steps.

Meteorological Data Set

Long term meteorological data needed for modeling studies is obtained from the regional meteorological stations. In this study, Bartin Meteorological Station of the Turkish State Meteorological Service is considered as suitable and the meteorological data recorded in this station was used in the modeling study. Since upper air observation values of the region are not measured by this station, these records were obtained Istanbul Meteorological Station.

10.5.2 Emissions

The Project will comprise of construction and operation phases; therefore air quality effects of the Project have been considered for these two phases. These effects are explained in the following section.

10.5.2.1 Construction Phase

Emission sources of the project can be classified into two categories as stack emissions and non-stack emissions. Non-stack emissions are represent the emissions which occur from especially land preparation and productive activities such as excavation, reclamation of the site, earthworks etc. Only dust emissions will be occur as non-stack emission. Stack emissions are represent the emissions which occur from mining ventilation and it is expected only CO emission will be occur.

In order to calculate dust emissions, emission factors were used. Particulate matter emission factors are taken from Regulation on the Control of Air Pollution Originating from Industry Annex-12 Table 12: Emission Factors Used to Calculate Dust Emissions. Dust emissions emitted from earthwork activities (excavation, loading, transport, etc.) and vehicle movements are calculated by using IAPCR Annex-12 emission factors which are shown in Table 10-11.Table 10-10

Table 10-11: Emission Factors Used to Calculate Dust Emissions

Sources	Emission Factors (kg/ton)	
	Uncontrolled	Controlled
Excavating	0.025	0.0125
Loading/Unloading	0.010	0.005
Carrying	0.7	0.35
Storage	5.8 (kg/ha-day)	2.9 (kg/ha-day)

According to these factors, dust emissions are calculated as shown in Table 10-12.

Table 10-12: Dust emissions calculations for earthwork activities

Area	Activity	Hourly Activity Amount	Emissions Value (kg/h)	
			Emission Factors	Emission (kg/h)
Shaft-1	Loading	23.74 ton/h	0,005 kg/ton	0.118
	Carrying		0,35 kg/km	0.084
	Unloading		0,005 kg/ton	0.118
Shaft-2	Loading	24.86 ton/h	0,005 kg/ton	0.124
	Carrying		0,35 kg/km	0.728
	Unloading		0,005 kg/ton	0.124
Shaft-3	Loading	20.74 ton/h	0,005 kg/ton	0.104
	Carrying		0,35 kg/km	0.616
	Unloading		0,005 kg/ton	0.104
Quay Construction	Unloading	534.2 ton/h	0,005 kg/ton	2.67
	Carrying		0,35 kg/km	2.34

10.5.2.2 Operation Phase

Calculated dust emissions that assumed to be originated from the activities during the coal production, storage and transportation are given in Table 10-13.

Table 10-13: Dust emissions calculations for earthwork activities

Area	Activity	Hourly Activity Amount	Emissions Value (kg/h)	
			Emission Factors	Emission (kg/h)
Spoil Dumpsite-1	Storage	8.85 ha	2.90 kg/ha.day	1.07
Spoil Dumpsite-2	Storage	0.72 ha	2.90 kg/ha.day	0.087
Coal Storage Area-1	Storage	0.64 ha	2.90 kg/ha.day	0.077
Coal Storage Area-2	Storage	1.6 ha	2.90 kg/ha.day	0.193
Coal Cleaning Area	Excavating	6.30 ton/h	0.0125 kg/ton	0.079
Coal Production	Loading	1,100 ton/h	0.005 kg/ton	5.5
	Unloading		0.005 kg/ton	5.5
	Carrying	750 ton/h	0.35 kg/km	13.12

Stack emissions will be occur from ventilation system and CO emissions will be released. There will be 3 different ventilation fans with independent stack. It is expected that 44 kg/day CO emission will be emitted. According to Annex-3 of IAPCR about the detection of the emissions of an industrial facility, organic compounds containing carbon should not exceed the limit value of 10 kg/h. Therefore, CO emissions originating from the ventilation fans do not pose a risk according to national regulation.

10.5.3 Dispersion Modeling Results

10.5.3.1 Non-Stack Ground Level PM_{10} and PM Deposition Concentrations

Modeling studies are carried out for dust parameters for non-stack activities. Ground level concentrations (GLC) of PM_{10} and PM Deposition, determined from the modeling studies are listed in Table 10-14 and the dispersion of PM_{10} and PM deposition GLC values for non stack emissions are shown in Figure 10-2.

Table 10-14: Maximum GLC Values Determined from the Modeling Studies

Parameter	Averaging Period	Maximum GLC Values and coordinates (µg/m^3 for PM_{10}, mg/m^2.day for PM Deposition)	National Limit Values for 2024 (µg/m^3)	EU Limit Values (µg/m^3)	WHO Limit Values (µg/m^3)
PM_{10}	*Daily (max.)*	443.61 (444389, 4618526)	50	50	50
	Daily (90.73%)	37.19 (445389, 4620026)	50	50	50
	Yearly	16.59 (444389, 4618526)	40	40	20
PM Deposition	*Monthly*	4.63 (444889, 4619526)	390	-	-
	Yearly	1.85 (444889, 4619526)	210	-	-

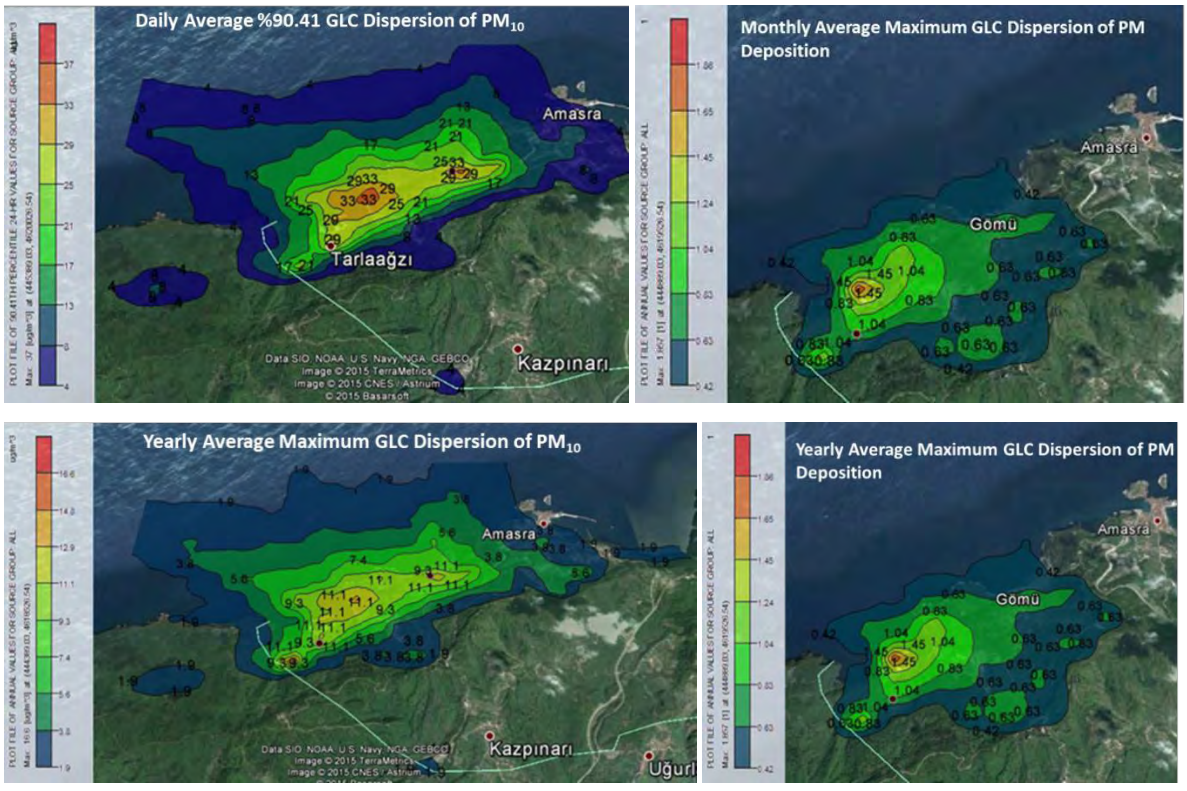


Figure 10-2: Dispersion of PM_{10} and PM deposition GLC values

10.5.3.2 Stack-Ground Level CO Concentrations

Modeling studies are carried out for CO parameter for stack emissions. GLC's of CO, determined from the modeling studies are listed in Table 10-15 and the dispersion model of the CO emission is shown in Figure 10-3.

Table 10-15: Maximum GLC Values Determined from the Modeling Studies

Parameter	Averaging Period	Values (µg/m^3)	National Limit Values for 2024 (µg/m^3)	EU Limit Values (µg/m^3)	WHO Limit Values (µg/m^3)
CO	8 Hour average	262.85 (449114, 4622267)	10.000	10.000	-

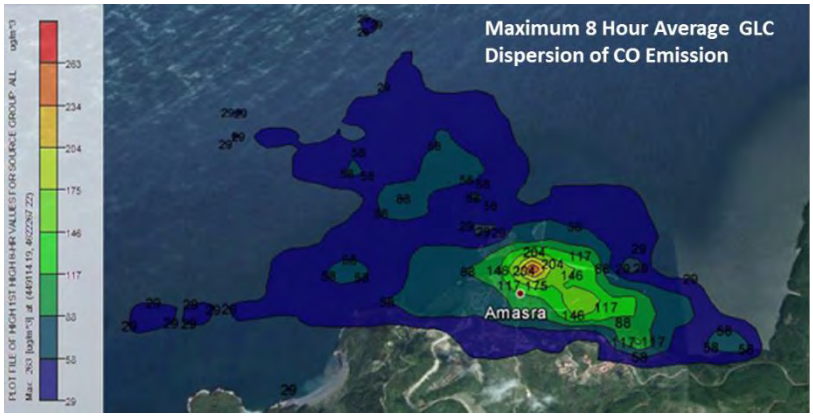


Figure 10-3: Maximum 8-Hour Average GLC Dispersion of CO Emission

10.6 Methane Gas Drainage and Recovery System

In order to avoid the risks related to lack of air quality while working underground, 35% of methane is being planned to be drained and therefore a methane drainage system will be installed in Shaft-3. Within the scope of the methane recovery project:

- Two exit pipes with having diameters of 500 mm and 700 mm will be placed in Shaft-3. These pipes will be installed down to the production panels.
- During the development of the production panels, methane will be drained from the points on bottom road and upper bottom road, every 5 meters. Furthermore, inclined methane drainage system will be installed into the production panels with the drainage pipes having the cross-sectional area of 8 m^2.
- A methane drainage station will be installed underground and two pump groups having the suction capacity of 200 m^3/min will operate in case the aboveground system is insufficient for lowering the methane concentration.
- Two vacuum pump systems are planned to be placed in the aboveground methane drainage station. Two of these pumps will be connected to the pipe having the diameter of 500 mm (with the capacity of 260 m^3/min; 10 Kv; 350 kW) and the other one will be connected to the pipe having the diameter of 700 mm (with the capacity of 500 m^3/min; 10 Kv; 715 kW).

Afterwards, the drained methane will be recovered by generating electricity to be used in the underground activities throughout the production phase. Layout of the methane drainage system is given in Annex I-2.

10.7 Green House Gases (GHGs) Estimations

There are GHGs emitted as part of the coal mining. The GHGs emissions from coal mining also arise from fugitive emissions. Fugitive gas emissions refers to escape gases when coal is mined in underground operations. Fugitive emissions from underground mines involve the release of methane and carbondioxide during the process fracturing of coal, overburden and underburden strata and besides the emission also arises from stockpiling. The gas needs to be removed from the underground to ensure safety for the workers by removing the accumulations of gases from surrounding strata. Emissions will also occur if coal mine waste gas is flared. There are six GHGs form part of the KYOTO Protocol in UN, carbon dioxide, methane, nitrous oxide (N_2O), hydroflurocarbons (HFCs), perfluorocarbons (PFCs), Sulphur hexafluoride (SF6). Of particular importance for the present operation is the release of Carbon Dioxide and Methane gases.

As mentioned previously, methane will be drained and vented through ventilation fans to be installed at Shaft-3. Methane gas will be drained during the development of production panels and coal production. An amount of 6-13 m^3/tonne in-situ methane is measured in coal at production areas according to a geological assessment for Zonguldak basin prepared for TTK; this data has been used for ventilation calculations. The anticipated methane emissions from each shaft and assumed level of methane drainage capture has been taken into account during the calculations. According to the calculations, 35% of methane is being planned to be drained and flared.

Table 10-16 is used for assessing the emission factors for coal mine waste gas used for combustion. Table 10-17 shows the GHG emissions from methane recovered and flared as well as methane emissions liberated directly to the atmosphere based on the yearly production schedule

Table 10-16: Emission factors for the consumption of coal mine waste gas that is captured for combustion

	Energy Content Factor (GJ/m^3)	Emission Factor (kg CO_2-e/GJ)		
		CO_2	CH_4	N_2O
Coal mine waste gas that is captured for combustion	$37.7*10^{-3}$	51.6	5	0.03

Using the given data above, the GHGs emission were estimated through using the factors in terms of CO_2 equivalent. Accordingly, gaseous fuel combustion emissions can be estimated thorugh the following formula;

$$Eij = \frac{Q \times EC \times EF}{1000}$$

*Eij: the emission of gas type (carbondioxide, methane or nitrous dioxide) in terms of CO_2-e tonnes
*Q: is the quantitiy of fuel type (cubic meters)
*EC: is the energy content factor of fuel type (gigajoules per cubic meter)
*EF: is the emission factor for each gas type (which includes the effect of an oxidation factor)

Fugitive emissions from coal mine waste flared can be estimated by multiplying the quantity of gas flared by the energy content and emission factor of each gas typE. The results shall be multiplied with the correction factor for the oxidation of coal mine waste gas flared, QFi: 0.98/0.995. Then the estimated emissions of each GHGs as follows:

Table 10-17: Methane and GHGs emissions based on annual productions of Amasra Coal Mine

			METHANE RECOVERED BY DRAINAGE				METHANE EMISSION (LIBERATED TO THE ATMOSPHERE)				METHANE RECOVERED BY DRAINAGE		FUGITIVE EMISSIONS FROM COAL MINE WASTE FLARE		FUGITIVE EMISSIONS FROM COAL MINE WASTE FLARE		FUGITIVE EMISSIONS FROM COAL MINE WASTE FLARE		METHANE EMISSION (LIBERATED TO THE ATMOSPHERE)	
	PLANNED COAL PRODUCTION OF AMASRA-B PROJECT		METHANE RECOVERED BY DRAINAGE DURING DEVELOPMENT AND PRODUCTION OF WC COALS		METHANE RECOVERED BY DRAINAGE DURING DEVELOPMENT AND PRODUCTION OF WC COALS		METHANE LIBERATED IN UNDERGROUND RETURN AIRWAYS DURING PRODUCTION OF WC-COALS		METHANE LIBERATED IN UNDERGROUND RETURN AIRWAYS DURING PRODUCTION OF WA-COALS		TOTAL RECOVERED METHANE		CARBON DIOXIDE		METHANE		NITROUS DIOXIDE		TOTAL LIBERATED METHANE	
YEARS	WC COALS (ton)	WA COALS (ton)	minimum (m³)	maximum (m³)	minimum (m³)	maximum (m³)	minimum (m³)	maximum (m³)	minimum (m³)	maximum (m³)	minimum (m³)	maximum (m³)	minimum (tonnes CO2	maximum (tonnes CO2	minimum (tonnes CO2	maximum (tonnes CO2	minimum (tonnes CO2	maximum (tonnes CO2	minimum (m³)	maximum (m³)
2015	4,880	-	14,689	19,227	-	-	27,279	35,673	-	-	14,689	19,227	28	37	3	4	0	0	27,279	35,673
2016	214,275	25,818	644,968	844,244	86,490	113,341	1,197,797	1,566,350	160,846	210,417	731,458	957,585	1,394	1,826	135	177	1	1	1,358,643	1,776,767
2017	1,583,336	151,113	4,765,841	6,238,344	506,229	663,386	8,850,848	11,574,186	941,434	1,231,571	5,272,070	6,901,730	10,051	13,158	974	1,275	6	8	9,792,282	12,805,757
2018	2,139,922	1,039,005	6,441,165	8,431,293	3,480,667	4,561,232	11,962,164	15,642,830	6,473,001	8,467,891	9,921,832	12,992,525	18,915	24,769	1,833	2,400	11	14	18,435,165	24,110,721
2019	1,983,222	1,408,440	5,969,498	7,813,895	4,718,274	6,183,052	11,086,211	14,497,353	8,774,581	11,478,786	10,687,772	13,996,946	20,375	26,684	1,974	2,586	12	16	19,860,792	25,976,139
2020	2,012,006	2,405,945	6,056,138	7,927,304	8,059,916	10,562,099	11,247,114	14,707,764	14,989,037	19,608,452	14,116,054	18,489,402	26,911	35,248	2,608	3,416	16	20	26,236,151	34,316,216
2021	2,042,614	2,476,500	6,148,268	8,047,899	8,296,275	10,871,835	11,418,212	14,931,508	15,428,595	20,183,475	14,444,543	18,919,734	27,537	36,069	2,668	3,495	16	21	26,846,807	35,114,983
2022	1,864,886	2,510,317	5,613,307	7,347,651	8,409,562	11,020,292	10,424,713	13,632,317	15,639,275	20,459,084	14,022,869	18,367,942	26,733	35,017	2,590	3,393	16	20	26,063,988	34,091,400
2023	2,019,044	2,383,231	6,077,322	7,955,033	7,983,824	10,462,384	11,286,456	14,759,212	14,847,529	19,423,333	14,061,146	18,417,417	26,806	35,111	2,598	3,402	16	20	26,133,985	34,182,544
2024	1,947,921	2,632,672	5,863,242	7,674,809	8,819,451	11,557,430	10,888,878	14,239,303	16,401,547	21,456,277	14,682,693	19,232,239	27,991	36,665	2,712	3,553	16	21	27,290,425	35,695,579
2025	2,075,235	2,529,494	6,246,457	8,176,426	8,473,805	11,104,479	11,600,564	15,169,968	15,758,748	20,615,376	14,720,262	19,280,905	28,063	36,757	2,719	3,562	16	21	27,359,311	35,785,344
2026	1,788,569	2,405,713	5,383,593	7,046,962	8,059,139	10,561,080	9,998,101	13,074,439	14,987,592	19,606,561	13,442,731	17,608,042	25,627	33,568	2,483	3,253	15	20	24,985,693	32,681,000
2027	2,282,970	2,261,372	6,871,740	8,994,902	7,575,596	9,927,423	12,761,802	16,688,511	14,088,348	18,430,182	14,447,336	18,922,325	27,543	36,074	2,669	3,496	16	21	26,850,150	35,118,693
2028	1,708,519	2,105,116	5,142,642	6,731,565	7,052,139	9,241,459	9,550,621	12,489,274	13,114,873	17,156,695	12,194,781	15,973,024	23,248	30,451	2,253	2,951	14	18	22,665,494	29,645,969
2029	1,828,793	2,035,227	5,504,667	7,205,444	6,818,010	8,934,647	10,222,953	13,368,477	12,679,464	16,587,100	12,322,677	16,140,091	23,492	30,770	2,276	2,982	14	18	22,902,417	29,955,577
2030	2,521,407	1,626,861	7,589,435	9,934,344	5,449,984	7,141,920	14,094,665	18,431,485	10,135,344	13,258,917	13,039,419	17,076,263	24,859	32,554	2,409	3,154	14	19	24,230,009	31,690,402
2031	3,597,395	1,044,248	10,828,159	14,173,736	3,498,231	4,584,249	20,109,438	26,296,957	6,505,665	8,510,621	14,326,390	18,757,985	27,312	35,760	2,647	3,465	16	21	26,615,103	34,807,579

2032	4,715,970	290,500	**14,195,070**	**18,580,922**	**973,175**	**1,275,295**	**26,362,272**	**34,473,741**	**1,809,815**	**2,367,575**	**15,168,245**	**19,856,217**	**28,917**	**37,854**	**2,802**	**3,668**	**17**	**22**	**28,172,087**	**36,841,316**
2033	4,591,233	51,842	**13,819,611**	**18,089,458**	**173,671**	**227,586**	**25,664,992**	**33,561,913**	**322,976**	**422,512**	**13,993,282**	**18,317,044**	**26,677**	**34,920**	**2,585**	**3,384**	**16**	**20**	**25,987,968**	**33,984,426**
2034	3,052,905	679,000	**9,189,244**	**12,028,446**	**2,274,650**	**2,980,810**	**17,065,739**	**22,316,736**	**4,230,170**	**5,533,850**	**11,463,894**	**15,009,256**	**21,855**	**28,614**	**2,118**	**2,773**	**13**	**17**	**21,295,909**	**27,850,586**
2035	2,409,781	264,590	**7,253,441**	**9,494,537**	**886,377**	**1,161,550**	**13,470,676**	**17,615,499**	**1,648,396**	**2,156,409**	**8,139,817**	**10,656,087**	**15,518**	**20,315**	**1,504**	**1,968**	**9**	**12**	**15,119,071**	**19,771,908**
2036	2,152,405	987,142	**6,478,739**	**8,480,476**	**3,306,926**	**4,333,553**	**12,031,944**	**15,734,081**	**6,149,895**	**8,045,207**	**9,785,665**	**12,814,029**	**18,656**	**24,429**	**1,808**	**2,367**	**11**	**14**	**18,181,839**	**23,779,288**
2037	1,864,083	808,789	**5,610,890**	**7,344,487**	**2,709,443**	**3,550,584**	**10,420,224**	**13,626,447**	**5,038,755**	**6,591,630**	**8,320,333**	**10,895,071**	**15,862**	**20,771**	**1,537**	**2,013**	**9**	**12**	**15,458,979**	**20,218,077**
2038	1,229,206	783,853	**3,699,910**	**4,843,072**	**2,625,908**	**3,441,115**	**6,871,262**	**8,985,496**	**4,883,404**	**6,388,402**	**6,325,818**	**8,284,186**	**12,060**	**15,793**	**1,169**	**1,530**	**7**	**9**	**11,754,666**	**15,373,898**
2039	1,264,767	807,323	**3,806,949**	**4,983,182**	**2,704,532**	**3,544,148**	**7,070,048**	**9,245,447**	**5,029,622**	**6,579,682**	**6,511,481**	**8,527,330**	**12,414**	**16,257**	**1,203**	**1,575**	**7**	**9**	**12,099,670**	**15,825,129**
2040	1,212,009	1,046,490	**3,648,147**	**4,775,315**	**3,505,742**	**4,594,091**	**6,775,130**	**8,859,786**	**6,519,633**	**8,528,894**	**7,153,889**	**9,369,407**	**13,638**	**17,862**	**1,322**	**1,731**	**8**	**10**	**13,294,763**	**17,388,679**
2041	1,190,693	1,067,446	**3,583,986**	**4,691,330**	**3,575,944**	**4,686,088**	**6,655,974**	**8,703,966**	**6,650,189**	**8,699,685**	**7,159,930**	**9,377,418**	**13,650**	**17,877**	**1,323**	**1,732**	**8**	**10**	**13,306,162**	**17,403,651**
2042	1,059,842	987,707	**3,190,124**	**4,175,777**	**3,308,818**	**4,336,034**	**5,924,517**	**7,747,445**	**6,153,415**	**8,049,812**	**6,498,943**	**8,511,811**	**12,390**	**16,227**	**1,201**	**1,572**	**7**	**9**	**12,077,931**	**15,797,257**
2043	1,271,418	891,333	**3,826,968**	**5,009,387**	**2,985,966**	**3,912,952**	**7,107,227**	**9,294,066**	**5,553,005**	**7,264,364**	**6,812,934**	**8,922,339**	**12,988**	**17,010**	**1,259**	**1,648**	**8**	**10**	**12,660,231**	**16,558,430**
2044	1,129,975	914915	**3,401,225**	**4,452,102**	**3,064,965**	**4,016,477**	**6,316,560**	**8,260,117**	**5,699,920**	**7,456,557**	**6,466,190**	**8,468,578**	**12,327**	**16,145**	**1,194**	**1,564**	**7**	**9**	**12,016,481**	**15,716,675**
2045	773,819	847707	**2,329,195**	**3,048,847**	**2,839,818**	**3,721,434**	**4,325,648**	**5,656,617**	**5,281,215**	**6,908,812**	**5,169,014**	**6,770,281**	**9,854**	**12,907**	**955**	**1,251**	**6**	**8**	**9,606,863**	**12,565,429**
										TOTAL	**311,418,156**	**407,832,437**	**593,692**	**777,497**	**57,528**	**75,339**	**345**	**452**	**578,686,316**	**756,865,089**

10.8 Impacts

Throughout the Project, dust emissions will arise from earth movements, transport of materials and resources, transport of excavated rokcs, working of machinery and vehicle movements inside the Project area. There will be also gas emissions from coal transportation and storage units. Air dispersion modeling study (for PM_{10} and PM dispersion) was undertaken to estimate the air quality impacts associated with the Project activities. In accordance with the result of the modeling studies, daily and yearly GLC values of PM_{10} are 443.61 µg/m^3 and 16.59 µg/m^3. It is allowed on IAPCR that PM_{10} emissions can exceed limit values more than 35 times during one year period. According to modelling study, Project emissions exceed limit value 29 times and it complies with the IAPCR. Also 35th highest value is calculated as 16.59 µg/m^3 and this value lower than the limit values. Monthly and yearly PM Deposition values for the Project activities are 4.63 µg/m^3 and 1.85 µg/m^3, respectively and these values are lower than the limit values to be complied with the IAPCR.

In addition to that, there will be CO emissions from ventilation fans. According to the conducted modeling study, maximum 8-hour average GLC value of CO is 262.82 µg/m^3. This value is significantly lower than the associated limits to be complied by the year 2024 which are set forth by the RAMAQ and international limit values.

Transport of coal outside the Project area will result in emissions which may have the potential to affect the ambient air quality. The majority of the coal are expected to be transported through Gomu-Tarlaagzi Village Road and Amasra-Bartın Road through Kazpınarı on which more than 100 settlements and also sensitive receptors such as a primary school are passed along the way that may be affected by the emissions. Considering that this type of transportation will be temporary until the HEMA port enters into service, it is considered that the impacts will be of minor to moderate significance.

10.9 Mitigation

An Air Quality Control and Monitoring Plan will be prepared, which will include mitigation measures that will be taken to reduce the dust emissions during the Project activities. Air pollutants will be monitored at nearby sensitive locations to ensure minimal impacts in accordance with the Air Quality Control and Monitoring Plan.The Air Quality Control and Monitoring Plan will include details of sampling locations, monitoring frequency, methods of sampling for each parameter, applicable regulatory limits and will require analysis of samples by accredited laboratories.

The following mitigation measures will be implemented to address dust emissions during construction:

- Minimal particulate emission from the construction activities will be maintained by good management and housekeeping practices and use of dust suppression methods. Water spraying will be performed at dust generating areas inside the Project area especially during dry weather conditions.
- Turkish Regulation on the Control of Excavated Soils, Construction and Demolition Wastes (Official Gazette Date/No: 18.03.2004/25406) will be followed which requires taking necessary measures to minimize dust emissions during excavations.

- Excavated rocks and soil will be dumped only at designated areas and will be placed as far as possible from the settlements. Dusty and loose materials will be properly covered or top layers will be kept moist.
- Screens will be placed as necessary at the dumping areas to reduce dust emissions.
- Coal will be conveyed to the port area in covered containers and good site practices will be applied for coal storage areas to minimize the dust generation.
- Vehicle speed limits will be applied inside the Project area. Truck operators will be trained to comply with speed limits and good construction site practices.
- Trucks carrying coal will be covered before leaving the construction area.
- Transfer roads will be sprayed with water as necessary (for example using mobile bowsers) to prevent significant dust emissions especially in dry weather conditions.
- The construction equipment and trucks will be maintained regularly to keep them in good working condition to minimize exhaust emissions caused by poor performance.
- Low sulphur fuel will be preferred as far as possible.
- Engines of the equipment/trucks will be prevented from idling and running unnecessarily.
- A Traffic Management Plan will be prepared and implemented which will decrease the impacts of the traffic load resulting from the coal transportation. This, in turn, will lower the exhaust emissions from the truck movements.

10.10 Residual Impacts

Impacts from air emissions can be effectively mitigated through good management practices and implementation of mitigation measures mentioned above. For this reason, it is assumed that the residual impacts on air quality will not be significant.

11.0 NOISE

11.1 Introduction

This chapter presents the assessment of the noise impacts that will be generated by the construction and operation of the Project. In order to evaluate the impact of noise due to the Project activities, a noise modeling study was undertaken covering the Project area and its surroundings, both for construction and operation phases.

The results of the noise modeling were then compared with the Turkish and IFC standards considering cumulative noise level that is the sum of modeled noise level and background noise levels. The noise models, assessment and mitigation analysis related to the Project activities included in this chapter were conducted by Frekans Acoustics Lab.

The impact significance criteria that are used related to noise are presented below.

Impact Significance	Description
Negligible	- Cumulative noise level does not result in change in background level
Minor	- Cumulative noise level below the IFC and Turkish standard limit value and resulting in an increase of background noise level up to 3 dBA - Cumulative noise level above the IFC standard limit value and resulting in an increase of background noise level by 1 dBA
Moderate	- Cumulative noise level below the IFC and Turkish standard limit value and resulting in an increase of background noise level more than 3 dBA - Cumulative noise level above the IFC standard limit value and resulting in an increase of background noise levels by 3 dBA
Major	- Cumulative noise level above the IFC and/or Turkish standard limit value and resulting in an increase of background noise level by more than 3 dBA

11.2 Definitions and Methodology

11.2.1 Definitions

Before explaining the studies that were undertaken, it would be helpful to provide definitions of basic acoustical terms and concepts, as given below.

Sound: Sound is vibrational disturbance, exciting hearing mechanisms, transmitted in a predictable manner determined by the medium through which it propagates. To be audible, the disturbance must fall within the frequency range 20Hz to 20,000Hz.

Noise: Noise is typically defined as "unwanted sound", sound being the human sensation of pressure fluctuations in the air. Sound levels are expressed in decibels (dB) on a logarithmic scale, where 0 dB is nominally the "threshold of hearing" and 120 dB is nominally the "threshold of pain".

Background (Baseline) noise: Prevailing noise in a specified environment measured in the absence of the noise being studied.

Decibels (dB): It is the unit describing the amplitude of the sound. The human hear responds to sound logarithmically. The bel is logarithm of the ratio of the two powers and decibel is 1/10 bel.

Frequency: The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or Hz.

Sound pressure level (Lp): It is a logarithmic measure of the effective sound pressure of a sound relative to a reference value. It is measured in decibels (dB) above a standard reference level. The commonly used "zero" reference sound pressure in air is 20 µPa RMS (root mean square), which is usually considered the threshold of human hearing (at 1 kHz).

Sound power level (Lw): Ten times the logarithm of the ratio of the sound power under consideration of the standard reference power of 1 pW (10^{-6} W). The quantity obtained is expressed in decibels.

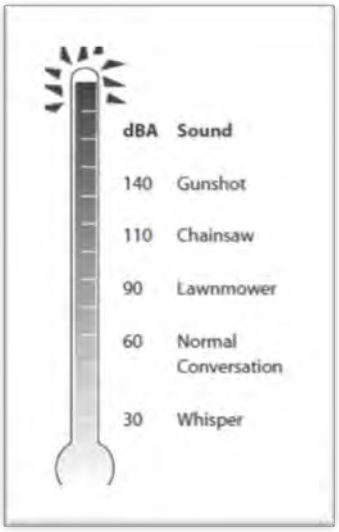
Equivalent Sound Level (Leq): Quantifies the noise environment as a single value of sound level for any desired duration. Leq correlates well with the effects of noise on people. Leq is also sometimes known as Average Sound Level.

L10: Sound pressure level that is exceeded 10% of the time of measurement.

L90: Sound pressure level that is exceeded 90% of the time of measurement.

A-Weighting: A measure of sound pressure level designed to reflect the response of the human ear, which does not respond equally to all frequencies. To describe sound in a manner representative of the human ear's response, it is necessary to reduce the effects of the low and high frequencies with respect to medium frequencies. The resultant sound level is said to be A-weighted, and the units are in decibels (dBA).

Several methods are present to characterize sound. The most common is the A-weighted sound level or dBA. This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Studies have shown that the A-weighted level is closely correlated with annoyance.



C-Weighting: A measure of sound pressure level designed to reflect the response of the human ear, for higher levels above 100 dB when the human ear's response is flatter.

LAeq: A weighted equivalent sound pressure level.

LAmax: The maximum A weighted sound pressure level detected in the measurement time domain.

LCeq: C weighted equivalent sound pressure level.

Point Source: A source of sound which is concentrated to a point.

Area Source: A source of sound which is distributed over an area.

Line Source: A source of sound emanating from a linear geometry.

The threshold of perception of the human ear is approximately 3 dB, and a 5 dB change is considered to be clearly noticeable to the ear. This is primarily due to the logarithmic measuring metric typically associated with decibels. The perceived change with regard to decibel levels is shown below:

Change in sound level	Perceived change to human ear
± 1 dB	Not perceptible
± 3 dB	Threshold of perception
± 5 dB	Clearly noticeable
± 10 dB	Twice as loud
± 20 dB	Four-fold change

11.2.2 Methodology

Noise Modeling

The noise model was developed using the commercial noise modeling software IMMI from Woelfel. The important parameters for the modeling and the methods used are described below.

The information on ground topography and buildings is important to be included in the noise model, since sound propagation is strongly affected by the terrain levels as obstacles, and by the buildings between sources and receivers as barriers. To develop the noise model of the Project, the ground topography data was obtained for an area of 160 km^2 from client and Digital Elevation Model Dataset from NASA, Reverb Earth Science Discovery tool as shown in Figure 11-1.

The surrounding buildings and facilities were digitized manually using the Google Earth imagery and provided DWG drawings by client. The heights of the surrounding buildings are assumed 6 meters.

Meteorological data (average relative humidity, average temperature, wind frequencies and directions as obtained from General Directorate of Meteorology) was entered to noise mapping software. Wind direction frequencies are presented in Figure 11-2.

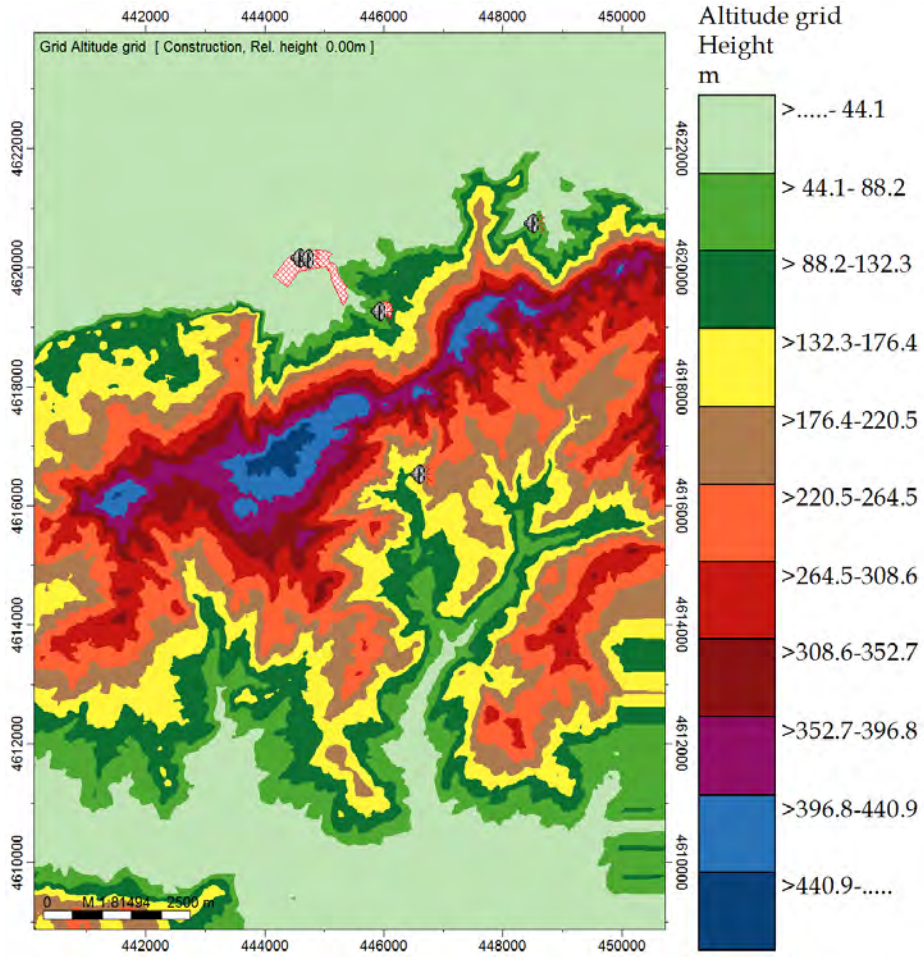


Figure 11-1: Terrain Levels of the Project Area

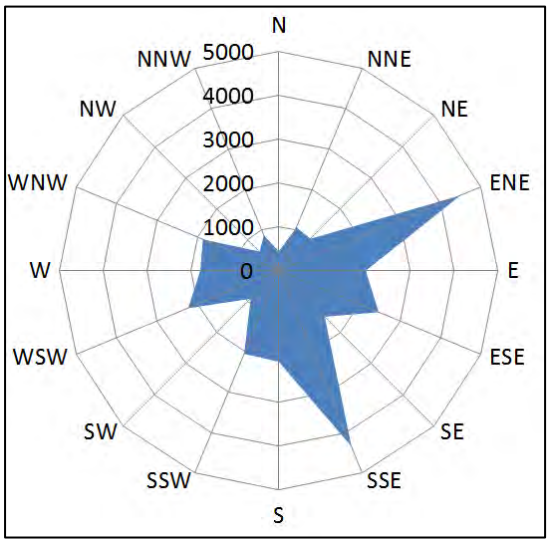


Figure 11-2: Wind Directions for Amasra

The noise model was developed with the commercial noise modeling software IMMI v2011-2. The calculations were carried out with ISO 9613 and XPS31-133 which are recommended by the Turkish Regulation on the Assessment and Management of Environmental Noise (Official Gazette Date and Number: 10.06.2010/27601).

The ISO 9613-2:1996 standard was used for calculating the noise from the machinery and equipment. The sound power level (L_w) of each source was entered into the noise model. L_w denotes the loudness of the equipment. There are three different approaches for determining L_w.

- First method is to calculate L_w from sound pressure level (L_p) measurements (Sound power levels of existing equipment which will be used at the beginning of the project were calculated from measurements performed in the Project as detailed in relevant sections).
- Second method includes using reference values. In order to determine L_w of construction machine and equipment, Roadway Construction Noise Model User's Guide (RCM) of the U.S. Federal Highway Administration was used. This guide includes sound pressure levels of various construction equipment. L_w was calculated based on the information submitted in this guide.
- Last approach is, calculation of L_w from engine powers of equipment which are planned to be used in the Project. This L_w prediction approach is more theoretical and mainly depends on conversion of engine power to acoustical power.

In addition to L_w, type of the noise source is an important parameter for the noise model. Different types of noise sources can be used in the model including point, line and area sources. Because of the mobility and dynamic behaviors of the construction equipment, they were modeled as an area source except for Pile driving and batch plants.

The traffic calculations related to construction trucks and equipment cause were carried out with XPS31-133 French Standard which is recommended by the Turkish Noise Regulations and European Commission for the assessment of environmental noise caused by sources such as highway, bridges, and tunnels by using the emission values mentioned on "Guide du bruit des transports terrestres, fasciculeprevision des niveaux sonores CETUR 1980" document.

Another important parameter for the noise model is the ground absorption (G). Ground absorption varies between 0 to 1 for hard-reflective surfaces and soft-absorptive surfaces, respectively. When calculating the noise propagation, G was assumed to be 0.8 for land area and 0 for sea.

The noise prediction model used in this study is limited with the defined noise sources as described in the next sections of this chapter. There may be other noise sources that cannot be foreseen at this stage. For this reason, modeling results provide information on noise propagation based on the noise sources considered.

Project Phasing and Noise Modeling Conditions

Within the scope of the Project, noise modeling was undertaken considering two phases as below:

- Phase 1: Earthworks and Main Construction
- Phase 2: Operation Phase

Although several equipment and machinery will not be used continuously during construction, all types of equipment and machinery are assumed to be operated together for each phases to assess the worst scenario.

11.3 Environmental Noise Standards and Guidelines

11.3.1 Turkish Regulations

Environmental noise is regulated by the Turkish Regulation on the Assessment and Management of Environmental Noise (Official Gazette Date and Number: 10.06.2010/27601). The regulation sets noise limits applicable to various areas (e.g. industrial areas, residential areas or combination of both) for three time periods (day, evening and night time). Noise limits for construction sites are given in Table 11-1.

Table 11-1: Environmental noise limits for construction sites

Type of activity (construction, demolition and renovation)	**Leq-daytime (dBA)** Day (07:00 - 19:00)
Building	70
Road	75
Other sources	70

In accordance with the mentioned regulation, construction activities inside or close to residential areas are not allowed to be conducted within evening and night time periods unless a consent is obtained from the relevant authorities. The construction working hours for the Project will be between 07:00 to 19:00 which falls to the daytime period. Only ventilation fans are planning to be on for 24 hours. If needed, consent will be obtained from Local Directorate of Environment and Urban Planning for undertaking construction activities during evening and night time.

Related to the operation phase of the Project, limit value for noise emission sources of industrial facilities to the surrounding buildings in the Turkish Regulation on the Assessment and Management of Environmental Noise is presented in Table 11-2. There, presented the maximum allowable environmental noise levels that shall be met at the nearest off-site receptor.

Table 11-2: Environmental Noise Limits for Industrial Facilities (Leq-dBA)

Areas	**Day (07:00 - 19:00)**	**Evening (19:00 - 23:00)**	**Night (23:00 - 07:00)**
Areas where sensitive receptors are located including education, culture, health, summer houses and camping areas	60	55	50
Commercial and residential areas where residential buildings dominate	65	60	55
Commercial and residential areas where workplaces dominate	68	63	58
Industrial areas	70	65	60

The Project area is selected to fall within the area “Commercial and residential areas where residential buildings dominate” and therefore the associated noise limits are applicable to the operation phase of the Project.

11.3.2 IFC Guidelines

IFC General Environmental, Health and Safety Guidelines sets limits for noise for two types of receptors and two time periods, as given in Table 11-3.

Table 11-3: IFC noise level guidelines (one hour Leq-dBA)

Receptor	Daytime (07:00 - 22:00)	Nighttime 22:00 - 07:00
Residential areas	55	45
Commercial/industrial areas	70	70

The guideline requires that noise levels do not exceed the limits given in Table 11-3, or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.

11.4 Baseline Measurements

Baseline environmental noise measurements were conducted in June 2012 at the 2 measurement locations. The measurements conducted for 45 hours totally. The measurement locations are shown on Figure 11-3. Results of the baseline environmental noise measurements are given in Table 11-4 and Table 11-5.

Figure 11-3: Background noise sampling locations

Table 11-4: Results of Baseline Noise Measurements

Measurement Location	Start Date	Time	Noise		
			A Weighted		
			L_{day} dB(A)	L_{eve} dB(A)	L_{night} dB(A)
Tarlaagzi	04.06.2012 09:00	21 Hours	41.5	42.2	43.1
Gomu	04.06.2012 09:00	24 Hours	45.4	45.9	46.8

Table 11-5: Results of Hourly Baseline Noise Measurements

Existing background noise level (dBA)							
No	Date&Time		Result Leq(A)	No	Date&Time		Result Leq(A)
Tarlaagzi	04.06.2012	09:00 - 10:00	40.3	Gomu	04.06.2012	09:00 - 10:00	44.8
	04.06.2012	10:00 - 11:00	41.5		04.06.2012	10:00 - 11:00	44.3
	04.06.2012	11:00 - 12:00	39.9		04.06.2012	11:00 - 12:00	44.2
	04.06.2012	12:00 - 13:00	40.4		04.06.2012	12:00 - 13:00	44.1
	04.06.2012	13:00 - 14:00	41.5		04.06.2012	13:00 - 14:00	44.1
	04.06.2012	14:00 - 15:00	40.1		04.06.2012	14:00 - 15:00	44.7
	04.06.2012	15:00 - 16:00	41		04.06.2012	15:00 - 16:00	45.9
	04.06.2012	16:00 - 17:00	43.4		04.06.2012	16:00 - 17:00	46.8
	04.06.2012	17:00 - 18:00	43.1		04.06.2012	17:00 - 18:00	46.4
	04.06.2012	18:00 - 19:00	42.3		04.06.2012	18:00 - 19:00	45.7
	04.06.2012	19:00 - 20:00	42		04.06.2012	19:00 - 20:00	45.7
	04.06.2012	20:00 - 21:00	42.1		04.06.2012	20:00 - 21:00	45.9
	04.06.2012	21:00 - 22:00	42		04.06.2012	21:00 - 22:00	45.5
	04.06.2012	22:00 - 23:00	42.6		04.06.2012	22:00 - 23:00	46.4
	04.06.2012	23:00 - 00:00	43.1		04.06.2012	23:00 - 00:00	46.7
	05.06.2012	00:00 - 01:00	43.6		05.06.2012	00:00 - 01:00	46.7
	05.06.2012	01:00 - 02:00	42.8		05.06.2012	01:00 - 02:00	46.4
	05.06.2012	02:00 - 03:00	43.6		05.06.2012	02:00 - 03:00	46.9
	05.06.2012	03:00 - 04:00	42.6		05.06.2012	03:00 - 04:00	46.9
	05.06.2012	04:00 - 05:00	43.1		05.06.2012	04:00 - 05:00	47.2
	05.06.2012	05:00 - 06:00	42.6		05.06.2012	05:00 - 06:00	46.9
	05.06.2012	06:00 - 07:00	-		05.06.2012	06:00 - 07:00	46.8
	05.06.2012	07:00 - 08:00	-		05.06.2012	07:00 - 08:00	46.6
	05.06.2012	08:00 - 09:00	-		05.06.2012	08:00 - 09:00	45.8

11.5 Noise Sources

This section provides information on the noise sources during construction and operation phases of the Project.

11.5.1 Construction Noise

The quantities of machines and equipment that will be required for construction activities are given in Table 11-6. All equipment is assumed to work together to assess the worst scenario during each phase of construction. Defined Areas and layout plans are given in Figure 11-4 to Figure 11-6 below.

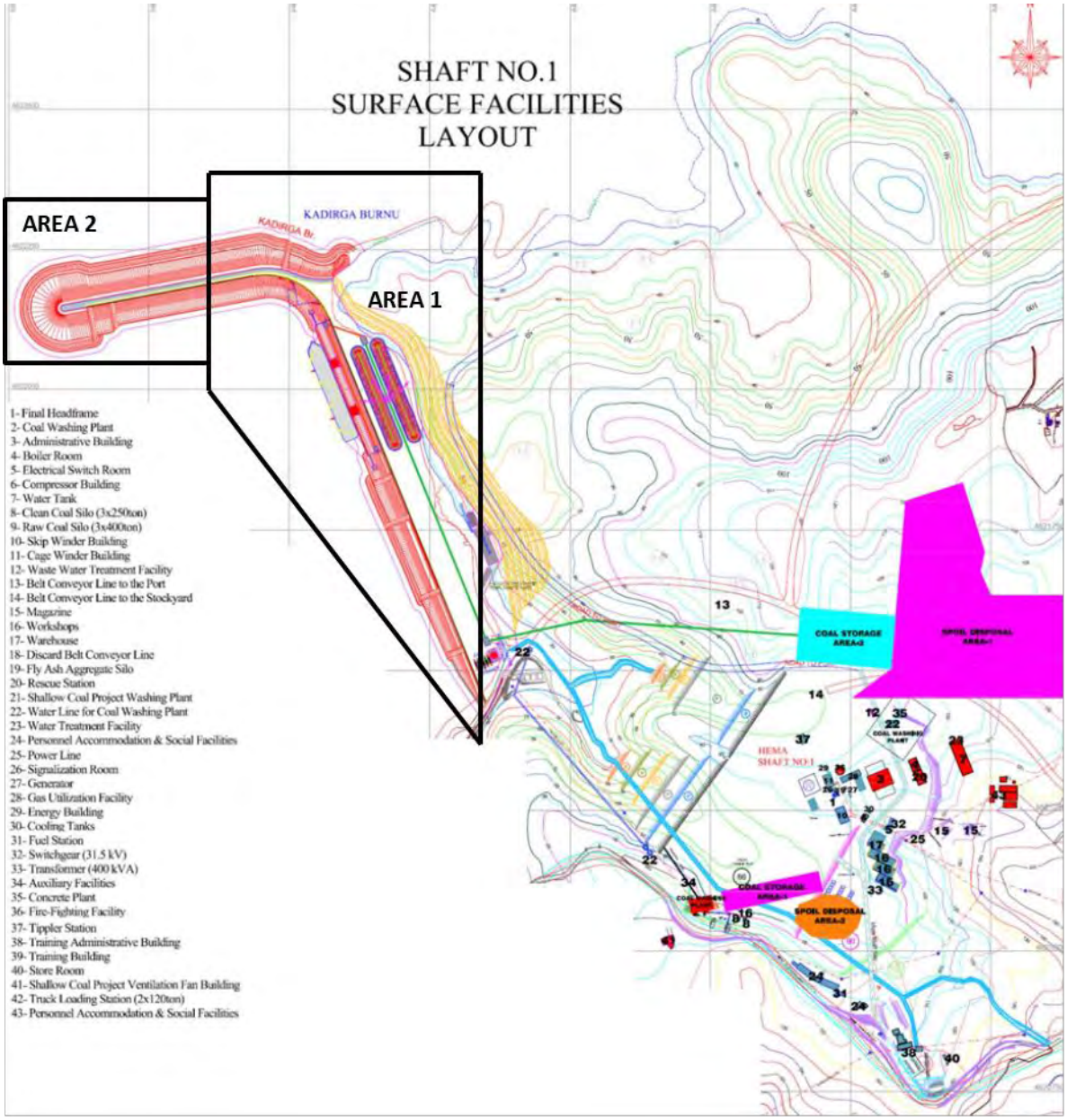


Figure 11-4: Shaft-1 Layout

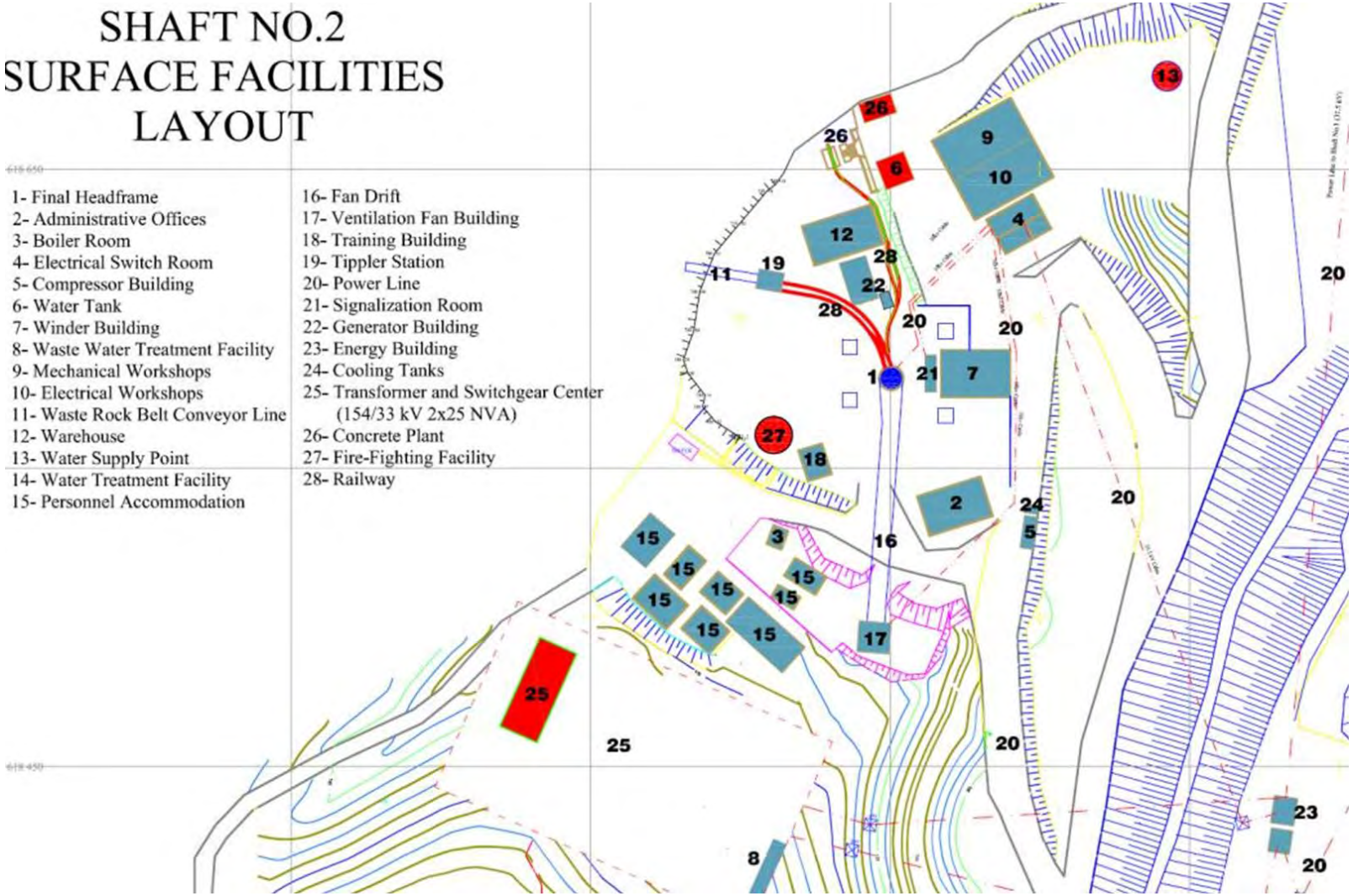


Figure 11-5: Shaft-2 Layout

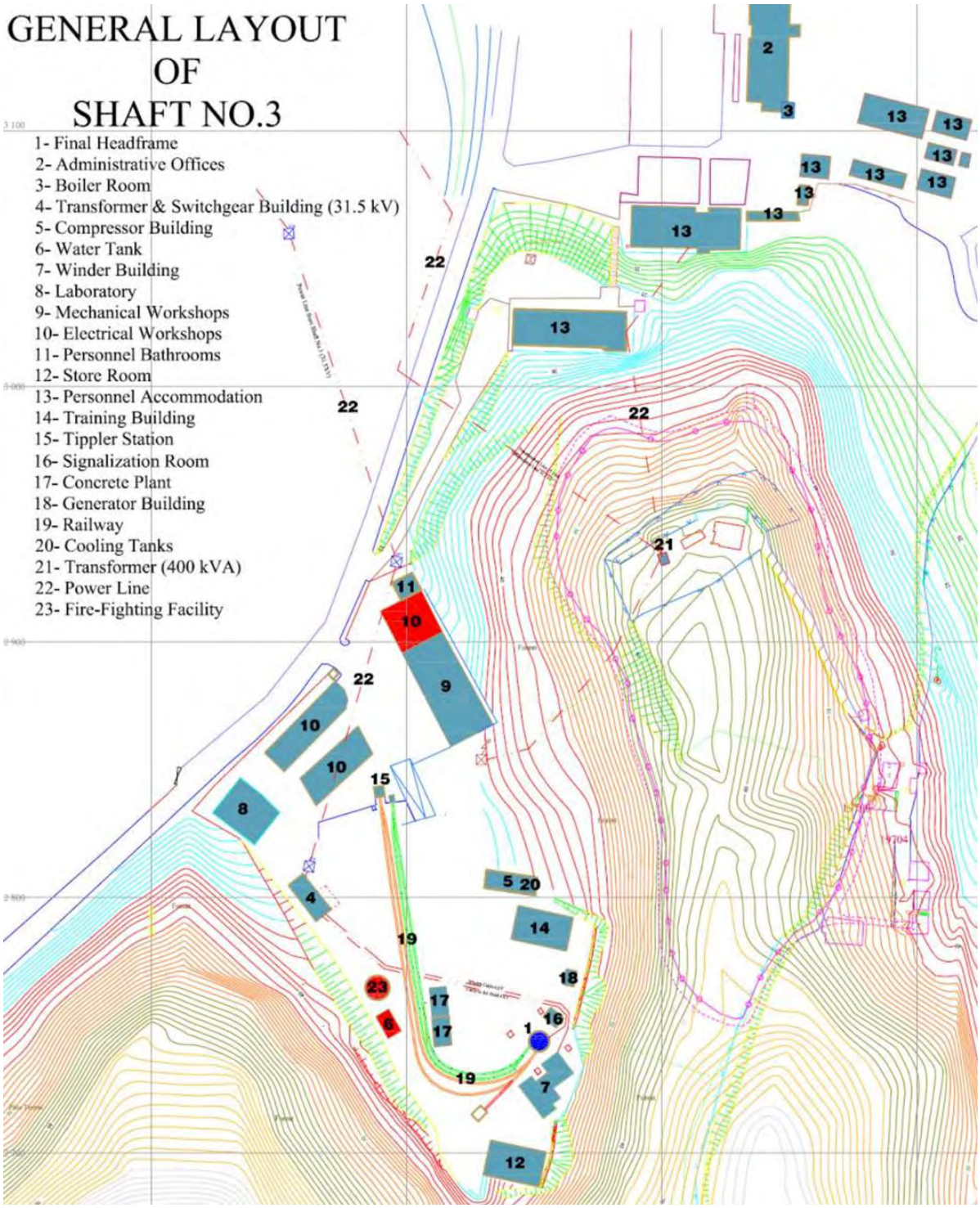


Figure 11-6: Shaft-3 Layout

Table 11-6: Machine and Equipment for Construction Activities

Equipment	Quantity (Q)				
	Port Construction		Coal Mining Area		
	Area 1	Area 2	Shaft 1	Shaft 2	Shaft 3
Dump trucks (20 tonnes)	15	-	-	1	1
Loaders	2	-	-	-	-
Backhoe	1	-	-	-	-
Excavators	2	-	-	1	-
Grader	1	-	-	-	-
Roller	1	-	-	1	-
Concrete pump	1	-	-	-	-
Watering truck	-	1	-	-	-
Welding machines	-	2	-	-	-
Floating pile hammer	-	1	-	-	-
Diesel hammer	-	1	-	-	-
Tugboat	-	1	-	-	-
Floating cranes	-	2	-	-	-
Cranes	2	-	-	1	-
Electrical or diesel vibrators	-	5	-	-	-
Buoy mounted tower and crane (1000 tonnes/h)	-	1	-	-	-
Pickup	-	-	-	1	-
Batch Plant	-	-	1	1	1
Pile Driver	-	2	-	-	-
Ventilation Fans	-	-	2	-	2

Table 11-7 provides information on the sound power levels of the machines and equipment that were calculated based on the noise levels of each machine/equipment obtained from Roadway Construction Noise Model User's Guide (RCM) of the U.S. Federal Highway Administration. Table 11-7 also provides the quantities of the machines/equipment for construction activities and the sound power levels for each type of machine/equipment and the total sound power level for each area. Usage factor (% operational time) accounts for the time that the machine/equipment is in use over a specified time period. The sound power levels were calculated by using the formula:

$$L_w = L(A)_{max} + 10x\log(U.F.) + 20x\log(Distance(m))$$

Table 11-7: Sound Power Level Calculations of Construction Machines/Equipment and Total Sound Power Level for Construction Phase

Machine/ Equipment	LA_{max} @15 m.	Oper. Time (%)	Port Construction				Coal Mining Area Construction					
			Area 1		Area 2		Shaft 1		Shaft 2		Shaft 3	
			Q	Total L_w (dBA)	Q	Total L_w (dBA)	Q	Total L_w (dBA)	Q	Total L_w (dBA)	Q	Total L_w (dBA)
Dump trucks (20 tonnes)	84	40	15	115.3	-	-	-	-	1	103.5	-	-
Loaders	85	40	2	107.6	-	-	-	-	-	-	-	-
Backhoe	80	40	1	99.5	-	-	-	-	-	-	-	-
Excavators	85	40	2	107.6	-	-	-	-	1	104.5	-	-
Grader	85	40	1	104.5	-	-	-	-	-	-	-	-
Roller	85	20	1	101.5	-	-	-	-	1	101.5	-	-

Machine/ Equipment	LA_{max} @15 m.	Oper. Time (%)	Port Construction				Coal Mining Area Construction					
			Area 1		Area 2		Shaft 1		Shaft 2		Shaft 3	
			Q	Total L_w (dBA)	Q	Total L_w (dBA)	Q	Total L_w (dBA)	Q	Total L_w (dBA)	Q	Total L_w (dBA)
Concrete pump	82	20	1	98.5	-	-	-	-	-	-	-	-
Watering truck	85	40	-	-	1	93.5	-	-	-	-	-	-
Welding machines	73	40	-	-	2	95.6	-	-	-	-	-	-
Floating pile hammer**	95	20	-	-	1	111.5	-	-	-	-	-	-
Diesel hammer	85	20	-	-	1	101.5	-	-	-	-	-	-
Tugboat	85	40	-	-	1	104.5	-	-	-	-	-	-
Floating cranes**	85	16	-	-	2	103.6	-	-	-	-	-	-
Cranes	85	16	2	103.6	-	-	-	-	1	100.6	-	-
Electrical or diesel vibrators	85	20	-	-	5	108.5	-	-	-	-	-	-
Buoy mounted tower and crane (1000 tonnes/h)	85	16	-	-	1	100.6	-	-	-	-	-	-
Pickup	55	40	-	-	-	-	-	-	1	74.5	-	-
Batch Plant**	85	15	-	-	-	-	1	103.5	1	103.5	1	103.5
Pile Driver**	95	20	-	-	2	114.5	-	-	-	-	-	-
TOTAL			**117.3**		**111.2**		**-**		**108.8**		**-**	
****: Machines/Equipment are not included to Total Calculation.**												

As the construction activities will be distributed within the Project area and the marked equipment/machines will stay in a fixed location; construction noise sources were defined as a point source in the model. Other construction noise sources which were included in total calculations were defined as area source and point sources in the noise modeling. The areas of sound sources and sound power level per area (L_w") area provided by using the formula:

$$L''_w = L_w(Total) - 10\ x\ \log\left[\frac{Area\ (m^2)}{Reference\ Area\ (1\ m^2)}\right]$$

During the construction and installation of coal washing plant, 2 trucks, one generator, one excavator and one crane will be used. L_w value of construction and installation of 2 coal washing plants (Located in Shaft-1) is 110.1 dBA for both.

As it is mentioned by the client, two units of ventilation fans will be located in Shaft 1 and Shaft 3. Ventilation units will work during both construction and operation activities. Sound power levels of ventilation fans were calculated by using "Engineering Noise Control Theory and Practice, David A. Bies and Colin H. Hansen, 3rd edition". Information on fans was provided by the client.

Fan is a common industrial noise source, which has been well documented (ASHRAE, 1987). The sound power radiated by each of the fan discharge and the fan inlet can be estimated with minimum information as follows:

$$L_w(dB) = C_f + 10\log Q + 20\log P - {}^{E}/_{3} + 18$$

C_f is an empirical number given for each octave band in related document, Q is the volume flow rate (m^3/s), E is the percentage of peak efficiency and P is the static pressure (Pa). If the fan operating point efficiency is not known E is assumed to be 99. A correction is applied to the octave band in which the blade passing frequency occurs by adding the blade frequency increment (BFI). This increment is added to the octave band containing the blade passing frequency (BPF) which can be calculated, using the following formula:

$$BPF = N_b x \frac{RPM}{60}$$

Where; N_b is the number of blades on the fan. An accuracy of 2 dB is claimed for the octave bands from 250 to 4000 Hz, 4 dB for the 125 Hz band and 8 dB for the 63 Hz band. Number of blades are 16 and RPM is 745. BPF value will be 198.7 Hz which means 250 Hz needed to be corrected 5 dB for over 1 m Tubeaxial fans.

The information on the fans, provided by the client is given in Table 11-8.

Table 11-8: C_f value of the fan

f (Hz)	63	125	250	500	1000	2000	4000	8000
C_f (dB)	41	39	43	41	39	37	34	27

Q is 200 m^3/s, P is 4000 Pa, and distance is 17 meters from fans to the exhaust louver. E is unknown and for that reason it is taken as 99. Equations provide estimates of the sound power level within the ductwork connected to the fan. To calculate the sound power radiated externally through the fan casing and adjacent ductwork, the corrections are given in Table 11-9.

Table 11-9: Corrections for f value of the fan

f (Hz)	63	125	250	500	1000	2000	4000	8000
Value to be subtracted from calculated in-duct sound power level, Lw (dB)	0.0	0.0	5.0	10.0	15.0	20.0	22.0	25.0

Noise will follow the corridor in duct of 17 meters. For that reason noise level in dependence of distance needed to be calculated with following formula;

$$L_2 = L_2 - \left(20 \log \frac{r_1}{r_2}\right)$$

Sound power levels of each ventilation units are summarized in Table 11-10.

Table 11-10: Sound Power Level of Ventilation Fans (each fan)

f(Hz)	63	125	250	500	1000	2000	4000	8000
C_f (dB)	41	39	43	41	39	37	34	27
L_w(dB)	121.1	119.1	123.1	121.1	119.1	117.1	114.1	107.1
BFI(dB)	-	-	5.0	-	-	-	-	
Correction (dB)	0.0	0.0	5.0	10.0	15.0	20.0	22.0	25.0
Corrected L_w(dB)	121.1	119.1	123.1	111.1	104.1	97.1	92.1	82.1
Including Distance Correction L_w(dB)	96.4	94.4	98.4	96.4	94.4	92.4	89.4	82.4
TOTAL								103.8

11.5.2 Operational Noise

The quantities of machines and equipment that will be required for operation activities are given in Table 11-11. During the operation phase, 72 of shuttle trips for transportation of employees and 175 trucks will carry coal on the route which is given by the client.

Table 11-11: Machine and Equipment for Operation Activities

Equipment	Quantity	Equipment	Quantity
Port Area		**Coal Washing Plants (Each)**	
Rail quay crane	2	Loader	4
Covered belt conveyor system	1	Compressor	1
Caterpillar	1	Crushing Sieving Unit	1
Loader	2	Dust Seperation Mesh	1
Mini loader	2	**Compressor Rooms**	
Forklift	2	Compressor (Shaft 1 and 2)	3
Tow truck	2	Compressor (Shaft 3)	4
Overhead crane	2	**Water Treatment**	
Electric Distribution System	1	Pump	5
Winder Buildings		**Batch Plants**	
Crane (Shaft 1)	3	Shaft 1	1
Crane (Shaft 2)	2	Shaft 2	1
Crane (Shaft 3)	1	Shaft 3	1
Spoil Dumpsite (Shaft 1)		**Ventilation**	
Loader	2	Shaft 1	2
Conveyor Belt	1	Shaft 3	2
Generator Building			
Generator	1		

Table 11-12 provides information on the sound power levels of the machines and equipment that were calculated based on the noise levels of each machine/equipment provided by the client. It also provides the quantities of the machines/equipment for operation activities and the sound power levels for each type of machine/equipment in each area/building.

Table 11-12: Sound Power Level Calculations of Operation Phase

Equipment	Quantity	L_w per Equipment	Total L_w(dBA)
Port Area			
Rail quay crane	2	105	108.0
Covered belt conveyor system	1	102	102.0
Caterpillar	1	101	101.0
Loader	2	103	106.0
Mini loader	2	65	68.0
Forklift	2	106	109.0
Tow truck	2	101	104.0
Overhead crane	2	105	108.0
Electric Distribution System	1	102	102.0

Equipment	Quantity	L_w per Equipment	Total L_w(dBA)
Coal Washing Plants (Each)			
Loader	4	103	109.0
Compressor	1	99.5	99.5
Crushing Sieving Unit	1	105.5	105.5
Dust Seperation Mesh	1	100	100.0
Compressor Rooms			
Compressor (Shaft 1 and 2)	3	99.5	104.3
Compressor (Shaft 3)	4	99.5	105.5
Water Treatment			
Pump	5	97.5	104.5
Generator Building			
Generator	1	102.5	102.5
Winder Buildings			
Crane (Shaft 1)	3	100.6	105.4
Crane (Shaft 2)	2	100.6	103.6
Crane (Shaft 3)	1	100.6	100.6
Spoil Dumpsite (Shaft 1)			
Loader	2	103	106.0
Conveyor Belt	1	102	102.0
Ventilation (dB)			
Shaft 1	2	103.8	106.8
Shaft 3	2	103.8	106.8
Batch Plants			
Shaft 1	1	98.3	103.5
Shaft 2	1	98.3	103.5
Shaft 3	1	98.3	103.5

Each area/building that are mentioned in Table 11-12, are entered in to the model by using L_w" calculations mentioned above. Noise sources which are located in buildings are modeled into the building with constant transmission loss (TL) value (12 dBA). TL values of louver which is located at the end of the ventilation duct is given in Table 11-13.

Table 11-13: Transmission Loss Value (Louver)

f(Hz)	125	250	500	1000	2000	4000
R'(dB)	6	6	9	13	14	15

11.6 Noise Mapping and Noise Modelling Results

Based on the implementation schedule of the Project and the construction and operation noise sources explained in the previous sections, noise modeling was conducted for the defined two phases. Noise maps were prepared in horizontal grid mapping format. The axis of the noise propagation model maps represents the UTM coordinates in WGS84 coordinate system.

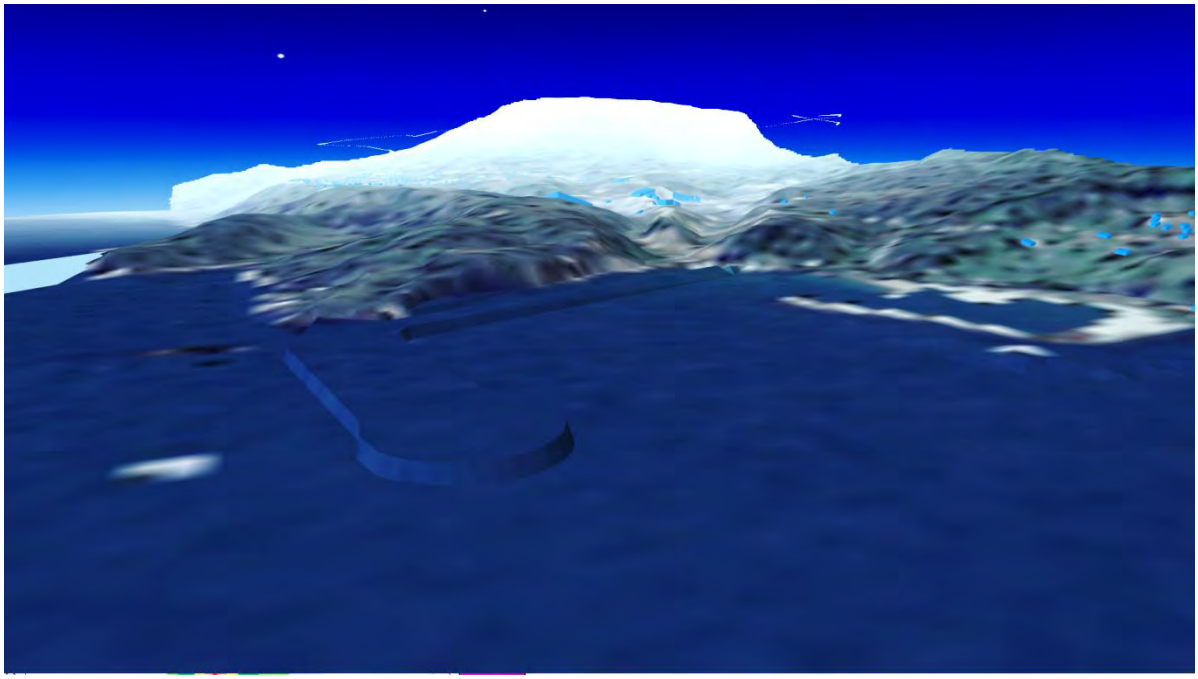


Figure 11-7: 3D Model of Project Area

11.6.1 Construction Phase

Noise Propagation Models

The satellite view showing the noise propagation modeling of construction phase of the Project area is presented in Figure 11-8. The propagation models showing each of the shaft area is given in Annex-J.

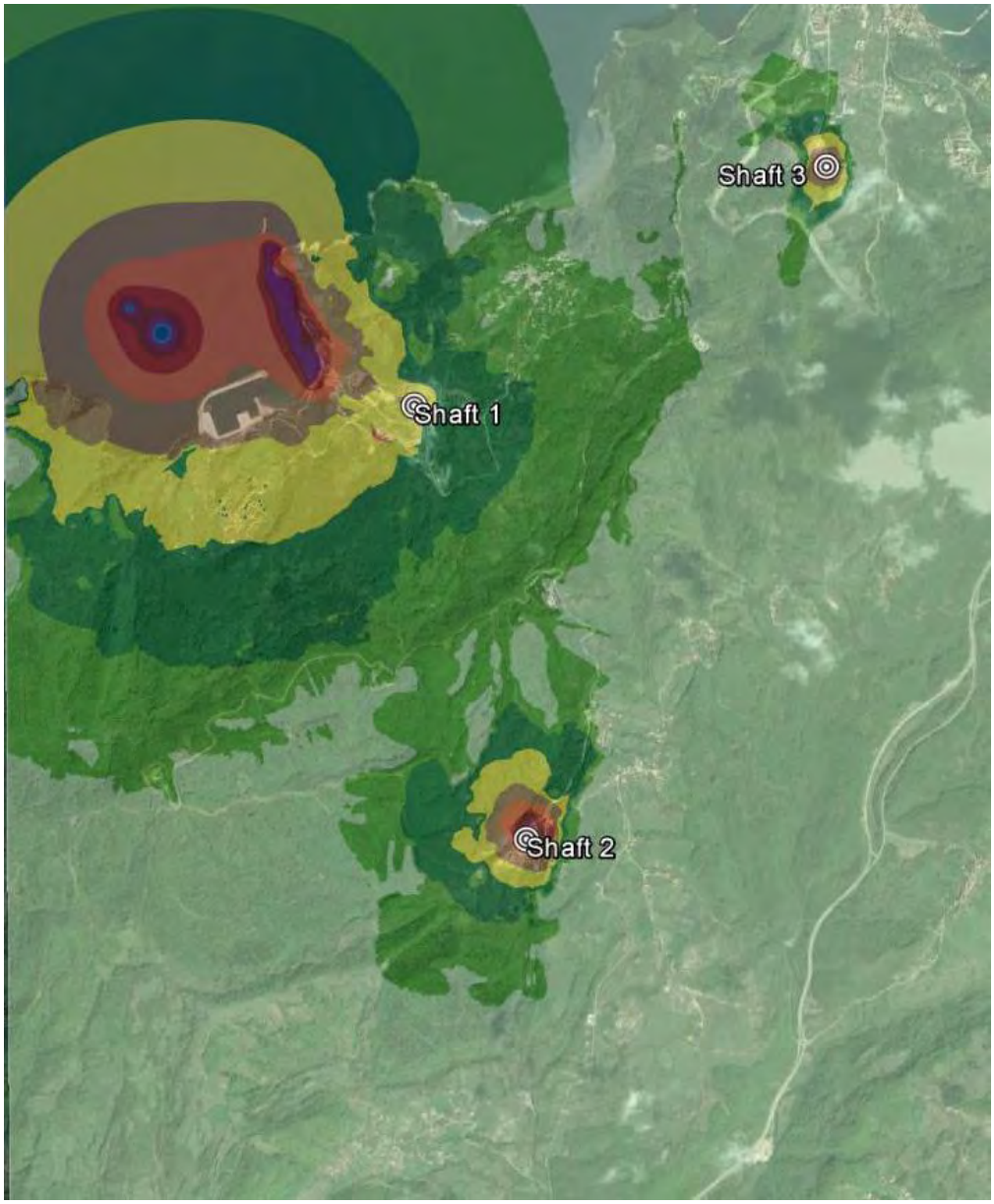


Figure 11-8: Noise Propagation Model for Construction with Satellite view

11.6.2 Operation Phase

Noise Propagation Models

This section provides noise propagation models for the operation activities considered in noise modeling. Until the HEMA port enters into service, the coal will be transported via road transportation (see *Chapter 12: Road Transportation*). Noise propagation models for the coal transportation is given in Figure 11-9 whereas the satellite view and 3D view showing the model for the Project area is given Figure 11-10 and Figure 11-11.

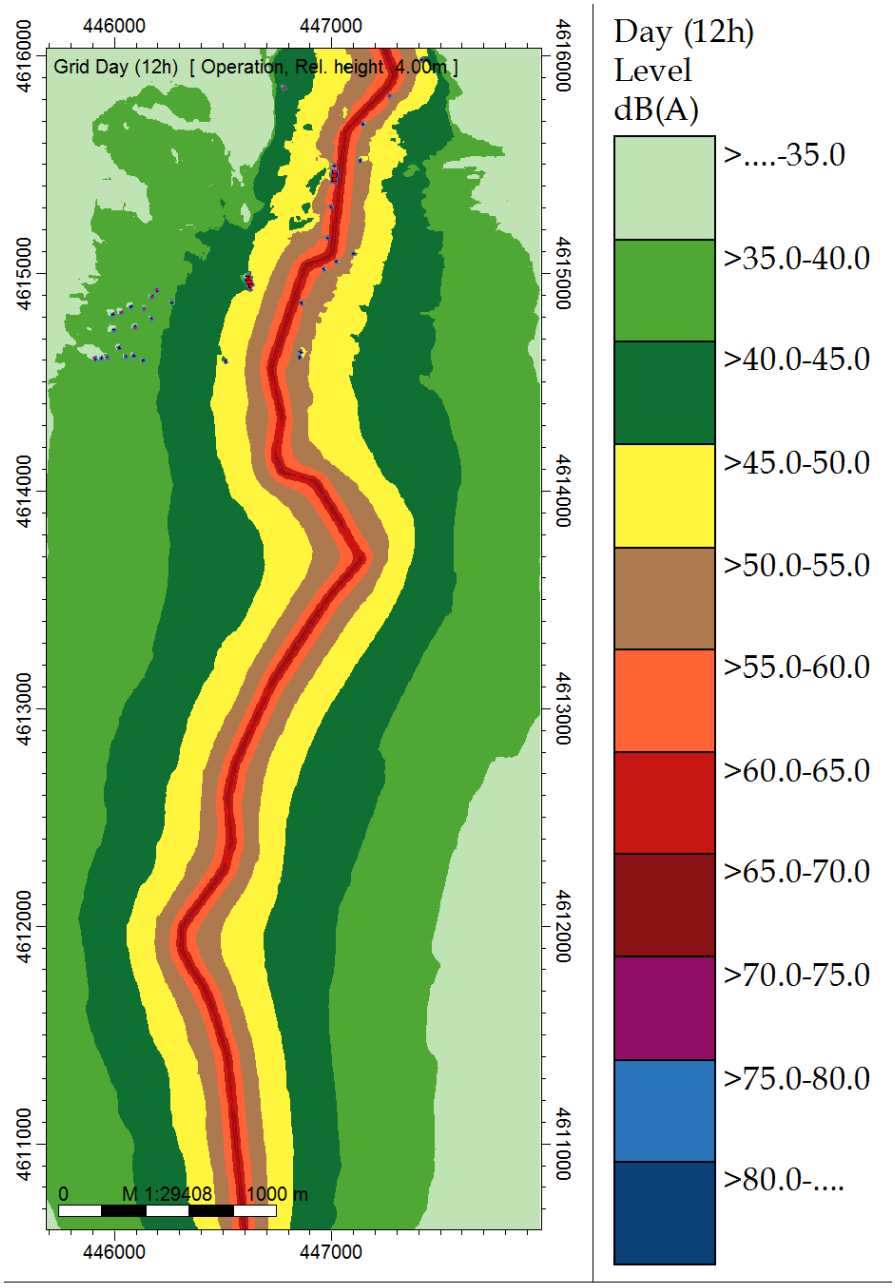


Figure 11-9: Noise Propagation Model for Operation (Road)

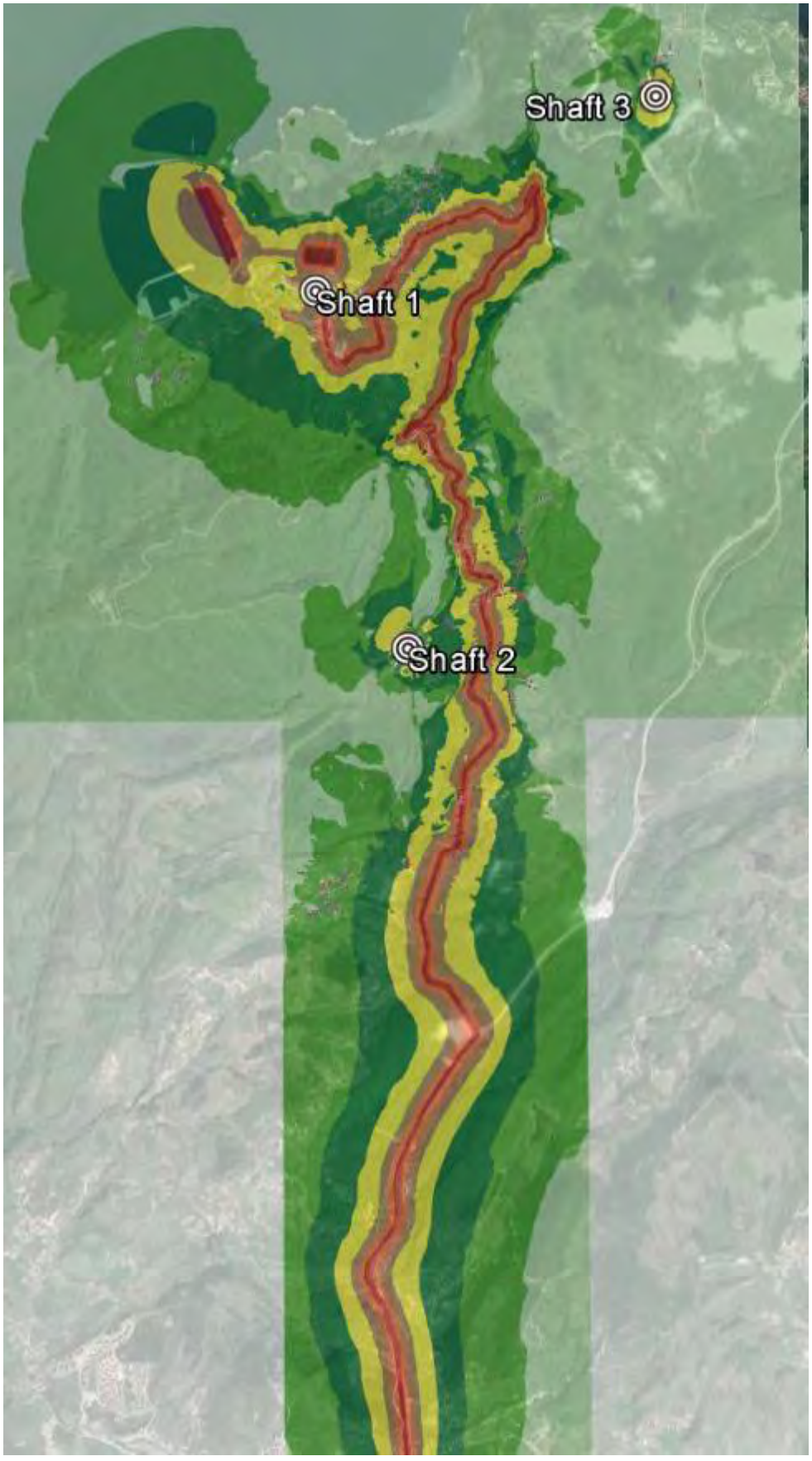


Figure 11-10: Noise Propagation Model for Operation with Satellite view

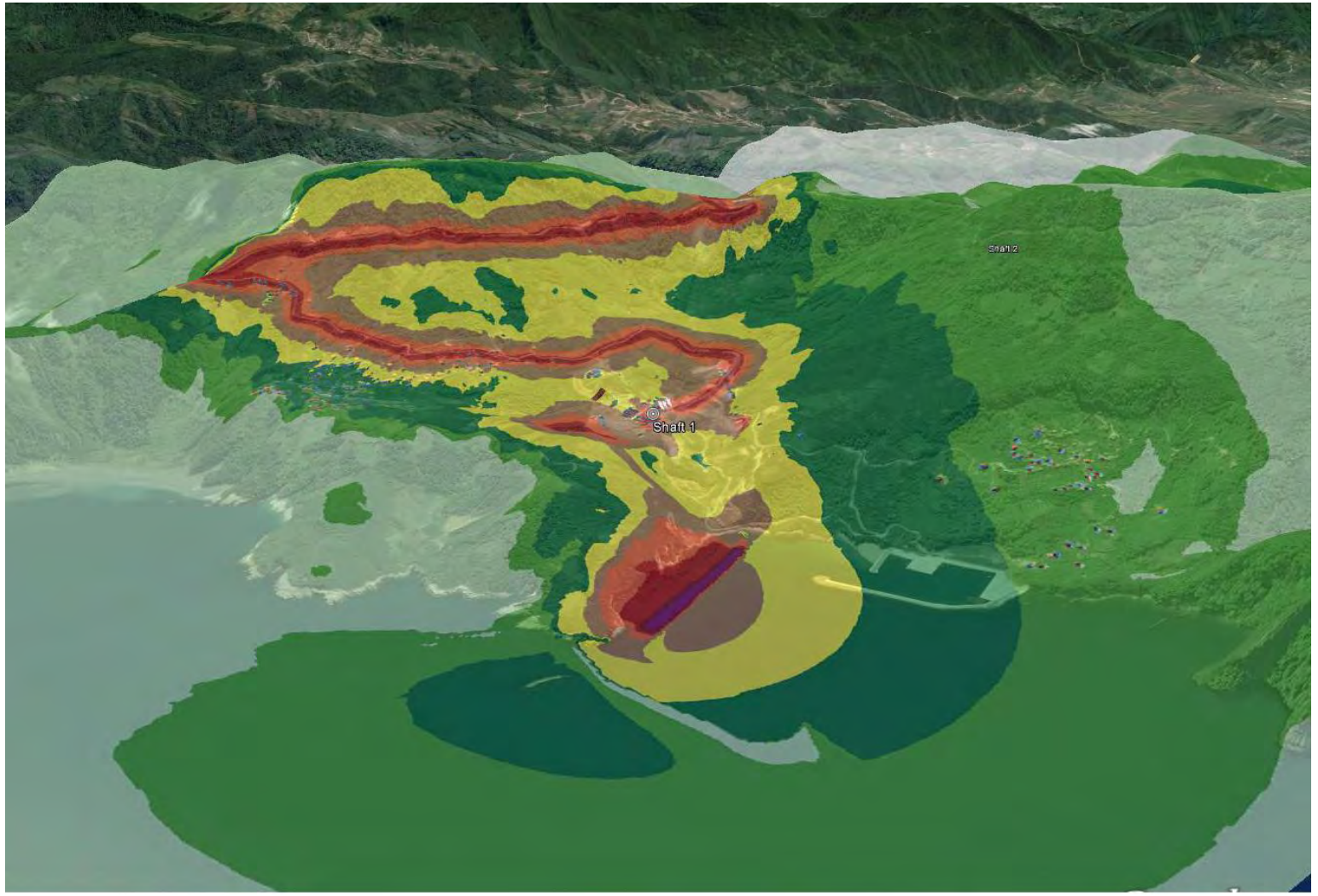


Figure 11-11: Noise Propagation Model for Operation with 3D Satellite view

As can be seen from Figures, the noise level at the receptors around the Project area and especially on the route of trucks will be 65-70 dBA during the operation phase.

11.6.3 Noise Modeling Results

Table 11-14 and Table 11-15 presents the results of the noise modeling study for different conditions considered and compared the results with the Turkish standards and IFC guidelines.

Table 11-14: Noise Modeling Results on Nearest Receptor (Highest Noise Levels)

Location	dBA								
	Calculated Results		Regulations						
	Construction	Operation	TNR (Cons)	TNR (Operation)			IFC		
				D	E	N	D	N	
Shaft 1	48	45	70	65	60	55	55	45	
Shaft 2	53	47							
Shaft 3	44	45							
Route of Trucks	-	71							
Port	50	41							

Table 11-15: Noise Modeling Results on Measurement Locations

Measurement				Calculated Results		Regulations							
Location	Background Noise Level (Leq, dBA)			Cons.	Oper.	TNR (Cons)	TNR (Operation)			IFC(+3 dBA)			
	D	E	N				D	E	N	D	E	N	
Tarlaagzi	41.5	42.2	43.1	51.4	44.3	70	65	60	55	44.5	45.2	46.1	
Gomu	45.4	45.9	46.8	41.7	50.1					48.4	48.9	49.8	

Table 11-16 presents the results of the noise modeling study for construction phase and for operation phase including cumulative noise levels that takes into account both the modeled noise level as a result of the Project activities and the measured background noise level.

Table 11-16: Noise Modeling Results (Hourly)

Existing background noise level (dBA)				Modeling result (dBA)		Cumulative noise Level (dBA)		Change in background level (dBA)	
ID	Date&Time		Result Leq(A)	Construction Phase	Operation Phase	Construction Phase	Operation Phase	Construction Phase	Operation Phase
Tarlaagzi	04.06.2012	09:00 - 10:00	40.3	51.4	44.3	51.7	45.8	11.4	5.5
	04.06.2012	10:00 - 11:00	41.5	51.4	44.3	51.8	46.1	10.3	4.6
	04.06.2012	11:00 - 12:00	39.9	51.4	44.3	51.7	45.6	11.8	5.7
	04.06.2012	12:00 - 13:00	40.4	51.4	44.3	51.7	45.8	11.3	5.4
	04.06.2012	13:00 - 14:00	41.5	51.4	44.3	51.8	46.1	10.3	4.6

Existing background noise level (dBA)				Modeling result (dBA)		Cumulative noise Level (dBA)		Change in background level (dBA)	
ID	Date&Time		Result Leq(A)	Construction Phase	Operation Phase	Construction Phase	Operation Phase	Construction Phase	Operation Phase
	04.06.2012	14:00 - 15:00	40.1	51.4	44.3	51.7	45.7	11.6	5.6
	04.06.2012	15:00 - 16:00	41.0	51.4	44.3	51.8	46.0	10.8	5.0
	04.06.2012	16:00 - 17:00	43.4	51.4	44.3	52.0	46.9	8.6	3.5
	04.06.2012	17:00 - 18:00	43.1	51.4	44.3	52.0	46.8	8.9	3.7
	04.06.2012	18:00 - 19:00	42.3	51.4	44.3	51.9	46.4	9.6	4.1
	04.06.2012	19:00 - 20:00	42.0	No Activity	44.3	No Activity	46.3	No Activity	4.3
	04.06.2012	20:00 - 21:00	42.1		44.3		46.3		4.2
	04.06.2012	21:00 - 22:00	42.0		44.3		46.3		4.3
	04.06.2012	22:00 - 23:00	42.6		44.3		46.5		3.9
	04.06.2012	23:00 - 00:00	43.1		44.3		46.8		3.7
	05.06.2012	00:00 - 01:00	43.6		44.3		47.0		3.4
	05.06.2012	01:00 - 02:00	42.8		44.3		46.6		3.8
	05.06.2012	02:00 - 03:00	43.6		44.3		47.0		3.4
	05.06.2012	03:00 - 04:00	42.6		44.3		46.5		3.9
	05.06.2012	04:00 - 05:00	43.1		44.3		46.8		3.7
	05.06.2012	05:00 - 06:00	42.6		44.3		46.5		3.9
	05.06.2012	06:00 - 07:00					-		
	05.06.2012	07:00 - 08:00	Measurements were not taken						
	05.06.2012	08:00 - 09:00							
Gomu	04.06.2012	09:00 - 10:00	44.8	41.7	50.1	46.5	51.2	1.7	6.4
	04.06.2012	10:00 - 11:00	44.3	41.7	50.1	46.2	51.1	1.9	6.8
	04.06.2012	11:00 - 12:00	44.2	41.7	50.1	46.1	51.1	1.9	6.9
	04.06.2012	12:00 - 13:00	44.1	41.7	50.1	46.1	51.1	2.0	7.0
	04.06.2012	13:00 - 14:00	44.1	41.7	50.1	46.1	51.1	2.0	7.0
	04.06.2012	14:00 - 15:00	44.7	41.7	50.1	46.5	51.2	1.8	6.5
	04.06.2012	15:00 - 16:00	45.9	41.7	50.1	47.3	51.5	1.4	5.6
	04.06.2012	16:00 - 17:00	46.8	41.7	50.1	48.0	51.8	1.2	5.0
	04.06.2012	17:00 - 18:00	46.4	41.7	50.1	47.7	51.6	1.3	5.2
	04.06.2012	18:00 - 19:00	45.7	41.7	50.1	47.2	51.4	1.5	5.7
	04.06.2012	19:00 - 20:00	45.7	No Activity	44.3	No Activity	51.4	No Activity	5.7
	04.06.2012	20:00 - 21:00	45.9		50.1		51.5		5.6
	04.06.2012	21:00 - 22:00	45.5		50.1		51.4		5.9
	04.06.2012	22:00 - 23:00	46.4		50.1		51.6		5.2
	04.06.2012	23:00 - 00:00	46.7		50.1		51.7		5.0
	05.06.2012	00:00 - 01:00	46.7		50.1		51.7		5.0
	05.06.2012	01:00 - 02:00	46.4		50.1		51.6		5.2
	05.06.2012	02:00 - 03:00	46.9		50.1		51.8		4.9
	05.06.2012	03:00 - 04:00	46.9		50.1		51.8		4.9
	05.06.2012	04:00 - 05:00	47.2		50.1		51.9		4.7
	05.06.2012	05:00 - 06:00	46.9		50.1		51.8		4.9
	05.06.2012	06:00 - 07:00	46.8		50.1		51.8		5.0
	05.06.2012	07:00 - 08:00	46.6	41.7	50.1	47.8	51.7	1.2	5.1
	05.06.2012	08:00 - 09:00	45.8	41.7	50.1	47.2	51.5	1.4	5.7

11.7 Impacts

Main noise sources during construction activities include use of construction machinery and equipment during excavation and construction works, mainly related to the port. Increased noise levels during construction activities have the potential to result in negative impacts to the background noise levels at nearest sensitive receptors. The actual impact level due to construction

activities will depend also on aspects such as the type of equipment to be used, time period and duration, and the perception of specific noise patterns (e.g. continuous, regular intervals, irregular).

Main noise sources during operation phase are ventilation system and the increase in road traffic from the transportation of the coal. As of late 2013, works for mining of shallow coals has been started near Shaft-1 and it is expected that the shallow coal extraction will initiate in 2015. The processed coal is proposed to be shipped to Catalagzi Thermal Plant and Eren Thermal Plant in Zonguldak through the HEMA port to be constructed, and not to be overlanded to Bartın Cement Plant once the port enters into service which projected to be in April 2017. The estimated number of trips of the coal carrying trucks is 350 per day. This means a loaded truck should be departing every 2.5 minutes unless transportation takes place during night time.

In order to predict the impacts of the Project on environmental noise, baseline noise measurements and a sound propagation modeling study was conducted as described in detail in above sections including information of potential noise sources as it is presented by the client. Environmental noise measurements were taken in 2012. For that reason; comparisons between background noise levels and cumulative noise levels can be revised with new noise measurements in the future.

Equipment/machines which are used in construction activities are considered working at the same time together. Therefore, modeling study covered both construction and operational activities showing the worst scenario. As it is explained in report, ventilation fans will work for 24 hours. However, construction phase occurs during the day-time period only and includes ventilation fans. For that reason; night and evening time construction works were not presented.

The results of the noise modeling revealed the following:

- Existing background noise levels are below the IFC daytime limit value of 55 dBA both for Tarlaagzi and Gomu villages which result in the cumulative noise levels not to be above the 55 dBA limit value. However, the increase in background noise levels at Tarlaagzi varies between 8.6 to 11.6 dBA during Phase 1 which is above the maximum increase defined by IFC and therefore it considered as moderate impact even it is below the limit values. During the operation phase, 4.2 to 5.7 dBA increase in noise levels for the daytime is expected in Tarlaagzi village. Still, the levels will be below the defined limits in IFC Guideline; however, since the increase is higher than 3 dB, the impact is assessed to be moderate.

- At Gomu Village, during daytime, the cumulative noise levels result increases in the background in the range of 1.2 to 2.0 dBA for the construction phase which is considered as a minor impact since the cumulative noise levels are below limit values. During the operation phase of the Project, the increase in baseline daytime noise levels varies between 5.0 to 7.0 dBA and the maximum cumulative noise level is 51.8 dBA, therefore the impact is estimated to be moderate.

- The existing background noise levels are below the IFC limit value of 45 dBA for Tarlaagzi village in the nighttime. During the operation phase of the Project, and the change in the night-time noise level will vary between 3.4 to 3.9 dBA in Tarlaagzi, which cause the cumulative noise levels to exceed the IFC standards. Therefore the impact is estimated to be major and mitigation measures are required.

- Existing background noise levels are above the IFC night-time limit value of 45 dBA at Gomu Village in the majority of the hourly noise levels which results in the cumulative noise levels to be above the 45 dBA limit value with the change in the baseline noise levels varying 4.7 to 5.2 dBA which is higher than the maximum allowable increase of the existing background noise levels and therefore the impact is estimated to be major and mitigation measures are required.

- According to the modeling studies, the noise levels of the road is around 70 dBA and the noise levels of its close vicinity are varying between 50 to 60 dBA. Since, mostly residential buildings are present on the both sides of the road and the coal transportation is expected to continue during night time, the noise levels are expected to exceed both national and IFC standards. Therefore the impact is estimated to be major and mitigation measures are required.

- According to the baseline data and the results of the modeling studies discussed through this chapter, the noise emissions from Shaft-3 (ventilation shaft) is expected to result in an increase of background noise level of Amasra central area, more than 3 dBA. When considered the operation of the ventilation will also continue during night time, the impact is estimated to be major and mitigation measures are required.

11.8 Mitigation Measures

The following mitigation measures will be taken during the construction and operation phases in order to ensure that the standard values set in the regulations are met:

- Long term noise measurements will be taken during the both phases. None of openings on the buildings are supported. For that reason, detailed measurements will be taken also around the noise sources to define the exact noise propagation.

- 'Low-noise' equipment will be used during construction and operational phases as far as possible. Where construction equipment is provided with sealed acoustic covers or enclosures, these will be kept closed whenever the machines are in use.

- Machines will be shut down or throttled down to a minimum when not in operation.

- Maintenance procedures will be implemented in order to keep equipment in good working condition to minimize extraneous noises caused by poor performance.

- Mobile noise barriers should be applied on critical locations.

- A work schedule planning of the noisy activities (ie. Not working with high noise level equipment during night time) will be implemented.

- Construction activities will be carried out during daytime.

- Necessary consent will be obtained from Bartın Provincial Directorate of Environment and Urban Planning for undertaking construction activities during evening and night time, if needed.

- Noisy activities taking place within construction sites will be located away from the residential areas as far as possible.

- On-site structures such as containers, offices, hoardings will be used to screen sensitive receptors from noise sources as far as possible. Where necessary movable noise barriers (2-2.5 m high) will be used to ensure receptor noise levels are less than the limit values adjacent to noisy activities.

- Awareness among workers will be increased regarding noise mitigation.

- A Noise Control and Monitoring Plan will be set up during the construction and the operation phase to measure noise levels at the closest sensitive receptors (closest residences from Tarlaagzi and Gomu Villages) for 24 hours. It is suggested that noise monitoring measurements are conducted monthlyIf levels at receptors exceed the standards, measures will be taken to reduce noise levels so that the limit values are met.

- Vibration levels will be monitored upon a grievance is made by the nearby residents and if the standards are exceeded, measures will be taken to reduce vibration.

- All noise generating equipment and machinery during operation will be placed in buildings with isolated walls, and the design of the technical unit building and selection of silencers are made such that the indoor noise levels at the hospitals do not exceed the regulatory standards.

- Impact from increase in traffic due to operation phase was assessed separately following the traffic study assessment. Mitigation measures to lower the noise impacts related to the coal transportation are;
    - Speed will not exceed 30 km/hr during the coal transportation,
    - 'Low-noise' equipment such as noise barriers and surface isolations will be used,
    - All vehicles and work machinery will be subject to periodic maintenance with the aim of reducing noise, dust and gas emissions from vehicles.
    - Drivers will be warned against creating unnecessary noise by using horns.

11.9 Residual Impacts

Construction phase noise impacts will be temporary and can be mitigated with the implementation of measures mentioned above. Therefore, the residual impact is estimated to be negligible.

However, the noise generated by the ventilation system and the noise related to the coal transportation until the port enters into service will significantly affect the residential areas near the Project area.

12.0 ROAD TRANSPORTATION

12.1 Scope

This chapter provides an assessment of the road transportation originating from the Project activities which may impact the existing road traffic during the operation phase. The chapter also sets out the optimum road itinerary for the transportation of the coal and mitigation measures to avoid or minimize the risks for possible incidents. The use and significance of the roads for the Project are also described in following chapters; *Chapter 14: Socio-economy* and *Chapter 15: Community Health and Safety.*

The following issues in relation to the Project were covered in this chapter:

- transportation network,
- coal transportation demand; and
- optimum transportation itinerary

The main information sources used to assist the assessment study are:

- Traffic Study conducted by Bogazici Proje Mühendislik Planlama Ltd., 2013
- Information from HEMA on coal production forecasts and duration of coal transportation
- Data gathered during the site visits

The potential significance criteria table that were used to assess the traffic impacts is given below:

Impact Significance	Description
Negligible	- Temporary and small increase (<10%) in local traffic in the immediate surroundings of the Project site - Physical conditions of the road are appropriate for heavy vehicle transportation and do not require upgrading.
Minor	- Small increase (10%) in local traffic in the immediate surroundings of the Project site but still within the design carrying capacity of the transport system - Physical conditions of the road may pose a risk for heavy vehicle transportation.
Moderate	- Moderate increase (<50%) in traffic for public and private transport systems in Amasra region but still within the design carrying capacity of the transport system - Physical conditions of the road are risky at several locations and require upgrading of these locations.
Major	- Major increase (>50%) in road traffic for public and private cars in Amasra region but still within the design carrying capacity of the transport system - Existing transport system is close to or above design carrying capacity of the transport system and the increase of the traffic due to coal transportation no matter how small results in exceeding the design carrying capacity of the transport system in Amasra region - Road conditions are not appropriate for heavy vehicle transportation and need upgrading.

12.2 Transportation Network

The following access roads are available in the vicinity of the Project area (Figure 12-1):

- Gomu-Tarlaagzi Village Road
- Amasra-Bartın Road
- Amasra-Ahatlar Road
- Bartın-Ankara State Road (No. D010)
- Amasra-Topderesi Road and Tunnel

An assessment of these access roads is provided below:

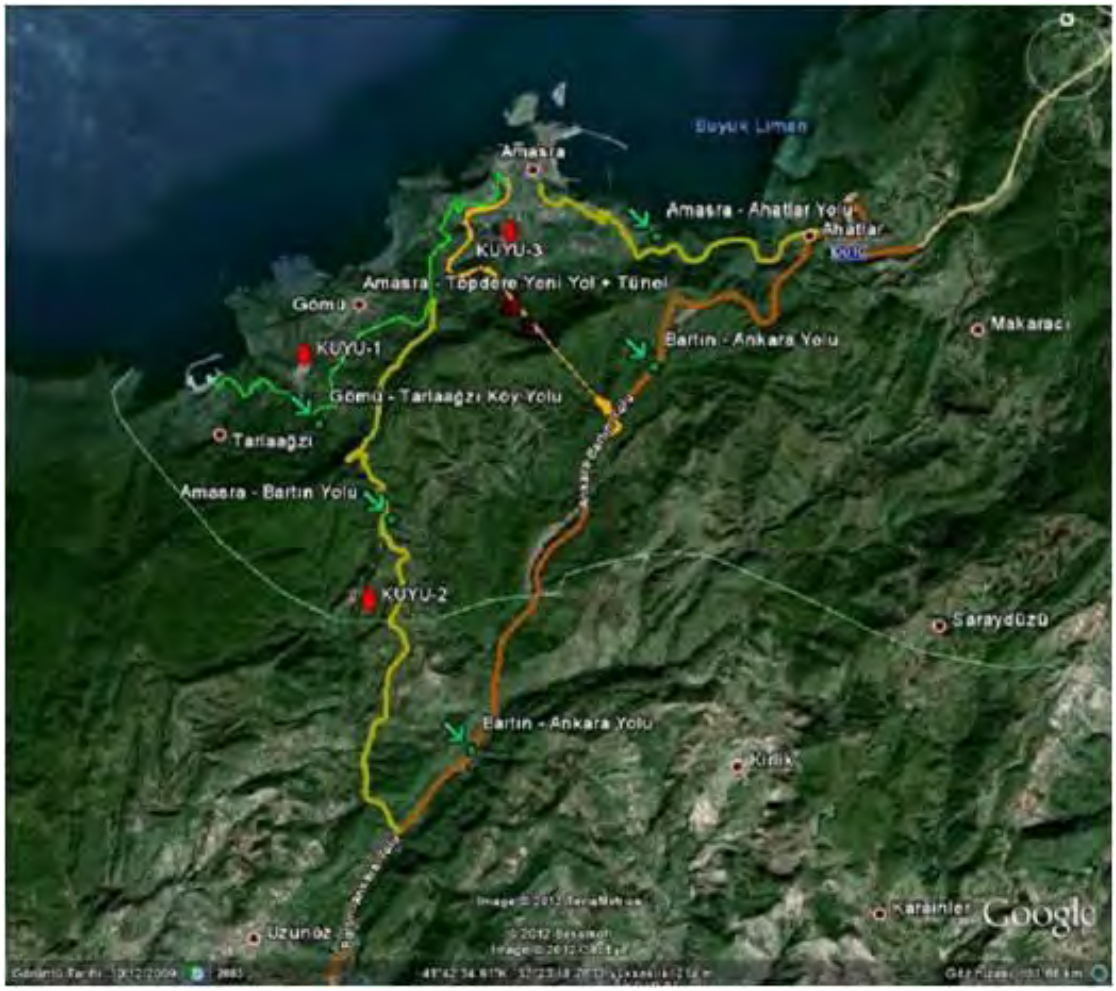


Figure 12-1: Transportation network in the Project area

12.2.1 Gomu-Tarlaagzi Village Road

The existing Gomu-Tarlaagzi Village Road is the only available access route from the Project site to Amasra-Bartın Road. This is a rural road that connects Tarlaagzi Village and Fishery to Amasra-Bartın road by crossing the southern boundary of Gomu Village. It extends a distance of approximately 2.6 km from the Shaft-1 location to the Amasra-Bartın Road exit. Although the width increases to 4-5 m at some locations, this road is usually only 3-meters wide with a single lane as seen in the Figure 12-2.

Figure 12-2: Gomu – Tarlaagzi Village Road

Deformation is observed in the asphalt paving throughout the road. Heavy vehicle transportation through this road has several disadvantages in terms of environmental impacts (noise, pollution, etc.), safety, capacity and superstructure, including:

- Two vehicles have difficulty to cross concurrently at several locations of the road.
- Near the Project site exit, an inclined road will be an issue for heavy vehicles, especially in winter conditions.
- Even though the road does not cross Gomu Village, it is routed next to a number of houses in the outer parts of the village.
- Transportation from Gomu and Tarlaagzi villages to Amasra and Bartın is also made through this road; villagers and fishermen use this road to sell their products in the district market and to transport their fish.
- Since there are no schools in neither of the two villages, school children use this road to reach their schools in Amasra central district. There are approximately 100 school children live in the two villages.
- Traffic density increases in summer due to touristic travels to the region.
- As a result of the forestry activities in the region, timber trucks frequently use this road to access Amasra-Bartın Road.
- The junction of the village road with Amasra-Bartın Road is inclined and therefore should be assessed in terms of traffic safety (Figure 12-3).

Figure 12-3: Village Road-Amasra-Bartın Road Junction Point

12.2.2 Amasra - Ahatlar Road

Amasra-Ahatlar Road is a two-lane undivided asphalt road that is routed eastbound and connected to Ankara-Bartın State Road (D010) near Ahatlar Village. Accessing Ankara-Bartın State Road via Amasra-Ahatlar Road is not considered as a favorable transportation alternative for the Project, since it makes the overall transport route longer and it passes through Amasra District center.

12.2.3 Amasra - Bartın Road through Kazpinari Village

Similar to Amasra-Ahatlar Road, Amasra-Bartın Road is a two-lane undivided asphalt road (Figure 12-4). It is routed southbound and connected to the Ankara-Bartın State Road (D010) in the south after passing through Kazpinari Village.

Figure 12-4: Amasra - Bartın Road

Currently, the road bears the majority of the traffic load between Amasra and Bartın since all public transport vehicles are using this road. There are sensitive receptors (such as an elementary school) as well as houses and agricultural fields next to it without any warning signs. Moreover, there are plenty of tight bends and slope instabilities on the road with insufficient lighting. However, according to the Traffic Study, it is the only viable transportation alternative for the Project.

12.2.4 Bartın-Ankara State Road (No. D010)

The D010 road is mostly a three lane two way road and partially a 2x2 divided road. However, roadwork is in progress and the D010 is intended to be developed into an entirely divided road. Among the others in the transportation route of the coal, it is the most convenient road for big trucks.

Figure 12-5: Bartın-Ankara Road

12.2.5 Urban Road to Bartın Cement Factory

In order to reach the cement factory, an urban road is used which passes through the city center. There are several junction points through the road and also there is a bridge over Bartın Creek. The road is mostly paved with cobblestones and it is confined with residential, commercial areas and several historical frame houses (Figure 12-6).

Figure 12-6: Urban Road to Bartın Cement Factory

12.2.6 Amasra-Topderesi Road and Tunnel

In order to shorten the route between Amasra District center and Ankara-Bartın State Road (D010), a new road project has been developed by the General Directorate of Highways and the road entered into the service on 25.12.2014. The new road includes a 1065 m long tunnel that crosses Tavacik Hill and it is connected to D010 near Topderesi Village and is designed as a 12 m wide road with one lane in each direction (Figure 12-7).

Figure 12-7: Amasra-Topderesi road and tunnel

Access from the Project site to Amasra-Topderesi Road is through the Amasra District center, and therefore intersects city traffic and settlement areas. For this reason, it is not considered as a viable transportation route for the Project. Besides, heavy vehicle traffic on this road may be subject to future restrictions by the authorities since it is only a two-lane road.

12.3 Coal Transportation Demand

As of late 2013, works for mining of shallow coals has been started near Shaft-1 and it is expected that the shallow coal extraction will initiate in 2015. The extracted coal will be processed in coal washing plants and then transported to Bartın Cement Plant by road transportation. On the other hand, coal extraction from the shafts is proposed to be initiated late 2016. The processed coal is proposed to be shipped to Catalagzi Thermal Plant and Eren Thermal Plant in Zonguldak through the HEMA port to be constructed, and not to be overlanded to Bartın Cement Plant once the port enters into service which projected to be in April 2017. The amount of coal to be transported is given in Table 12-1.

Table 12-1: Amount of Coal to be Transported

Years	Shallow Coals (tons)	Main Project Coals (tons)	Daily Amount of Coal to be Transported (tons/day)
2015	3,555	-	3,555/365=**10**
2016	134,653	43,924	(134,653+43,924)/365=**490**
2017	174,378	1,122,649	(174,378+1,122,649)/365=**3553**

The Shaft-1 site is also the administrative center and all logistic activities of the project will depart from this location. According to Regulation on Road Traffic (OG Date/Number: 18.07.1997/23053), the total weight of a loaded truck should not exceed 32 tons including the weight of the vehicle itself. Therefore the number of trucks to transport the coal is estimated as in Table 12-2.

Table 12-2: Number of Coal Carrying Trucks

Loading Capacity	Number of Trucks	Maximum Amount of Coal to be Transported (tons/day)
Approximately 20-22 tons of load/trip	175 vehicles/ 350 trips	3500-3850 tons/day

It is assumed that a heavy vehicle technically is equivalence of 3 cars and therefore totally 1050 units-traffic demand will be generated (350 x 3 = 1050).

Additionally the Project will have employee shuttle bus services that will contribute to the local traffic density. There will be four shifts per day and number of shuttles per shift is proposed to vary by years. Currently, there are 790 employees working in the Project site. With the initiation of the port construction on 2015, additional 100 workers will be employed in the site whereas in 2017, the mine will start production with full capacity and it is anticipated that a total of 2000 personnel will be employed. In all phases, 200 workers will accommodate in the on-site facilities near Shaft-1 and it is stated that shuttles will be carrying 25 persons per trip. The estimated number of shuttle services according to the above data is given in Table 12-3.

Table 12-3: Number of employee shuttle services (daily-bidirectional)

Year	2015 (24 hours)	2016 (24 hours)	2017 (24 hours)
Number of shuttle trips	7 vehicles/shift x 4 shifts x 2 rounds = 56	7 vehicles/shift x 4 shifts x 2 rounds =56	18 vehicles/shift x 4 shifts x 2 rounds =144

According to the estimations, in 2017, traffic demand of the shuttle services will be 288 units when the equivalence of a shuttle service is assumed to be 2 cars. All in all, maximum of 1338 (1050 + 288) units-traffic demand will be generated around the facility as a result of the Project activities.

12.4 Optimum Transportation Itinerary

The most appropriate transportation route to Bartın Cement Plant is given in the Figure 12-8 below. Total length of this route is 19 km and the estimated duration of the trip is 30 minutes. The route that trucks will follow is listed below with the deemed impact significances of the coal transportation:

- Tarlaagzi- Gomu Village Road – major impact
- Amasra-Bartın Road through Kazpinari Village– moderate impact
- Ankara- Bartın State Road (No. D010) – minor impact
- Urban Road to Bartın Cement Factory: 190. Ave (D010) / Tersane Ave. (D010) / Gazhane Ave. (D010) / Golbucagi Ave. (D755) / Bogaz Ave. (D755) – minor impact

Regarding the proposed itinerary and the transportation schedule, permission letters were obtained by the Project from the General Directorate of Highways and Bartın Provinicial Administration.

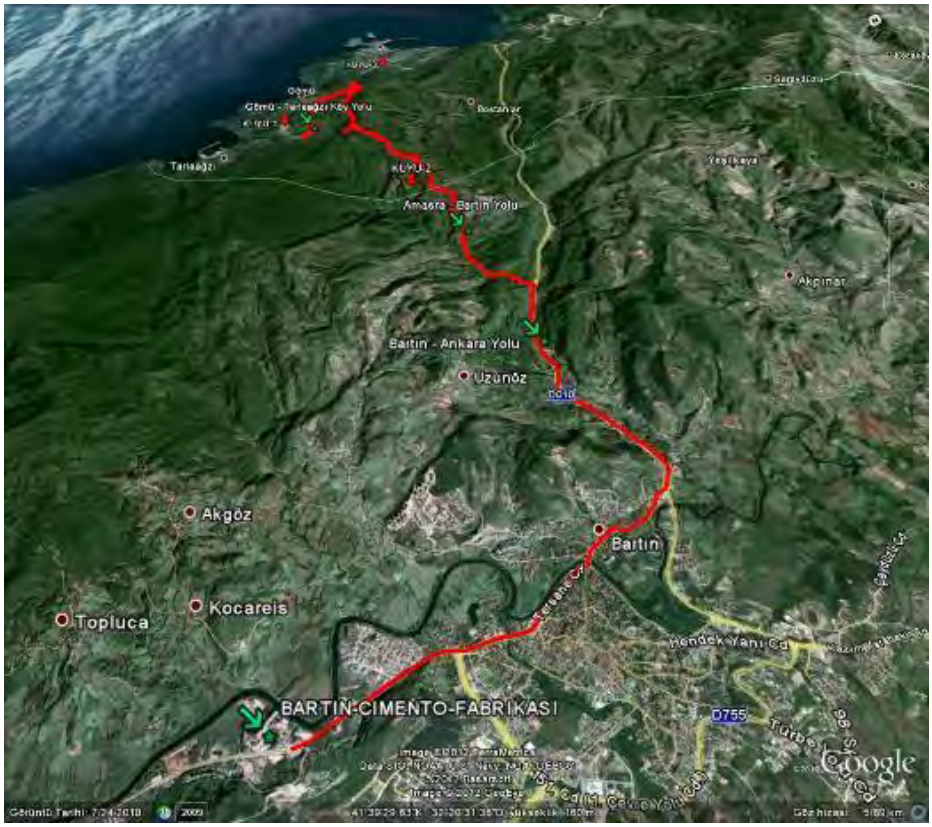


Figure 12-8: Route to Bartın Cement Plant

The proposed road transportation schedule will involve the following:

- Number of loaded trucks may be up to 12 per hour (at a maximum interval of 5 minutes) during an 18-hour period between 06:00- 24:00.
- A maximum number of 200 loaded trucks may check out and 200 empty trucks may check in per day (up to 400 trucks /day on the road excluding the regular traffic).
- Transportation will be done by non-trailer vehicles.
- The maximum transportation load (including vehicle weight) will be 32 tons and the maximum vehicle width will be 2.55 m.
- On the weekends, the empty trucks coming back from the cement factory may use Amasra-Topderesi road and tunnel.

It is stated in the official letter of General Directorate of Highways (dated 10.05.2012) that, minimum of 2 million tons of coal can be transported using the existing roads annually. Taking the above into consideration, the capacity of present road network can satisfy the transportation of produced coal until operation of the port.

12.5 Mitigation Measures

Mitigation measures to avoid and/or mitigate the predicted impacts on the road traffic during the transportation of the coal to the cement factory will include the following:

- Traffic signs and warnings will be placed at the Gomu Village turn and Amasra-Bartın road junction on Gomu-Tarlaagzi Village Road.

- Convex mirrors will be placed at the necessary points of Gomu-Tarlaagzi Village Road and Amasra-Bartın Road in order to extend the angel of sight. Additionally, all drivers will be warned and trained to be careful for the points with tight bends, residential areas and schools. Also, necessary traffic and warning signs will be placed at those points.
- Speed limit will be 30 km/h on Gomu-Tarlaagzi Village Road and at Kazpinari Village turn on Amasra-Bartin Road. On Amasra-Bartın Road, Bartın-Ankara Road and Bartın Urban Road, speed limit of 'Highways' will be valid and drivers of trucks and vehicles will adhere to defined speed limits.
- Traffic signs will be placed at appropriate locations in order to prevent and accidents.
- Periodic maintenance will be applied to all traffic and warning signs and they will be renewed when necessary.
- Coal will not be transported during the school buses carrying the children on Gomu-Tarlaagzi Village Road and on the rush hours which children getting to /leaving Kazpinari Elemantary School right next to Amasra-Bartın Road.
- A school crossing sign will be placed earlier on Kazpinari Elementary School. All vehicles will lower their limits prior to that point.
- In case of an accident, drivers will inform the administration at once. Other than the emergency and first aid response teams, temporary warning spots will be established at the appropriate distances on the both sides of the location of the incident by company personnel and their communication will be provided by walkie-talkies.
- First aid and technical response teams will stand by during the operation of the mine at Shafts 1 and 2.
- Drivers will be warned against creating unnecessary noise by using horns.
- All vehicles will have GPS and by tracking system it will be prevented to have two heavy vehicles on the opposite directions at the same time on Gomu-Tarlaagzi Village Road.
- Road maintenance will be provided in case of any physical damage occurred as a result of the Project activities.
- Weekly transportation schedule will be handed to head of Gomu Village and he will be informed in case of instant changes in the schedule.
- All vehicles and work machinery will be subject to periodic maintenance with the aim of reducing noise, dust and gas emissions from vehicles.
- Trucks will be covered and any physical condition which may pose risks such as fall-offs or spills will be prevented before leaving the Project site.
- Transfer roads will be sprayed with water as necessary (for example using mobile bowsers) to prevent significant dust emissions especially in dry weather conditions.
- In case of heavy rains and/or snowfalls a scout car will be sent from the Project site to Amasra-Bartın junction point to observe the road conditions. No vehicles will leave the site unless it is reported that the road is clear and safe.
- All vehicles will be cleaned regularly and while leaving the site, tires of the vehicles will be cleared off the mud.
- Drivers will be obliged to have heavy vehicle driver license at least for five years.

- A comprehensive Traffic Management Plan will be prepared by company administration and implemented in order to manage the internal traffic in the Project site that will take into account vehicular traffic, emergency conditions and pedestrian traffic.
- A transportation map showing all accessible roads in the region and pointing out the coal transportation itinerary will be handed out to drivers and they will be warned periodically for not to use any other routes unless emergency conditions.

12.6 Residual Impacts

Assuming all the mentioned mitigation measures stated above are fully implemented in a diligent manner, the associated risks on road traffic and safety of the nearby communities will be minimized. No residual impact is expected to occur due to road transportation of the coal since the maritime transportation will initiate shortly after the coal production.

13.0 ECOLOGY AND BIODIVERSITY

13.1 Scope

This chapter presents an assessment of the potential impacts of the Project on terrestrial and marine ecology and resources of nature conservation interest. Baseline information on terrestrial and marine ecology was taken from the following sources:

- Final Terrestrial Ecology Report (Flora and Fauna), by flora expert Prof. Hayri DUMAN and fauna expert Prof. Mustafa SOZEN, 2014
- HEMA Reclamation Area and Quay Project Marine Biodiversity Ecology Report, by Prof. Gülendam TUMEN, 2013

The ecology study presented in the "Final Terrestrial Ecology Report" involved a one day field survey conducted by two ecologists (flora expert Prof. Hayri DUMAN and fauna expert Prof. Mustafa SOZEN) on 11 November 2014 within the HEMA Hard Coal Mine Project Areas. This study was undertaken to complement the information gaps identified in the earlier studies of HEMA on faunal and floral habitat of the area, which were:

- Amasra Hard Coal Mine Project Terrestrial Ecology Report, Prof. Dr. Gülendam TUMEN and Prof. Dr. Fatih SATIL from Balikesir University, 2014
- Ecology Report, Prof. Dr. Gülendam TUMEN and Prof. Dr. Fatih SATIL from Balikesir University, 2013
- Amasra Hard Coal Mine Project Terrestrial Ecology Report, by Dokay Engineering and Consultancy, 2011
- HEMA Reclamation Area and Quay Project Terrestrial Biodiversity Ecology Report, by Dokay Engineering and Consultancy, 2011

The significance criteria that are used related to impacts on terrestrial and marine ecology are presented below, respectively.

Impact Significance for Terrestrial Ecology	Description
Negligible	- No habitat loss due to development of the Project. - No dust generation due to development of the Project. - No endemic and/or widespread flora species loss due to Project Areas to be cleared. - Little or no change in faunal population, habitat availability or habitat quality.
Minor	- Habitat loss that potentially recoverable in a short term. - Short-term, local change of faunal species abundance, distribution, habitat availability or habitat quality. - Short-term and small amount dust generation outside of the vegetative development period.
Moderate	- Habitat loss that potentially recoverable in a long term. - Short-term and small amount dust generation within the period of vegetative development. - Widespread flora species removal due to development of the Project prior to the rehabilitation of the disturbed areas. - Short-term and extensive dust generation leading decreased air quality causing diseases among livestock and wild animals - Entire faunal community may not be removed due to the small size of the Project Areas to be cleared. - The removal of the faunal species with lower conservation status within the area where the project is located and its surroundings. - Widespread, short-term change in habitat availability or quality which would likely modify natural abundance or distribution of faunal species using the Project Areas; or

	local modification in habitat availability or quality which would likely modify natural abundance or distribution at least as long as modifying influences exist.
Major	- Permanent and irreversible habitat loss due to development of the Project. - Extensive dust generation within the period of vegetative development. - Long-term and extensive dust generation leading decreased air quality may cause diseases among livestock and wild animals. - Endemic flora species loss due to development of the Project. - Entire faunal community may be removed due to the large size of the Project Areas to be cleared. - Permanent removal of faunal species with restricted ranges within the area where the Project is located and its surrounding. - Widespread, long-term change in habitat availability or quality which would likely modify natural abundance or distribution of faunal species using the Project Areas. Modification will persist at least as long as modifying influences exist.

Impact Significance for Marine Ecology	Description
Negligible	- No turbidity within the port area and thereby no risks on marine species and density of the populations associated with the increasing levels of suspended solids, nutrient content and reducing levels of light penetration. - No underwater noise and vibration and thereby no adverse impact on sensitive receptors within the marine environment. - No contamination of marine environment through site run-off, uncontrolled wastewater discharges and oil spills during construction and operation activities thereby no risks on marine species - No discharge of ballast water into marine environment.
Minor	- Short-term turbidity and thereby temporary damage of the ecosystem and loss of biomass.
Moderate	- Long-term turbidity may cause a loss of biodiversity and a decline in the health and integrity of aquatic ecosystems. - Temporary and site specific noise and vibration below the threshold levels may disturb the marine species. - Temporary small-scale oil spills and uncontrolled wastewater discharges during construction and operation and thereby temporary damage on marine ecosystem.
Major	- High levels of underwater noise and vibration and thereby significant adverse impact on sensitive receptors within the marine environment. - Large-scale oil spills and uncontrolled wastewater discharges during construction and operation and significant adverse impact on marine ecosystem. - Accidental (or illegal) discharge of ballast water into marine environment may affect whole marine ecosystem due to it can contain traces of oil or other potential polluting chemicals or foreign (alien) invasive species and pathogens.

13.2 Legislative Framework

Data obtained from the Final Terrestrial Ecology Report and the HEMA Reclamation Area and Quay Project Marine Biodiversity Ecology Report have been evaluated according to the International Union for the Conservation of Nature (IUCN), Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) and the Bern Convention standards, the Central Game Commission (MAK) Decisions, Habitat Directives and the Directive on the Conservation of Wild Birds.

The IUCN maintains a List of Threatened Species (the IUCN Red List) which is a widely recognised, global approach for evaluating the conservation status of plant and animal species. It provides taxonomic, conservation status and distribution information on taxa that are facing a high risk of global extinction. The 1994 (ver. 2.3) and 2012 (ver. 4.0) IUCN Red List categories and criteria are given in Table 13-1.

Table 13-1. IUCN Red List Categories and Criteria

IUCN Red List Categories and Criteria 1994 (ver. 2.3)		IUCN Red List Categories and Criteria 2012 (ver. 4.0)	
EX	Extinct	**EX**	Extinct
EW	Extinct in the Wild	**EW**	Extinct in the Wild
CR	Critically Endangered	**CR**	Critically Endangered
EN	Endangered	**EN**	Endangered
VU	Vulnerable	**VU**	Vulnerable
LR	Lower Risk		
	cd : conservation dependent	**NT**	Near Threatened
	nt : near threatened	**LC**	Least Concern
	lc : least concern		
DD	Data Deficient	**DD**	Data Deficient
NE	Not Evaluated	**NE**	Not Evaluated

The Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) was accepted by Turkey by Law no. 4041 (Official Gazette dated 1 October 1994 and no. 22068) and published in the Official Gazette dated 20 June 1996, no. 22672.

Species covered in CITES are given in three different appendices according to their conservation status. Appendix I covers the species which are under threat of extinction. Trade in the specimens of these species is not allowed except in extraordinary circumstances. Appendix II includes species which are not threatened with extinction, but trade in specimens is restricted in order to prevent utilization incompatible with their survival. Appendix III includes species for which other parties of CITES have applied for assistance in controlling trade and which are conserved in at least one country.

The Bern Convention on the Conservation of European Wildlife and Natural Habitats was adopted by the Council of Europe in Bern, Switzerland in 1979, and came into force in 1982. The Convention aims to ensure conservation and protection of wild plant and animal species and their natural habitats, to increase cooperation between contracting parties, and to regulate the exploitation of certain species (including migratory species). The Convention imposes legal obligations on contracting parties, protecting over 500 wild plant species and more than 1000 wild animal species.

Species that are protected under Bern Convention are classified according to the following categories:

- Appendix I: Strictly protected flora species
- Appendix II: Strictly protected fauna species
- Appendix III: Protected fauna species

Each Party is required to assign and develop legislative and administrative measures for the conservation of the habitats of wild flora and fauna species, especially those specified in Appendices I and II, and the conservation of endangered natural habitats, and to give special attention to the protection of areas that are of importance for migratory species specified in Appendices II and III as wintering, staging, feeding, breeding or moulting areas. Contracting parties also undertake to strictly control the introduction of non-native species.

The Central Game Commission (MAK) Decisions for 2014-2015 Hunting Season took effect by publishing in the Official Gazette dated May 5, 2014 and evaluates fauna species. MAK Decisions are classified according to the following categories;

- Appendix I: Wild Animals Protected by the Ministry of Forestry and Water Affairs
- Appendix II: Game Animals Protected by MAK
- Appendix III: Game Animals whose Hunting is Allowed for Certain Periods for 2014-2015 Season

The Habitats Directive (together with the Birds Directive) forms the cornerstone of Europe's nature conservation policy. EU governments adopted the Habitats Directive in 1992 (Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora). Together with the Birds Directive, it sets the standard for nature conservation across the EU and enables all 28 Member States to work together within the same strong legislative framework in order to protect the most vulnerable species and habitat types across their entire natural range within the EU.

The Habitats Directive protects around 1200 European species, other than birds, that are considered to be endangered, vulnerable, rare and/or endemic. Included in the Directive are mammals, reptiles, fish, crustaceans, insects, molluscs, bivalves and plants. The protection provisions for these species are similar to those in the Birds Directive. They are designed to ensure that the species listed in the Habitats Directive achieve the desirable conservation status within the EU.

Habitats Directives are classified according to the following categories;

- Annex I: Natural habitat types of community interest whose conservation requires the designation of special areas of conservation.
- Annex II: Animal and plant species community interest whose conservation requires the designation of special areas of conservation
- Annex III: Criteria for selecting sites eligible for identification as sites of community importance and designation as special areas of conservation
- Annex IV: Animal and plant species of Community interest in need of strict protection
- Annex V: Animal and plant species of community interest whose taking in the wild and exploitation may be subject to management measures
- Annex VI: Prohibited methods and means of capture and killing and modes of transport

Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the Conservation of Wild Birds: Acts adopted before 1 December 2009 under the EC Treaty, the EU Treaty and the Euratom Treaty)

The birds in the scope of the EU list are listed as Annex I, Annex II (Part A, Part B); the birds in Annex I are the ones that require strict protection; while the others are listed in Annex II. The birds of the Project Areas are classified as Ann.-I Ann-IIA and Ann-IIB in the respective table.

- Annex I: The species mentioned in Annex I shall be the subject of special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution.
- Annex II: The species referred to in Annex II, Part A may be hunted in the geographical sea and land area where this Directive applies. The species referred to in Annex II, Part B may be hunted only in the Member States in respect of which they are indicated.

- Annex III: The activities referred to in paragraph 1 shall not be prohibited in respect of the species referred to in Annex III, Part A, provided that the birds have been legally killed or captured or otherwise legally acquired.

Impact assessment on the ecology considered the above mentioned international conventions, the International Finance Corporation (IFC) Performance Standard (PS) 6 and the relevant Turkish regulations on protection of ecology which includes the following:

- Environmental Law (Law No: 2872) (Official Gazette-OG- Date/Number: 11.08.1983/18132)
- Law on Terrestrial Hunting (Law No:4915) (OG Date/Number: 11.07.2003/25165)
- Aquatic Products Law (Law No: 1380) (Official Gazette Date and Number: 04.04.1971/13799)
- Aquatic Products Regulation (Official Gazette Date and Number: 10.03.1995/22223)
- Regulation on Wildlife Protection and Wildlife Development Areas (OG Date/Number: 08.11.2004/25637)
- National Parks Law (Law No: 2873) (Official Gazette Date and Number: 11.08.1983/18132)
- Forest Law (Law No: 6831) (Official Gazette Date and Number: 08.09.1956/9402)
- Pasture Law (Law No:4342) (Official Gazette Date and Number: 28.02.1998/23272)

The "IFC Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources" covers areas of biodiversity conservation, ecosystem services and sustainable management of living resources, which are all fundamental to achieve sustainable development. Accordingly, the objectives of PS 6 are outlined as the following (IFC, 2012b):

- To protect and conserve biodiversity.
- To maintain the benefits from ecosystem services.
- To promote the sustainable management of living natural resources through the adoption of practices, which integrate conservation needs and development priorities.

Actions necessary to be implemented to meet the requirements of PS 6 are managed within the scope of the Environmental and Social Management System (ESMS) of a project. The requirements can be listed as the following; considering direct and indirect impacts of the project on biodiversity and ecosystem services, avoiding such impacts, taking necessary measures to minimize them when avoidance is not possible, adopting an adaptive management system, protecting and conserving the biodiversity, managing ecosystem services and living natural resources, and evaluating the supply chain in terms of its potential impacts.

Within the scope of the IFC PS 6, it is crucially important to also evaluate ecosystem services that a particular site offers, which include "benefits that people, including businesses, derive from ecosystems". Accordingly, the IFC defines four types of ecosystem services, which have been identified as part of the HEMA Hard Coal Mine Project flora and vegetation studies (IFC, 2012b):

- Provisioning services, which are the products people obtain from ecosystems
- Regulating services, which are the benefits people obtain from the regulation of ecosystem processes
- Cultural services, which are the non-material benefits people obtain from ecosystems
- Supporting services, which are the natural processes that maintain the other services

The IFC requires that a project owner carries out a systematic review, called an Ecosystem Services Review (ESR), to identify priority ecosystem services. For the purposes of Performance Standard 6 implementation and the ESR, ecosystem services are categorized as two types (IFC, 2012b: 42):

- Type I: Provisioning, regulating, cultural and supporting ecosystem services, over which the client has direct management control or significant influence, and where impacts on such services may adversely affect communities.
- Type II: Provisioning, regulating, cultural and supporting ecosystem services, over which the client has direct management control or significant influence, and on which the project directly depends for its operations

Accordingly, Type I ecosystem services will be considered priority, if:

- Project operations are likely to result in a significant impact on the ecosystem service;
- The impact will result in a direct adverse impact on Affected Communities" livelihood, health, safety and/or cultural heritage; and
- The project has direct management control or significant influence over the service.

On the other hand, Type II ecosystem services will be considered priority, if:

- The project directly depends on the service for its primary operations; and,
- The project has direct management control or significant influence over the service

In addition to the provisions of the IFC Performance Standard 6, the High Conservation Value (HCV) concept was utilized as a tool to identify presence of natural habitats with significance or critical importance due to the environmental, socioeconomic, biodiversity or landscape values that it carries. The HCV approach was initially developed by the Forest Stewardship Council (FSC) in the context of forest management. It is now widely utilized for a wide range of fields including palm oil, soy, sugar, bio-fuels and carbon, as well as landscape mapping and natural resource planning. HCV Resource Network is a charter-based organization that is governed by environmental and social NGOs, private sector representatives and multilateral organizations that promotes the use of the HCV approach and its consistent application and brings HCV stakeholders together (HCV Resource Network, 2013).

The HCV approach allows for sustainable management when such areas are identified in accordance with the six main types of HCVs outlined below:

- **HCV1:** Areas containing globally, regionally or nationally significant concentrations of biodiversity values (e.g. endemism, endangered species, refugia)
  HCV1.1. Protected areas
  HCV1.2. Threatened and endangered species
  HCV1.3. Endemic species
  HCV1.4. Critical temporal use
- **HCV2:** Globally, regionally or nationally significant large landscape-level areas where viable populations of most, if not all, naturally occurring species exist in natural patterns of distribution and abundance
- **HCV3:** Areas that are in or contain rare, threatened or endangered ecosystems
- **HCV4:** Areas that provide basic ecosystem services in critical situations (e.g. watershed protection, erosion control)
  HCV4.1 Forests critical to water catchments

HCV4.2 Forests critical to erosion control

HCV4.3 Forests providing barriers to destructive fire

- **HCV5**: Areas fundamental to meeting basic needs of local communities (e.g. subsistence, health)
- **HCV6:** Areas critical to local communities' traditional cultural identity (areas of cultural, ecological, economic or religious significance identified in cooperation with such local communities)

The IFC also recognizes HCV as a tool used by certain sectors, such as agriculture and forestry, in determining conservation value of a land area or management unit. However, there are differences in the way HCV types are set by the HCV Resource Network and the way IFC defines biodiversity and ecosystem services within its Performance Standard 6 (IFC, 2012a). Consequently, the IFC provides a tool to identify the relation between each HCV type and performance standards that best fit the HCV type. The relation between High Conservation Value Types and Performance Standard 6 is presented in Table 13-2.

Table 13-2. The relation between High Conservation Value Types and Performance Standard 6

HCV Type	Performance Standard 6
HCV 1: Areas containing globally, regionally or nationally significant concentrations of biodiversity values	Critical habitat in most cases. See paragraphs GN55–GN112 for further guidance.
HCV 1.1: Protected areas	
HCV 1.2: Rare, threatened or endangered species	
HCV 1.3: Endemic species	
HCV 1.4: Seasonal concentrations of species	
HCV 2: Globally, regionally or nationally significant large landscape-level areas where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance.	Natural habitat, and may be critical habitat if areas contain high biodiversity values as identified in paragraph 16 of Performance Standard 6.
HCV 3: Areas that are in or contain rare threatened or endangered ecosystems	Critical habitat
HCV 4: Areas that provide basic ecosystem services in critical situations	Priority ecosystem services as defined by paragraph 24 of Performance Standard 6. See paragraphs GN126–GN142 for further guidance.
HCV 4.1: Areas critical to water catchments **HCV 4.2:** Areas critical to erosion control	
HCV 4.3: Areas providing critical barriers to destructive fire	
HCV 5: Areas fundamental to meeting basic needs of local communities	Priority ecosystem services as defined by paragraph 24 of Performance Standard 6. Client requirements defined in Performance Standard 5 are also applicable. See paragraphs GN126–GN142 for further guidance.
HCV 6: Areas critical to local communities' traditional cultural identify (areas of cultural, ecological, economic or religious significance identified in cooperation with such local communities.	Priority ecosystem services as defined by paragraph 24 of Performance Standard 6. Client requirements defined in Performance Standard 8 are also applicable. See paragraphs GN126–GN142 for further guidance.

13.3 Legally Protected Sites and Key Biodiversity Areas

In order to identify the protected sites in the vicinity of the Project areas, maps and other relevant documents published by the Ministry of Forest and Water Affairs (MFWA), General Directorate of Nature Conservation and National Parks have been utilized along with the information collected from following references:

- Geodata (Geographical Information System) of MFWA
- General Directorate of Nature Conservation and National Parks of MFWA

http://www.milliparklar.gov.tr/belge/tp.pdf

- Key Biodiversity Areas of Turkey (Türkiye'nin Önemli Doğa Alanları Kitabı) – Nature Society (Doğa Derneği)
- Natural and Cultural Assets in Bartın – Republic of Turkey, Governorship of Bartın http://www.bartin.gov.tr/kultur-turizm
- List of Natural Protected Areas and Natural Assets in Bartın – Bartın Provincial Directorate of Ministry of Environment and Urban Planning http://www.csb.gov.tr/iller/bartin/index.php?Sayfa=haberdetay&Id=14446
- World Database on Important Bird Areas http://www.birdlife.org/datazone/geomap.php?r=i&bbox=-150%20-50%20150%2080

According to the information obtained from the List of Natural Protected Areas and Natural Assets in Bartın, natural protected sites within the licence area and its surroundings are *Kuşna Rocky Cliff*, *Bartın River and North of Bartın – Amasra Highway* (see Figure 13-1). *Kuşna Rocky Cliff* and *North of Bartın – Amasra Highway* are located in the north of the licence area and *Bartın River* is located approximately 5,000 m southwest of it.

Kuşna Rocky Cliff has been registered as a first degree natural site on 28.09.2007 by the Karabük Cultural and Natural Assets Conservation Board and *Bartın River* has been registered as a first degree natural site on 26.07.2002 by the Ankara Cultural and Natural Assets Conservation Board.

First degree natural sites call for absolute protection and preservation for public interest due to their scientific values, interesting features and attractions, and rare characteristics. Human activities that may damage the geological characteristics, vegetation cover and general landscape of such sites are prohibited.

North of Bartın – Amasra Highway has been registered as a third degree archaeological and natural site on 28.09.2007 by the Karabük Cultural and Natural Assets Conservation Board.

Third degree archaeological sites are areas in which construction may be allowed. In third degree natural sites residential development may be permitted in the light of use patterns and the potentials of the region.

In addition to the natural sites mentioned above, another legally protected site close to the licence area is the *Ahatlar Natural Park* (information obtained from GIS database of MFWA) located approximately 2,000 m north-east of the licence area (see Figure 13-1). *Ahatlar Natural Park* has an area of 9.3 ha and has been registered as a protected area on 11.07.2011 by the Ministry of Forestry and Water Affairs. The aim of declaring *Ahatlar Natural Park* as a protected area is to conserve the wildlife and vegetation in the area.

Figure 13-1. Legally protected sites in the licence area and its surroundings

According to the information obtained from the GIS Database of MFWA, a large part of the licence area is covered by productive forests. Also, subsidiary agricultural production (i.e., chestnut, lime flower, laurel) takes place in the area where the Project is located and its surroundings (see Figure 13-2).

Figure 13-2. Productive forest and secondary products in the licence area and its surroundings

Key Biodiversity Areas (KBAs) have been identified in Turkey, but there are no regulatory provisions for the identified KBAs except for those that have a legal protection status. The book entitled 'Key Biodiversity Areas of Turkey' published by Doğa Derneği (Nature Society) in cooperation with the Turkish Ministry of Environment and Forestry (former ministry, now Ministry of Environment and Urban Planning) and several conservationists and academics, is an important source for KBAs in Turkey. According to the book, Amasra Coastline is a key biodiversity area (Figure 13-3).

Figure 13-3. Amasra Coastline Key Biodiversity Area

In addition to the KBAs, Important Bird Areas (IBAs) have also been identified by Birdlife International. According to the available information in the world database on important bird areas of Birdlife International, the closest IBA is located approximately 2,000 m south of the licence area. (See Figure 13-4).

Figure 13-4. Closest IBA to the licence area

13.4 Terrestrial Flora

13.4.1 Methodology

Terrestrial flora studies were conducted within an investigation area which covers Shaft-1, Shaft-2, Shaft-3, spoil dumpsites, waste rock dumpsites, HEMA Port and their surroundings including the forests, maquis and plantation sites. Field surveys were conducted and literature was reviewed in

order to identify the local habitat characteristics and vegetation cover within the Project Areas and the region as well as to make an inventory of flora species. The endemism and threat/protection status of species were taken as basis for evaluation.

The Flora list was prepared in accordance with the phylogenetic order in Turkish flora; ferns, open seed plants (*Gymnospermae*) and closed-seeded plants (*Angiospermae*). Families under each group were also listed according to the phylogenetic order in the Turkish flora. Species are listed with their latin name, English names (if available), phytogeographic regions, endemism, threat categories for endemic and rare species, and their relative abundance in the region. Samples collected in the Project Areas were transformed into herbarium material and identified by using the "Flora of Turkey and the East Aegean Islands" by Davis, 1965-1988. While determining threat statuses of endemic and rare flora species the Red Data Book of Turkish Plants (Ekim et al., 2000), which was prepared in accordance with the IUCN 1994 criteria, was utilized.

13.4.2 Overview of Baseline Conditions

The Project is located in Amasra District of Bartin Province in the West Black Sea Region of Turkey. There are deciduous mixed forests, maquis, plantation sites and some vegetable and fruit gardens, as well as settlements within and around the Project Areas. The region is included in the Euro-Siberian phytogeographical region, but also it is possible to see the impacts of the Mediterranean climate in the region. Therefore, evergreen maquis communities are dominant in some areas. Due to oceanic rainfall, the average annual rainfall is more than 1,000 mm in the region. The flora is quite rich and interesting within the region because both Euro-Siberian and Mediterranean plant communities are distributed in it. Endemism rate within the Project Areas is quite low because habitats are highly destructed.

Forest and shrub species distributed within the region mostly consist of natural species. The most important assets are the deciduous mixed forests and pseudo-maquis vegetation that grow on calcareous main rock. Natural pseudo-maquis and deciduous forests within the region are highly disrupted due to existence of the settlements and agricultural lands.

Deciduous forests are composed of *Carpinus betulus* (Common hornbeam), *Fagus orientalis* (Oriental beech), *Quercus cerris* (Turkey oak), *Quercus petraea* (Sessile oak), *Tilia rubra* and *Castanea sativa* (Sweet chestnut). The evergreen maquis vegetation consists of *Laurus nobilis* (Bay), *Arbutus unedo* (Strawberry tree), *Phillyrea latifolia*, *Erica arborea* (Tree heath), *Myrtus communis* (Common myrtle). Dominant species of deciduous forests in the area change with elevation. The dominant species of deciduous forests that are distributed at an elevation lower than 200 meters within the area where the Project is located is *Fagus orientalis* while *Carpius betulus, Acer campestre* and *Quercus petraea* are dominant species above 200 meters. Evergreen maquis vegetation in the area is quite healthy. *Alnus glutinosa* is the dominant species along the streams.

There is also a *Pinus nigra* (Black pine) plantation area within the area where the Project is located. Crops like *Coryllus avellana* (Common hazel), *Juglans regia* (Persian walnut), *Moru alba* (White mulberry), *Ficus carica* (Common fig), *Prunus x domestica* (European plum), *Pyrus communis* (European pear), *Brassica oleracea*, *Zea mays* (Corn), *Phaseolus vulgaris* (Common bean), *Lycopersicum esculentum* (Tomato), *Capsicum annuum* (Chilli pepper), *Solanum tuberosum*

(Potato), *Solanum melongena* (Aubergine), and *Cucurbita pepo* (Pumpkin) are also grown on the site.

Photographs of the deciduous forest vegetation, evergreen maquis vegetation and pinus nigra plantations within the Project Areas can be seen in Figure 13-5 through Figure 13-8.

Figure 13-5. Deciduous forest vegetation

Figure 13-6. Deciduous forest vegetation

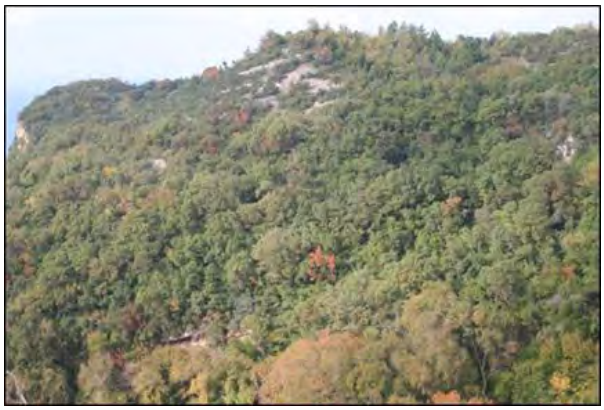


Figure 13-7. Evergreen maquis vegetation

Figure 13-8. *Pinus nigra* plantations

13.4.3 Terrestrial Flora Inventory of the Project Areas

The flora of the Western Black Sea Region Turkey is quite well-studied. As a result of field studies carried out in the Project Areas, a total of 203 flora taxa, 7 of which belong to 5 fern families, 3 species that belong to 2 *Gymnospermae* families and 195 species that belong to 58 *Angiospermae* families were identified. In general, species identified during the field studies, except for plantation trees, are natural species. Lists of flora species inside and surrounding the Project Areas, including the English name, phytogeographic region, endemism, habitat, abundance and threat categories of these species, are provided in Annex L - Table L-1.1.

13.4.4 Threat Status, Rareness and Endemism of Flora Species

Among the 203 plant taxa of 65 families identified during the field studies, there are three endemic species. *Seseli resinosum* (see Figure 13-9) and *Euonymus latifolius subsp. cauconis* (see Figure 13-10) species are regionally endemic as they have a limited distribution in the Western Black Sea Region of Turkey only. However, *Campanula lyrata subsp. lyrata* (see Figure 13-11) is distributed in

the Aegean, the Mediterranean, the Marmara, the Western Black Sea, and partly in the Central Anatolia regions of Turkey, and therefore *Campanula lyrata subsp. lyrata* is widespread endemic.

Figure 13-9. *Seseli resinosum*

Figure 13-10. *Euonymus latifolius subsp. Cauconis*

Figure 13-11. *Campanula lyrata subsp. lyrata*

Seseli resinosum is found within the maquis and rocks on the shore within the region. Its population density was assessed to be medium. This species was also recorded in Bartin, Duzce, Karabuk, Kastamonu and Zonguldak, at elevations of 0-500 meters. Although the species was recorded in all provinces of the Western Black Sea region their population density is low. Therefore, it is listed as "VU: Vulnerable" under the IUCN list.

The other regionally endemic subspecies of *Euonymus latifolius subsp. cauconis* is found in the Zonguldak Kozlu and Sinop region according to the Turkish flora. Also, it is found within deciduous forest areas of the Western Black Sea Region. The IUCN threat category of this species is "NT: Near Threatened". *Campanula lyrata subsp. lyrata* is quite widespread in Turkey. Therefore, its IUCN

threat category is "LC: Least Concern". Although it is not endemic, *Cyclamen coum var. coum* is listed under Annex II of the CITES since its tubers are exported.

Endemic species within the Project Areas and distribution coordinates are given in Table 13-3.

Table 13-3. Distribution coordinates of the endemic and rare species within the Project Areas

Local Endemic Species	English Name	Threat Category	Distribution Coordinate (UTM-36T)
Seseli resinosum	-	VU (IUCN)	445353 E ; 4619581 N
Campanula lyrata subsp. lyrata	-	LC (IUCN)	445353 E ; 4619581 N
Euonymus latifolius subsp. cauconis	-	NT (IUCN)	446794 E ; 4616783 N 444182 E ; 4617982 N
Cyclamen coum var. coum	Pink silverleaf	Annex II (CITES)	446149 E ; 4619402 N

13.4.5 Evaluation of the Flora Species According to HCV and IFC Standards

As mentioned in section 13.3.4, three endemic flora species were identified within the Project Areas. Therefore, the area where the Project is located is considered as HCV Type 1 which covers "areas containing globally, regionally or nationally significant concentrations of biodiversity values (e.g. endemism, endangered species)". The conservation value is derived from the presence of endemic species and therefore the area is classified as HVC 1.3.

As outlined in Table 13-2, the relation between the HCV types and IFC Performance Standards suggest that the site can be considered as "Critical Habitat" in terms of flora. Critical habitats are areas of high biodiversity value that may include at least one or more of the five values specified in IFC Performance Standard 6. Critical habitat criteria should form the basis of any critical habitat assessment and include (IFC, 2012a: 19):

- Criterion 1: Critically Endangered (CR) and/or Endangered (EN) species[1]
- Criterion 2: Endemic and restricted-range species
- Criterion 3: Migratory and/or congregatory species
- Criterion 4: Highly threatened and/or unique ecosystems
- Criterion 5: Key evolutionary processes

The IFC PS 6 implies that no project activities are to be implemented in areas of critical habitat unless all of the following is demonstrated (IFC, 2012b: 4):

- No other viable alternatives within the region exist for development of the project on modified or natural habitats that are not critical;
- The project does not lead to measurable adverse impacts on those biodiversity values for which the critical habitat was designated, and on the ecological processes supporting those biodiversity values[2];

[1] As listed on the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species. The determination of critical habitat based on other listings is as follows: (i) If the species is listed nationally / regionally as critically endangered or endangered, in countries that have adhered to IUCN guidance, the critical habitat determination will be made on a project by project basis in consultation with competent professionals; and (ii) in instances where nationally or regionally listed species' categorizations do not correspond well to those of the IUCN (e.g., some countries more generally list species as "protected" or "restricted"), an assessment will be conducted to determine the rationale and purpose of the listing. In this case, the critical habitat determination will be based on such an assessment.

[2] Biodiversity values and their supporting ecological processes will be determined on an ecologically relevant scale.

- The project does not lead to a net reduction in the global and/or national/regional population [3]of any Critically Endangered or Endangered species over a reasonable period of time[4]; and
- A robust, appropriately designed, and long-term biodiversity monitoring and evaluation program is integrated into the client's management program.

According to the IFC PS 6, if the client is able to meet the above-given requirements, it is required to define a mitigation strategy for the project that should be designed to achieve net gains[5] of biodiversity values for which the critical habitat was designated (IFC, 2012b:4).

The IFC PS 6 also requires that the client determines if the site is located in a Tier 1 or Tier 2 critical habitat with respect to Criterion 2: Endemic and restricted-range species. Table 13-4 below presents the quantitative thresholds for Tiers 1 and 2 of Critical Habitat Criterion 2 (IFC, 2012a:27).

Table 13-4. Quantitative Thresholds for Tier 1 and Tier 2

Criteria	Tier 1	Tier 2
2. Endemic and Restricted-Range Species	(a) Habitat known to sustain ≥ 95 percent of the global population of an endemic or restricted-range species where that habitat could be considered a discrete management unit for that species (e.g., a single-site endemic).	(b) Habitat known to sustain ≥ 1 percent but < 95 percent of the global population of an endemic or restricted-range species where that habitat could be considered a discrete management unit for that species, where adequate data are available and/or based on expert judgment.

As a result of flora and vegetation studies carried out within the scope of the HEMA Hard Coal Mine Project, it was concluded that the Project Areas is a Tier 2 habitat type, based on the criteria given in Table 13-4. However, Project Areas fail to sustain more than 95% of the global populations of any of the endemic species.

13.4.6 Terrestrial Ecosystem Characteristics

Terrestrial ecosystem types within the Project Areas include a forest ecosystem and a herbaceous ecosystem. The ecosystem types were classified using the codes that have been defined by UNESCO in line with its hierarchical classification system. This system is based on the physical and floristic structure of the vegetation cover, as well as climatic and topographic characteristics.

Forest Ecosystem

Characteristics of the forest ecosystem are given in Table 13-5 below and detailed information regarding communities of this ecosystem is provided in the subsequent parts of this section.

[3] Net reduction is a singular or cumulative loss of individuals that impacts on the species' ability to persist at the global and/or regional/national scales for many generations or over a long period of time. The scale (i.e., global and/or regional/national) of the potential net reduction is determined based on the species' listing on either the (global) IUCN Red List and/or on regional/national lists. For species listed on both the (global) IUCN Red List and the national/regional lists, the net reduction will be based on the national/regional population.

[4] The timeframe in which clients must demonstrate "no net reduction" of Critically Endangered and Endangered species will be determined on a case-by-case basis in consultation with external experts.

[5] Net gains are additional conservation outcomes that can be achieved for the biodiversity values for which the critical habitat was designated. Net gains may be achieved through the development of a biodiversity offset and/or, in instances where the client could meet the requirements of paragraph 17 of this Performance Standard without a biodiversity offset, the client should achieve net gains through the implementation of programs that could be implemented in situ (on-the-ground) to enhance habitat, and protect and conserve biodiversity.

Table 13-5. Characteristics of the Forest Ecosystem

Characteristics	
Class	Terrestrial
Physiognomic Class	Forest
Physiognomic Sub-Class	Deciduous
Physiognomic Group	Oceanic
Formation	Calcareous
Community	Fagus orientalis-Carpinus betulus forests, Carpinus betulus-Quercus petraea forests and Alnus glutinosa forests

Fagus orientalis-Carpinus betulus Forests

These forests are quite widespread in the Black Sea Region. Dominant species of these forests that are located to the south of the Shaft-2 can be listed as; *Fagus orientalis, Carpinus betulus* and *Laurocerasus officinalis.* The dominant species of the sub-flora is *Rhododendron ponticum.* The height of the tree layer is 4-6 meters. Phytosociologically, beech forests found in this area are under the *Querco-Fagetea sylvaticae* Braun-Blanq & Vliger 1937 class, *Rhododendro pontici-Fagetalia orientalis* Quezel, Barbero & Akman 1980 order and *Crataego pentagyna-Fagion orientalis* Quezel, Barbero & Akman 1980 alliance.

Carpinus betulus-Quercus petraea Forests

These forests are found in lesser mountainous and mostly north-facing slopes in the Black Sea Region. Dominant species of these forests are *Carpinus betulus, Acer campestre,* Quercus petraea, *Tilia rubra subsp. caucasica* and *Castanea sativa.* There are species like *Laurus nobilis* (Figure 13-2), *Arbutus unedo* (see Figure 13-3), *Erica arborea, Phillyrea latifolia* and *Myrtus communis* within the sub-flora, and herbaceous species include *Helleborus orientalis* (see Figure 13-14), *Cyclamen coum* (see Figure 13-5), *Bellisa sylvestris, Ruscus aculeatus, Oenanthe pimpinelloides* and *Doronicum orientale*. The height of the tree layer is 4-6 meters. Phytosociologically, deciduous mixed forests found in this area are under the Quercetea pubescentis Doing-Kraft 1959 class, Querco cerridis-Carpinetalia orientalis Akman, Barbero & Quezel 1980 order and Carpino betuli-Acerion hyrcani Quezel, Barbero & Akman 1978 alliance.

Figure 13-12. *Laurus nobilis*

Figure 13-13. *Arbutus unedo*

Figure 13-14. *Helloborus orientalis*

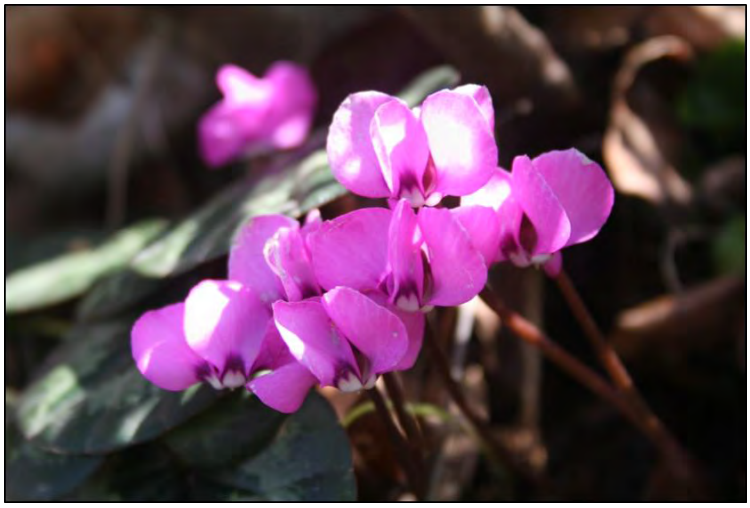


Figure 13-15. *Cyclamen coum*

Alnus glutinosa Forests

These forests are found along the streams in the region. Their water demand is quite high. Although the dominant species is *Alnus glutinosa*, there are also tree species like *Cornus sanguinea, Periploca graeca, Laurus nobilis*, and *Acer campestre.* Phytosociologically, these mixed forests are under the Salici purpurea-Populetea nigrae Rivas Martinez et al. 1991 class, Populetalia albae Braun-Blanq et al 1948 order.

Herbaceous Ecosystem

Characteristics of the herbaceous ecosystem are given in Table 13-6 below and detailed information regarding communities of this ecosystem is provided in the following part of this section.

Table 13-6. Characteristics of the Forest Ecosystem

Characteristics	
Class	Terrestrial
Physiognomic Class	Herbaceous
Physiognomic Sub-Class	-
Physiognomic Group	Oceanic
Formation	Calcareous
Community	*Arbutus unedo-Erica arborea* community

Arbutus unedo-Erica arborea Community

This community is quite well represented within the Project Areas. Dominant species of this community, which is also called pseudo-maquis, are; *Arbutus unedo, Laurus nobilis, Phillyrea latifolia, Erica arborea, Pistacia terebinthus, Cistus creticus and Cornus sanguinea*. There are also shorter shrubs and herbaceous plants within the sub-flora. Widespread species are; *Osyris alba, Helleborus orientalis, Asparagus aphyllus, Ruscus aculeatus, Ligustrum vulgare, Bellis sylvestris,* and *Teucrium chamaedrys.* Phytosociologically, this community is under the Quercetea ilicis Braun-blanq 1952 class.

13.4.7 EUNIS Habitat Types in Project Areas

EUNIS stands for the European Nature Information System, which puts forward a system for identification and classification of European habitat types. The classification area is quite large including the entire European mainland and seas including islands that are close to the mainland (except for Cyprus, Iceland and Greenland), EU states' archipelagos (Canary Islands, Madeira Islands and Azore Islands) and the European mainland to the west of the Ural Mountains that cover Turkey and the Caucasus.

EUNIS habitat types within the Project Areas are;

G: Woodland, forest and other wooded land

F: Heathland, scrub and tundra

I: Regularly or recently cultivated agricultural, horticultural and domestic habitats

G1.1: Riparian and gallery woodland, with dominant Alnus, Betula, Populus or Salix

This habitat type is observed along the streams within the region. Characteristic species of this habitat is *Alnus glutinosa.*

G1.A: Meso- and eutrophic Quercus, Carpinus, Fraxinus, Acer, Tilia, Ulmus and related woodland

This is the most widespread habitat in the area. The most significant characteristic of this habitat is its deciduous mixed forest composition. Characteristic species of the habitat are *Carpinus betulus, Tilia rubra, Acer campestre,* and *Quercus petraea*.

G1.D. Fruit and nut tree orchards

Represents fruit and hazel orchards within the region. The most widespread crop is *Coryllus avellana.*

F5.2. Maquis

This is one of the most widespread habitats of the region Characteristic species consisting of evergreen shrubs. Dominant species are; *Arbutus unedo, Erica arborea, Laurus nobilis*, and *Phillyrea latifolia*.

I2: Cultivated areas of gardens and parks

Represents cultivated areas within the region.

13.4.8 Impacts

13.4.8.1 Habitat Loss

As explained in above sections, there are deciduous mixed forests, maquis, plantation sites and some vegetable and fruit gardens, as well as settlements within the Project Areas. The spoil dumpsites 1, 2 and waste rock dumpsite close to the Shaft-2 are located in an area that is mostly forested. There is also a marginal agricultural area within the waste rock dumpsite close to the Shaft-2. There will be habitat loss due to the development of the Project. Large tracts of forest will be disturbed and trees will be cut for a number of reasons such as opening of the transport routes from the quarry to the port for transport of materials and the access roads to the Project Areas. This is considered to be a major impact.

13.4.8.2 Dust Generation

It is also anticipated that dust will be generated during the construction phase in which excavation, transportation and disposal activities take place. Precipitation of dust has a major impact on the development of flora because of the amount and in particular in the period of vegetative development. Dust generation could cause major impact on flora species if no mitigation measures are taken.

13.4.8.3 Endemic Species Loss

As mentioned in the earlier sections of this report, a total of 203 flora species and subspecies were identified within the Project Areas during the field studies. Generally, the majority of identified flora species are widespread and cosmopolitan species. Considering that 34% of Turkish flora is endemic, the endemism rate is considered to be quite low within the Project Areas. There are three

endemic species observed during the field studies, *Seseli resinosum*, *Euonymus latifolius subsp. Cauconis, Campanula lyrata subsp. Lyrata, Seseli resinosum and Euonymus latifolius subsp.cauconis* species are regionally endemic. *Cauconis, Campanula lyrata subsp. Lyrata* is quite widespread in Turkey. *Seseli resinosum*, *Euonymus latifolius subsp. Cauconis and Campanula lyrata subsp. Lyrata species* are listed under IUCN as "VU: Vulnerable", "NT: Near Threatened" and "LC: Least Concern", respectively. These endemic species and other natural flora elements will be directly impacted due to planned Project activities and most of the impact will be observed at the port area, shaft areas, spoil dumpsites and waste rock dumpsites. However, these impacts would be relatively low due to the fact that the most of the flora elements are cosmopolitan and the majority of endemic species are widespread in the Western Black Sea region. The *Seseli resinosum* population within the Project areas is lower than 1 % of the population of the same species within the Amasra region. The *Euonymus latifolius subsp. cauconis* population within the Project areas is lower than 0,5 % of the population of the same species within the Amasra region while *Campanula lyrata subsp. Lyrata* population within the Project areas is lower than above mentioned percentages. Another factor that decreases the degree of the impact is the fact that mining activities will be conducted underground.

13.4.9 Mitigation Measures

Mitigation measures envisaged to be completed will include the following:

- Ensure that trees, shrubs and vegetation adjacent to the Project Areas will not be damaged or destroyed.
- Necessary communication with the relevant forestry directorate is ensured, an inventory of the trees will be prepared and approval of the forestry directorate will be obtained prior to removing the trees.
- During the construction phase water will be sprayed to prevent dust emissions from excavation, transportation and disposal activities. As a technical solution water will be sprayed with the help of dedicated vehicles (auto cisterns) with the spraying equipment.
- The seeds of endemic plant species in the region will be collected by experts during the appropriate seasons and will be stored in seed banks until the end of the construction phase of the Project. In particular the seeds of *Seseli resinosum* will be collected around the Port area during the month of August. After the construction is finished, the collected seeds will be dispersed throughout the disturbed areas. Seeding and re-vegetation of disturbed areas will be done in accordance with the ecological quality of the Project Areas.
- Since Spoil Dump Site 1, 2 and some part of the waste rock dumpsite close the Shaft-2 are situated in forestry land, a Rehabilitation Project will be prepared in accordance with the "Regulation on Implementation of the 16th Article of the Forestry Law (Official Gazette Date and Number: 30.09.2010/27715; last amended on 07.07.2012)" and submitted to the local and regional forestry authorities for the necessary permits.
- The reject materials generated by the coal washing facilities and the waste materials generated by the gallery opening activities will be deposited into the spoil dumpsites and waste rock dumpsites, respectively. These dumpsites are needed to be permitted by the Ministry of Environment and Urban Planning. For the pH adjustment of the spoil and waste rock materials, those will be covered with soil and re-planted after dumping operations. The topography of the dumpsites will be brought in line with the surroundings in order to prevent accumulation of water. After rehabilitation of the field, the area will be forested.
- Approved transport routes will be used for all vehicles and plants within the Project areas.

- Uncontrolled burning of combustible materials will not be allowed in the forest areas during Project activities.
- A robust, appropriately designed, and long-term biodiversity monitoring and evaluation programme will be implemented within the scope of the Project.
- A Biodiversity Action Plan (BAP) including a set of future actions that enables the conservation or enhancement of biodiversity will be developed.
- In line with PS 6 provisions, the habitat loss to occur within the Project Areas will be offset through implementation of strict mitigation measures to ensure that the project-related impacts are minimized. Populations of flora species that are of higher sensitivity are enabled to survive within the Project Areas through restoration projects and also outside the Project Areas by seed/tuber collection and plantation. Plant species which can be used for restoration and plantation purposes within the Project Areas are given in Table 13-7 below.

Table 13-7. Plant species which can be used for restoration and plantation activities

Taxon	Suitable Months for Seed/Tuber Collecting	Suitable Months for Seed/Tuber Planting
Regional Endemic Species		
Seseli resinosum	August	October-November
Natural Species (Trees/Shrubs)		
Quercus cerris var *cerris* (seed)	September- October	October-November
Quercus petraea (seed)	September- October	October-November
Castanea sativa (seed)	September- October	October-November
Acer campestre (seed)	September- October	October-November
Carpinus betulus (seed)	September- October	October-November
Laurus nobilis (seed)	September- October	October-November
Fagus orientalis (seed)	November-December	November-December
Arbutus unedo (seed)	July-August	October-November
Natural Species (Herbaceous Plants)		
Dactylis glomerata (seed)	June-July	October-November
Cyclamen coum subsp. coum (tuber)	May-June	October-November
Doronicum orientale (seed)	June-July	October-November
Helleborus orientalis (seed)	June-July	October-November
Salvia forskahlei (seed)	June-July	October-November
Commercial Seeds		
Lolium perene	-	October-November
Poa annua	-	October-November
Dactylis glomerata	-	October-November
Poa bulbosa	-	October-November
Medicago sativa	-	October-November
Trifolium campestre	-	October-November

13.5 Fauna

13.5.1 Methodology

Terrestrial fauna studies were conducted within an investigation area which covers Shaft-1, Shaft-2, Shaft-3, spoil dumpsites, waste rock dumpsites, HEMA Port and their surroundings. Field surveys were conducted and literature was reviewed to identify the local characteristics of the fauna species within the Project Areas and the region as well as to make an inventory of fauna species. The endemism and threat/protection status of species were taken as basis for evaluation. The author of the fauna section of the Final Terrestrial Ecology Report (Prof. Mustafa SOZEN) has been conducting field surveys to identify local characteristics of the fauna species in the region for 14

years. Although the timing of the field studies was unfavourable in terms of presence of migratory birds and hibernating vertebrate species such as amphibians and reptiles, literature data and past extensive field study experiences around the area made it possible to prepare a comprehensive vertebrate fauna list reflecting the actual situation in the area. Additionally, the above mentioned butterfly watching and photographing made it possible to prepare a butterfly species list containing the species determined in the area and species possibly found in the area according to habitat types. Three dolphin species in the Black Sea were also added to the fauna list. The identified fauna species were classified according to the Bern Convention, IUCN Criteria, the CITES Convention, the Habitat Directive, the MAK Decisions and the European Union (EU) Birds Directive.

13.5.2 Baseline Conditions and Faunal Species Richness

The Project is surrounded by Gomu Village in the East and Tarlaagzi Village in the West, by the Black Sea in the North and by mountains in the South. There are natural and semi natural habitats within the region. A general overview of a natural habitat within the Project Areas is given in Figure 13-16. Some of the natural habitats within the Project Areas have been destroyed by ongoing construction activities. Natural habitat destruction due to spoil dumping activities in waste rock dumpsites near the Shaft-1 is shown in Figure 13-17.

Figure 13-16. General overview of a natural habitat within the Project Areas

Figure 13-17. Waste rock dumpsites near the Shaft-1

The terrestrial vertebrate and butterfly fauna of the Western Black Sea region are quite well-studied. In the field study carried out in November, a total of 312 fauna taxa that belong to butterflies (63 species), amphibians (8 species), reptiles (15 species), birds (187 species) and mammals (39 species) were identified. Fauna species within and around the Project Areas are

provided in Annex L-2, including the English name, endemism and threat categories of these species as well as migratory habits of the bird species.

13.5.3 Threat Status and Endemism of Faunal Species

Butterfly Species

There are no endemic and/or threatened butterfly species within the Project Areas. Only one species, *Lycaena dispar* (Büyükbakır, Large Copper), is listed under the IUCN Global List and the Red Book of Butterflies in Turkey as NT (Near Threatened). Butterfly species detected inside and surroundings of the Project Areas are listed in Annex L-2 – Table L-2.1.

Amphibian Species

Amphibians are dependent on water. Although some amphibian species spend most of their life on land they need to return to water for reproduction.

There are no endemic and/or threatened amphibian species within the Project Areas. Only one species, *Ommatotriton ophryticus* (Şeritli Karadeniz semenderi), is listed under the IUCN List as NT (Near Threatened).

Three amphibian species are listed under Appendix II (Strictly protected fauna species) of the BERN Convention while five amphibian species are listed under Appendix III (Protected fauna species) of the Bern Convention.

Three amphibian species are listed in Annex IV (Animal and plant species of Community interest in need of strict protection) of the Habitat Directive while one species is listed in Annex V (Animal and plant species of Community interest whose taking in the wild and exploitation may be subject to management measures) of the Habitat Directive.

Amphibian species detected inside and in the surroundings of the Project Areas are listed in Annex L-2 - Table L-2.2.

Reptile Species

There are no endemic reptile species within the Project Areas except for *Testudo graeca* (Tosbağa) that is listed under the IUCN List as VU (Vulnerable).

Eleven reptile species are listed under Appendix II (Strictly protected fauna species) of the BERN Convention while four reptile species are listed under Appendix III (Protected fauna species) of the Bern Convention.

Eleven reptile species are listed in Annex IV (Animal and plant species of Community interest in need of strict protection) of the Habitat Directive while one species is listed in both Annex II (Animal and plant species community interest whose conservation requires the designation of special areas of conservation) and Annex IV of the Habitat Directive.

Testudo graeca (Tosbağa) is also listed under Appendix II (Species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled) of the CITES.

Most of the reptile species within the Project Areas are in need of strict protection. Reptile species detected inside and surroundings of the Project Areas are listed in Annex L-2 - Table L-2.3.

Bird Species

The region contains a lot of different habitat types including sea side, steep rocky slopes, open areas in forest, scrubby areas and cultivated areas. Therefore, the area has a potential to contain a rich bird fauna. A total of 193 bird species were identified within the Project Areas. Some bird species identified can be seen in Figure 13-18.

Figure 13-18. Some bird species identified at Project Areas

(1 - Corvus corone, 2 - Phoenicurus ochruros, 3 - Buteo buteo, 4 - Ardea cinerea, 5 - Parus ater, 6 - Larus michaellis)

There are no endemic and/or threatened bird species within the Project Areas. Four bird species are listed under the IUCN List as NT (Near Threatened) while 183 bird species are listed under the IUCN List as LC (Least Concern).

One hundred and twenty four bird species are listed under Appendix II (Strictly protected fauna species) of the Bern Convention while seven bird species are listed under Appendix III (Protected fauna species) of the Bern Convention.

One hundred and thirty five species are listed under Appendix I (List of wild animals protected by the Ministry of Forestry and Water Affairs) of the MAK Decisions, thirty three species are listed under Appendix II (List of game animals protected by MAK) of the MAK Decisions and nineteen species are listed under App-III (List of game animals whose hunting is allowed for certain periods for 2014-2015 season) of the MAK Decisions.

One species is listed under Appendix I (species that are threatened with extinction and thus international trade in specimens of these species is prohibited, except when the purpose of the import is not commercial) and nine species are listed under Appendix II (Species that are not

necessarily now threatened with extinction but that may become so unless trade is closely controlled) of the CITES.

Fifty five bird species are listed in Annex I (birds that requires strict protection), eight species in Annex IIA (Part A may be hunted in the geographical sea and land area where this Directive applies), seventeen species in Annex IIB (Part B may be hunted only in the Member States in respect of which they are indicated), and seven species Annex III (the birds have been legally killed or captured or otherwise legally acquired) of the EU Bird Directive. Bird species detected inside and in the surroundings of the Project Areas are listed in Annex L-2 - Table L-2.4.

Mammal Species

No endemic mammal species were observed within the Project Areas except a bat species, (*Myotis capaccinii*, Long-fingered Bat), which is listed under the IUCN List as VU (Vulnerable). The Project Areas do not include any housing for this species. Most likely the area is only used for feeding during night flights. None of the other mammal species are listed as threatened.

Sixteen mammal species are listed under Appendix II (Strictly protected fauna species) of the Bern Convention while nine mammal species are listed under Appendix III (Protected fauna species) of the Bern Convention. Sixteen species are listed under Appendix I (List of wild animals protected by the Ministry of Forestry and Water Affairs) of the MAK Decisions, three species are listed under Appendix II (List of game animals protected by MAK) of the MAK Decisions and four species are listed under App-III (List of game animals whose hunting is allowed for certain periods for 2014-2015 season) of the MAK Decisions.

One species, (*Lutra lutra*, European otter), is listed under Appendix I (species that are threatened with extinction and thus international trade in specimens of these species is prohibited, except when the purpose of the import is not commercial) and three species are listed under Appendix II (Species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled) of the CITES.

Additionally, eight mammal species are listed in Annex II of Habitat Directive while thirteen species are listed in Annex IV of the Habitat Directive. Mammal species detected inside and in the surroundings of the Project Areas are listed Annex L-2 - Table L-2.5.

13.5.4 Evaluation of the Fauna Species According to the HCVs and IFC Standards

In terms of HCVs and the scope of the IFC Performance Standards the area where the Project is located does not meet any of the HCV criteria. There are no endemic or endangered vertebrate species within the Project Areas. Since the area is under dense anthropogenic pressure and is too small for a large-scale natural habitat, none of the species are abundantly present nor actually live in their natural habitat. The Project Areas do not contain rare, threatened or endangered ecosystems. The site does not provide basic ecosystem services in critical situations. The site is not fundamental to meeting basic needs of local communities. The site is not critical to local communities' traditional cultural identity.

When looking at Table 13-2, correspondence between HCV types and IFC Performance Standards suggests that the area where the Project is located may potentially be considered as “critical habitat”. Critical habitats are areas of high biodiversity value that may include at least one or more

of the five criteria specified in the IFC Performance Standard 6. Critical habitat criteria should form the basis of any critical habitat assessment and include (IFC, 2012a: 19):

- Criterion 1: Critically Endangered (CR) and/or Endangered (EN) species
- Criterion 2: Endemic and/or restricted-range species
- Criterion 3: Migratory and/or congregatory species
- Criterion 4: Highly threatened and/or unique ecosystems
- Criterion 5: Key evolutionary processes

According to Annex L-2 – Table L-2.4, the area contains 135 migratory bird species, which satisfy Criterion 3. However, the project area is not on the main migration route of birds in Turkey. Since some important routes of birds migrating between Africa, Europe and Asia are located in Turkey, every part of the country, even city centres, may include some migratory birds. Additionally, the size of the area where the Project is located and its current, mostly modified, habitat type does not offer a crucial habitat to support a population in natural condition.

As a result of fauna studies carried out within the scope of Amasra Coal Mining Project, it was concluded that the site is neither a Tier 1 nor a Tier 2 habitat for faunal aspects, since it does not contain any CR or EN species/subspecies.

13.5.5 Impacts

13.5.5.1 Habitat Loss

Project activities including excavation, filling and disposal activities, to be conducted within the Project Areas and construction of staged slopes at the back side of the quay will potentially result in habitat loss. Therefore, the most important concern regarding the impact of the Project on fauna is the habitat loss, which will lead to a decline in the population of existing species within the Project Areas.

249 vertebrate and 693 butterfly species were identified within the Project Areas. These species were mostly widespread and cosmopolitan species. None of the fauna species identified within the Project Areas are restricted range species.

There is a small creek within the area which covers waste rock dumpsite near the Shaft-2. Also, there are open grasslands and wooded areas within the Project Areas. Therefore, the area where the Project is located provides a suitable habitat for some butterfly species. However, some of these areas will be covered by waste rocks due to Project activities and suitable butterfly habitat will be lost inside the Project Areas. Project activities in and in the surrounding of the areas where the Project Components are located will cause major adverse impacts on suitable habitats for butterfly species. However, adverse impacts in the Amasra region will be minor due to presence of similar habitats. Impacts resulting from Project activities will not cause extinction of any butterfly species because the butterfly species identified in the area where the Project is located are common species.

Some water bodies at the Project Areas are suitable for breeding, feeding and sheltering of amphibians. A water body which is located in waste rock dumpsite near the Shaft-2 is shown in Figure 13-19. Project activities such as construction of buildings, and waste rock and spoil dumping will cover some of these water bodies which will render these areas unsuitable for amphibians.

Project activities in and in the surrounding of the areas where the Project Components are located will cause major adverse impacts on suitable habitats for amphibians. However, adverse impacts in the Amasra region will be minor due to presence of similar habitats. Impacts resulting from Project activities will not cause extinction of any amphibian species because the amphibians identified in the area where the Project is located are common species.

Figure 13-19. A water body within the waste rock dumpsite near the Shaft-2

The area where the Project is located provides a suitable habitat for some reptile species which are listed in Annex L-2- Table L-2.3. Project activities, especially waste rock dumping, will cover some of these habitats and the number of reptile specimens may reduce. Project activities in and in the surrounding of the areas where the Project Components are located will cause major adverse impacts on suitable habitats for reptile species. However, adverse impacts in the Amasra region will be minor due to presence of similar habitats. Impacts resulting from Project activities will not cause extinction of any reptile species because the reptile species identified in the area where the Project is located are common species except *Testudo graeca* (Tosbağa). As mentioned in the earlier section of this report, *Testudo graeca* (Spur-thidged Tortoise) is listed under the IUCN List as VU (Vulnerable). Therefore, the proposed mitigation measures are indispensable for this species.

About 200 bird species are present at the Project Areas several times a year. The Project Areas provide feeding, sheltering and potential breeding areas for these species because of its semi natural habitat type. Some feeding, sheltering and potential breeding areas of the birds will disappear because of the Project activities and the resulting habitat loss will affect the birds. Construction activities and change of habitat affecting birds in the area would possibility make them leave the area for some time. After finishing the activities including landscape designing and restoration, meadows, green fields and some woody areas may recover. As a result birds may come back and continue to use the area. On the other hand, since the area is not located on the main migration route of the birds and because of anthropogenic pressure, the area is not of major importance for birds.

39 mammal species were identified within the Project Areas. The Project will affect these species and cause a reduction in their populations within the Project Areas. Project activities in and in the

surrounding of the areas where the Project Components are located will cause major adverse impacts on suitable habitats for mammal species. However, adverse impacts in the Amasra region will be minor due to presence of similar habitats. Impacts resulting from Project activities will not cause extinction of any mammal species because the mammal species identified in the area where the Project is located are common species.

13.5.5.2 Dust Generation

Coal mining activities will generate dust leading to decreased air quality. Large quantities of dust from excavation, transportation and disposal activities can render nearby settlements uninhabitable. This will have a negative impact on the flora while also increasing the incidence of diseases among livestock and wild animals. Dust generation will cause major adverse impacts on fauna species within the area where the Project is located. Adverse impacts due to Project activities on fauna species will be moderate in the vicinity of the area where the Project is located.

13.5.6 Mitigation Measures

Mitigation measures envisaged to be completed will include the following:

- As mentioned in the earlier sections of this report, *Testudo graeca* (Spur-thidged Tortoise) is listed under the IUCN List as VU (Vulnerable). This species will be transferred to suitable natural habitats that may be found in the surroundings. It is important to realize that the tortoise and more generally all reptile, amphibian and hibernating mammal species are not active in winter. Therefore spoil and waste rock coverage of habitats for these animals will not start before April. During any kind of activities on or in the ground, tortoise specimens will be collected and transferred to safe places.
- At the time of the field study, it was observed that the waste rock produced during gallery opening are deposited onto the vegetation directly. The covered vegetation undoubtedly is a natural habitat for several animal species. Covering these habitats can cause death of animals under the waste rock layer. To prevent animal death, firstly all vegetation will be cleared by cutting and then surface soil to a depth of approximately 30 cm will be taken away. This allows animals to move away to suitable habitats. The removed surface soil can be put back in order for the original vegetation to grow back and to restore the habitat. Physcial requirements need to be meet to construct dumpsites are mentioned in detailed in Chapter 8: *Material Resources and Waste Management*.
- Some semi natural areas, as large as possible, will be left inside the project areas for wildlife. This measure is most effective to mitigate the effects on birds. To help birds survive in the area after completion of the project vegetation with fruit and/or seed as food sources for birds will be planted, and scrubby areas will be prepared on restoration sites. Additionally, the provision of water sources such as small ponds will be useful for wildlife in the Project Areas.
- All construction and operation activities of the Project will be conducted pursuant to the Environmental Law (Law No: 2872), National Parks Law (Law No: 2873), Land Hunting Law (Law No: 4015) and their regulations. Also, requirements of the CITES Convention and the 6th and 7th Articles of the Bern Convention will be met during the construction and operation phases of the Project.

- Potential adverse effects on biodiversity due to human activities within the Project areas will be minimized. Collection of wild plant species within the Project Areas and region, damaging, hunting, intentional killing and/or capturing of the wild animals and collection of their eggs will be prohibited. Trespassing of animals and humans through the designated working area will be prevented by the use of site fencing. Also, employees will be trained to not harm the wildlife.
- Construction activities will be conducted in an environmentally safe manner in order to minimize adverse effects of environmental impacts on fauna. Fauna species are sensitive to environmental impacts during their breeding period. Therefore, Project activities will be conducted considering the mating and breeding seasons of the fauna species. In this respect, project activities that may cause adverse effects on fauna species will not be conducted during spring season and twilight hours (one hour before and after sunrise, one hour before and after sunset). This is because the breeding activity for most fauna species takes place during spring seasons and foraging/feeding activities are generally intense during twilight. It is likely that some of the fauna species will move away from the project area due to environmental damages caused by construction activities. Therefore, environmental habitats will be restored to enable the return of these species back to the project area after the completion of the construction activities.
- The trees in the Project Areas may be used by some bird species, and before cutting the trees, an ornithologist will check the trees for the presence of birds and determine the time the trees can be cut.
- Transportation of coal between the mine site and the port will be via a closed belt conveyor system preventing coal and coal dust spillage to the environment.

13.6 Marine Ecology

13.6.1 Methodology

Within the scope of the HEMA Reclamation Area and Quay (HEMA Port) Project, a field survey for sampling of marine species from five stations and literature review were conducted. The investigated area in this Section is referred to as Project Site.

Samples were collected at five stations, between Bartin and Amasra, at approximately 7.5 km distance to Amasra Province. The study area, that covered five sampling stations, is inside the borders of Tarlaagzi and Gomu villages in the Amasra district of Bartin province and at the north-east of the Tarlaagzi Fishery Shelter.

Sampling stations are given in Figure 13-20 below. Samples of the field survey performed for the HEMA Reclamation Area and Quay Project were collected from 1 mile distance to the coastal line and at 17-18 m depths.

Figure 13-20. Sampling stations

During the field survey, bottom mud samples were collected for macro benthos with a Vaan-Veen Grap. For the zooplankton sampling, a 200 micron-Hensen type plankton ladle was used and vertical samples were collected. For the phytoplankton samples, a Nansen water sampler was used and the samples were collected in the middle of the subject depth. The collected samples of zooplankton, phytoplankton, benthos and algae were fixed in sea water-filled jars by buffering with 4% neutral formalin boric acid. For *Rhodomelaceae* and *Corallinaceae* 10% HCl was used.

Based on their colors, Algae were classified in four groups. Algae were identified using the "identification key". For the identification of the species, Anagnostidis and Komárek (1988), Wehr and Sheath (2003) for Cyanophyta; John et al. (2002) for Chlorophyta; Kylin (1956), Woelkerling (1983), Irvine and Woelkerling (1986) for Rhodophyta were referred to/used. For the identification of fish eggs and larvae, systematic definitions suggested by Dekhnik (1973), Russell (1976), Yüksek and Gücü (1994) were referred to/used. Bilecenoğlu et al. (2002) and Whitehead et al. (1986) were referred to/used for the identification of fish species.

13.6.2 Overwiev of Baseline Conditions of Aquatic Ecosystem

Micro and Macro Algae (Phytoplankton and Macrophyte)

Algae are the primary producer organisms in the aquatic environment. Having pigment in their structure, they consume CO_2 and water and with light they produce carbohydrate. Therefore, they increase the nutritional value and O_2 content of the aquatic environment which makes them significant factors in the food chain.

Zooplanktonic Organisms-Invertebrates

Cladocera and Copepoda, composing a significant group of the zooplanktonic organisms, are very small, mostly microscopic animal groups. Species belonging to the Cladocera group generally exist in freshwater while some species such as Podon, Euadne and Penilia are marine species. Another group of the zooplanktonic Organisms is Rotifera which is also very small microscopic livings mostly exist in freshwater. The number of marine species is less than freshwater species.

Benthic Organisms-Invertebrates

Distribution of the benthic fauna is quite heterogeneous as because of the differences in the need for feeding, growth and breeding. The distribution, growth and breeding potential of these organisms depend on their adaptability to environmental changes. Benthic species are highly diverse and they can be represented with almost all divisions from protozoa to macro invertebrates and vertebrates. All these make these livings hard to be addressed with a holistic and functional approach.

Fish-Vertebrates

Fish are one of the significant biological components of the top of the food chain in the aquatic environment. Fish feed on algae, zooplankton or benthic organisms. They are not only ecologically but also economically important. Migrating fish use ports as feeding, sheltering and breeding areas.

13.6.3 Aquatic Organism Inventory of the Project Site

Micro and macro algae (phytoplankton and macrophyte) existing within the Project site and its surrounding are listed in Annex L-3 – Table L-3.1. The table is based on the findings in the 5 sampling stations of the HEMA Reclamation Area and the Quay Project Marine Biodiversity Ecology Report.

Zooplankton present within the Project Site and its surrounding is listed in Annex L-3 - Table L-3.2. The table is based on the findings in the 5 sampling stations of the HEMA Reclamation Area and the Quay Project Marine Biodiversity Ecology Report.

Benthic organisms existing within the Project Site and its surrounding are listed in Annex L-3 - Table L-3.3. The table is based on the findings in the 5 sampling stations of the HEMA Reclamation Area and the Quay Project Marine Biodiversity Ecology Report.

Fish detected within the Project area and its surrounding are listed Annex L-3 – Table L-3.4. The table is based on the findings in the 5 sampling stations of the HEMA Reclamation Area and the Quay Project Marine Biodiversity Ecology Report. Identified fish species were classified according to the Bern Convention, theIUCN Criteria and to their breeding period.

13.6.4 Threat Status, Rareness and Endemism of Aquatic Organisms

Within the study area of the *HEMA Reclamation Area and Quay Project* four fish species listed under the IUCN list were detected.These species are categorized as: *Raja clavata* “NT” Near Threatened, *Mustelus mustelus* “VU” Vulnerable, *Anguilla anguilla* “CR” Critically Endangered and *Scomber scombrus* “LC” Least Concern. None of the fish species within the Project Site are

protected under the Bern Convention. Threatened fish species within the study area of the HEMA Reclamation Area and Quay are presented in Table 13-8.

Table 13-8 Threatened fish species within the HEMA Reclamation Area and Quay Project Area.

Familia	Species	Threat Category
Rajidae	*Raja Clavata*	NT
Triakidae	*Mustelus Mustelus*	VU
Anguillidae	*Anguilla Anguilla*	CR
Scombridae	*Scomber Scombrus*	LC

13.6.5 Fishing Activities within the Project Site

Fishing was observed within the impact area of the Project. The fishing port closest to the Project area is the Tarlaagzi Fishing Port located 4 km off of the Amasra Port. The Tarlaagzi Fishing Port is shown in Figure 13-21 . The Tarlaagzi Fishing Port was constructed in October, 2005. The main pier and the secondary pier in the fishing port are 570 m and 310 m long respectively. Fishing boats, yachts and light tonnage sea vessels that are present in the Black Sea benefit from subject piers. The Tarlaağzı Fishing Port is managed by the Aquacultural Resources Cooperation[6] as of 2007. According to the Aquacultural Resources Cooperation's statistics, in 2013, 256,000 crates of various types of fish were handled at the port and transferred to the end user.

Figure 13-21. Tarlaağzı Fishing Port

European anchovy are distributed throughout the Black Sea with the main spawning and feeding grounds along the coastal waters of Bulgaria, Romania, Ukraine and the Russian Federation. Spawning occurs between May and August over continental shelf areas with the main spawning areas on the north-western and western shelf of the Black Sea. The main feeding and growth seasons are also in the summer months. In addition to anchovy preference for shelf areas, the central Black Sea has much lower levels of productivity and consequently less availability of

[6] District Governorships of Amasra Website (http://www.amasra.gov.tr/)

zooplankton prey for the developing larvae. Anchovy display two seasonal migrations ; in autumn a southward migration occurs between October and November through the Black Sea and along coastal waters to the Turkish and Georgian coasts, in the spring, anchovy migrate from southern coastal wintering grounds to spawning areas in the north-western coast. These migration routes pass through the Black Sea from northern coasts to southern coasts, and back again. Anchovy (*Engraulis encrasicolus)* is the main fish resource in the district. Aquaculture production is not commonly present due to insufficient freshwater resources in Amasra.

Detailed information on fishing activities in the Project area is provided in *Chapter 14: Socio-Economy*.

13.6.6 Impacts and Mitigation Measures

Construction activities to be conducted in the marine environment, movements of the vessels during the construction and operation phases of the HEMA Port, and certain littoral activities (i.e. coal handling, tetrapod production) will potentially affect the marine environment. Potential issues associated with marine ecology and the most important mitigation measures to minimize adverse impacts of these issues during the construction and operation phases of the Project are as follows:

- Four of the fish species within the Project Site are threatened species. Among these species, the threat levels of *Raja clavata, Mustelus mustelus* and *Anguilla anguilla* are higher than those of the other species in the region. *Anguilla anguilla* migrate to the Mexican Gulf for breeding. However, between April and July the region is a potential breeding location for *Raja clavata*, and between March and May for *Mustelus mustelus*. Therefore, between March and July in the breeding period of both species heavy construction should be supervised by an expert biologist.
- Underwater noise impacts from certain sources (ship engine, pile driving and filling) may adversely impact fish populations during the construction phase of the Project. It is considered unlikely that vessel engine noise will cause significant damage to the fish population because the noise level is expected to be below the threshold levels that could cause lethal damage. Pile driving may cause noise and vibration which may disturb marine species, especially if in close proximity to the piling location. However, noise and vibration will be temporary and site-specific. Additionally, fish species are present in a wider ecosystem that will not be impacted by the loss of a few individuals. However, noise and vibration may have a significant impact on the four fish species listed under the IUCN list (Raja clavata “NT” Near Threatened, *Mustelus mustelus* “VU” Vulnerable, *Anguilla anguilla* “CR” Critically Endangered, Scomber Scombrus “LC” Least Comcern).
- Construction activities within the marine environment such as pile driving, land fill operation, construction of the reclamation areas, breakwater and port will potentially increase the turbidity of the water and increase the level of suspended solids and nutrient content while also reducing sunlight penetration into the deep-sea. Suspended solids furthermore affect species and density of the populations and the natural colour of sea water. Sunlight is an important parameter of photosynthesis (or primary production). Increased turbidity adversely impacts filter feeding benthic fauna by clogging and damaging feeding equipment. Respiration problems may also arise for the macro species. Turbidity has an adverse effect on species which search for their food by following the light. Reduced dissolved oxygen concentrations within the marine environment may harmfully affect zooplankton, species living close to the sea surface, fish and benthic fauna. Sediment

plumes from construction activities (especially pile driving) may cause excessive nutrient release resulting in algal growth causing potential eutrophication. Nutrient increase indirectly impacts fish distribution near the construction area as well as near the area where the plume migrates to and settles. Therefore, as oxygen, sunlight and nutrient content are of great importance to the aquatic ecosystem, turbidity is considered as one of the most significant impacts of construction activities on the marine environment. However, given the size and nature of Project Site, all effects mentioned will only lead to temporary damage of the ecosystem and loss of biomass. Concrete screens (Perdeleme/Beton Perde ve anroşman) will prevent turbidity and shoaling due to sediment disturbance. Construction activities will be performed between the land border and the screen. In this way the influence of turbidity on the sea environment and the shoaling which will potentially be developed due to the wave action will be minimized. During filling mainly fish, benthic invertebrates and algae will be affected. However, only a small area will be affected. Organisms, which may be forced to move away due to filling operations, will likely return to the area shortly after completion of the construction activities of the Project. The recreated area will be an important sheltering, feeding, and nesting area for biological life after the construction activities are completed.

- The uncontrolled release of oil, wastewater, waste, coal, coal dust etc. as by-products of the processes from sources including vessels, conveyor belt, construction site (run-off), tetrapod producing areas (cement run-off), Port, and coal storage yards, will adversely affect sea water quality. The potential uncontrolled release of untreated wastewater that is generated during both the construction and operation phases of the Project may affect the water quality by increasing nutrient levels. The introduction of excess nutrients may lead to potential eutrophication. Uncontrolled discharge or spillage of liquid chemicals/oils may impact water quality and destroy plankton which acts as a food source for higher trophic levels. Fish and benthic species may also be negatively affected by release of construction-related chemicals and fuels from vessels into the water. Solid waste disposal may adversely impact the water quality and the ecosystem. Run-off and potential discharges will result in marine water and bottom sediment contamination leading to deterioration of aquatic habitats and species.
- Invasive species may be introduced into the area from ballast water and ship hull contamination. Invasive species have the potential to affect the whole marine ecosystem. Within the scope of the Project, it will not be allowed to discharge ballast water into the marine environment.
- Transportation of coal between the mine site and the port will be via a closed belt conveyor system preventing coal and coal dust spillage into the sea environment. In order to prevent run-off and dust emissions during the construction and operation phases, raw material storage areas will be covered or enclosed; water suppression will be used on raw materials except hygroscopic materials like grains or cement.
- All construction and operation activities of the Project will be conducted pursuant to the Environmental Law (Law No: 2872), the National Parks Law (Law No: 2873), the Land Hunting Law (Law No: 4015) and their regulations. Also, requirements of the CITES Convention and the 6th and 7th articles of the Bern Convention will be met during the construction and operation phases of the Project. Construction activities will take into account the regulatory requirements to comply with the Aquatic Products Law (Law No: 1380) as the port area is located within the aquatic products production zone. The

necessary permit will be obtained from the Ministry of Agriculture, Food and Livestock pursuant to the Aquatic Products Law (Law No: 1380).

- In case of an accident, fire or leakage, coal shipping will be stopped immediately and necessary action(s) will be taken in coordination with the ship management and coastal guard units as soon as possible.
- Good construction site practices will be adopted to minimize risks of water pollution and sediment plume.
- It is reported that project activities to be carried out in the marine environment will be executed according to the 7th Article of Changes in Production Areas section (amendment by law no. 3288) of the Fisheries Act and following the opinion of the Ministry of Agriculture, Food and Livestock. In addition, it is reported that no liquid and solid waste discharges will exceed receiving environment and wastewater discharge limits.
- A Marine Ecology Monitoring Plan will be developed for the Project.

14.0 SOCIO-ECONOMY

14.1 Scope

This chapter presents an assessment of the potential socio-economic impacts of the Project. The issues that were included in Table 1 of the IFC "Good Practice Note: Addressing the Social Dimensions of Private Sector Projects" were considered in the assessment. The following potential socio-economic impacts of the Project were identified:

- Temporary and permanent changes in population and demographic characteristics of the Project areas,
- Direct and indirect employment creation as a result of construction and operation,
- Direct and indirect loss of existing employment and business in immediate surroundings,
- Wider (regional) economic impacts,

A number of other issues related to social factors are addressed in *Chapter 16: Labor and Working Conditions*.

The socio-economic assessment has involved:

- Gathering existing and available baseline data regarding current socio-economic conditions and how they may develop in the absence of the Project
- Determining the direct and indirect socio-economic impacts of the project
- Identifying measures which HEMA will take to ensure compliance with international best practice in mitigation of social and socio-economic impacts.

The existing socio-economic data was obtained through the review of secondary sources of information from relevant government authorities and official statistics. National and regional data was obtained and assessed for following aspects relevant to the Project:

- Population and Demographics
- Economy and Occupations
- Employment
- Income Distribution
- Education
- Recreation and Tourism
- Health
- Ports

Existing socio-economic data were obtained from the following sources and references:

- Turkish Statistical Institute (http://www.turkstat.gov.tr/)
- Governorships of Bartın Website (http://www.Bartın.gov.tr/)
- District Governorships of Amasra Website (http://www.amasra.gov.tr/)
- Bartın Provincial Environmental Status Report, 2011

- West Black Sea Development Agency Website, (http://bakka.gov.tr/).
- Bartın Provincial Directorate of Food, Agriculture and Livestock Briefing for the Year 2013
- Ministry of Energy and Natural Resources Website (http://www.enerji.gov.tr/index.php?dil=en)
- General Directorate of Science, Industry and Technology of Bartın Website (http://Bartın.sanayi.gov.tr/)
- Ministry of Transport, Maritime and Communications Bartın Port Authority Website, (http://www.Bartınliman.gov.tr/)
- Literature Survey
- Data obtained during the Project site visits
- Hema Amasra Hard Coal Mine Project Social Baseline Survey Report (Social Baseline Survey Report): A social baseline study was conducted in the five project-affected settlements (Kum Neighbourhood, Fatih Neighbourhood, Gomu Village, Tarlaagzi Village and Kazpinari Village) between the dates October 5-9, 2011 with a team of six people comprising one team supervisor, one focus group moderator and four interviewers. Settlement level questionnaires were conducted with the village headman to obtain general information about the villages. Out of a target of 295 questionnaires, 242 household questionnaires were conducted with the household heads and numbers of questionnaires by the villages are listed in Table 14-1 below. Due to unwillingness of the headman of the Fatih Neighbourhood to participate in the study, the sample formerly set for this neighbourhood was removed from total sample. However, a total of four household heads from Fatih Neighbourhood were randomly interviewed during site visit. Additionally, focus group discussions were conducted with vulnerable groups such as women, disabled, and elders.

Table 14-1: Number of Conducted Questionnaires

Settlement	Household Sample Size	Number of Households Heads participated in the Questionnaire
Kum Neighbourhood	167	167
Fatih Neighbourhood	57	4
Gomu Village	25	25
Tarlaagzi Village	17	17
Kazipinari Village	29	29

Source: Social Baseline Survey Report, 2011

- Social Impact Evaluation Report: This report is written in order to identify the social conditions of Gomu and Tarlaagzi Villages and evaluate the impacts of any other investments than coal mining in the future periods.

14.2 Existing Conditions

14.2.1 Population and Demographics

Total population of Turkey is 76,667,864 (50.2% male and 49.8% female) according to the "Population Census 2013" conducted by the Turkish Statistical Institute (TSI) (Figure 14-1). The population growth rate of Turkey was 2.0-2.5% between 1945 and 1990. After 1990, the growth rate decreased to 1.8%.This was the first time the population growth rate dropped below 2% and

decreasing tendency in the population growth rate continued until 2013 where it was assessed to be 1.4%.

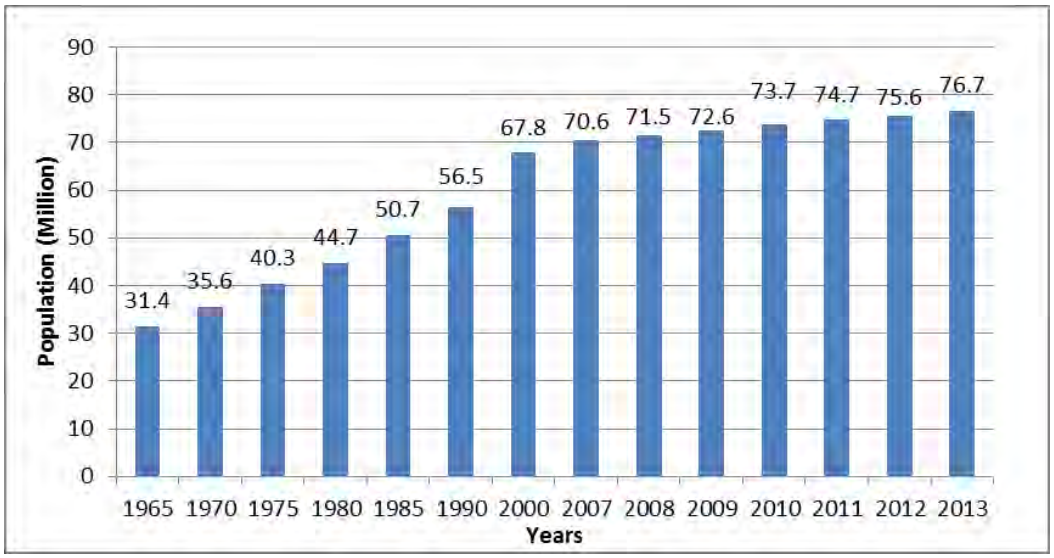


Figure 14-1: National population of Turkey between 1965 and 2013

The Project is located in Amasra District of Bartın Province. While it was a district of Zonguldak, Bartın became a province on 07.09.1991 in accordance with the Law No. 5747 and dated 28.08.1991. The total population of Bartın is 189,139 (49.4% male and 50.6% female) according to the "Population Census 2013"conducted by TSI (Figure 14-2 and Table 14-2). 38.6% of the population lives in the city (urban areas), and 61.4% lives in rural areas. Bartın has four districts including the central district. Other three districts are called as Kurucasile, Ulus and Amasra.

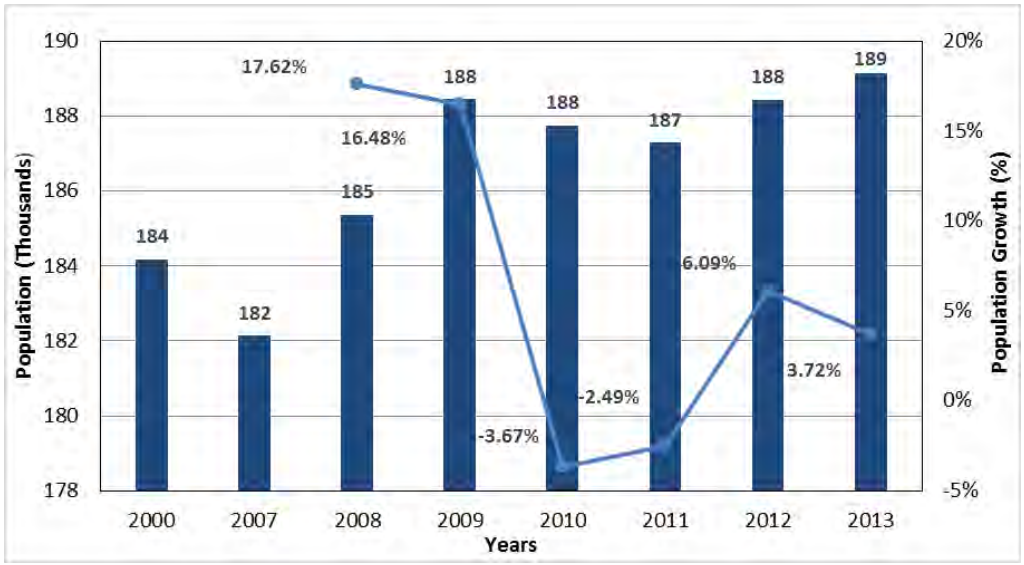


Figure 14-2: Population of Bartın between 2000 and 2013[1]

[1] Blue bars indicate the population in thousands; blue line indicates the annual population growth

Amasra District is located on the coastal side of Bartın, 18 km north of the central district of the province. There are five towns, one municipality, and 30 villages affiliated to the district. Population of Amasra is 15,341 as of 2013. 56.72% of the population lives in rural and 43.28% of the population lives in urban areas.

The most populated district among four districts in Bartın is the central district with a population of 144,273 (Table 14-2). Other districts of the province are Ulus, Amasra and Kurucasile and the district populations are 22,466, 15,341 and 7,059 respectively. Population data of Bartın province is given in Table 14-2, in detail. Average population density of Bartın is 91 person/km^2. However, the population density varies depending on the tourism activities in summer and winter. Kurucasile and Ulus are the two districts that experienced a decrease in population between 2012 and 2013.

Table 14-2: Population of Bartın Province and its districts between 2000 and 2013

Location	Population							
	2000	2007	2008	2009	2010	2011	2012	2013
Bartın	184,178	182,131	185,368	188,449	187,758	187,291	188,436	189,139
Central District	130,492	135,051	137,612	140,981	141,193	141,802	143,262	144,273
Kurucasile	8,742	7,593	7,657	7,672	7,553	7,322	7,210	7,059
Ulus	28,822	24,288	24,458	24,315	23,648	23,024	22,680	22,466
Amasra	16,122	15,199	15,641	15,481	15,364	15,143	15,284	15,341

Source: TSI official Website; (http://www.turkstat.gov.tr/)

Due to its historical and touristic places, Amasra has short term visits and therefore population of the district may reach even 30 to 40 thousands during summer seasons. According to 2013 data, population density of Amasra is 121 person/km^2 and the total population of coastal villages is higher than that of interior Amasra.

Project area is located in the vicinity of four settlements of Amasra, which are Gomu, Kazpinari, and Tarlaagzi Villages. Location and population data of the villages are given in Table 14-3.

Table 14-3: Location and population data of three nearby settlements in the vicinity of the Project area

Villages	Distance to Amasra district center	Distance to Bartın central district	Number of Households*	Population
Gomu	5	17	160	494
Kazipinari	7	10	142	633
Tarlaagzi	6	17	110	358

Source: Social Baseline Survey Report, 2011
* data reported by the headmen

According to Social Baseline Survey Report, the average household size is 3.44 in Tarlaagzi, 4.07 in Gomu and 5.03 in Kazpinari Village. The average household size of all three settlements is 4.18. The average age of a household member is 40. More than half of the households have 2-4 family members. Majority of the households (76.4%) has a nuclear family composition (i.e. a family unit with parents and their children, exclusively living together) and almost one fourth (23.6%) is extended families (i.e. a family unit in which several generations live together within a single household).

According to the TSI data, Amasra, Kurucasile and Ulus districts are faced with a serious population loss. Since 2000, the populations of three districts have dropped with the rates of 3.8%, 16.4% and 19.2% respectively. Only district in which population growth occurred is the central district. Since the population of the central district constitutes more than 75% of the province population, overall change in population is reflected as a 2% population growth in Bartın.

Migration is the major reason of the population movements in Bartın. The data belongs to migration records are given in Table 14-4. Population movement, arising from unemployment, results in an economic slowdown in the region[1]. Young qualified people emigrate due to lack of adequate employment in the city and this prevents the formation of qualified workforce, which is one of the most important development factors.

Table 14-4: Migration data of Bartın Province between 1995 and 2013

Time Period	In-migration	Out-migration	Rate of Net Migration
1995-2000	10,069	25,727	-86.8
2007-2008	8,418	6,325	11.4
2008-2009	7,566	7,104	2.5
2009-2010	6,902	7,859	-5.1
2010-2011	6,560	7,619	-5.6
2011-2012	7,145	7,330	-1.0
2012-2013	7,886	8,133	-1.3

Source: TSI official Website; (http://www.turkstat.gov.tr/)

After 2010, the impact of out-migration has gradually become less significant for the province, when compared to the last decade. Rate of the net migration has decreased between 2010 and 2013 (Table 14-4) 7,886 people migrated to Bartın and 8,133 people left the city in 2013. Net migration is 247 people and the rate of net migration is -1.3% in 2013. Out-migration occurred mostly to Istanbul, Zonguldak and Ankara Provinces. By 2013, the population of Bartın is 189,139.

Population of Gomu Village increases up to 800 with the visiting villagers in summer season. Kazpinari Village receives seasonal agricultural workers coming from Sarayduzu (Bartın) for hazelnut cultivation. Kum Neighbourhood, as a tourism center, experiences seasonal immigration as a result of the need of workforce for restaurants, cafes, hotels etc. during high seasons.

Settled populations of Gomu and Tarlaagzi Villages remained stable mainly due to the employment opportunities at HEMA and no out-migration of young population was observed. Population of Kazpinari Village increased with the returning young people mainly due to employment opportunities at HEMA. On the other hand, the population of Kum Neighbourhood decreased due to high rental rates.

The population of Bartın and Amasra by 'age group' and 'gender distribution' is given in Table 14-5. According to the TSI 2013 datum; the male population is 93,422 and the female population is 95,422 in Bartın.

[1]Governorships of Bartın Website: (http://www.Bartın.gov.tr/)

Table 14-5: Population by age group in Bartın Province and Amasra District

Age Group	Bartın			Amasra		
	Total	Male	Female	Total	Male	Female
0-4	10,778	5,535	5,243	853	444	409
5-9	11,374	5,854	5,520	950	496	454
10-14	12,879	6,531	6,348	1,005	496	509
15-19	14,017	7,017	7,000	914	457	457
20-24	13,943	7,023	6,920	902	505	397
25-29	13,289	6,810	6,479	1,103	567	536
30-34	14,603	7,380	7,223	1,247	655	592
35-39	13,930	7,028	6,902	1,138	630	508
40-44	13,280	6,552	6,728	1,024	509	515
45-49	12,403	5,970	6,433	972	459	513
50-54	12,870	6,199	6,671	1,064	527	537
55-59	12,450	6,070	6,380	1,161	563	598
60-64	10,558	5,269	5,289	987	538	449
65-69	7,669	3,688	3,981	704	345	359
70-74	5,751	2,589	3,162	502	228	274
75-79	4,047	1,781	2,266	342	143	199
80-84	3,642	1,509	2,133	328	118	210
85-89	1,408	541	867	119	31	88
90+	248	76	172	26	6	20
Total	189,139	93,422	95,717	15,341	7,717	7,624

Source: Turkish Statistical Institute (www.turkstat.gov.tr, 2013).

Both Bartın Province and Amasra District have relatively youthful populations. In Bartın, 27% of the population is of age between 0 and 14 and approximately half of the population is of age between 15 and 65 (Table 14-5). 38.6% of the population lives in the city center (urban areas) and 61.41% in rural areas (Table 14-6). As previously shown in Figure 14-1, population of Turkey continues to increase and the annual population growth was reported to be 13.7‰ in 2013. For the same year, population of Bartın also increased at a rate of 3.7‰. The population density of Turkey is 100 people/km^2 while the value is 91 people/km^2 in Bartın. It is a relatively small city by surface area (it ranks 25 out of 81 provinces) and the population density is close to the country-average according to Turkish Statistical Institute data in 2013. The average of number of households is 3.7 for Turkey and 3.4 for Bartın. Comparison of general demographic indicators of Bartın and Amasra with Turkey is shown in Table 14-6 below.

Table 14-6: General demographic indicators of Bartın and Amasra as compared to Turkey

Indicators (2013)	Turkey	Bartın	Amasra
Total Population	76,667,864	189,139	15,341
Rural Population (%)	8.65	61.41	56.72
Urban Population (%)	91.35	38.59	43.28
Population Density (people/ 1 km^2)	100	91	121*
Average Number of Household (2012)	3.7	3.4	3.5**
0-14 Age Group Population (%)	36.30	26.67	26.71
15-65 Age Group Population (%)	52.35	56	54.06
Age 65 and Over Population (%)	11.35	17.33	19.23
Age Dependency Ratio	47.65	44	45.94
Annual Population Growth (2012-2013) (‰)	13.7	3.7	3.7

Indicators (2013)	Turkey	Bartın	Amasra
Crude Birth Rate (2012) (‰)	17.0	11.1	N.A.
Crude Mortality Rate (2012) (‰)	5.0	8.2	N.A.
Infant Mortality Rate (2012) (‰)	11.6	9.6	N.A.

Source: TSI official Website; (http://www.turkstat.gov.tr/).
*Governorships of Bartın Website: (http://www.Bartın.gov.tr/).
**Hema Amasra Hard Coal Mine Project Social Baseline Survey Report, 2011.

Population distribution by marital status for Turkey and Bartın is given in Table 14-7 below with the assumption that minimum marriage age is 15. In Bartın, 103,098 couples got married in 2013 whereas 4,554 couples got divorced. Therefore, the crude marriage rate is 7.38% and the crude divorced rate is 1.46% according to Turkish Statistical Institute data of 2013. Average age at first marriage is 26 for males and 22.9 for females in Bartın.

Table 14-7: Population distribution of Bartın and Amasra by marital status and gender

Marital Status	Bartın			Amasra		
	Total	Male	Female	Total	Male	Female
Never married	34,007	19,096	14,911	2,466	1,495	971
Married	103,098	51,655	51,443	8,404	4,242	4,162
Divorced	4,554	2,228	2,326	378	188	190
Widowed	12,008	2,222	9,786	1,072	171	901
Total	153,667	75,201	78,466	12,320	6,096	6,224

Source: Turkish Statistical Institute (www.turkstat.gov.tr, 2013).

Marital status for the project site was reported in Social Baseline Survey Report as following: 63.8% of household members are married, 32.3% is single and 3.9% are divorced or widow in total of Gomu, Kazpinari, Tarlaagzi Villages and Kum Neighbourhoods.

Vulnerable Groups

According to Social Baseline Survey Report, number of vulnerable households within the responding group (i.e. low-income, ethnic/religious minority, households with at least one disabled-member and/or with a single female head) is shown in Table 14-8. In the survey, 6.9% of the respondent households were determined to be poor (low-income), 2.4% has a disabled member and 1.6% has a single-female head. 89% of the respondent households stated not to be in any kind of vulnerable groups.

Table 14-8: Vulnerability of respondent households

Vulnerability Status	Exist	
	Number	%
Low-income	17	6.9
Ethnic/religious minority	0	0.0
Households with at least one disabled member	6	2.4
Households with a single female head	5	1.6
Households without any vulnerability	214	89.0

Source: Social Baseline Survey Report, 2011

14.2.2 Economy and Occupations

Mining, agriculture, trade, tourism, fishing and forestry are the main factors that determine the basic economic structure of the province. Besides, hand embroidery, weaving, wood carving and shipbuilding are traditional professions in the province. According to the Bartın District Governorship official web site, by 2013, there are 36,973 registered employments and 11.8% increase in registered waged employment rate recorded, compared to the previous year. In this manner, Bartın showed a remarkable increase upon the Turkey's average registered waged employment rate. Based on a study dated 2011 by Turkish Statistical Institute (TSI), the employment in the agricultural, industrial and service sectors in Bartın is 36.3%, 26.5% and 37.2%, respectively. The socio economic indicators of the Turkey and Bartın for 2011 are shown in Table 14-9.

Table 14-9: Socio-economic indicators of Bartın as compared to Turkey

Indicators (2011)	Turkey	Bartın
Population (Age 15+) (thousand)	54,724	69
Employment in Agricultural Sector (%)	22.7	36.3
Employment in Industry (%)	27.2	26.5
Employment in Service Sector (%)	50.1	37.2
Unemployment (%)	7.9	6.9

Source: TSI official Website; (http://www.turkstat.gov.tr/).

Industrial and agricultural products are the main components of domestic and foreign trade of Bartın Province. Also, stock (animal) breeding activity and aquaculture has an important trade potential. Majority of industrial facilities in the province centers upon soil, plastics, furniture, machinery, food, mining, textiles and garments. Type and number of enterprises in the province in 2012 are listed in Table 14-10.

Table 14-10: Type and number of enterprises in Bartın Province as of 2012

Enterprises (2012)	Number of Enterprise
Wholesale and retail trade, motor vehicle and motorcycle repair	2483
Transport and storage	1705
Accommodation and food service activities	1166
Manufacturing	795
Other service activities	623
Construction	366
Vocational, scientific and technical activities	252
Finance and insurance activities	70
Culture, arts, entertainment, recreation and sports	66
Human health and social service activities	53
Information and communication	33
Real estate activities	32
Administrative and support service activities	31
Education	31
Mining and quarry	11
Electricity, gas, steam and air conditioning production and distribution	1
Water supply, sewerage, waste management and treatment activities	1
Total	7719

Source: Turkish Statistical Institute (www.turkstat.gov.tr, 2012).

Economic structure is formed on mining investment in Amasra District where the Project will be carried out. While many Amasra residents is working in mines operated by Turkish Hard Coal Authority (TTK), economy is focused on agriculture and stock (animal) breeding in rural areas. According to District Governorships of Amasra website (http://www.amasra.gov.tr/), rural population is employed in stock breeding, shop keeping, self-employed (especially fishing) and in public service.

Main economic activities in the Project-affected settlements (Gomu, Tarlaagzi and Kazpinari Villages) are provided in Table 14-11. Economically active population aged between 15 and 64 has a regular job with a salary (such as mine worker) or they are retired according to the data provided by village headmen. In the Social Baseline Survey Report it is mentioned that focus groups (both female and male young population) are either working in the mines (HEMA or TTK) or migrating to bigger cities, mainly to İstanbul, with better employment opportunities.

Table 14-11: Main economic activities in the settlements*

Settlement	Main Economic Activities
Gomu Village	Agricultural production, animal husbandry, fishing, mining / quarrying
Kazpinari Village	Mining / quarrying, cultivation of hazelnut(additional income)
Tarlaagzi Village	Agricultural production (hazelnut cultivation),stock breeding, apiculture, fishing, tourism, mining / quarrying, retirement

Source: Social Baseline Survey Report, 2011
*data reported by the village headmen

Although Bartın Province is a suitable region for agriculture with its moderate climate, this sector is not as developed as expected due to small and scattered farmlands and the existence of the mining sector.

Agriculture Products

The total land area of Bartın Province is 214,300 hectares with 74,408 hectares (34.7%) suitable for agriculture, 98,578 hectares (46%) of forestlands and 15,000 hectares (7%) of grassland. The rest of the available land (26,314 hectares) is being utilized as settlement and for other purposes. Agricultural area that is open to irrigation is approximately 30,000 hectares and 10% of this area (i.e. 3,000 hectares) is currently irrigated; 2,000 hectares is irrigated by public and 1,000 hectares is irrigated by state. After completion of Bartın Kirazlikopru Dam, irrigation water will be provided additionally for 2,111 hectares of agricultural area[1].

Bartın Province generally has a rugged terrain and hence, mechanized agriculture application is not feasible. Agricultural land is generally small, of fragmented parcels of land and scattered between farmer families by inheritance. Since there is a mine worker or retired person almost in every family, income from agricultural sources is of secondary importance. Bartın Central District, Amasra, Kucucasile and Ulus Districts have 2,822, 1,026, 1,112 and 1,138 farmers, respectively registered in "Farmer Registration System" (a total of 6,098 farmers in the province)[2].

1 Bartın Provincial Environmental Status Report, 2011.
2 Bartın Provincial Directorates of Food, Agriculture and Livestock, Briefing for the Year 2013.

Important agricultural crops in Bartın are corn, wheat, tomato, cucumber and hazelnut. 265,096 tons of corn, 27,180 tons of wheat, 9,948 tons of tomato, 5,351 tons of cucumber and 5,684 tons of hazelnut are harvested from 36,043 hectares of agricultural area in 2013. In addition, greenhouse cultivation is widely used in the province. An overview of agricultural crop production in Bartın Province including greenhouse production in 2012 is given in Table 14-12.

Table 14-12: Overview of some agricultural activities in Bartın Province

Greenhouse					
Low Tunnel		High Tunnel		Plastic Greenhouse	
Area (ha)	Production (ton)	Area (ha)	Production (ton)	Area (ha)	Production (ton)
44.5	25,555	200.4	12,859	0.6	40

Important Agricultural Products									
Corn		Wheat		Tomato		Cucumber		Hazelnut	
Area (ha)	Quantity (ton)	Area (ha)	Quantity (ton)	Area (ha)	Quantity (ton)	Area (ha)	Quantity (ton)	Number of Trees	Quantity (ton)
16,653	265,096	15,231.1	27,180	2,815	9,948	1,344	5,351	3,810,000	5,684

Cooperatives and Agricultural Dealers				
Fertilizer	Pesticide	Seed	Equipment	Feed
19	13	14	5	65

Source: Turkish Statistical Institute (www.turkstat.gov.tr, 2013).

The total land area of Amasra District is 12,000 hectares with 4,168 hectares of agricultural area, 5,894 hectares of forestlands, 1,080 hectares of grasslands and the rest of the 858 hectares is settlement area. The most important agricultural products in Amasra are hazelnut, grains, forage crops, vegetables, fruits, tubers and legumes. Corn and wheat are the main cultivated products due to their economic value. Vegetable cultivation such as tomato, pepper, cucumber, eggplant, spinach, leeks, lettuce, beans, squash, onions, cabbage and beans is very common almost in every village in the district. Vegetable growing is carried out in a total area of 74 hectares.

Recently, Amasra district showed a rapid increase in feed crop planting area with the seed plants delivered through the applied project "Feed crop production and Development of livestock breeding", within the scope of 2000/467 issued Supportive Program[1]. Overview of agricultural crop production in Amasra District in 2013 is provided in Table 14-13.

Table 14-13: Overview of some agriculture activities in Amasra District

Important Agricultural Products									
Corn		Wheat		Tomato		Cucumber		Hazelnut	
Area (ha)	Quantity (ton)	Area (ha)	Quantity (ton)	Area (ha)	Quantity (ton)	Area (ha)	Quantity (ton)	Number of Trees	Quantity (ton)
424	2,625	373	638	8.3	249	6.8	177	780	1,134

Source: Turkish Statistical Institute, 2013 data (www.turkstat.gov.tr)

According to Social Baseline Survey Report, 79 households carry out agricultural production within the subject focused group. Most common agricultural products are hazelnuts and vegetables as shown in Table 14-14.

[1] District Governorships of Amasra Website: (http://www.amasra.gov.tr/).

Table 14-14: Agricultural products in surveyed area

Agricultural Products (N=79)	Exist		Average Produced (kg)/Year	Average Sold (kg)/Year
	N	%		
Grain (wheat, barley)	1	1.3%	800	0
Corn	8	10.1%	450	450
Hazelnut	46	58.2%	720	677
Melon/watermelon	1	1.3%	-	-
Other fruits	11	13.9%	297	288
Vegetables	21	26.6%	675	624

Source: Social Baseline Survey Report, 2011

Fishing

The Black Sea region regarded as a major fishing zone under the subarea 37.4 classified according to the Food and Agriculture Organization of the United Nations[2]. Bluefin tuna, blue whiting, red mullet, bluefish, small bluefish, gar fish, Atlantic bonito and turbot are important economic species in Black Sea Region. There are 10 aquaculture enterprises available in Bartın Province and 6 of them were in service as of 2012. Aquaculture is not carried out in this region as significant as other types of activities due to insufficient freshwater resources. Figure 14-3 represents the aquaculture production of Turkey by provinces.

Figure 14-3: Aquaculture production by provinces, 2012[1]

The substantial part of the production as fishing activities are performed in the Bartın-Amasra-Kurucaşile Coasts, West of the Black Sea Region. Fishing activities are main focus at the coastal side

[1] Fishery statistics for Turkey, TSI, 2012.
[2]Food and Agriculture Organization of the United Nations, Fisheries and Aquaculture Department, " FAO Major Fishing Areas". (http://www.fao.org/fishery/area/Area37/en)

of the province (especially around port areas). There are 2 fishing ports located in Amasra; Amasra and Tarlaagzi Fishing Ports. Fishing, specifically anchovy fishery is the main source of living for many families representing 500 tonnes/year in Bartın Province and Amasra District. Anchovy is the most abundant fish species in the district; however, different types of fish such as horse mackerel, haddock, bonito, bluefish, garfish, black bream, and scorpion fish are also hunted depending on the season. The list of the fish species belong to the Bartın province is represented in Table 14-15.

Table 14-15: The list of the fish species (written in Latin) in Bartın Province

Species (Latin)	
Barbus barbus	*Proterorhinus marmoratus*
Blicca bjoerkna	*Perca fluviatilis*
Capoeta tinca	*Salmo gairdneri*
Cyprinus carpio	*Salmo turutta*
Cobitis simplicispinna	*Stizostedion lucioperca*
Gobitis sp.	*Salmo labrax*
Gobio gobio	*Tinca tinca*
Nemacheilus lendli	*Vimba vimba*

Source: Bartın Provincial Environment Status Report, MoEU, 2011).

Amasra is a fish hunting area for both professional and amateur hunters during fishing seasons. Fishing activities carried out in the district to meet the need of Bartın Province and excess fishes are marketed to different regions of Turkey[1].

Table 14-16: Some fishery statistics in Bartın Province

Fishery Statistics			
Sea Products (ton)	Freshwater Products (ton)	Aquaculture Production (ton)	Other Sea Products (ton)
1,782	13	13	30

Source: TSI official Website; (http://www.turkstat.gov.tr/, 2012).

The area starting from the border between Kastamonu and Bartın to the border of Bartın and Zonguldak is allocated for Aquaculture Production Area as published in State Gazette dated 24.07.1997, issue number 23059.

Legally, the marine environment falls into the state jurisdiction and related articles 5 and 6 state that, 'In order to protect existing aquaculture in Black Sea region which plays an important role in country's water resources, a committee is formed to determine the suitability of marine environment of Amasra District to aquaculture production. In addition to stable aquaculture, mobile aquaculture production is also observed. Therefore, marine environment shown in Figure 14-4 is formed between borders of Amasra District and Bartın Province along Black Sea shoreline and aligned vertically. The marine environment between Amasra and Kurucaşile is considered as 'Aquaculture Production Area' in accordance with the 'Aquaculture Law, 1380, Article 2'.

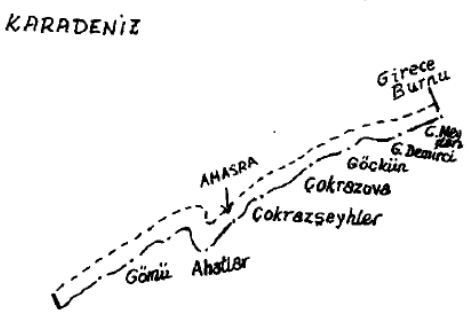


Figure 14-4: Amasra District Aquaculture Production Area

The main ecological effect of commercial fishing is the capture of non-target species. However, studies are being conducted to develop new fishing methods in order to increase the chance of survival of discarded non target fish in the bottom trawling. Some parts of the Black Sea region are not suitable for bottom trawling due to the narrowed continental shelf. Therefore, restrictions have been taken in order to eliminate the negative impacts on the marine ecosystem and ensuring the sustainable fishing. Figure 14-5 shows the areas where the bottom trawling is prohibited near Project area.[1]

Communiqué titled 3/1, the Management of Commercial Based Aquatic Product Fishing, Article 10 by the Ministry of Food, Agriculture and Animal Breeding published in 01.09.2012 (last update on 17.05.2013) provides information on the prohibition related to bottom trawl hunting and the relevant restricted areas related to the Project .

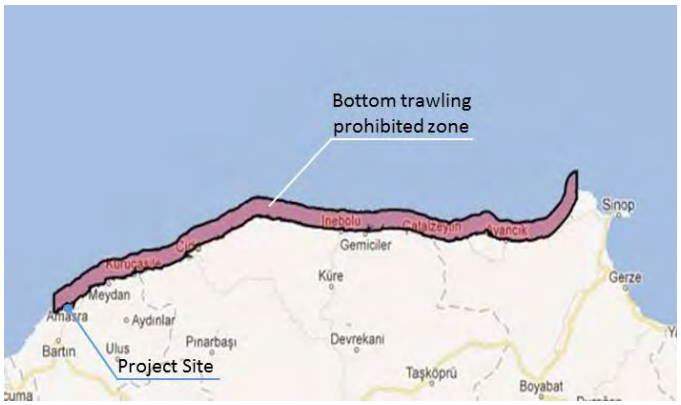


Figure 14-5: Areas where bottom trawling is prohibited

According to Social Baseline Survey Report, fishing is not an important income source for the majority (92.2%) of the households. As indicated in Table 14-17, 19 respondents reported that fishing is important. 13 of these respondents are small-scale fishermen, 5 of them are working for fishing companies named Başaran and Kemaneciler and one is a small-scale fisherman, working for a company as well.

[1] Y. Ceylan, C. Şahin and F. Kalaycı, 2014. "Bottom trawl fishery discards on the Black Sea coast of Turkey", Mediterranean Marine Science vol: 15/1, 156-164.

Table 14-17: Importance of fishing for households

Importance of Fishing for Households (N=242)	N	%
Very Important	8	3.3
Important	11	4.5
Not Important	223	92.2

Source: Social Baseline Survey Report, 2011

According to the survey conducted in the Project areas, 5 of the 19 respondents for whom fishing is important/very important (i.e. a source of income) are members of Amasra Water Products Cooperative, 5 of them are members of Tarlaagzi Water Products Cooperative and 9 of them are not a member of any cooperatives. The fish yield is high and satisfactory in autumn period and it is low in summer. 12 of the 19 respondents described that there is a decrease in the productivity due to unplanned fishing, industrial waste and mining activities in the vicinity of coastal region.

Greenhouses

In recent years, vegetable growing has been carried out in plastic greenhouses and plastic tunnels. There are 3.1 hectares high tunnel greenhouses available in the district (TSI). Vegetable production in greenhouse is the most appropriate way to make use of the agriculturally available land since it can be done in small agricultural areas and the production is approximately 5-10 times more efficient than the traditional vegetable production. As a result of an increasing interest in greenhouses, there is a growing number of farmer families. According to District Governorship of Amasra, in parallel to that growth, recently, modern greenhouses are being set up[1]. Details of the greenhouse cultivation in Amasra are given in Table 14-18.

Table 14-18: Greenhouse cultivation in Amasra

Distrcit	Number of Villages Engaged in Greenhouse Cultivation	Number of Enterprizes Engaged in Greenhouse Cultivation	Total Greenhouse Area
Amasra	28	260	30

Source: Bartın Provincial Directorate of Food, Agriculture and Livestock, 2012.

Stockbreeding

Stockbreeding with two to three animals is another form of small family businesses in Bartın Province. Due to the difficulties of marketing, stockbreeding is an engagement for living, instead of trading. Majority of raised animals are low-yielding domestic or hybrid cattle. Due to cheap source of animal feed, interest in the corn silage is increasing and yield per animal is increased due to better feed. An overview of the animal breeding activities including the number of the animals and some animal products in Bartın in 2013 is shown in

[1] District Governorships of Amasra Website: (http://www.amasra.gov.tr/).

Table 14-19.

Table 14-19: Some animal breeding activities and animal products in Bartın in 2013

Cattle & Product				
Pure Culture Cattle	Hybrid Culture Cattle	Domestic Cattle + Buffalo		Milk (ton)
14,683	31,648	4,646		59,473
Small Cattle				
Sheep	Goat	Milk (ton)		Wool (Ton)
3,471	1,653	166		6,228
Poultry				
Broiler	Layer Chicken	Other Fowls (turkey, goose, duck)		
734,500	181,500	3,358		
Apiculture				
Number of Enterprises	Old Style Bee Hive	New Style Bee Hive	Honey (ton)	Bee wax (ton)
1,419	145	25,550	352.42	16.03

Source: TSI official Website; (http://www.turkstat.gov.tr/, 2013).

Dairy farming has also improved in the district due to the establishment of milk collection centers and better marketing of milk production. Livestock activities are observed to be more common in the mountain villages than that of closer ones to district center. In addition, poultry and apiculture is commonly carried out in the district. An overview of animal breeding activities including the number of animals and animal products in the Amasra in 2013 is shown in Table 14-20.

Table 14-20: Some animal breeding activities and animal products in Amasra District in 2013

Cattle & Product			
Pure Culture Cattle	Hybrid Culture Cattle	Domestic Cattle + Buffalo	Milk (ton)
238	1,410	857	2,553.467
Small Cattle			
Sheep	Goat	Milk (ton)	Wool (kg)
103	37	3.866	179
Poultry			
Layer Chicken		Other Fowls (Turkey, goose, duck)	
7,500		317	
Apiculture			
Number of Enterprises	New Style Bee Hive	Honey (ton)	Bee wax (ton)
147	2,650	36.9	1.33

Source: TSI official Website; (http://www.turkstat.gov.tr/, 2013).

According to Social Baseline Survey Report, 32 households have animals and 5 households have beehives (as shown in Table 14-21) within the focused group in the Project area. On average, households which engaged in stockbreeding as the only source of income, produce 10,300 kilograms of meat, 9,300 liters of milk and 3,000 kilograms of cheese, annually.

Table 14-21: Animal breeding in surveyed area

Animals (N=32)	**Exist**		**Do not exist**		**Total**
	N	**%**	**N**	**%**	
Cattle	19	59.4%	13	40.6%	87
Sheep	2	6.3%	30	93.7%	17

Animals (N=32)	Exist		Do not exist		Total
	N	%	N	%	
Horse	3	9.4%	29	90.6%	8
Poultry	8	25.0%	24	75.0%	119
Beehive	5	15.6%	27	84.4%	13

Source: Social Baseline Survey Report, 2011

Industry

Forestry products, furniture, food, chemistry, coal, stone and soil-based industry, plastic, metal goods, machinery and equipment, textile and garment industries are existing industrial sectors in Bartın. There are 26 textiles, garment and shoe companies, 11 chemical and plastic companies, 20 stone and soil-based companies, 19 forestry products and furniture companies, 11 food companies, 6 metal goods, machinery and equipment companies available in the province. These companies employed 6063 people throughout Bartın[1].

Due to the fact that employment is concentrated on coal mines in Amasra and Zonguldak, industrialization has not been completed. Industrialization process has been started with public investment such as Turkish Hard Coal Enterprise (TTK), Bartın Cement Plant and ORUS Forest Establishment and continued with other private sector investments. After privatization of Bartın Cement Plant in 1995 and also two factories of ORUS in 1996 and 1997, industrial activities have been carried out by the private sector except TTK. Since private sector investments are generally small and medium sized enterprises, they can employ only half of the available workforce in the industry. Remaining industrial workforce is still employed by the TTK[2].

There are three stone quarries and one limestone quarry in Kurucasile, one milk production factory in Ulus. There is one TTK hard coal facility, five stone quarries and one marble quarry available in Amasra District where the Project takes place. Other establishments and organized industrial zone (OIZ) are located in the Central District. There are two OIZs in the province including Bartın OIZ and Special Provincial Administration OIZ. Bartın OIZ was built on 96 hectares area. There are now 30 companies in production and employed 2985 people. Textile, plastic and food are predominant sectors in Bartın OIZ. Special Provincial Administration OIZ was built on 11 hectares area. There are currently 6 companies in production which employed 530 people. Other than OIZs in the region, there are 5 small industrial sites in the province (three in Central District, one in Ulus District and one in Amasra District). These small industrial sites were built on total area of 443 hectares. Currently, there are 549 companies in production and 1032 people are employed in 5 industrial sites according to Industry and Trade Status Report of Bartın prepared by the Provincial Directorate of Ministry of Science Industry and Technology, 2011.

Coal Mining

[1]West Black Sea Development Agency website, http://bakka.gov.tr/).
[2]Bartın Provincial Environmental Status Report, 2011.

Coal mines fulfill 26% of the global energy demand. Turkey has imported 23% of its coal supply in 2012. This amount may increase in the future as importance of coal on the electricity generation increases. Russia, Australia, and the United States are the main suppliers of Turkey's hard coal. In Turkey, total coal consumption is higher than the production as seen in Figure 14-6. As the coal's importance in the electricity generation increases, the volume of imported is foreseen to be increased as well[1].

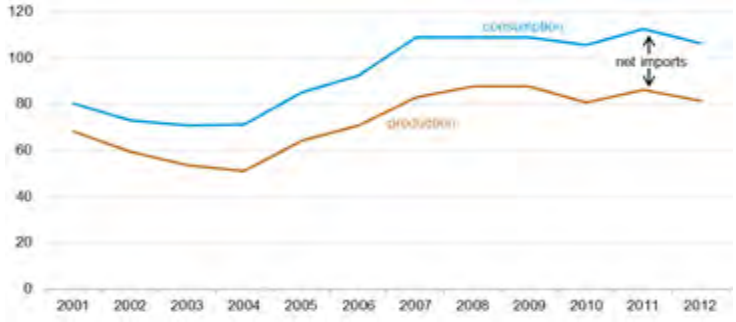


Figure 14-6: Turkey's coal consumption and production, 2001-2012 (million short tons).

According to the Ministry of Energy and Natural Resources, it is going to be made up the main share rather than imported natural gas. In this manner, both private and public sector is going to be engaged to achieve this target. For this purpose, Turkish Coal Enterprise is studying to increase the share of coal in overall energy production.

Approximately 50% of the lignite potential in Turkey is located in the Afsin-Elbistan basin of southeastern Anatolia, whereas hard coal is remained in one location, the Zonguldak basin of northwestern Turkey[2]. Bartın provides a suitable environment for hard coal and industrial raw material owing to the virtue of the geological properties of province. 99% percent of Turkey's hard coal reserves are present in Zonguldak-Bartın Region and 573 million tons of total reserves are located in Amasra District. According to TTK data, 261,235 tons of raw coal and 129,393 tons of merchantable coal are produced in Amasra.

In the Regional Environmental Plan of TR81 sub-region, dated 03.05.2013, it is stated that 22.20% of the total employment in the region was provided by Amasra Hard Coal Enterprise (TTK) in 2000 and it is projected that mining industry will continue to be of significant importance by providing 17% of the total employment in year 2025.

According to the Bartın District Governor official website, there are twenty four mining field assigned to private sector in which four of them situated in Amasra. There are also marble quarries in the province and a portion of the processed marble is exported. Number of coal, marble and stone enterprises in the province is 2, 4 and 5 respectively and these enterprises employ 1391, 127 and 217 people, respectively, in 2013[3] (see Table 14-22).

[1] EIA, Analysis Briefs Country Report of Turkey, U.S. Energy Information Administration (http://www.eia.gov/countries/analysisbriefs/Turkey/turkey.pdf)
[2] Republic of Turkey, Ministry of Energy and Natural Resources (http://www.enerji.gov.tr/index.php)
[3] West Black Sea Development Agency website, http://bakka.gov.tr/).

Table 14-22: Mining business facilities in Bartın Province

	Bartın		TR81	
	Facility	Employment	Facility	Employment
Coal	2	1391	57	16279
Marble	4	127	12	181
Natural Stone	5	217	13	316
Quartz Sand	-	-	1	30
Dolomite	-	-	1	69
Bauxite	-	-	1	2

Source: West Black Sea Development Agency website (http://bakka.gov.tr/)

14.2.3 Employment

According to the main labor force indicators of the provinces given by TSI for 2011 and 2012, it is observed that Bartın possessed the highest employment rate of 57.5%. Table 14-23 presents the employment data for Turkey, West Black Sea Region and Bartın Province for 2012. Specific data for Amasra is not available.

Table 14-23: Employment data for Turkey, West Black Sea Region and Bartın Province

	Total Population (Age +15)	Labor Force Participation Rate (%)	Unemployment Rate (%)	Employment Rate (%)
Turkey	54,724,000	50.0	9.2	45.4
West Black Sea*	3,416,000	52.0	6.1	48.8
Bartın	164,037	60.9	5.7	57.5

Source: TSI official website; (http://www.turkstat.gov.tr/). *West Black Sea Region covers Zonguldak, Karabuk, Bartın, Kastamonu, Cankiri, Sinop, Samsun, Tokat, Corum, Amasya Provinces.

Based on the 2012 data of TSI, the unemployment rate in Bartın Province is 5.7% which is lower than both West Black Sea Region (6.1%) and the overall country unemployment rate (9.2%). The labor force participation rate for population age of 15 and above is 60.9% and higher than that of Turkey and West Black Sea Region.

Comparison of population distribution based on business branches between Zonguldak, Karabuk, Bartın sub-region and Turkey in 2012 is listed in Table 14-24.

Table 14-24: Comparison of population distribution by working sectors in Zonguldak, Karabuk, Bartın sub-region* and Turkey

Occupational Group	Turkey (Thousand)	Zonguldak, Karabuk, Bartın (Thousand)
Legislators, senior officials and managers	1,911	21
Professionals	1,931	25
Technicians and associate professionals	1,575	20
Clerks	1,736	22
Service workers and sales employees	3,181	40
Skilled agricultural and fishery workers	4,868	117
Craft and related trade workers	3,208	52
Plant and machine operators and assemblers	2,539	39
Elementary occupations	3,872	40

*Zonguldak, Karabuk, Bartın is a sub-region of West Black Sea Region (sub region numbered TR81)

More than half of the households (57.4%) depend on a regular income of the single household member and 30.6% of household depends on two household members' regular income within the

focus group study according to Social Baseline Survey Report. Number of occupied household members aged 15 or older is given in Table 14-25.

Table 14-25: Distribution of occupational groups in Gomu, Tarlaagzi, Kazpinari Villages and Kum Neighbourhood

Occupational Group (N=759)	Number of Occupied People
Farmer	11
Merchant	80
Craftsman	4
Public/Civil Servant	30
Worker	105
Daily/Seasonal Worker	4
Housewife	243
Income-Generating Worker At Home	3
Retired	166
Student	59
Unemployed	33
Other	21
Total	759

Source: Social Baseline Survey Report, 2011

According to Table 14-25, 32% of the total household members are housewives, 21.9% are retired, 13% are workers and 10.5% are merchants. Work force availability in surveyed area by positions is presented in Table 14-26. Majority (69%) of the households do not have any labor force available. Remaining 31% of the focus group is working as a driver, mine worker or unqualified worker

Table 14-26: Availability and location of jobs

Available Jobs	Available Work Force	Location of Jobs
Unqualified Worker	11	Gomu,Kazpinari, Tarlaagzi Villages and Kum Neighbourhood
Repairer	9	Gomu, Tarlaagzi Villages and Kum Neighbourhood
Driver	19	Gomu,Kazpinari, Tarlaagzi Villages and Kum Neighbourhood
Welder	5	Gomu, Tarlaagzi Villages and Kum Neighbourhood
Heavy Equipment Operator	3	Gomu,Kazpinari, Tarlaagzi Villages and Kum Neighbourhood
Heavy Vehicle Driver	9	Gomu,Kazpinari, Tarlaagzi Villages and Kum Neighbourhood
Security	7	Gomu,Kazpinari, Villages and Kum Neighbourhood
Cooker	4	Kum Neighbourhood
Engineer	4	Kum Neighbourhood
Tree Cutter	1	Kazpinari and Tarlaagzi Village
Mine Worker	16	Gomu,Kazpinari, Tarlaagzi Villages and Kum Neighbourhood

Source: Social Baseline Survey Report, 2011

Family members, neighbors, friends of headmen (including headmen themselves) have previously worked in a hard coal mine. According to Social Impact Evaluation Report, 60.7% of households have a family member who worked in a mine before. There are about 50 workers employed by Hema in the mines at southeast of Gomu Village and 15 people employed by TTK whereas in Tarlaagzi Village, 40 people are working at Hema mines and 6 people at TTK.

14.2.4 Income Distribution

Net annual disposable income data for households in Turkey and the West Black Sea Region are given in Table 14-27. West Black Sea Region covers Zonguldak, Karabuk, Bartın, Kastamonu, Cankiri, Sinop, Samsun, Tokat, Corum and Amasya Provinces. According to TSI, annual disposable income for the region is 22,866 TL which is below the country average (26,577 TL).

Main source of income for the households in project-affected areas is listed in Table 14-27 below. Economy of households is generally based on retirement pension and/or daily wage works such as mining. 66.4% of households relying on retirement pension have additional income from daily wage works, agricultural production or animal breeding. The average annual income of a household is 26,047.00 TL. The highest annual income is 300,000.00 TL and the lowest income of a household is 2,000 TL[1].

Table 14-27: Main source of income for households

Main Sources of Income (N=242)	Households	
	Number	%
Agricultural Production	23	9.5
Animal Breeding	8	3.3
Seasonal Agricultural Labor	6	2.5
Retirement Pension	143	59.1
Widow/Orphan/Handicapped/Old-Age Pension	11	4.5
Rents	4	1.7
Daily Wage Works	111	45.9
Assistance of Relatives	2	0.8
Small Scale Retailer	24	9.9
Tourism	12	5.0
Other	11	4.5

Source: Social Baseline Survey Report, 2011

Poverty

According to statistics of year 2012, 16.3% of the population lives under relative poverty threshold (4,515.00 TL per month) in Turkey and the number of people of low-income is estimated to be 11,998,000. Available data for the number of poor people and regional poverty rates states that 12% of the population is living under the relative poverty threshold (i.e. 4,389.00 TL/month) in West Black Sea Region (specific data for Bartın Province is not available) and the number of people with low-income is calculated as 526,000 in the region. Turkey and West Black Sea Region poverty data comparison is provided in Table 14-28.

Table 14-28: Poverty comparison of Turkey and West Black Sea Region

Years	Turkey			West Black Sea Region		
	Poverty Threshold (TL)	Number of People with Low-Income (Thousand)	Poverty Rate (%)	Poverty Threshold (TL)	Number of People with Low-Income (Thousand)	Poverty Rate (%)
2006	2,351	12,548	18.6	2,057	675	15.3

[1] Social Baseline Survey Report

Years	Turkey			West Black Sea Region		
	Poverty Threshold (TL)	Number of People with Low-Income (Thousand)	Poverty Rate (%)	Poverty Threshold (TL)	Number of People with Low-Income (Thousand)	Poverty Rate (%)
2007	3,041	11,163	16.3	2,782	549	12.3
2008	3,164	11,580	16.7	2,795	524	11.9
2009	3,522	12,097	17.1	3,135	621	14.4
2010	3,714	12,025	16.9	3,424	630	14.4
2011	4,069	11,670	16,1	3,870	609	13.8
2012	4,515	11,998	16,3	4,389	526	12

Source: TSI official Website; (http://www.turkstat.gov.tr/)

14.2.5 Education

Educational services are provided by 90 pre-schools, 82 primary schools, 46 pre-secondary schools, 8 secondary schools (high schools) and 28 vocational and technical high schools representing a total of 254 educational facilities in Bartın. The education system employed 2,192 teachers and serviced 34,447 students in 2012[1]. The information on the educational status of Bartın Province based on the 2012 population census is provided in Table 14-29.

Table 14-29: Educational status of Bartın Province

Age	Gender	Illiterate	Literate but not graduated	Pre School	Elementary School	Secondary School	High School	(Academy) University Degree	Master Degree	Post Graduate Degree	NK*	Total
06-13	Male		10,053		32						7	10,092
	Female		9,504		53						6	9,563
14-17	Male	1	228		5,055		99				5	5,388
	Female	1	169		5,050		160				7	5,387
18-21	Male	17	122		2,407		2,948	143			39	5,676
	Female	24	98		2,596		2,941	145			43	5,847
22-24	Male	30	71		1,407		1,766	764	3		92	4,133
	Female	32	75		1,759		1,320	731			99	4,016
25-29	Male	45	46	263	2,660	74	2,228	1,348	43		276	6,983
	Female	74	79	2,008	1,813	75	1,331	1,111	32	1	118	6,642
30-34	Male	75	31	359	2,663	549	2,379	1,078	87	16	95	7,332
	Female	96	72	2,976	1,422	380	1,294	906	58	11	94	7,309
35-39	Male	52	22	784	2,504	479	1,943	991	74	25	97	6,971
	Female	95	58	3,121	1,536	378	933	621	45	13	88	6,888
40-44	Male	65	28	1,257	2,197	577	1,069	909	72	26	87	6,287
	Female	128	206	3,475	1,267	364	593	425	25	7	83	6,573
45-49	Male	49	41	2,136	1,468	495	836	575	47	24	118	5,789
	Female	198	532	3,817	750	249	461	218	9	4	142	6,380
50-54	Male	82	86	3,364	710	434	794	387	23	5	190	6,075
	Female	405	1,088	3,779	381	154	350	162	3	5	180	6,507

[1]TSI Website; (http://www.turkstat.gov.tr/).

Age	Gender	Illiterate	Literate but not graduated	Pre School	Elementary School	Secondary School	High School	(Academy) University Degree	Master Degree	Post Graduate Degree	NK*	Total
55-59	Male	117	206	4,066	291	368	475	370	20	6	191	6,110
	Female	709	1,814	3,014	162	100	191	120	4	1	219	6,334
60-64	Male	183	441	3,451	104	250	289	191	11	3	159	5,082
	Female	940	1,943	1,775	71	76	100	66	2		193	5,166
65 +	Male	1,550	2,317	4,893	50	180	204	175	10	6	525	9,910
	Female	5,208	3,737	2,500	28	69	70	49			589	12,250
Total		10,176	33,067	47,038	38,436	5,251	24,774	11,485	568	153	3,742	174,690

*Not-known
Source: 2012 Population Census, TSI Website; (http://www.turkstat.gov.tr/).

In Amasra District, 9 primary schools, 5 pre-secondary schools, 2 vocational and technical high schools (total of 16 educational facilities) are in service. Detailed information based on the 2012 population census is given Table 14-30.

Table 14-30: Educational status of the Amasra District

Age	Gender	Illiterate	Literate but not graduated	Primary School	Elementary School	Secondary School	High School	Academy Faculty Degree	Master Degree	Post Graduate Degree	NK	Total
06-13	Male		790		1						2	793
	Female		765		5						2	772
14-17	Male		19		376		2					397
	Female		8		372		6					386
18-21	Male	1	16		217		104	10			5	353
	Female	3	8		180		117	9			3	320
22-24	Male	2	5		113		111	46			11	288
	Female	1	4		122		78	40			10	255
25-29	Male	4	2	8	234	7	183	115	1		18	572
	Female	8	8	177	133	7	122	87		1	12	555
30-34	Male	5	1	36	232	50	214	87	1		7	633
	Female	9	5	248	99	45	100	58			14	578
35-39	Male	4	4	91	190	53	142	72	4	1	14	575
	Female	9	4	255	71	37	73	46	3		5	503
40-44	Male	2	2	103	142	63	69	59	2		14	456
	Female	9	21	265	78	27	55	36	1	1	8	501
45-49	Male	6	7	138	77	77	76	39	3	1	8	432
	Female	12	45	283	49	23	48	20	1		13	494
50-54	Male	8	9	249	48	73	75	35	1		14	512
	Female	32	89	280	26	25	46	21			24	543
55-59	Male	10	19	342	20	50	50	42	2		30	565
	Female	55	141	288	12	19	29	14			27	585
60-64	Male	16	39	322	8	40	36	30	1		20	512
	Female	56	130	195	12	7	13	8			12	433
65 +	Male	92	130	504		17	30	20	1	1	35	830
	Female	380	290	349	7	10	13	10			61	1,120
Total		724	2,561	4,133	2,824	630	1,792	904	21	5	369	13,963

Source: 2012 Population Census, TSI Website; (http://www.turkstat.gov.tr/).

According to the conducted survey in the project area, 31.7% of respondents is primary school graduate, 16.4% is high school graduate,16.3% is secondary school graduate and 5.6% of the population has an academic degree. On the other hand, percentage of illiterate people is determined to be 5.3%.

Although there are school buildings for primary education in Gomu and Tarlaagzi Villages, they are currently out of service whereas there is one primary school in Kazpinari Village and one primary and high school in Kum Neighbourhood. Gomu and Tarlaagzi Villages utilize transportation to Amasra District for primary education. The total number of the students going to Amasra from Gomu and Tarlaagzi Villages for primary, pre-secondary and secondary (high) school education is 45 and 40, respectively. The number of the students going to Bartın from Tarlaagzi Village is 20. All the transportation fee is covered by the Ministry of National Education.

According to Social Baseline Report, 78.1% of households do not have children of any school age (i.e. between 7 and 15). The distribution of educational enrollment of the rest 21.9% is given in Figure 14-7.

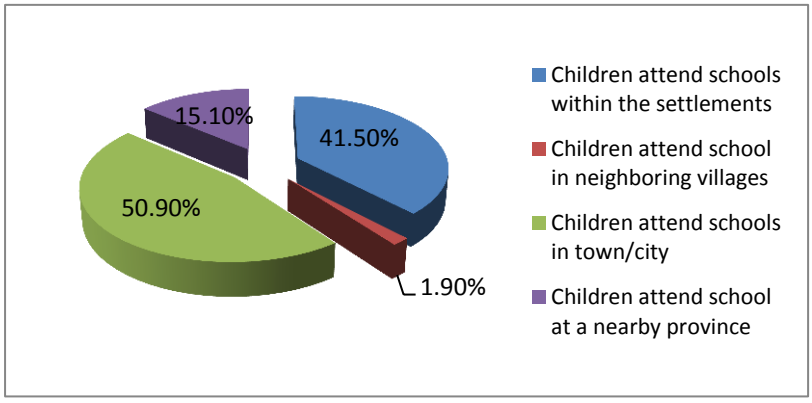


Figure 14-7: Distribution of educational enrollment

Bartın Province has one state university (i.e. Bartın University). It provides education with 7 faculties, 3 higher education vocational schools and 3 institutes. The State University employs 316 academic staff and provides educational service to 7,119 students as of 2012[1]. Bartın University does not have any faculty or institution in Amasra District.

The number of Public Education Center courses and the number of student enrollment in Bartın Province and the Amasra District is listed in Table 14-31.

Table 14-31: Courses and enrollment in 2012 in Bartın Province and Amasra District

Type of Course	Bartın*		Amasra**	
	Courses	Enrollment	Courses	Enrollment
Vocational courses	248	3,911	N.A.	N.A.
Public education center	176	3,095	1	968

*Governorships of Bartın Website: (http://www.Bartın.gov.tr/).
**District Governorships of Amasra Website: (http://www.amasra.gov.tr/)

[1]Governorships of Bartın Website: (http://www.Bartın.gov.tr/)

14.2.6 Recreation and Tourism

Bartın is a candidate to be an important tourism center with its clean coastal side, untouched beaches, natural parks and highlands and its various cultural and historical assets. The province known for its 700 years old church, 100-300 years old mosques, bridges, Turkish bath, wooden Bartın houses, traditional women bazaar (Garıla Pazarı), traditional Anatolian weddings, outstanding local cuisine, variety of festivals, cultural and folkloric values, rivers, caves, springs and interesting natural values and hunting locations. According to 2011 data, approximate number of tourists visiting Bartın per year is 200,000[1].

Number of municipality licensed accommodation facilities details by districts and types is shown in the Table 14-32.

Table 14-32: Municipality licensed accommodation establishments in Bartın Province

Districts	Hotel			Hostel			Total		
	Number of Facilities	Number of Rooms	Number of Beds	Number of Facilities	Number of Rooms	Number of Beds	Number of Facilities	Number of Rooms	Number of Beds
Central	11	231	471	9	133	332	20	364	803
Amasra	21	391	1,052	4	60	143	25	451	1,195
Kurucasile	1	14	32	-	-	-	1	14	32
Total	33	636	1,555	13	193	475	46	829	2,030

Source:http://www.ktbyatirimisletmeler.gov.tr/TR,9861/belediye-belgeli-tesis-envanteri.html

Alongside the economic return, tourism sector creates job opportunities for the local community. Number of personnel employed in the tourism sector is given in Table 14-33.

Table 14-33: Number of Employees in Tourism Sector

Touristic Facilities	Number of Employees
Licensed Accommodation Facilities	90
Accommodation Facilities Licensed by Municipality	200
Travel Agencies	6
Food and Beverae Sector (Rastaurants, Cafes, Bars etc.)	300
Total	**596**

Source: West Blacksea Developmeny Agency, Regional Plan, 2013

Numbers and details of Ministry of Tourism licensed accommodation facilities are shown in the Table 14-34.

Table 14-34: Ministry of tourism licensed accommodation establishments in Bartın central district

Bartın	Number of Facilities	Number of Rooms	Number of Beds
Tourism Operation Licensed	6	282	582
Tourism Investment Licensed	1	99	189

Source: Bartın Provincial Environmental Status Report, 2011

[1] Bartın Provincial Environmental Status Report, 2011.

Amasra –with board housing system and available camping areas– is known to be the region where first touristic activities started in the country by 1940s. However, although Bartın and Amasra have a very rich tourism potential, expected economical increase was not observed until 1991, when Bartın became a province. Since then, investments have tended towards tourism industry to boost the sector by enhancing the urban infrastructure services (e.g. roads, necessary permits, touristic landscape design) enriching the touristic facilities and advertising activities[1].

Recently, tourism is one of the main sources of income in Amasra. Since it is the closest seaside to Ankara province (the capital city), during summer time the population reaches up to 30-40 thousand people[2]. There are many beaches and untouched bays which are also favorable camping sites. Scuba diving, water skiing and wind surfing are other summer activities in the region. Moreover, there are several spots in the district where ruins of antique cities, ancient covered bazaars, churches and cemeteries were discovered. Also the historical Amasra castle and Amasra museum are important tourist attractions.

As a part of 2023 Tourism Strategy, reorganizing and opening of fishing ports located in Marmara and Black Sea Region is aimed. In this context, Akcakoca, Amasra, Cide and İnebolu Fishing Ports in Western Black Sea Region are included in reorganization targets and the construction of "Amasra Port Cruise Terminal and Small Boat Berth Project" in Amasra Fishing Port was started by the Ministry of Transportation. Ecotourism is also started to develop in Amasra District. Mountains, rich vegetation and activities such as bird-watching catch attention of ecological researchers and nature enthusiasts.

Settlements in coastal areas also have bed and breakfast hotels and boarding houses. For instance, there are 20 boarding houses in Tarlaagzi Village. The number of households which will serve as a boarding house will increase to 50 in the next period, according to Social Impact Evaluation Report. By 2011, there were 787 licensed rooms available for accommodation with 1969 beds in Amasra18[18].

According to Social Baseline Survey Report, main activities for tourism are boarding (bed and breakfast, motel/hotel), local businesses such as gift-shops supermarkets etc., boat/yacht trips and tourist guidance (see Table 14-35).

Table 14-35: Main Types of Activities for Tourism Revenue

Main Types of Activities for Tourism Revenue (N=56)	N	%
Bed & Breakfast, Hotel/Hostel etc.	22	39.3%
Local Businesses (gift shops, supermarkets etc.)	18	32.1%
Restaurants and Cafes	7	12.5%
Boat/Yacht Trip and Tourist Guidance	9	16.1%

Source: Social Baseline Survey Report, 2011

According to Social Impact Evaluation Report, population of the Gomu Village during summer season reaches up to 5000 due to the increasing number of hostel/motel and bed & breakfast hotels and immigration of village residents for summer vacation.

[1] Bartın Provincial Environmental Status Report, 2011.
[2] West Blacksea Development Agency Corporate Bulletin, September 2014.

76.9% of the respondents of the Social Baseline Survey suggest that tourism is not an important income source (see Table 14-36). This is expected when considered most of the accommodation facilities are located around the district center or natural beaches.

Table 14-36: Importance of tourism for households

Importance of Tourism for the Households (N=242)	N	%
Very Important	15	6.2%
Important	41	16.9%
Not Important	186	76.9%

Source: Social Baseline Survey Report, 2011

According to the statistics, number of domestic tourists visiting Bartın was 246,367 and number of foreign tourists visiting Bartın was only 9,366 in 2013. Assuming all foreign visitors coming to Bartın Province spend the night at Amasra, the number is still very low in comparison with the total number of foreign tourists visiting Turkey. However, according to the statements of the operators of the facilities themselves, it is seen that the actual number of tourists in the region are remarkably higher than the statistics.

14.2.7 Health

According to the Governorships of Bartın website, health services are provided in two state hospitals (Bartın and Ulus State Hospital) and two private medical centers. Total hospital bed capacity in the state hospitals is 407 (402 in Bartın State and 5 in Ulus State Hospital). Number of hospital beds per 10,000 people is 22.1, which is below country average (26.5 per 10,000 people) as of 2012[1]. There are one dental health center, one tuberculosis control dispensary, three community health centers, 30 family health centers, 32 village health center and 63 pharmacies within the province. 99 specialists, 94 practicing physicians, 21 dentists, 330 nurses, 165 midwifes and 396 other health service personnel practice in private and state hospitals[2].

Specifically, Amasra District has four family health centers, one community health center, four pharmacies and one emergency station. According to Ministry of Health[3], there will be an integrated district hospital with fifteen to twenty beds in Amasra.

In terms of the Project area, there is one health care center in Gomu Village. Kazpinari and Tarlaagzi Villages do not have any health care institutions and utilize the Family Health Care System provided by the Ministry of Health. According to this system, the villages are to be visited by a doctor and a nurse (sometimes with additional health care officials) once every week for outpatient treatments. However, visiting frequencies were reported as twice a month. None of the settlements have doctors, nurses, health officers or midwives. Table 14-37 shows health institutions where people get healthcare service.

Table 14-37: Healthcare service locations being utilized by people live near the project area

Where People Get Health Care (N=242)	Exist

[1]Ministry of Health, Annual Health Statistics, 2012
[2]Governorships of Bartın Website: (http://www.Bartın.gov.tr/)
[3]Ministry of Health, Meeting Point for Health Website: (http://www.sbn.gov.tr/icerik.aspx?id=35556)

	N	%
Pharmacy	20	8.3%
Family doctor	5	2.1%
Family health center	152	62.8%
Private consultation room	6	2.5%
Private clinical	21	8.7%
Private hospital	7	2.9%
Research Hospital	14	5.8%
Military hospital	1	0.4%
State Hospital	80	33.1%
I do not receive any medical service	1	0.4%
Other	3	1.2%

Source: Social Baseline Survey Report, 2011

14.2.8 Ports

Bartın Port

Bartın Port is located 13 km north of Bartın city center and 11 km southwest from Project site. Port has a 480 meters-long pier. Maximum safe water depth is 7.5 m (can be dragged up to 8 m). Ships with the length of 215 m can approach to the port. The port has four mobile cranes with a lifting capacity of 90-120 tons. Several caps of forklifts and electronic weight bridge of 100 meters are also in operation. Due to the naval base located at inner harbor, vessels carrying dangerous cargoes, including chemicals carriers and tankers are strictly prohibited in the port. Bagged cement, steel by-products, lime, flour and logs are usually shipped via this port. Handling of the cargoes is performed by port contractors[1].

In accordance with the international ISPS Code comes in force in 2004, the certification of the port has completed and it is in operation for international sea traffic for following types of vessels:

- Ferries / Passenger
- General Cargo Ship
- Bulk Carrier
- Container

In 2013, the total number of ships came into the port was 576, the total weight of freight loaded at the port was 895,961 tones and that of unloaded freight was 837,877 tones. 2014 data of the port is not available yet.

Amasra Fishing Port

Amasra Fishing Port is located 13 km north of Bartın city center and 5 km north of the Project site. The port has a 210 m long berthing space/ramp. It consists of 2 piers of which the main pier is 605 meters-long and the secondary pier is 310 meters-long. There is no additional pier/jetty and the area is protected by existing piers.

[1] Ministry of Transport, Maritime and Communications, Bartın Port Authority Website: (http://www.Bartınliman.gov.tr/)

2700 fisherman is registered as skilled personnel at Amasra Fishing Port personnel registry. 1100 personnel out of a total number of 2700 fishermen are actively working in fishing boats as sailor/shipman. These professions are main occupations encountered in the port[1].

The number of fishing boats registered in the port is calculated as 530. In 2012, the total number of ships in the port was 156 and the total weight of freight loaded at the port was 136,750 tones. No freight is unloaded in the port by year 2012[2].

There is an ongoing pier construction within the port. Project scope consists of one additional wharf and one floating jetty. It is planned to be transferred to the Municipality of Amasra upon completion of the project. The wharf is planned to be constructed with concrete pier method. It will be 9 meters deep and parallel to the existing breakwater. The total length of the wharf is to be 240 m. The width of the riprapped area to be constructed between existing breakwater and the wharf is estimated as 30 m.

Planned floating jetty will consist of one, 120 m long smaller floating jetty extended to the sea from an existing pier within Amasra Fishing Port and two smaller 60 m long, floating jetties extended perpendicular to above-mentioned, 120 m long, floating jetty. Passenger ships with 30,000 DWT will be able to approach to the projected wharf. There will be numbers of bollards and other equipment to ensure the safe transfer of passengers.

Approximately 1000 m^2 surface area of above-ground facilities will be constructed as a part of port services. Subject facilities will include port terminal, authorized waste facility, fuel storage area, restaurants/coffee shops and fishing net storage area. In addition, required electricity, water supply and technical (internet, phone) infrastructure will be delivered. It is also planned to provide passenger tickets and customs services to contribute to Turkey's tourism industry. Advertising campaigns and sales activities will be carried out to increase public awareness to both existing and projected ports. The upgraded port will be able to provide service to approximately 10 international cruise ships every year. Hence, the project will increase the number of ships approaching to the port and improve local and international tourism in the region[3].

Tarlaağzı Fishing Port

Tarlaağzı Fishing Port was constructed in October, 2005 and it is four sea miles away from Amasra Port. It is the biggest fishing port in Black Sea Region. Main pier and secondary pier is 570 m and 310 m long, respectively. Fishing boats, yachts and light tonnage sea vessels operates in Black Sea benefit from subject piers. Management of the fishing port is performed by the Aquacultural Resources Cooperation.

According to the data given 2011, the numbers of boats using Tarlaağzı Fishing Port both during fishery season and out of the fishery season are represented in Table 14-38. Approximately 100

[1] District Governorships of Amasra Website (http://www.amasra.gov.tr/)
[2] Minister of Transport, Maritime Affairs and Communications, Director General of Merchant Marine Website: https://atlantis.denizcilik.gov.tr
3Governorships of Bartın Website (http://www.Bartın.gov.tr/)

people including boat crew is employed at the port. In addition, five personnel is employed at the management of Aquacultural Resources Cooperation for Tarlaagzi and Gomu Villages.

Table 14-38: The number of boats both using Tarlaağzı fishing port

	Exist	
	Fishing Boats	**OtherBoats**
In the fishery season	85	40
Density (%)	65.8	-
Out of the fishery season	43	10

According to the 2012 data of the cooperation 256,000 fish crates (203,000 crates of bonito, 36,000 crates of anchovy and 17,000 crates of horse mackerel, goatfish and cod fish) were dropped in the Tarlaağzı Fishing Port and delivered for the consumption. Approximately, 2000 to 3000 vehicles are loaded to commercial vessel and more than 1000 receipts were written in 2013. Furthermore, according to Aquacultural Resources Cooperation, 11,500 vehicles and 55,000 people visited the port and the beach as a part of local tourism activities in summer, 2013.

14.3 Impacts

The scope of this section is to identify the anticipated impacts of the proposed Project on the socio-economic environment and to prevent and mitigated where negative or maximized where opportunities exists. For ease of review the predicted impacts on the socio-economic environment of the proposed Project are described below and divided into the following categories:

- Direct and Indirect Employment Creation
- Economy
- Population
- Social Environment and Infrastructure
- Road and Ship Traffic
- Expropriation and Resettlement
- Fisheries and Aquaculture
- Recreation and Tourism

14.3.1 Direct and Indirect Employment Creation

Project construction works are currently carried out with a total number of 790 HEMA employees. This constitutes administrative personnel, engineers, technicians and skilled/unskilled workers. HEMA has also cooperated with the Chinese DATONG firm and employed foreign workers for installation of the 3 mine shafts. During these works, experienced Chinese mine technicians and workers have been employed (currently 200 employees) and will continue to be employed in future works. Additionally, for driving the galleries, contracts have been signed with Denfa Construction Installation Mining Industry and Trade Co. Ltd. and Soner Engineering, whose 110 and 51 personnel currently serve the Project, respectively. The Project team intends to employ as many Amasra based construction workers as is realistically possible (and thus have their individual accommodation in the city). However, there are on-site worker accommodations both for local and Chinese workers. The camp site is equipped with the necessary utilities and infrastructure to

support their operations including power generation, water supply, sewage treatment and waste management. The camp site is managed in accordance with the provisions of IFC PS 2: Labor and Working Conditions and the IFC/EBRD guidance on workers accommodation. The existing infirmary of HEMA (which is located at Gomu Shaft-1 site) will be utilized for health care needs of the workforce. Relevant information is provided in *Chapter 16: Labor and Working Conditions.*

- The number of employees by years, to be employed for the underground mining projects are provided in Table 14-40. According to the table, by year 2032, 2178 workers will be working in the project. Employment of these workers will provide a positive impact. It is the intention that the large majority of the workforce will be sourced locally.
- The study found that there is a high rate of out-migration in the area. Indeed, one of the expectations from the Project was to attract some of the young people back to the villages. The local people appeared to be positive about workers coming to work in the region.
- All workers will be employed and remunerated in accordance with the provisions of Turkish law and IFC Performance Standard (PS) 2: Labor and Working Conditions. In addition to the direct employment benefits of the Project, indirect and induced employment benefits will also arise. Job opportunities are expected to be created by the need of goods and services during the construction and operation of the mines. Additionally, revival of the economy will also provide employment for different sectors in the region.

Table 14-40: Labor requirement by years for underground mining works

Title/ Number of personnel	1.5 million tonnes/year production out of one full mechanized panel (2014-2016)					2.5/3 million tonnes/year production out of two full mechanized panels (2017-2018)					4.5 M tonnes/year production out of three full mechanized panels (2019-2025)					5 million tonnes/year production out of four full mechanized panels (2026-2032)				
Aboveground Personnel					**Total**					**Total**					**Total**					**Total**
Mine Director	1				1	1				1	1				1	1				1
Production Superintendent	1				1	1				1	1				1	1				1
Electro-Mechanic Superintendent	1				1	1				1	1				1	1				1
Chief Engineer	3				3	3				3	3				3	4				4
Engineer and Technician	14				14	12				12	12				12	14				14
Underground Workers	**Shift 1**	**Shift 2**	**Shift 3**	**Shift 4**	**Total**	**Shift 1**	**Shift 2**	**Shift 3**	**Shift 4**	**Total**	**Shift 1**	**Shift 2**	**Shift 3**	**Shift 4**	**Total**	**Shift 1**	**Shift 2**	**Shift 3**	**Shift 4**	**Total**
Production Team	31	37	31	31	130	62	74	62	62	260	93	111	93	93	390	124	148	124	124	520
Development Team	114	54	120	114	402	114	54	120	114	402	152	72	160	152	536	152	72	160	152	536
Winch Operator	2	1	2	4	9	4	2	4	4	14	4	2	4	4	14	5	3	5	5	18
Switch Operator	7	7	7	7	28	15	15	15	15	60	15	15	15	15	60	20	20	20	20	80
Dam Worker	3	3	3	3	12	6	6	6	6	24	6	6	6	6	24	6	6	6	6	24
Pump Operator	2	2	2	2	8	6	6	6	6	24	6	6	6	6	24	9	9	9	9	36
Repair Crew	7	7	7	7	28	18	18	18	18	72	18	18	18	18	72	30	30	30	30	120
Safety Supervisor	3	3	3	3	12	5	5	5	5	20	5	5	5	5	20	5	5	5	5	20
Safety Worker	4	4	4	4	16	8	8	8	8	32	8	8	8	8	32	8	8	8	8	32
Dynamite Storage Responsible	2	2	2	2	8	3	3	3	3	12	3	3	3	3	12	3	3	3	3	12
Surface Production Personnel	4	4	4	4	16	15	15	15	15	60	15	15	15	15	60	24	24	24	24	96
Surface Workshop Personnel	6	6	6	6	24	12	12	12	12	48	12	12	12	12	48	17	17	17	17	68
Surface Auxiliary Service Personnel	5	5	5	5	20	8	8	8	8	32	10	10	10	10	40	18	18	18	18	72
Surface Coal Washing Plant Personnel	6	6	6	6	24	9	9	9	9	36	9	9	9	9	36	14	10	14	14	52
Methane Drainage Personnel	4	4	4	4	16	8	8	8	8	32	8	8	8	8	32	12	12	12	12	48
Rail Transportation Personnel	3	3	2	4	12	5	5	4	4	18	5	5	4	4	18	10	10	10	10	40
Other (Office)				18	18				18	18				18	18				20	20
Sub-Total					783					1164					1436					1794
TOTAL (above and under-ground)					**797**					**1182**					**1454**					**1815**
Total labor requirement considering 20% absence rate					**956**					**1418**					**1745**					**2178**

14.3.2 Economy

Economic impact analysis for the Project involves assessing revenues generated or lost (by potential downsizing of existing fisheries, negative impacts of the project on tourism sector) by the economic activity as they flow through the local economy, tracking jobs created or lost, spending changes that supports local business and tax revenues.

Analysis includes both direct and indirect benefits. Direct benefits, in the context of the mines, coal washing plants and the port take the form of:

- revenues generated in the course of the mining and transportation of the coal (i.e., the value of output);
- the wages and benefits that go to administrators, providers and all other employees;
- the number of jobs created in the mine and logistics industry; and
- the taxes that are paid by mine, port and their owners/employees.

Economic activities and businesses that will be supported by the HEMA mines other than mine industry represent indirect benefits. Mining companies are increasingly required to assist local business development, to outsource services, and to give preference to local business. These *business-to-business* effects include the supplies and equipment purchased by the mine, coal washing plant and the port, administrative services, property maintenance services, etc.

Additional indirect benefits (sometimes called induced effects) will arise when employees of mine, plant and port spend their earnings to support local businesses. However, increased demand may cause a rise in the prices of goods and services, locally.

An economic impact analysis was not commissioned as part of the ESIA process, however it can prudent to assume that the overall economic benefits are expected to accrue from the operation of the mine with a well-organized community despite its potential negative impacts on social and physical environment.

14.3.3 Population

As the Project necessitates a high number of workforces, during the construction and operation phases of the mine, coal washing plants and the port, it is expected to cause in-migration to the area. Moreover, it is expected that workers would bring along their families since long-term job opportunities are offered by the Project. Hence, the migration related impacts such as increases in crime; prostitution or social conflicts are some important issues throughout the course of the Project.

The impact will begin with the construction activities and extend through the life of the mine. Residents will experience the changes to the nature of the environment and potential impacts on their health and sense of well-being. People's sensitivity to potential changes on their current levels of health and well-being is expected to be high if the mitigations are not undertaken.

14.3.4 Social Environment and Infrastructure

Location of camps built for Chinese workers near the existing communities may pose some risks to local people. Intrusion in local communities can lead to a breakdown in existing community structures and livelihoods. A key objective will be to avoid any impact on the adjacent community or on local services, community facilities and businesses. Unnecessary interactions by the workforce with the local community will be minimized in order to avoid the risk of the increase in the levels of communicable diseases to the local residents and certain social diseases such as HIV/AIDS. On the other hand, workers who come with their families would possibly prefer to rent a house from a close village or from Amasra. Therefore, it is not likely that the contact of local people with workers to remain at a minimum.

Apart from that, water use and quality is a preferential issue such as pressure on water resources and access to clean drinking water may cause increase in the level of infectious disease.

Another important issue related with influx of large groups (mainly male workers) in coal mining project (including mine, port and coal washing plants) is injury risks. Project may also increase injury rates through the social interaction. For this purpose, the influx of large groups in the project may lead to social unrest including violence and sexual assault. Influx of new people may also contribute to crime and safety issues.

If separate ethnic groups and cultures exist along with the increase in the population, this may weaken social controls in local communities. Although capacity of police, fire stations and other related services are enough for the district, services may be strengthening to prevent potential incidents. According to the desk-based research, the capacity of the local police station is well developed and equipped for safety issues. Amasra district has 41 police officer/policemen.

Additionally, with the increased population of the region, the demand for education and health facilities will increase. There is an infirmary in the camp site for the workers staying in the construction side. The emergency and health care facilities are very limited around the district for both construction and operation phase to cope with the potential influx of new workers and their routine medical needs. However, the need for a fully-equipped health service will arise in the future. A pressure on education services to some extend is also expected since there are no schools at the villages for workers' children to continue. The potential impacts of influx of new people on the community health and resources are described in detailed in *Chapter 16: Community Health and Safety*.

Movement of non-local workers will be strictly controlled to prevent inappropriate interaction with local people and a strict Code of Conduct governing activities and behavior will apply to all Project personnel. All personnel will receive training in these requirements. Local goods and services will be used where possible, but onsite utilities, catering and recreational facilities will be provided so that camps do not place unsustainable demands on local resources, facilities or amenities.

14.3.5 Road and Ship Traffic

During the installation and operation of the coal mines, some portion of the surface coal and the extracted coal (proposed to transport to the Bartın Cement Factory) will be transported through overland traffic by heavy vehicles. Therefore, within the scope of the Project, a transportation assessment study was undertaken by Bogazici Proje Mühendislik Planlama Ltd. (Bogazici) and the results were presented in the report titled "Transportation Survey and Evaluation Study for Amasra HEMA Coal Mines" dated June 2013. This study also involves a Traffic Management Plan. Details of the road transportation are described in *Chapter 12: Road Transportation* and the potential impacts on road safety and congestions near the project site are discussed in *Chapter 15: Community Health and Safety.*

Among other issues raised by the heavy vehicle traffic and traffic safety measures of the vehicle routes, severe disturbance may arise from the contact of heavy vehicle with school transportation. There are between 80 to 85 children using the Gomu-Tarlaagazı Village Road and Amasra Road for school service transportation. Potential ongoing noise and safety issues of road due to traffic during operation of coal mining and port activities may even give rise to a severe disturbance in case of an incident resulting from a negligent road instability.

For the marine transportation of the coal, maximum of 2 vessels are expected to anchor at HEMA Port in a week. In terms of the ship traffic, to estimate whether fishermen are going to be effected during the construction activities and the operation of the port, a simulation study developed in order to determine the security conditions during ship maneuvering. According to the study, as a part of the design works carried by the Istanbul Technical University January 2012, the risks are found to be insignificant and no concern is expected about the ship traffic regarding their maneuvering.

14.3.6 Expropriation and Resettlement

Rating impacts associated with Potential Displacement of Residents as a result of the proposed Project footprint and potential impacts related to proposed project activities as follows:

- The settlements within the proposed Project areas may be disrupted during the footprint requirement and Project and therefore expropriation of several numbers of lands may occur.
- The duration of the impacts associated with the potential displacement will be permanent even if the land is returned to its original state from the construction phase through to post closure. If the Project goes ahead without any mitigation, this impact will be inevitable. However, fully implementation of Resettlement and compensation process will reduce the vulnerability.
- Direct negative impact may arise from the result of displacement. People's attachment to their land related with the land tenure status, negotiations about the loss of land and discussions should be made in a diligent manner. Due to the proximity of the Project footprint to the near neighborhoods, security land tenure agreements should be applied.

It is important to conduct a comprehensive study to survey all income sources in order to calculate the income loss resulted from the Project land acquisition. Analysis should be made upon the identification of the households most at risks from the physical and economical displacement. According to the data gathered from the satellite view and the agricultural products statistics, it may be derived that there is no advanced agricultural production area in the vicinity. Even so, the residents may reluctant to change their land/households for resettlement purposes. Therefore, the client will engage a qualified specialist to carry out a consensus within a defined affected area, and prepare a Livelihood Restoration Plan where involuntary resettlement is unavoidable.

14.3.7 Fisheries and Aquaculture

There is a potential disturbance of the fishery boat operations due to the ship traffic and anchoring sites. The ships will not anchor other than this specified areas unless mandatory cases. Therefore, anchoring areas of the fishing boats of Tarlaagzi port is not going to be affected by the ship traffic and the potential impacts on the fishing grounds are expected to be of minor significance.

There will be no disturbance due to the ship traffic during the operation of the port. According to the Ministry Of Transport Maritime Affairs And Communications, the density of the fishing boats during the fishery season in the Tarlaagzi Fishing port is 65%. Unless the legal fishery has been conducted, it is hard to envisage the adverse impacts on the fishing activities due to the insufficient information on of the anchoring and fishing ground activities of the area. The Bartın province and Port authorities should be regulated these activities and set limits to avoid potential harms to fishing activities.

The port construction activities will result in the emergence of the suspended solids and the expansion of these materials to the marine system. Before the construction begins, an enrockment screening will be constructed in the Project boundaries so as to minimize the turbidity and shoaling of the sediment stemming from the construction activities. The wave movement paves the way for the expansion of the suspended solids into the sea by creating turbidity and thereby effecting the marine environment. Building a separator block may act as a filter mechanism before the expansion. During both the construction and operation phases of the Project, a temporal change may be seen on the quality of the sea water which is expected to be affected by the presence of suspended solid content. Nevertheless, it was stated that is not going to affect the fishing activities in the Project area.

14.3.8 Recreation and Tourism

Recently, tourism is an important contribution to residents' income in Amasra district. Therefore, potential negative impacts of construction and operation phase of coal mining together with the port operation on the tourism and recreation should be considered. The influence of the Project on the traffic density, visual appearance, construction of the port in the coastal area used for touristic purposes, bird watching activities of ecological researchers, outdoor sports activities, possible population increase due to in-migration are major issues which may cause a decrease in the number of tourists visiting the region. This would adversely affect the board housing business which is very common in Tarlaagzi village as well as in Amasra.

Moreover, Amasra has great scenery in terms of its coasts, historical structures, vegetation rich mountains and its nature. There are several observation points located in the mountains for touristic purposes. The construction and operation activities of both coal mine and the port will deface this scenery due to clearing of vegetation, large excavations, dust, and the presence of large-scale equipment, and vehicles. Additionally, transportation of the hard coal which is estimated to happen in every 5 min of interval may obstruct the roads to be used by tourists.

The impact is likely to occur during the Project life. People are dependent on income from tourism activities in Amasra district and may demonstrate high level of vulnerability if proper mitigations are not undertaken.

14.4 Mitigations

A range of options for mitigation of the potential adverse socio-economic effects is potentially available for the Project, including the types of measures outlined below. These will be considered during all phases of the Project.

- Operation of the coal mine, coal washing plant and port staff will be employed as locally as possible. They will be trained accordingly to enable employees to take advantage of the employment.
- Recruitment procedures will be in line with Project Owners Human Resources Policy that is to be developed for the Project. This will include the aim to provide opportunities for employment of local workforce to the extent possible considering unskilled, semi-skilled and skilled workforce.
- Coal mine and worker accommodation compounds built for Chinese workers will be located as such to minimize adverse effects on the existing population. The accommodation containers will provide housing conditions equipped with all applicable health and safety regulations and norms.
- Necessary appeals will be made to governmental authorities in order to provide the enhancement and improvement of health and education facilities in the region for the expected population increase.
- The Project will seek to maximize the benefits from the Project to local communities in terms of direct and indirect employment, and purchasing of local good and services during construction. This will include measures such as adopting local employment and purchasing policies to the extent possible establish tenders for procurement of subcontracted goods and services at a scale that local businesses can respond to and ensuring that the opportunities are advertised locally.
- Livelihood Restoration Plan will be prepared to ensure that affected persons and/or communities are provided in a transparent, consistent, and equitable manner. The provisions of Performance Standard 5 comprise of the vulnerable groups to make full compensation for the losses related with the Project. For this purpose, according to the Performance Standard 5 “Land Acquisition and Involuntary Resettlement- clause 8”, the client should consider feasible alternative project design to minimize the displacement accordingly.

- Transportation of the coal will comply with all applicable regulations and conditions stipulated in the relevant permit and will be accompanied by appropriate safety vehicles.
- Due to the practical and safety implications of visual impacts, the mitigation potential is limited. Nevertheless, plant area around the site will be fenced and progressive rehabilitation of all areas damaged during the operational phase will be implemented.
- Anchoring areas will be defined by the HEMA Port Authority in order to prevent the big vessels to hinder the fishing activities.
- To minimize/avoid potential impacts on fishery industry in the area, no direct discharges will be allowed during construction and operation phases into the marine environment and all other relevant mitigation measures set out in *Chapter 9: Marine Environment* will also apply.
- The contractor should be required to adhere to an Environment and Social Managament Plan. Measures to be incorporated into this plan in order to reduce or avoid socio-economic impacts are:
    - Inform local communities of major activities in advance;
    - Ensure all dangerous construction sites and areas used for mining-related activities are fenced off;
    - Ensure the construction sites and areas used for mining-related activities do not block the passage ways of any animal breeders;
    - The area impacted during construction will be limited and wherever possible, access to agricultural land will be restricted.
    - Improve quality of roads being used by the project.
    - Inform the local communities of employment and procurement opportunities to keep public sensitization alive throughout the both construction and project implementation stages;
    - Establish a grievance mechanism in order to resolve the complaints in a just, efficient and timely manner.
- The contractor should be required to adhere to policies and codes of conduct concerning employment and workforce behavior. Measures to be incorporated into these policies in order to reduce or avoid socio-economic impacts are:
    - Ensure that the workers camp and construction areas are open only to formal employees;
    - Develop and implement strict code of conduct for workers to regulate behavior in the local communities including road safety.

14.5 Residual Impacts

The local communities will be positively affected by the creation of job opportunities. There will be a demand for health and education facilities in the region with the expected increased population due to the job creation provided by the Project. Additionally, the proposed routes for the hard coal transportation will adversely affect the immediate environment unless “Traffic Management Plan” is implemented. These may result in a significant negative impact in the social environment of the

district unless the mitigation measures mentioned above are comprehensively applied during the lifetime of the Project.

15.0 COMMUNITY HEALTH AND SAFETY

15.1 Scope

This chapter provides an assessment of the Project activities that may impact the nearby communities and employees working in the coal mine, coal washing plant or the port during the construction and operation phases, and sets out the mitigation measures to avoid or minimize the risks together with the residual impacts that are foreseen to remain.

In accordance with the requirements of IFC PS4: Community Health, Safety and Security the following issues relevant to the Project were covered in this chapter:

- water use and quality,
- land subsidence,
- dust, noise and vibration,
- community health and wellbeing,
- emergency preparedness and response
- road traffic,
- vessel traffic and marine safety,
- visual impacts
- infrastructure and machine/equipment safety; and
- mine and port security requirements.

The main information sources that assisted the assessment study were as follows:

- IFC PS4: Community Health, Safety and Security
- IFC EHS Guidelines for Mining
- Mining, Minerals and Sustainable Development –Final Report of International Institute for Environment and Development
- UNEP's APELL Report for Mining
- Project information provided by HEMA (2014)
- Environmental Impact Assessment Report for HEMA Port (Reclamation Area and Quay) prepared by Dokay-ÇED Ltd. (April 2013),
- Project Introduction File for HEMA Coal Washing Plant prepared by Dokay-ÇED Ltd. (January 2014)
- Traffic Study conducted by Bogazici Proje Mühendislik Planlama Ltd. (2013)
- Information collected by ELC during field studies

The risk and impacts of the Project, in the context of health and safety of off-site communities, will be managed through a Community Health and Safety Management Plan to be developed and implemented by Hattat Enerji ve Maden Ticaret A.Ş. This plan will include measures to address the identified risks and ensure the disclosure of relevant Project-related information to enable the affected communities to understand the risks and impacts.

Additional management plans related to protection of community health and safety will be required including plans to prevent and respond to incidents and emergencies, as well as plans to protect the health, welfare and security of the community from any adverse effects related to

water use, land subsidence, generation of noise and dust, emergency cases, road and marine traffic, visual effects and security operations, as explained further below.

15.2 Impacts and Risks

15.2.1 Water Use and Quality

Management of water sources and pollution is a significant issue in and around mine sites. Alongside the potential contamination of water during the exploration stage and possible reduction of surface groundwater availability due to mining operations, indirect effects such as population increase may result in water scarcity. Therefore, adequate monitoring and management of water as well as the treatment of effluent streams including the stormwater run-off from the mine property are necessary actions to be taken by the mine operator. Details of the subject are discussed earlier in *Chapter 8: Material Resources and Waste Management* and *Chapter 9: Hydrology and Hydrogeology.*

Water Use

Mines can use large quantities of water, mostly in processing plants and related activities. Within the scope of the Project, two coal washing plants will be constructed to enrich the calorific value of the coal. During the operation of these plants, water will be reused in a closed-circuit washing system in order to minimize the water usage and prevent the formation of industrial wastewater.

Besides, significant amount of water will be used for drinking and domestic usage in the mine area. For this purpose, well water will be drawn and also sea water will be treated in order to minimize the impacts to natural systems and water users, and avoid depletion of aquifers.

Water Quality

Mine effluent streams discharged to the environment, including stormwater, process effluents and overall mine works drainage can be a serious problem which affects not only the mine area but also the surroundings. Therefore, the quality and quantity of the wastewater should be managed and treated to meet the applicable effluent discharge criteria defined by Turkish Water Pollution Control Regulation[1] and IFC General EHS Effluent Guidelines. In order to treat the domestic wastewater generated in the mine area including the construction and operation periods of coal washing plant and the port, an on-site package biological wastewater treatment plant will be installed.

15.2.2 Land Subsidence

A series of depressions are expected to occur across the landscape as a result of underground mining activities and this may leave the land prone to flooding and may otherwise damage property if the mining activities occur beneath the developed areas on the surface, as mentioned earlier in

[1] Water Pollution Control Regulation of Ministry of Environment and Urban Planning: Official Gazette Date/Number: 31.12.2004/25687

Chapter 6: Geology, Soils and Contaminated Land. A classification for impact significance of the land subsidence is given in Table 15-1.

Table 15-1: Classification for the Impact Significance of Land Subsidence

Impact Significance	Description
Negligible	Subsidence is so slight that there is no change in grade and impact on settlements and structures.
Minor	Minor changes in grade and insignificant impact on settlements and structures.
Moderate	Moderate changes in grade and medium (easily repairable) impact on settlements and structures which can be remedied without functionality loss in usage.
Major	Significant changes in grade and severe impact on settlements and structures which will require expropriation and resettlement due to functionality loss in usage.

In HEMA Amasra Hardcoal Production Project Report it is stated that, Bostanlar Village, Karayusuflar and Camlik Neighborhoods are located above East production field and 54-64 cm of subsidence was calculated for the region which may occur after 8-10 years. The impact significance of the subsidence is expected to be moderate for the aforementioned settlement areas. However, in case of a serious impact which significantly changes the grade and severely impact settlements and structures, necessary actions will be taken by HEMA.

In Southeast Block, production will be done 900 m deeper than settlements level. Therefore no major impacts due to subsidence are expected. As for West production field, there is no settlement above which constitutes a threat to the community.

15.2.3 Dust, Noise and Vibration

Impacts related to generation of air and noise emissions during construction and operation phase of the Project are detailed addressed in related chapter of this ESIA report (Chapter 10: *Air Quality* and *Chapter 11: Noise*). There will be dust and noise generation during construction activities including earth movements, operation of equipment, vehicle movements, coal transportation, construction of infrastructure and structures for both Port and coal mine activities.

Air dispersion modeling study was undertaken to estimate the air quality impacts associated with the Project activities. The air modelling study indicated that PM_{10} and PM dispersion values are complied with the limits set by the Industrial Source of Air Pollution Control Regulation (IAPCR). It is allowed on IAPCR that PM_{10} emissions can exceed limit values more than 35 times during one year period. According to modelling study, Project emissions exceed limit value 29 times and it complies with the IAPCR. In addition to the above mentioned source, ventilation fans will be the most important source and there will be CO emissions from ventilation fans. According to the conducted modelling study, CO emission is also found conformity with the associated set by the national legislations. Additionally, Transport of coal outside the Project area will result in emissions which may have the potential to affect the ambient air quality. However, transportation will be temporary until the HEMA port enters into service, it is considered that the impacts will be of minor to moderate significance.

There will be impacts related to noise emissions during construction and operation phase of the Project activities. Main noise sources during construction activities are construction machinery and equipment during excavation and construction works, mainly related to the port whereas ventilation system and road traffic from coal transportation during operation phase. The noise modelling study indicated that IFC noise limit values will be exceeded at Tarlaagzi and Gomu Village during night time and during coal transportation. Additionally, according to the baseline data and modelling results, the noise emissions from Shaft-3 (ventilation shaft) is expected to result in an increase of background noise level of Amasra.

HEMA will undertake deemed appropriate mitigation measures to reduce the amount of noise and air emissions. Necessary mitigation measures will be taken through good construction site practices, Air Quality Control and Monitoring Plan and Noise Control and Monitoring Plan and mitigations measures as mentioned in the relevant chapters.

15.2.4 Community Health and Wellbeing

Community health issues with respect to the construction and operation of the mine and the port include communicable diseases associated with the mining activities and the influx of temporary (port and coal washing plant construction) and permanent (mine, port and coal washing plant operation) labor.

The workforce currently employed for the construction of the mines is 790 people and appropriate pre-fabricated facilities are provided to those employees who need onsite accommodation. Therefore, risks associated with influx of workforce, such as introduction of diseases or anti-social behavior affecting local communities are not anticipated.

On the other hand, during the envisaged project operation period of 18 years, labor requirement was determined to be 2,178 people. Hattat Enerji ve Maden Ticaret A.Ş. intends to recruit this workforce locally to the extent possible and provide appropriate on-site pre-fabricated facilities to those employees who need accommodation. Nevertheless, a certain number of in-migration to the region is inevitable and with this influx of newcomers, relatively isolated communities may be particularly vulnerable to infectious and chronic diseases.

The environmental and socio-economic changes resulted from the mining activities can lead to an increase in the level of infectious diseases. For instance, pressure on the water resources may occur for the processes used during mining activities as well as the domestic use of the mine employees at the expense of local community's sanitation systems and access to clean drinking water. This may result in spreading of water borne bacterial diseases. Creation or removal of habitats where disease carrying insects can flourish may also occur through the creation of wastewater pits or wild landfilling which negatively affect the community health.

In-migration of large group of workers can also lead to the introduction of new infections to remote areas where the community has little or no natural immunity to them in the region. Other than that, influx of new people, living away from their families may also result in an increased risk of sexually transmitted infections such as HIV/AIDS, gonorrhea and chlamydia.

Hazardous substances generated during the mining projects and wastes in water, air, and soil can have serious, negative impacts on public health. Because of the quantity, concentration, or physical, chemical or infectious characteristics, hazardous substances may pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed. However, HEMA stated that hazardous wastes will be separately collected and will be sent to licensed recycling and disposal facilities according to the provisions stated in Hazardous Waste Control Regulation[1]. As a result of this, the risk associated with the hazardous waste is low due to the fact that hazardous waste collection, transport and disposal are common practice that is well regulated by MEUP.

Alteration of the social characteristic of the region due to in-migration may also indirectly affect the injury rates; the influx of large groups of male workers may occasionally cause social disturbance, namely violence or sexual assault. New people coming to the region can further affect the harmony of local communities especially if separate ethnic groups or nationalities are of matter. Alongside the increase in the population, capacity of the local police, fire and other related services to deal with incidents may stretch due to the Project. Other than that, community tensions can arise if there is conflict between those who support and those who oppose the project particularly for the ones face involuntary resettlement or have concerns about lack of job security.

As described in *Chapter 14: Socio-economy*, Amasra does not have a general hospital but instead there are four family health care centers. This Project will also place additional pressures on local health, social care and public services (including emergency services) due to increase in local population. Therefore an enhanced health and public care center seems essential for the region.

15.2.5 Emergency Preparedness and Response

Emergencies can create a variety of hazards -such as tailings/hazardous substance spill or subsidence of active mine workings- for workers and the community around a mining area. Preparing before an emergency incident plays a vital role in ensuring that the community knows the hazards to be aware of and how to keep themselves safe when an emergency occurs. For this purpose, an Emergency Action Plan was prepared by the HEMA; however, the existing plan provided was reviewed and it was deemed to require more detail to be in line with UNEP APELL Report for Mining: Awareness and Preparedness for Emergencies at the Local Level [2] (The report provides a framework for preparation of an Emergency Response Plan involving the mine, emergency response agencies, local authorities and communities). A new Emergency Response Plan should be prepared in accordance with the guidance of APELL Technical Report.

15.2.6 Road Traffic

According to the statement of the company, coal extraction from the shafts is proposed to be initiated as of mid-2016 and the construction of the port will be finished by the beginning of 2017. In the meantime, the coal will be transported to Bartın Cement Plant via land route. For the

[1] Official Gazette Date/Number: 14.03.2005/25755
[2] APELL for Mining, Awareness and Preparedness for Emergencies at Local Level, Technical Report No.41, UNEP 2001.

transportation the following access roads will be used, respectively; Gomu-Tarlaagzi Village Road, Amasra-Bartın Road, Bartın-Ankara State Road (D010). As mentioned earlier in *Chapter 12: Road Transportation* and *Chapter 14: Socio-Economy*, it was projected that loaded trucks may be passed at maximum 5 min of intervals during the 18 hour period (from 06:00 to 24:00). Additionally, the Project will have employee shuttle bus services that will contribute to the local traffic density. There will be four shifts per day and number of shuttles per shift is proposed to vary by years.

There are about 80 to 85 children using the Gomu-Tarlaagazi Village Road and Amasra District Center for school service transportation and in relation to the forestry activities in the region, timber trucks frequently use this road to access Amasra-Bartın Road. Due to its physical conditions, concurrent transportation is not possible at several locations of the Gomu-Tarlaagzi Village Road and some parts are challenging for heavy trucks due to the slope instability. According to the data obtained during the site visits, there are more than 100 households located within the 50-meters band along the road which are most likely to be disturbed during the coal transportation. Therefore, potential ongoing noise and safety issues due to road traffic during the operation of coal mining and port activities may even give rise to a severe disturbance in case of an incident.

According to the official letter 15th of Regional Directorate of General Directorate of Highways (Ministry of Transport, Maritime Affairs and Communications) dated 10.05.2012, a minimum of two million tonnes of coal can be transported using the existing roads annually and the capacity of present road network can satisfy the transportation of produced coal until operation of the port. Within the scope of the Project, a transportation assessment study was undertaken by Bogazici Proje Muhendislik Planlama Ltd. (Bogazici) to manage the traffic impacts and the results were presented in the report titled "Transportation Survey and Evaluation Study for Amasra HEMA Coal Mines" dated June 2013. This study also involves development of a Traffic Management Plan for the Project including necessary precautions to avoid a critical incident related to road traffic.

15.2.7 Vessel Traffic and Marine Safety

With the construction of the port, maritime traffic will be an issue which may pose risks to the community as a result of vessel collisions, fires and other accidents. Such incidents may result in spills and discharges that might spread, affecting marine life and disturbing recreational activities in Amasra.

A Maneuvering Simulation Report was prepared to assess the possible risks due to maritime traffic. The number of bulk transport vessel that will be berthed the Hema Port is stated not to be more than two in a week. Therefore, four different scenarios were built which are:

- Scenario 1: A dry cargo vessel berthing while a ro-ro ship is at anchor;
- Scenario 2: A dry cargo vessel leaving the port while a ro-ro ship is at anchor;
- Scenario 3: A ro-ro ship berthing while a dry cargo vessel is at anchor;
- Scenario 4: A dry cargo vessel leaving the port while a ro-ro ship is at anchor.

The risk of an incident is assessed with the degree of risks and the acceptability criteria shown in Table 15-2. According to the criteria, the risk of an unacceptable incident is none during the maneuverings of two vessels in the port when considered the risk ratios of the built scenarios given in Table 15-3.

Table 15-2: Degree of Risk and Acceptability Criteria

Degree of Risk	Acceptability Criteria
Negligible	Acceptable
Marginal	
Critical	Unacceptable
Catastrophic	

Table 15-3: Degree of Risk and Acceptability Criteria

Simulation Number (SN)	Negligible Risk (%)	Marginal Risk (%)	Critical Risk (%)	Catastrophic Risk (%)
SN-1	37	63	0	0
SN-2	100	0	0	0
SN-3	49	51	0	0
SN-4	100	0	0	0

Additionally, Turkey is a signatory to the Bucharest Convention on the Protection of the Black Sea Against Pollution (1992). Therefore, in the context of protection of marine environment a Risk Assessment and Emergency Response Plan (RAERP) should be prepared for the port that identifies procedures and actions to be applied in case of an emergency according to the intervention levels to be determined based on the risk assessment study. As for the risk assessment, risks associated with marine accidents including fires, vessel collisions, sinkage and explosions should be identified.

15.2.8 Visual Impacts

The Project site has a moderate to high visual quality, especially with its shoreline, which is dense in natural vegetation and low level of demographic development. According to the IFC Performance Standard given for Environmental, Health and Safety Guidelines for Ports, Harbors, and Terminals, permanent and temporary installations and ships can result in visual changes to the landscape.

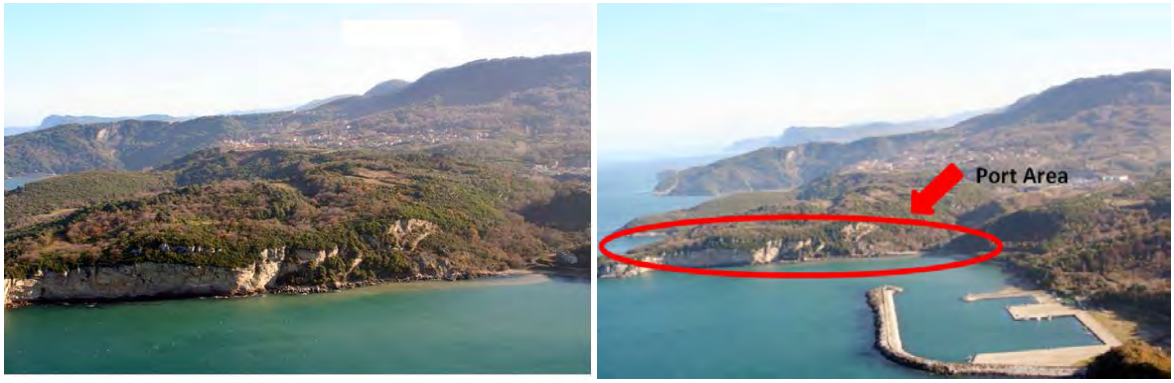


Photo 1. Visuals of both project site and port area

A letter of the Ministry of Environment and Urban Planning dated 8 April 2013 states that Bartın Provincial Directorate of Environment and Urban Planning should evaluate Bartın Province Local Environment Board's decision dated 25 August 2011 regarding "prohibition of any mining activities within a distance of 400 m from the shoreline towards inland within visible distance". Therefore, HEMA had it confirmed with the official letter of Ministry of Energy and Natural Resources numbered 350141 and dated 16.01.2014 that the port construction is exluded from the minig activities by Regulation on Mining Activities Implementation Regulation (Official Gazzette Date/Number 06.11.2010/27751).

The port is planned to be built on an area of 163,000 m^2 and it involves reclamation works and construction of a breakwater, a quay structure and storage yards. Transfer of coal to the port from Shaft 1 will be undertaken by conveyor belt system (2000 tonnes/h). Two units of 1000-tonnes/h capacity rail quay cranes will be used for dry bulk handling at the port. Additionally, a concrete rail beam will be installed between two stocking yards. It is estimated that, there will be a maximum of two ships maneuvering at the same time within the port and they will be served at most twice in a week after the completion of port construction activity.

During the port construction activities, slope protection will be applied in order to provide a complete stabilization against risks to landslides. Upon the completion of slope protection area, the surface of the berms will be filled with topsoil to preserve natural pattern. Correspondingly, the company ensures that the vegetation and restoration work will commence applying by appropriate seeding and planting practices to the area.

One of the significant issues related with the visual impacts are the night illumination and scenery impacts depending on its proximity to sensitive land usages such as residential or tourist areas (e.g. observations points also exist on the road transportation route). Apart from this, excessive illumination may result in the changes in flight paths and bird breeding patterns. Other than that, there exist some landscape observation points (mainly used by tourists) across the coal transportation route. The passage of the vehicle in every 5 min interval in front of the observation points may be nettlesome for both residents and tourists. HEMA stated that the road transportation of coal will end up when the port comes into operation.

As a result, the proposed Project will negatively impact the visual environment, although the significance of the impact will be moderate to low if the precautions will be applied.

15.2.9 Infrastructure and Equipment Safety

The risk of structural failure will increase in case of a natural hazard such as earthquakes and floods. The Project area lies within the 1st degree seismic zone. The related information regarding Seismic Zone Degree of the Bartın Province is mentioned earlier in *Chapter 6 Geology, Soils and Contaminated Land*.

Necessary criteria (e.g. appropriate standards, regulations etc.) will be taken into account in the design of the facilities to address seismic risks according to the design parameters. However, significant impacts on the community and workers' health and safety may arise from spills, fire, etc. related to seismic incident. During the construction Works, HEMA will comply the following regulations to prevent risk of structural failures and minimize the occurrence of incidents;

- Regulation on Buildings to be Constructed in Seismic Zones (Official Gazette date/no: 06.03.2007/26454)
- Technical Regulation on Seismic Design of Coastal Structures, Ports, Railways, Airports (Official Gazette date/no: 18.08.2007/26617).

15.2.10 Mine and Port Security Requirements

HEMA port will not be complied International Ships and Port Facilities Security (ISPS) code and the scope of the Solas agreement (1974) since no international transportation is envisaged for the port. Four security staff is going to work during the port operation.

In mine sites, qualified security personnel should exist to control transport, storage and use of explosives on site. During the construction phases of the project, there will exist a security personnel in order to minimize the risk of an incident and to be prepared in case of an emergency, in all units of the facility. According to the Turkish Mining Law No. 3213[1] and pursuant to the Article 29 "All mining activities shall be stopped in case of determination of dangerous conditions that risks security of life and property".

15.3 Mitigation Measures

The potential risks and impacts to the community shall be managed appropriately during the lifetime of the Project through the following measures:

- Adequate monitoring and management of water resources used by the operations as well as the treatment of effluent streams including the stormwater run-off from the mine property will be applied.
- Water will be reused through a closed-circuit washing system to minimize the water usage and prevent the formation of industrial wastewater in the coal washing plant.
- Wastewater treatment plant will be operated to ensure that the quality and quantity of the wastewater meets the applicable effluent discharge criteria defined by Turkish Water Pollution Control Regulation and IFC General EHS Effluent Guidelines.

[1] Official Gazette date/number: 15.06.1985/18785

- Construction and operation activities will be planned in a way considering the nearby communities and noise generating activities will not be undertaken during night time. A Noise Control and Monitoring Plan will be prepared and implemented.
- The risks and impacts of the Project, in the context of communication and social management practices with local community will be managed through a Social Management Plan; including Stakeholder Engagement, Human Resources and Employment, Land Use Management to be developed and implemented by HEMA.
- An Emergency Preparedness and Response Plan to be prepared in accordance with the guidance of APELL Technical Report.
- Necessary appeals will be made to governmental authorities in order to provide the enhancement and improvement of health facilities in the region for the expected population increase. Close partnership with local health, social care and NGO welfare services in order to develop a plan to manage demand, enhance service capacity (medical supplies, equipment and personnel), and develop and implement preventative public health measures.
- All relevant health and safety regulations will be followed during the development and operation of the Project in order to minimize accidents that may have impacts on the community and to control potential Project related releases and/or emissions.
- Any adverse risks and impacts will be disclosed to the community and engagement with affected communities and agencies will be ensured by HEMA.
- Good communication and working in partnership with local communities and the local police alongside good training of Project staff to ensure crime and safety issues are prevented from happening.
- A grievance management system will be in place that will enable the community to raise concerns during the lifetime of the Project.
- HEMA will attempt to minimize transmission of communicable diseases that may be associated with the influx of temporary or permanent Project labor.
- A Traffic Management Plan will be implemented to manage the internal and external traffic for the coal transportation that will take into account vehicular traffic, emergency conditions, pedestrian traffic entering, exiting and internal traffic.
- Maritime traffic will be managed to effectively identify and correct unsafe conditions. This safety issues should include procedures to regulate the safe movement of vessels within the harbor (including pilotage procedures), protect the general public from dangers arising from marine activities at the harbor, and prevent events that may result in injury to workers, the public, or the environment.
- The vegetation and restoration work will commence in the Project area, considering the slope stability issues. Also, the color of the structures in the facilities will be selected to mitigate the adverse visual impacts caused by the landscape alteration.

15.4 Residual Impacts

Assuming the mentioned mitigation measures stated above and in all chapters of the ESIA are fully implemented in a diligent manner, the associated risks on community health and safety will be minimized and the related residual impacts will be minor unless an unexpected incident occurs.

16.0 LABOR AND WORKING CONDITIONS

16.1 Scope

This chapter will describe how labor and working conditions will be managed for the Project and the requirements of IFC Performance Standard 2: Labor and Working Conditions (PS2) will be discussed. This chapter will address the following issues:

- Legal &Policy Context
- General Condition of Service
- Non Discrimination
- Retrenchment
- Grievance Mechanism
- Child Labor & Forced Labor
- Health & Safety
- Supply Chains

The assessment is based on the review of the following standards and documents:

- IFC PS2: Labor and Working Conditions
- IFC EHS General Guidelines
- IFC EHS Guidelines for Ports, Harbors and Terminals
- IFC EHS Guidelines for Mining
- International Labor Organization (ILO) Fundamental Conventions
- Turkish Labor, Health and Safety Legislation
- Human Resources (HR) Policy and Core Values and Principles of Hattat Enerji ve Maden Ticaret A.Ş. (hereby referred as HEMA)
- Social-Labor Audit (SLA) of Chinese Contractor for HEMA Amasra Hardcoal Project in Bartin, Amasra by ERM GmbH, Final Report, December 19, 2011. SLA was conducted by 3-person team from ERM Ltd. The work conducted by ERM in 2011 was reviewed by ELC personnel in February 2015 by comparing the actual working conditions of Chinese workers with the applicable Turkish labor laws and IFC PS2: Labor and Working Conditions, along with IFC Labor Toolkit, 2008 and IFC-EBRD Guidance on Worker's Accommodation Processes and Standards, 2009. The report is included in Annex N-2.
- Health And Safety Assessment and Social – Labor Audit Follow-Up for HEMA Amasra Hardcoal Project in Bartin, Amasra, Final Report, March, 2015 (conducted by independent experts between 17-19 February, 2015).

  SLA and HSA were performed to understand the current situation regarding labor and working conditions of Chinese workers in the Project and to identify social and labor issues and risks associated with the Project and audit report is presented in Annex N-1.

HEMA is responsible for the labor and working conditions depicted in this chapter for their own personnel and sub-contracted workers in addition to personnel providing support services during the construction and operation phase of Project components.

16.2 Legal and Policy Context

16.2.1 IFC PS2: Labor and Working Conditions

IFC PS2 sets out policies and standards of international good practice related to labor and working conditions. The objectives of the Performance Standard are:

- To establish, maintain and improve the worker-management relationship
- To promote the fair treatment, indiscrimination and equal opportunity of workers, and compliance with national labor and employment laws
- To protect the workforce by addressing child labor and forced labor
- To promote safe and healthy working conditions, and to protect and promote the health of workers.

The PS2 sets out several requirements as summarized in Table 16-1.

Table 16-1: Requirements under IFC PS2

PS2 Provisions	Summary of the Requirements
Working Conditions and Management of Working Relationship	
Human Resources (HR)Policy	Client to adopt a HR policy that is consistent with this PS. Under the policy, the client will inform employees of their rights. It will be clear, and will be made available at start of employment.
Working Relationship	Working conditions and terms of employment will be clearly documented and communicated to employees and contracted workers.
Working Conditions and Terms of Employment	If the client is a party to a collective bargaining agreement, the terms of the agreement will be respected. Where not, working conditions and terms of employment will at least comply with national law.
Worker's Organizations	Where national law recognizes worker's rights to associate and bargain collectively, the client will comply with the national law. Where the law is restrictive, the client will enable alternative means of expression, including a mechanism for grievances.
Non-Discrimination and Equal Opportunity	The employment relationship will be based on the principle of equal opportunity and fair treatment, and will not discriminate with respect to hiring, compensation, working conditions and terms of employment, access to training, promotion, termination of employment or retirement and discipline.
Retrenchment	The client will develop a plan to mitigate the adverse impacts of retrenchment, if layoff is expected to be significant.
Grievance Mechanism	The client will provide a grievance mechanism for workers, inform the workers about the mechanism at the time of hire and make it easily accessible to them. The mechanism should be transparent and well understood, and should address concerns promptly at an appropriate level of management. The mechanism should not impede access to other judicial or administrative remedies that might be available under law or through existing arbitration procedures, or substitute for grievance mechanisms provided through collective agreements.
Protecting the Work Force	
Child Labor	The client will not employ children in a manner that is exploitative, is likely to be hazardous, or to interfere with child's education, or to be harmful to child's health or development. The client will follow national laws as applicable, but children below the age of 18 will not be employed in dangerous work.
Forced Labor	The client will not employ forced labor, which consists of any work or service not voluntarily performed that is exacted from an individual under threat of force or

PS2 Provisions	Summary of the Requirements
	penalty. This covers any kind of involuntary or compulsory labor, such as indentured labor, bonded labor or similar labor-contracting arrangements.
Occupational Health and Safety	
Health and Safety	The client will provide the workers with a safe and healthy work environment, taking into account inherent risks and hazards. Steps will be taken to prevent accidents, injury and disease arising from, associated with or occurring in the course of work by minimizing the causes of hazards as far as practicable. In line with good international industry practice, the client will address identification of hazards; provision of preventative and protective measures; training of workers; documentation and reporting of accidents, diseases and incidents; and emergency prevention, preparedness and response arrangements.
Non-Employee Workers and Supply Chain	
Non-Employee Workers	The client will use commercially reasonable efforts to apply the requirements of PS2 to non-employee workers directly contracted, except for provisions under HR Policy, Retrenchment, and Supply Chain.
Supply Chain	The client will address child labor and forced labor in its supply chain consistent with the provision under Child Labor and Forced Labor.

16.2.2 International Labor Organization (ILO) Fundamental Conventions

IFC PS2 is in part guided by a number of ILO Conventions, and PS2 requires complying with four core labor standards of ILO including child labor, forced labor, non-discrimination and freedom of association and collective bargaining. Furthermore, ILO has identified eight conventions as "fundamental (or core)", covering subjects that are considered as fundamental principles and rights at work. These fundamental conventions are presented in Table 16-2, all of which are ratified by Turkey. HEMA will comply with the requirements of these conventions during the construction and operation phases of the Project components.

Table 16-2: ILO Fundamental Conventions

Convention Name	Key Provisions
C29: Forced Labor (Ratification by Turkey: 1998)	• Forced or compulsory labor not permitted, except under very specific circumstances • Existing practices to be suppressed in the shortest possible time • Regulated by governments that are signatories to the convention
C 87: Freedom of Association and Protection of the Right to Organize (Ratification by Turkey: 1993)	• Workers and employers have the right to establish and join organizations of their choice, subject to the rules of the organization concerned • Regulated by governments that are signatories to the convention
C98: Right to Organize and Collective Bargaining (Ratification by Turkey: 1952)	• Workers to be protected against anti-union discrimination in the workplace • Worker's and employer's organizations to be protected from acts of interference • Regulated by governments that are signatories to the convention
C 100: Equal Remuneration (Ratification by Turkey: 1967)	• Men and women to receive equal remuneration for work of equal value, consistent with the provisions of the applicable remuneration methods. • Regulated by governments that are signatories to the convention
C 105: Abolition of Forced Labor (Ratification by Turkey: 1961)	• Forced labor not to be used for political ends, for economic gain, as a form of discipline or punishment, or in the context of discrimination. • Regulated by governments that are signatories to the convention

Convention Name	Key Provisions
C111: Discrimination (Ratification by Turkey: 1967)	• Equal opportunity in respect of employment and opportunity to be pursued in a manner appropriate to national practice, • Discrimination based on race, color, sex, religion, political opinion, nationality not permitted. • Exclusion or preference in respect of the requirements of a specific job is not discrimination • Regulated by governments that are signatories to the convention
C138: Minimum Age (Ratification by Turkey: 1998)	• Child labor to be progressively abolished where it is still practiced • Signatories to determine a locally appropriate minimum age, not less than 15 years or 14 in specific circumstances • Regulated by governments that are signatories to the convention
C182: Worst Forms of Child Labor (Ratification by Turkey: 2001)	• Elimination of child exploitation through slavery, prostitution, pornography, illicit services or work which is harmful to health, morals or safety • Regulated by governments that are signatories to the convention

16.2.3 Turkish Health and Safety Regulations

IFC PS2 requires complying with the national laws and regulations that are applicable to projects with regard to labor and working conditions. An Environmental, Health, Safety and Social (EHSS) legislation review has been undertaken as part of the ESIA study (see Annex C) including review of the Turkish Labor Law and Occupational Health and Safety Legislation as listed below:

- Labor Law (State Gazette Date/Number: 10.6.2003/25134)
- Regulation on the Minimum Wage (State Gazette Date/Number: 01.08. 2004/25540)
- Worker Health and Occupational Safety Bylaw (State Gazette Date/ Number:11.01.1974/14765)
- Occupational Health and Safety Regulation(State Gazette Date/ Number: 09.12.2003/25311)
- Regulation on Health and Safety at Construction Sites(State Gazette Date/Number: 23.12.2003/25325
- By-law on Worker Health and Occupational Safety in Construction Works (State Gazette Date/Number: 12.09.1974/15004)
- Heavy and Dangerous Works Regulation(State Gazette Date/Number: 16.6.2004/25494)
- Communique on Occupational Trainings of Workers who will be employed at heavy and dangerous works(State Gazette Date/Number: 31.05.2009/27244)
- Regulation on Works that are regarded as Industrial, Commercial, Agricultural and Forestry (State Gazette Date/Number: 03.09.2008/26986)
- Communique on Danger Class Lists Related to Occupational Health and Safety (State Gazette Date/Number: 25.11.2009/27417)
- Regulation on the provisions of occupational health and safety training of employees(State Gazette Date/Number: 07.04.2004/25426)
- Regulation on the Use of Personal Protective Equipment in Workplaces (State Gazette Date/Number: 11.2.2004/25370)

- Regulation on Health and Safety Requirements in the Use of Work Equipment(State Gazette Date/Number: 11.2.2004/25370)
- Regulation on Safety and Health Signs(State Gazette Date/Number: 23.12.2003/25325)
- Regulation on Machine Safeguards(State Gazette Date/Number: 17.05.1983/18050)
- Regulation on the Health and Safety Measures at working with Asbestos(State Gazette Date/Number: 26.12.2003/25328)
- Regulation on Occupational Health and Safety Boards (State Gazette Date/Number: 07.04.2004/25426)
- Regulation on Occupational Health and Safety Services (State Gazette Date/Number: 27.11.2010/27768)
- Regulation on Duties, Authority, Responsibilities and Trainings of Workplace Doctors (State Gazette Date/Number: 27.11.2010/27768)
- Regulation on Duties, Authority, Responsibilities and Trainings of Occupational Safety Specialists (State Gazette Date/Number: 27.11.2010/27768)
- First Aid Regulation (State Gazette Date/Number: 22.05.2002/24762)
- Noise Regulation (State Gazette: 23.12.2003, No: 25325)
- Vibration Regulation(State Gazette: 23.12.2003, No: 25325)
- Regulation on Manual Handling (State Gazette Date/Number: 11.02.2004/25370)
- Regulation on Health and Safety Measures in works with Chemical Substances (State Gazette Date/Number: 26.12.2003/25328)
- Regulation on Protection of Workers from Dangers of Explosive Environments (State Gazette Date/Number: 26.12.2003/25328)
- Regulation on Work Durations in Relation with the Labor Law (State Gazette Date/Number: 06.04.2004/25425)
- Regulation on Excess Work and Working in Excess Periods (State Gazette Date/Number: 06.04.2004/25425)
- Regulation on Occupational Health and Safety in Temporary or Fixed Term Employment (State Gazette Date/Number: 15.05.2004/25463)
- Regulation on Special Principles in Works Carried-out by Employing Workers in Shifts (State Gazette Date/Number: 07.04.2004/ 25426)

16.2.4 Human Resources (HR) Policy of HEMA

HEMA has a written HR Policy which aims to increase the productivity and motivation of the employees, adoption of the corporate culture by all employees, establishing an effective in-house communication environment, solidarity and cooperation between units and individuals. The Company manages labor and social activities on site with written procedures, policy and designated Human Resources (located in the head office in Istanbul) who coordinate centrally with the Deputy General Manager.

HEMA will review and communicate the existing HR Policy as part of the Environmental and Social Management System (ESMS) which will be an Integrated Management System that will cover environmental, health and safety and social issues for the construction and operation phases.

HEMA will fulfill the requirements of IFC PS2 and Equator Principles (EPII) by adopting and implementing an HR policy appropriate to its size and workforce during the construction and operation phases of the Project components.

16.3 General Condition of Service

16.3.1 Employment Contract

PS2 requires documenting and communicating to all employees their working conditions and terms of employment, including their entitlement to wages and any benefits. According to Turkish Labor Law, the employer is required to have a written contract with the employees for employment with duration of one year or more. In cases when a written contract is not made, the employer is under obligation to provide the employee with a written document, within two months at the latest, showing the general and special conditions of work, the daily or weekly working time, the basic wage and any wage supplements, the time intervals for remuneration, the duration (if it is a fixed term contract), and conditions concerning the termination of the contract.

HEMA provided a copy of the written contract with the selected sub-contractor (i.e. Qitaihe Long Coal Mining Co. Ltd.) signed in April 2014 complying with the requirements of the Turkish Labor Law. Currently, 188 employees from the sub-contractor are working on the Site.

For the construction phase, HEMA has also cooperated with the Chinese CHINA COAL No:1 firm and employed foreign employee for installation of the 3 mine shafts. During these works, experienced Chinese mine technicians and workers have been employed (currently 35 employees of China Coal No:1) and will continue to be employed in future works. Additionally, for driving the galleries, contracts have been signed with Denfa Construction Installation Mining Industry and Trade Co. Ltd. and MAK PRO Steal Construction, whose 122 and 9 personnel currently serve the Project, respectively. TEM Security provides security service to the Project by 16 security guards. Contract conditions of these indirect payroll workers comply with legal requirements.

It was reported during the recent Social-Labor Audit that construction works of project components are carried out with a total number of 486 employees including on-site 370 subcontractor staff on-site. The characteristics of the workforce can be summarized as follows:

- Grand total of 486 employees comprised of 100 white collar/non-union and 386 blue collar/union employees,
- 26 women including administrative staff,
- No ex-prisoners,
- 7 disabled personnel for cleaning services,
- Varying number of interns hired on a temporary basis from trade high schools, industrial vocational schools and universities,
- No part-time employees.

The turnover on permanent employment at the Site was reported as 15% in 2014.

The number of workers to be employed for the operation of the west block shallow coal mining is 385 and 979 for 2013 and 2022, respectively; and that of the underground mining operation are 956, 1745 and 2178 for 2016, 2025 and 2032, respectively.

Reportedly, HEMA applied for employment permits for 235 Chinese technicians and miners of QITAIHE LONG COAL and CHINA COAL No:1 in accordance with the provisions of Work Permits for Foreigners stated in the Law# 4817. The permits were approved and they are valid for one year.

16.3.2 Working Hours

As stated in the Regulation on Work Duration Related to Labor Law, the maximum working duration is forty-five (45) hours a week, and the daily working duration for above-ground working activities cannot exceed eleven (11) hours in any case. Regarding working hours and conditions, HEMA will comply with the Turkish laws and regulations.

ELC understands during the audit that the office employees work five (5) days, from Monday to Friday between 8:00-17:30. The union employees work six (6) days (45 hours per week) in 3 shifts in the mine and maintenance employees work five (5) days (45 hours per week). The working hours in each department are summarized below:

Reportedly, intern students from trade high schools work 3 days per week during fall and winter periods and intern students from industrial vocational schools work 5 days per week (from 08:00 to 17:30) and interns from universities work 5 days per week during summer period (from 08:00 to 17:30).

In addition, According to Regulation on Excess Work and Work in Excess Periods, excess work is defined as “those works that exceed forty-five (45) hours a week”, and work in excess periods is defined as “those works that lasts less than forty-five (45) hours a week according to a contract and becomes forty-five (45) hours a week when the work exceeds the working period set in the contract.”

Pursuant to Article 4 of the subject regulation, the wage for each hour of the excess work is paid by increasing the hourly wage of normal working condition by 50%, and the wage for each hour of the work in excess periods is paid by increasing the hourly wage of normal working condition by 25%.

For Turkish miners, the maximum number of overtime hours that employees can work is fifteen (15) hours per week. Reportedly, the overtime is paid as addition to the monthly salaries of the employees. Students do not work overtime as per relevant regulation. HEMA will continue to ensure to communicate to all employees and workers the working durations including the conditions and wages related to excess works, as appropriate.

16.3.3 Accommodation

HEMA manages workers’ accommodation and provide basic services to workers in line with the provisions of PS2 and also follow the guidance note on worker’s accommodation published by IFC and EBRD (Worker’s Accommodation: Processes and Standards). During the construction and

operation phases, HEMA provides appropriate pre-fabricated facilities to Chinese sub-contractor employees who need on-site accommodation. Workers' accommodation arrangements will not restrict workers' freedom of movement or of association.

According to the Guidance Note by IFC and Equator Principles, giving special attention to the following issues[1] with regard to housing is expected:

- Minimum space allocated per person (floor area; cubic volume; or size and number of rooms),
- Supply of safe water in the workers' dwelling in such quantities as to provide for all personal and household uses,
- Adequate sewage and garbage disposal systems,
- Appropriate protection against heat, cold, damp, noise, fire, and disease-carrying animals, and, in particular, insects,
- Adequate sanitary and washing facilities, ventilation, cooking and storage facilities and natural and artificial lighting,
- A minimum degree of privacy both between individual persons within the household and for the members of the household against undue disturbance by external factors.

Detailed regulatory and best practice application (including current status of the accommodation) review is provided in Health and Safety Assessment and Social – Labor Audit Follow – Up Report for HEMA Amasra Hardcoal Project, Bartin/Turkey dated 21.03.2015, Annex B, No.18.

16.4 Non-Discrimination

HEMA strictly prohibits discrimination against any employee or applicant for employment because of the individual's race, color, religion, gender, sexual orientation, gender identity or expression, national origin, age, disability, veteran's status or any other characteristic protected by law.

Turkish Labor Law forbids discrimination due to race, language, gender, political views and opinion and religion. In accordance with the equal treatment principle covered in Article 5 of the Turkish Labor Law# 4587, employers should treat part time workers with the same rights as full time workers and indefinite period workers to definite period workers unless there are genuine reasons for not doing so. As HEMA will comply with the Turkish Labor Law and will base the employment relationships on the principle of equal opportunity and fair treatment, the Turkish standards will fulfill the requirements of PS2 and PR2 with regard to avoiding non-discrimination.

16.5 Grievance Mechanism

IFC PS2 requires providing a grievance mechanism for workers (and their organizations, where they exist) to raise reasonable workplace concerns. Grievance mechanism should be documented, publicized and made easily accessible. The employees should be informed of the mechanism and procedures at the time of hire. As a best practice, options of anonymous grievance mechanism should be established to encourage concerns to be raised freely. The grievances can be raised

[1] ILO Workers' Housing Recommendation 115

anonymously and reviewed in one week interval followed by initiation corrective action within two days for grievances with high importance.

During the Site audit, it was reported that sub-contractors QITAIHE LONG COAL and CHINA COAL No:1 do not have a written grievance policy and procedure. Limited grievance mechanism being implemented is provided to the sub-contractor employees (via translator) and it is not published to all workers at the construction sites of HEMA. Reportedly, employees have freedom to forward any complaints to their immediate supervisors, or to send an anonymous e-mail/mail to the head offices of sub-contractor companies in China.

HEMA should develop a written grievance mechanism to ensure confidentiality and physical protection of complaints. Grievances of employees related to environment, health and safety issues should be handled according to the Communication Procedure to be produced by HEMA and the employees to be informed about the grievance mechanism at the time of employment. Grievance mechanism should be prepared in both Turkish and English languages and to be easily accessible by the personnel.

16.6 Child Labor and Forced Labor

Turkish Labor sets provisions related to child labor and forced labor. According to Turkish Labor Law, it is forbidden to employ children under the age of fifteen (15). Children and young employees under the age of eighteen (18) must not be employed in industrial work during the night. Young employees who have not reached the age of sixteen (16), children and workers who have not received relevant occupational training for the work they are responsible for must not be employed on heavy and dangerous work. Forced labor is prohibited by the Turkish Labor Law.

It was reported at the Site audit that, no employees under the age of 18 is employed at HEMA. This finding was verified by a review of the employment records. HEMA hires workers who completed their military duty. The minimum hiring age is 22-23 for male employees after the completion of the military duty and 18-19 for women of jobs that are non-mining activities (such as administrative jobs). Age range of Chinese employees varies between 25 and 50. It was also observed during the Site audit that, no forced labor is present at HEMA. Salary payments were reported to be performed on time.

HEMA will continue to comply with the provisions of Turkish Labor Law with regard to child labor and forced labor.

16.7 Health and Safety

PS2 requires providing the workers with a safe and healthy work environment, taking into account inherent risks and hazards specific to the work. Health and Safety Audit was conducted by Mr. Özgen Özden between 17 – 19th February, 2015 simultaneously with the Follow-up Social – Labor Audit by Dogan Oktar. The audit team was managed by Prof. Cem Avcı, Technical Advisor at ELC. ELC staff Öner Akten participated in the site visit for supervision. The scope of the audit is summarized as follows:

- Briefly review of HEMA's management systems and performance in place with regards to occupational health and safety;

- Identification of compliance issues with Turkish laws and regulations regarding occupational health and safety;
- Occupational health and safety management capacity;
- Review of accident and reporting statistics against industry benchmarks.

Findings of the audit are provided in Health and Safety Assessment and Social – Labor Audit Follow – Up Report for HEMA Amasra Hardcoal Project, Bartin/Turkey dated 21.03.2015. Major findings are listed below:

- Grounding of electrical equipment not connected to a separate grounding system located outside of the underground mines;
- No annual inspection documentation of above and underground electrical system and equipment.
- It was reported during the site visit that the Site activities was temporarily suspended by the Ministry of Labor and Social Security on 15.10.2014 due to non-compliances and the suspension was lifted upon the rectification of non-compliances. The official letter for resuming the activities was provided by HEMA.
- No detailed accident investigation program (including root-cause analysis).

16.8 Non-employee Workers and Supply Chains

In accordance with PS2, HEMA will use commercially reasonable efforts to apply the requirements of PS2 to non-employee workers directly contracted by HEMA, except for provisions of PS2 under will be signed with all sub-contractors. HEMA will also address child labor and forced labor in its supply chain consistent with the provisions of PS2 under child labor and forced labor, and as defined in Section 16.7. The third party employers will be managed and monitored by an existing procurement procedure that includes assessment of the third party performance.

16.9 Impacts

Detailed regulatory and best practice application review is provided in Health and Safety Assessment and Social – Labor Audit Follow – Up Report for HEMA Amasra Hardcoal Project, Bartin/Turkey dated 21.03.2015, Annex B, No.18.

16.10 Mitigation Measures

The following mitigation measures will be applied to manage labor and working conditions including the health and safety of the employees:

- An Integrated Management System (IMS) to be prepared to include labor and health and safety procedures during the construction and operation phases of the Project.
- An HR manager on Site will be appointed to ensure the implementation of the HR policy.
- Child and forced labor will be prohibited.
- A grievance mechanism will be developed for employees and included in the IMS both in Chinese and Turkish languages (for the operation phase). Employees will be informed about this mechanism at the time of hiring. Grievance mechanism will be extended to non-employee workers.

- Subcontractors will also be required to follow the requirements of PS2. Contracts to be signed with sub-contractors will include health, safety and environmental requirements.
- All applicable national health and safety legislation and international regulations (i.e. ILO Code of Practice for Safety and Health in Ports) will be followed.
- All the risks of each activity at the project component sites will be identified followed by identification of the appropriate mitigation measures/personal protective equipment.
- Material handling operations should follow a simple, linear layout to reduce the need for multiple transfer points.
- Dust, noise and air emissions will be minimized to the extent possible with the implementation of mitigation measures mentioned in Chapter 11: Air Quality.
- Earplugs will be provided to workers dealing with noisy activities.
- All employees (including sub-contractors) will be trained on health and safety, and emergency preparedness and response plan to respond timely to the incidents.
- During the construction phase, the suppliers who shall work more than 5 days in the construction sites, cannot start to work unless they are given main environment, health and safety trainings. The suppliers, who shall work less than 5 days, cannot enter in the construction site without a Construction Responsible together with them.
- Workers (including sub-contractors) will be provided safety briefings every day before the work starts and provided with necessary personal protective equipment.
- Work permits will be required for high risk activities such as working at heights, operation of heavy equipment etc. and such activities to be monitored by site supervisors.
- All accidents and incidents will be recorded and develop accident investigation program (including root-cause analysis) to prevent recurrence of the accidents and provide relevant training to key personnel.
- The efficiency of health and safety practices will be monitored through internal and external audits, and corrective actions will be taken if required.
- Workers' accommodation will be managed in line with the provisions of PS2 provisions and the guidance note on worker's accommodation published by IFC and EBRD (Worker's Accommodation: Processes and Standards), and relevant procedure will be set out in the IMS.
- Workers will have contracts in place prior to commencement setting out working conditions, terms of employment and EHS responsibilities.
- All workers will be insured under Social Security Institution. Equivalency and compliance of vocational training of Chinese employees with Turkish regulations to be investigated prior to the employment.
- Job Safety Analysis (JSA) and Safe Working Instructions (SWI) for critical or high risk tasks during construction and operation phases to be prepared (in both Turkish and Chinese languages) as a part of risk assessment procedure and communicated to all employees.
- An Explosion Protection Document to be prepared (for the operation phase).
- HEMA will develop and implement a detailed management plan to mitigate immediate health and safety hazards on site.

Detailed regulatory and best practice application review is provided in Health and Safety Assessment and Social – Labor Audit Follow – Up Report for HEMA Amasra Hardcoal Project, Bartin/Turkey dated 21.03.2015.

16.11 Residual Impacts

If the IMS is put into place and implemented properly during operation and construction phase which will cover the implementation of all mitigation measures mentioned above and ensure compliance with Turkish regulatory requirements, the residual impact is considered to be insignificant to of minor significance.

17.0 CULTURAL HERITAGE

17.1 Scope

This chapter addresses the potential cultural heritage and archeological impacts associated with the project components and define the mitigation measures to be taken against the potential impacts i) to protect cultural heritage from adverse impacts of project activities, İİ) to support its preservation particularly prior to and during the construction and operational phases of the Project.

The results from the following desk-based study resources, view of scientific committee and also opinion letters obtained from relevant authorities were used to establish the baseline information. The key aims and objectives of this study included the followings:

- To review of existing local and regional zoning plans covering the Project areas
- To identify and describe of existing cultural heritage sites and archeological assets within the proposed Project areas and surroundings
- To asses potential impacts on cultural heritage sites and archeological assets in the vicinity of the area where the Project is located
- To identify the scope of any mitigation in advance of, or during, the construction and operational phase

Following information sources have been used during the assessment:

- 1/25,000 scaled Bartın and Bartın Coastal Region Sub-Regional Planning Zone Environmental Plan (Approval Date: 10.04.2014)
- Environmental Impact Assessment Report for HEMA Port (Reclamation Area and Quay) prepared by Dokay-ÇED Ltd. (April 2013)
- Amasra Protected Archaeological Site Map provided by Bartın-Amasra Museum Directorate (January 2015)
- View of a scientific committee (consisting of two Archeologists university professors and an art historian)

The significance criteria of the potential impacts on cultural heritage sites and archeological assets have been determined on the basis of magnitude and sensitivity receptor summarized below.

Impact Significance	Description
Not Significant	- The footprint of Project areas and surroundings do not consist of any cultural heritage sites and archeological assets - No impact on archeological sites or areas having an archaeological potential were identified within the project areas, and thereby no mitigation measure for archaeological resources is considered necessary - Very minor changes to archeological materials or setting (the visible environment around the site or feature 1-10% of surviving deposits damaged or destroyed) - No relocation of cultural heritage sites, natural and archeological assets
Minor	- Cultural heritage sites and archeological assets of minor value lies outside of the project footprint which is sufficiently distant from the Project components - Changes to archeological materials or setting (the visible environment around

Impact Significance	Description
	the site or feature 10-25% of surviving deposits damaged or destroyed) - Indirect effects of the project components on cultural heritage sites and archeological assets caused by changes in the land form restricting access
Moderate	- Potential threat to cultural heritage sites and archeological assets at times during the course of the construction and operational phases of the project - Changes to many archeological key materials such that the resource is clearly modeified (25-50% of surviving deposits damaged or destroyed) - Considerable changes to setting that affect the character of asset
Major	- Direct physical effects of the project activities on cultural heritage sites, natural and archeological assets protected by national and international legislations (e.g direct removal and loss of cultural and archeological resources) - Change the majority or all of the key archeological materials, such that the resource is totally altered (75-100% of surviving deposits damaged or destroyed) - Damage and disturbance to cultural heritage sites, natural and archeological assets at times during the course of the construction and operational phase. - Significant impacts which will be negative and irreversible unless necessary mitigations measures are undertaken

17.2 Information Sources

17.2.1 Baseline Studies

The baseline studies conducted initially for the Project areas covered initial assessment which was based on desk-based researches, literature survey and reconnaissance survey at the licensed area. Reconnaissance survey was conducted within the licensed area on 13-16th of January 2015. The assessment study was conducted an archeological expert team. The team members were Assoc. Prof. Feridun Ozgumus, Assoc. Prof. Sevket Donmez and Art Historian Ayse Didem Ozger-Bayvas. As a result of the studies, Amasra HEMA Hard Coal Mine Project Cultural Heritage Assessment Report was prepared (dated 23 January 2015) and presented in Annex O. Details and findings of the study are provided in *Section: 17.4.2 Surface Reconnaissance Surveys at Licensed Area.*

17.2.2 Consultation with Relevant Regulatory Authorities

The necessary opinion letters from relevant regulatory authorities were obtained prior to construction phase of the project. These authorities included the followings:

- Ankara Provincial Directorate of Environment and Urban Planning, General Directorate of Natural Assets Protection
- Ministry of Culture and Tourism, Karabük Regional Council Directorate of Protection of Cultural and Natural Assets
- Amasra District Governorship, Museum Directorate

The results of consultation with the above mentioned authorities and the studies conducted as per the request will be defined in the following sections.

17.3 Regulatory Framework

Movable and immovable cultural and natural assets in Turkey are protected and preserved by the Law on Preservation of Cultural and Natural Assets (Law No. 2863) published in the Official Gazette dated 23.07.1983 and numbered 18113. The law defines the movable and immovable cultural and natural assets to be protected, arranges the related actions to be taken, determines the establishment and duties of the relevant organizations that will take implementation decisions. The definitions made in the law are given below:

- Cultural Assets: All movable and immovable assets on the surface, underground or underwater regarding science, culture, religion and fine arts that belong to prehistoric and historic area or which have scientific or cultural genuine qualifications that belong to prehistoric and historic areas.
- Natural Assets: Valuables from geological, prehistoric and historic era, on surface, underground or under water, of which the preservation is essential due to their unique features and beauty.
- Archeological Site: ancient sites and city ruins that reflect the social, economic, architectural and other features of their era, locations of significant historic events and areas containing cultural assets that require preservation within/among their specified natural features; and
- Preservation Areas: buffer areas needed to preserve immovable cultural assets in their physical historical surrounding/context.

Law 2863 establishes legal protection for the following:

- all natural assets and immovable cultural assets constructed up until the end of the 19th century,
- any immovable cultural asset from after the end of the 19th century, identified by the Ministry of Culture and Tourism as an important asset worthy of preservation,
- all immoveable cultural assets located within archeological sites,
- buildings/areas that have witnessed significant historical events during the National War and the foundation of the Turkish Republic and dwellings that have been used by Mustafa Kemal ATATÜRK, regardless of time and registration.

The Ministry of Culture and Tourism is the responsible body for protection of cultural heritage in Turkey at the national level. As part of the Ministry, the High Commission for the Protection of Cultural Assets is responsible for protecting and restoring the immovable cultural and natural assets. Related to natural assets, the responsible body is the Ministry of Environment and Urban Planning (General Directorate of Natural Assets Protection) for the works, processes, and decisions foreseen in Law 2863 about natural assets except movable ones, natural archeological sites, and the related protection areas.

There are also Cultural Assets Protection Regional Boards at regions defined by the Ministry of Culture and Tourism, which are responsible for the protection of cultural heritage within their respective jurisdictions. The relevant Regional Board for the Project is the Karabük Regional Council Directorate of Protection of Cultural and Natural Assets which is responsible for the project areasof West Black Sea Region: Karabuk, Zonguldak and Bartin.

In addition to Law 2863, there are principle decisions related with the protection and preservation of cultural and natural assets, among which Principle Decision No.658 (dated 05.11.1999) defines the evaluation and classification criteria for archaeological sites in three levels as given below:

- 1st Degree Archaeological Sites: Highest level of protection. Areas to be preserved as they are, except for scientific studies with preservation purpose. In these areas any kind of excavation, other than scientific excavations, and construction are prohibited.
- 2nd Degree Archaeological Sites: Moderate level of protection. Areas to be preserved as they are, except for scientific studies with preservation purpose. The preservation and utilization requirements for these areas are set by Protection Boards. New constructions are not allowed in these areas but basic maintenance on existing structures may be carried out in accordance to standards set by the Protection Boards.
- 3rd Degree Archaeological Sites: Lowest level of protection. Archaeological Sites where new arrangements can be allowed according to the preservation and utilization decisions.

17.4 Baseline Conditions

17.4.1 Brief Literature Survey

Bartın is considered as its significant potential of cultural heritage sites, natural and archeological assets (e.g. old grave, ancient ruins, houses) due to its historical background. A literature review has been conducted to understand the archaeological background of the area where the Project is located. In order to identify the cultural heritage sites in the vicinity of the Project Areas, The List of the Natural Protected Areas and Natural Assets in Bartin, published by the Bartin Provincial Directorate of Ministry of Environment and Urban Planning, have been utilized in this study.

According to the List of Archeological Sites obtained from Bartın-Amasra Museum Directorate, there are twenty-six archeological site were identified and represented in a map which is shown in Figure 17-1. The list consists of the following both archeological site (1-12) and archeological monuments (13-26); 1) Upside of Boztepe Island (1st degree), 2) Boztepe District (3rd Degree), 3) Kaleici District (3rd Degree), 4) Bedesten Locality (2nd Degree), 5) Tavsan Island (1st Degree), 6) Tekketepe Locality (3rd Degree), 7) Necropolis Area (Beneath the TTK Service Buildings) (3rd Degree), 8) Direklikaya (3rd Degree), 9) Little Harbour, Antique waterfront (2nd Degree), 10) Municipal Housing Area (2nd Degree), 11) Amasra Cemetery (It extends to the enterence of TTK (2nd Degree), 12) It extends to the Old Bedesten Where Service Buildings of TTK are located (3rd Degree), 13) Ruins of a Monastry (Tavşan Island), 14) Temple Ruins (Boztepe Quarter), 15) Church Ruins (Boztepe Quarter), 16) Lodging House of District Governor (Zindan Quarter), 17) Mosque of Fatih (Old Byzantine Church at Zindan Quarter), 18) Art House (Small Church Kuledibi), 19) Naval Academy (Museum Building), 20) Theatre ruins (in the public cemetery), 21) Gymnasium (The Bazaar), 22) Kemerdere Bridge (Roman Bridge-Located near the Bazaar), 23) Kuskayasi Road Monument (Askersu the Location), 24) City Baths (Kummahalle), 25) Bath (İskele Street), 26) Roman Aqueduct (Cevizlik Valley).

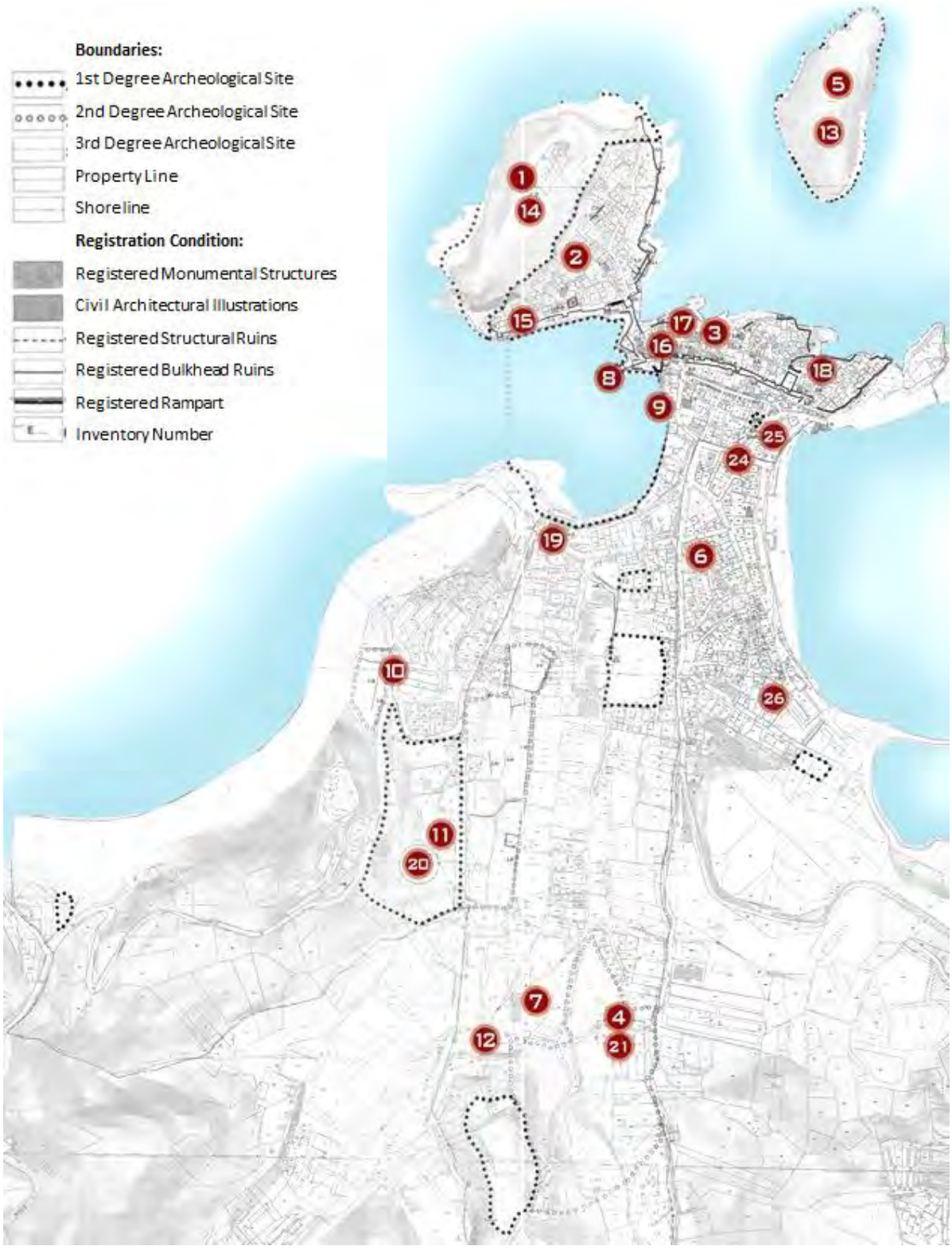


Figure 17-1: Distribution of Archeological Sites in Amasra District Center

The Zonguldak-Bartın-Karabük Planning Zone Environmental Plan (1/25,000 scaled) around both Port Area and Shaft-3 area was reviewed since the Figure 17-1 only represents the archeological site and monuments situated in Amasra District Center while not covering the whole Project Licensed area. It was identified that there is an archeological site in Akcukur Quarter and archeological Remain in top of the Cape Kadırga (Figure 17-2). The identifications and detail

information of the aforementioned areas are provided in the following sections based upon the Surface Reconnaissance Surveys.

Figure 17-2: Section of 1/25,000 scaled Zonguldak-Bartın-Karabük Planning Zone Environmental Plan around Port Area

17.4.2 Surface Reconnaissance Surveys at Licensed Area

Field visits to the Licensed Project areawere conducted by Assoc. Prof. Feridun Ozgumus, Assoc. Prof. Sevket Donmez and Art Historian Ayse Didem Ozger-Bayvas on 13-16th January 2015. This section presents the findings of the Amasra HEMA Hard Coal Mine Project Cultural Heritage Assessment Report and is presented in Annex O. Since the Project Licensed area covers a surface area of 50 km^2 and comprises of different project components, the Project Licensed area is divided into main four areas; HEMA Port, Shaft-1, Shaft-2 and Shaft-3 area.

HEMA Port and Shaft-1

HEMA Port and Shaft-1 area are studied together in this section due to the proximity of two project components to each other. According to the 1/25,000 scaled Zonguldak-Bartın-Karabük Planning Zone Environmental Plan around Port Area and surface Reconnaissance Field study findings, it was assessed that the nearest archeological remains are **"Rock-cut Tomb" and** "**ancient structure".** Rock-cut Tomb is located approximately 60 m away from Reclamation and Port Area, 500 m from conveyor line and 1km away from Shaft-1. The rock cut tomb is a pile of rubble collected on a certain spot to make the land consistent with the remaining agricultural field (as shown in figure 5.5). Ancient Structure is located approximately 500 m away from Reclamation Port Area and 1 km away from the Shaft-1.

According to the findings of the Reconnaissance field study, Tarlaagzi and Gomu village cemetery was searched; as a result Late Ottoman tombstones and a fine sculptured Roman sarchophagus were identified which the latter is currently used as a fountain by the local residents. It was stated that no evidence of any cultural heritage found in the vicinity of Spoil dumpsite 1 and HEMA Port. Amasra Museum Directorate conducted an archeological exploration and made some excavations near Gomu Village (Photo 5.1). A track road was opened in order to carry out the archeological explorations and diggings in the area. In the 100 m west of the excavated area, there are many

shards and terracotta pieces were observed which are located outside the project components (Photo 5.3 and 5.4).

Photo 5.1. Archeological Exploration

Photo 5.2. Archeological excavations

Photo 5.3. Shards and Terracotta Pieces

Photo 5.4. Closer view of Terracotta Pieces

Photo 5.5. Rock-Cut Tomb

Additionally, the characteristics of the seabed in proposed HEMA Port area was identified with a side scan sonar survey applied within the scope of "Hydrographic, Oceanographic, Geologic and Geophysical Investigation Report" conducted by MCH Marine Research Ltd. in April, 2011. According to the findings of side scan sonar survey, it was found that there is no evidence of any underwater cultural heritage (i.e. shipwreck) encountered.

Shaft-2

Waste rock dumpsite area, transmission line and office buildings are located in Shaft-2 area. The nearest archeological remains to the shaft-2 area is a monument called "Bird's Rock Road (Kuşkayası)". The monument is located on Amasra- Bartın road approximately 4 km away from Amasra district center, approximately 1 km away from Shaft-1 and 3 km away from Shaft-2 area.

Figure 17-3: The location of Bird's Rock Road Monument

Bird's Rock Road monument was ordered by the Roman Emperor Tiberius Germanicus Claudius and built by Gaius Julius Aguillla between the years of 41-54 A.D. Considered as unique in Anatolia, the monument is composed of a headless human statue engraved in rocks, a Roman eagle figure symbolizing sovereignty, and two epitaphs. The epitaphs read, " for peace and friendship between the states and for the memory of the Emperor Germanicus, Gaius Julius Aquila cracked this mountain and built this resort with funds granted to him". The Kemerdere Bridge in the Valley of Cevizlik is located one kilometer down the Roman Road in front of the monument. The monument can be reached by impractical steps and in a very bad state of preservation.

This archeological remain is prominent in terms of its location which situated on the coal transportation route. Additionally, there are no national parks and natural monuments reported in the vicinity of the Project areas. Additionally, there are no unique national features or tangible objects related with the cultural values are encountered through both reconnaissance field study and desk-based researches.

Shaft 3

The vicinity of Shaft-3 area (especially Amasra District Center) is considered to have importance due to the presence of highly significant archeological site and monuments, however Shaft-3 have sufficient distance not to cause any disturbance to the sensitive aforementioned areas mapped in Figure 17-1.

Shaft-3 is considered as an ideal location for a ventilation adit however, changes with the location of the ventilation shaft and site configuration were suggested to avoid any disturbance to a site of cultural heritage importance. Some part of the shaft-3 area was previously defined as "archaeological site". Upon the opinion letter from the Ministry of Culture and Tourism, Karabük Regional Council Directorate of Protection of Cultural and Natural Assets (16.10.2007), the ventilation shaft planned to be drilled within the land (No: 1057), was shifted to outside of the archeological site boundary of the same plot.

The nearest archeological ruin is "Ancient Theater" (currently modern cemetery) which is about 500 m away from Shaft-3. The theatre originated from Roman Period and it is located on the southern slope of a hill called *St. George (Hagios Georgios)*. A small portion of the stage can be seen in Photo 5.6 and 5.7.

Photo 5.6 and 5.7. Ancient Theatre

Apart from that, another archeological ruin in the vicinity of the Shaft-3 area is "Covered Market (Bedesten Building)" which is located approximately 1 km away from the Shaft-3 (in Photo 5.8). The basilica was constructed between the end of the 1st and the beginning of the 2nd century A.D.. The basilica was a Roman Province Council House. Afterwards it was called Bedesten (Covered Market). Later it was used as a market where the caravans coming from different directions, spent the night and sold their goods. The market is separated into five big sections. It is possible to enter the other arched gates from the big section which is in the middle. The walls were built by bricks in a classic manner.

Photo 5.8. Covered Market (Bedesten Building)

17.5 Consultation with Relevant Regulatory Authorities and Archaeological Investigations

Based on the opinion letters obtained from relevant authorities results of the study conducted by authorities, HEMA provided maps and locations regarding all the project components and potential impact area of project activities in order to get official view on the archeological potential of the Project area. The related opinion letters from relevant authorities are summarized in below:

Shafts

- **Mining Area/Opinion Letter/10.05.2007:** The opinion letter was obtained from Amasra District Governorship, Museum Directorate. It is stated in the official letter of the authority that the land (section No. 22, plot No. 1057) is 2nd degree archeological site. Pursuant to Article 2 of the resolution of High Council of the Protection of Cultural and Natural Heritage (No. 658) dated 05.11.1999, the land is protected against all kinds of activities except scientific researches and "It is prohibited to extract stone, soil, sand etc.; to open stone, sand, marble, mine and similar.; and to dispose soil, clinker, waste, industrial waste and similar". Therefore, the application being conducted on the plot no. 1057 must be ceased and the authority must be informed about the action. Otherwise, required legal actions will begin.
- **Mine Project/Opinion Letter/04.06.2007:** The opinion letter was obtained from Amasra District Governorship, Museum Directorate. According to the official letter of the authority, the mine shaft was planned to be drilled within the land (section No. 22, plot No. 1057) which is 2nd degree archeological site. However, it is planned to be shifted to another area which is outside of the archeological site boundary of the same plot. Therefore, in terms of Law on Protection of Cultural and Natural Assets (No. 2863), there is not any objection for drilling the mine shaft.
- **Mining Project/Opinion Letter/16.10.2007:** The opinion letter was obtained from Ministry of Culture and Tourism, Karabük Regional Council Directorate of Protection of Cultural and Natural Assets. According to the official letter of the authority, as the ventilation shaft planned to be drilled within the land (section No. 22, plot No. 1057) which is 2nd degree archeological site was shifted to another area which is outside of the archeological site boundary of the same plot. Therefore, there is not any action of the authority determining

the activity as out of the scope of the Law on Protection of Cultural and Natural Assets (No. 2863) at current status.

- **Mining Project/Opinion Letter/03.05.2012:** The opinion letter was obtained from Ministry of Culture and Tourism, Karabük Regional Council Directorate of Protection of Cultural and Natural Assets. The authority states in the response letter upon the request letter of the HEMA (HEMA requested from the authority to determine whether any potential registered and/or determined archaeological site exists within the Shaft-1, Shaft-2 and Shaft-3 sites, to mark historical, urban, archaeological and similar sites on the map and to provide sample council decisions regarding protected areas) that considering the extensive size of the Project area, long period of field investigations and equipment will be required for researches on the potential cultural assets and/or protected areas within the mentioned areas. Therefore, for not to cause waste of time and resource, information related to the activities to be conducted within the Field-A and Field-B and the legislation concerned in the determination of the boundary of these areas should be provided to the authority.
- **Mining Project Opinion Letter/12.06.2012:** The opinion letter was obtained from Ministry of Culture and Tourism, General Directorate of Cultural Assets and Museums. Following information are summarized by the authority:
    - Considering the extensive size of the Project area, long time field investigations and equipment will be required for researches on the potential cultural assets and/or protected areas within the mentioned areas. Therefore, for not to cause waste of time and resource, information related to the activities to be conducted within the Field-A and Field-B and the legislation concerned in the determination of the boundary of these areas should be provided to the authority.
    - There is a registered archaeological site within the Field A and Field B and an ancient structure and rock cemetery recorded to Gömü Village map section E28CI exist. Current archeological sites are marked on 1/1000 and 1/5000 scaled maps. Therefore, there are technical inconveniences to mark these areas to 1/40000 scaled map (upon the request of the HEMA). However, if requested, personnel support can be provided to applicant Company in marking the archaeological sites and cultural assets to the map.
    - Considering the above mentioned issues, HEMA Dış Ticaret A.ş. should inform Karabük Regional Council Directorate of Protection of Cultural Assets; before the field studies to be conducted within the scope of the Law no.2863, the Council Directorate should be communicated; boundary of the activity area within de Field A and Field B should be identified and; investigations related to the area should be immediately conducted by Karabük Regional Council Directorate of Protection of Cultural Assets within the scope of letter dated 19.04.2012 and numbered 87037 (not available for ELC).
- **Mining Project Opinion letter/11.07.2012:** The opinion letter was obtained from Ankara Provincial Directorate of Environment and Urban Planning. The opinion given by the authority states that there is not proclaimed natural protected area within the site in which Shaft-1, Shaft-2 and Shaft-3 were drilled.

Coal Washing Plant

- **Coal Washing Plant Opinion letter/03.08.2012:** The opinion letter was obtained from Ankara Provincial Directorate of Environment and Urban Planning. The opinion given by the authority states that there is not proclaimed natural protected area within the site in which Coal Washing Plant is planned to be constructed. However, in case of encountering with any natural asset (cave, fossil deposit etc.) during the activities to be performed within this site General Directorate should immediately be informed.

Reclamation Area and Quay

- **Reclamation Area and Quay Opinion Letter/01.10.2012:** The opinion letter was obtained from The Ministry of Culture and Tourism, Karabük Regional Board Directorate of Conservation of Cultural Assets (Regional Government.)It is stated in the official letter of the authority that as a result of onsite research conducted by the authority on 17.06.2012, no cultural asset which can be assessed within the scope of the of Law on Protection of Cultural and Natural Assets (No. 2863) was detected near shaft 1, shaft 2, shaft 3, Tarlaağzı Port, Fishing Port, Conveyor Line and Coal Storage Area. However, in case of encountering any cultural asset during construction or other physical practices, it is mandatory to act in accordance with Article 4 (Notification Obligation) of Law on Protection of Cultural and Natural Assets.

17.6 Impacts

The aim of this section is to identify the potential impacts on Cultural Heritage may arise as a result of proposed project activities , the significance impact criteria from a cultural Heritage perspective have been summarized in Section 17.1.

In the scope of HEMA Hard Coal Mine Project, the cultural heritage sites and archeological assets such as evidence of ancient settlements and ruins within/or out of the Project areas have been assessed through the desk-based researches, literature survey and reconnaissance field survey. Determination of the magnitude of impacts related with the project activities on cultural heritage sites and archaeological assets is based on site specific reconnaissance field survey study.

Cultural heritage sites, natural and archeological assets within/surrounding of the area where the Project is located may potentially be impacted by the proposed Project activities. As mentioned in section 17.4.1, there are cultural heritage assets in the vicinity of the Shaft-1, 2 and 3 and HEMA Port which are very close to legally protected archeological sites according to the information obtained from both Amasra Museum Directorate and Zonguldak-Bartın-Karabük Planning Zone Environmental Plan. Direct impacts on cultural heritage may arise from demolition and construction works and transport associated with the proposed Project if the cultural heritage assets are not sufficiently distant and properly protected from the Project footprint and activities.

Cultural heritage;

- may adversely affected by erosion caused by project activities (if exist)
- may be damaged physically as a result of project activities (the removal of topsoil, excavation access roads, construction of camps, equipment etc., and other excavation of

foundations at the facility sites and movement of heavy vehicles) which may likely to be happen in case of future expansion

- may be physically affected due to subsidence or road transportation (if occurs in the future)
- may be affected through dust emissions if not mitigated properly
- as a beneficiary impact; any archaeological programme associated with large-scale development may have beneficial impact of increasing knowledge, both of previously explored areas and of locations where archaeological surveys have not been conducted previously. The observations of a project may create a link between archaeological sites and the landscape and environment it crosses.

17.7 Mitigation Measures

The following mitigation measures should be undertaken based on desk-based study and literature survey. Additional measures may be needed following site archeological assessment.

Mitigation measures envisaged to be completed will include the following:

- Documentation of archeological, historical and cultural sites as well as the evaluation of the potential impacts to each of those sites must be assessed (part of site assessment).
- An effective monitoring undertaken to demonstrate the mining activities have no significant adverse impact on the special values for those protected areas.
- HEMA will identify and protect cultural heritage by ensuring that both national and internationally recognized practices for the protection, field-based study and documentation of cultural heritage are implemented.
- HEMA is responsible for siting and designing a project to avoid significant adverse impacts to cultural heritage.
- Mining and related project activities to support, respect and strengthen the effectiveness of legally determined protect areas in the vicinity of the project components.
- Chance Find Procedure must be conducted to address cultural heritage discoveries during both construction and operations. Using an “Archaeological Chance Find Report Form” by construction site responsible to record the date and time of discovery, coordinates of the location of the chance find, description of the chance find, contacts made with the authorities and decisions taken, and the date of recommencement of work.
- Should chance finds of archaeological assets objects occur during Project construction activities, the relevant museum directory will be informed of chance finds pursuant to 2863 numbered “Law on the Conservation of Cultural and Natural Property”.
- Appropriate staff training in cultural heritage awareness will be undertaken by staff and contractors (including both native and Chinese workers) during all Phases of the Project to assist in the prevention of interference or accidental damage to cultural heritage.
- Ensuring systematic stewardship of cultural heritage throughout the Project life-cycle in case of future expansion by developing and implementing a Cultural Heritage Management Plan (CHMP) including a chance find procedure. The Cultural Heritage Management Plan may be developed and implemented in collaboration with the Turkish Ministry of Culture and Tourism if proposed project expansion decided.

- Any mitigation works to be agreed in consultation with the Ministry of Culture and Tourism, and designed and executed in line with the following national guidelines:
  - Law on the Conservation of Cultural and Natural Property (23 July 1983, Law No. 2863, last amended February 2008);
  - Regulation on the Collection and Control of Movable Cultural and Natural Property to be Protected (17 January 1984);
  - Regulation on Survey, Sounding and Excavation to be Performed in Relation to Cultural and Natural Property (10 August 1984); and
  - Regulation on the Identification and Registration of Immovable Cultural and Natural Property to be Protected (10 December 1987);
  - UNESCO Convention on the Protection of the Underwater Cultural Heritage (2001).

18.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT

This chapter describes the arrangements by how environmental, occupational and community health and safety, social and labor related *(altogether described as "environmental and social")* risks and impacts will be managed during the construction and operation phases of the Project Components. A management system is proposed to be used in order to manage these risks and also to meet applicable Turkish laws and regulations as well as the Lenders' Requirements.

Hattat Enerji ve Maden Ticaret A.S. (HEMA) will establish an integrated management system *(referred to here as the Environmental and Social Management System - ESMS*) for the construction and operation phases of the Project Components. The ESMS will enable to (i) manage the above mentioned risks and impacts, (ii) implement, monitor and review identified mitigation measures, (iii) provide continuous control of the processes and (iv) improve environmental and social performance.

The ESMS will be established and implemented separately for the construction and operation phases. The ESMS will be established in line with the following international good practice and guidelines:

- ISO 9001:2008 - Quality Management System;
- ISO 14001:2004 - Environmental Management System;
- OHSAS 18001:2007 - Occupational Health and Safety Management System;

IFC PS1 - Assessment and Management of Environmental and Social Risks; The following issues/documents will be taken into account during the establishment of the ESMS:

- Compliance with relevant Turkish laws and regulations
- IFC PSs
- IFC EHS General Guidelines
- IFC EHS Guidelines for Mining
- IFC EHS Guidelines for Waste Management Facilities
- IFC EHS Guidelines for Ports, Harbors, and Terminals
- Environmental and Social Management Plan -ESMP- prepared within the scope of the ESIA study

The ESMS will integrate planning, implementation, control and review of the processes in terms of environmental and social impacts. The scope of the ESMS will be clearly defined in an *"ESMS Manual"* to be developed. This chapter has been prepared to identify and describe the outline structure of the ESMS and the relevant documentation. The scope will cover the following issues:

18.1: Environmental, Health and Safety and Social -EHSS- Policy
18.2: Planning of the ESMS
18.3: Implementation of the ESMS
18.4: Control of the ESMS (including monitoring and audit)
18.5: Stakeholder Engagement
18.6: Grievance Process

18.1 Environmental, Health and Safety and Social Policy

The senior management (or the Project Board) of Hattat Enerji ve Maden Ticaret A.S. will officially define a written "*EHSS Policy"*. The Policy will be relevant and compatible to the activities and environmental and social issues of the Project in order to provide a framework for the determination and review of environmental and social targets and objectives. In addition, a Project specific *HR Policy* will be developed to set values and principles including active and competent participation of all employees in management and decision taking processes, and equal employment opportunity to all employees.

EHSS Policy and HR Policy will be developed both for construction and operation phases of the Project Components. These policies will encompass the following:

- Comply with environmental protection requirements and be in line with the EHS Legislation,
- Occupational health and safety, human resources management and satisfaction of employees,
- Lender's requirements,
- Satisfaction of stakeholders,
- Commitment to continuous development and improvement of EHS quality

The Policy will be provided to employees, contractors and suppliers as an attachment of the contracts and will also be disclosed to the public on the Project website.

18.2 ESMS Planning

18.2.1 Environmental, Health and Safety and Social Aspect/Risk Assessment

The identification of the environmental, health and safety and social aspects, significant risks and impacts of the Project is considered to be the principle stage of the planning of an effective ESMS. Significant impacts of the Project have been identified within the scope of the ESIA study and an ESMP has been developed for the Project in order to manage these significant impacts as set out in Annex D. HEMA will determine the aspects and significant risks and impacts for specific processes, activities and/or services that could interact with the environmental and social elements based on the results of the ESIA study and the ESMP. For this purpose, HEMA will establish an *"EHSS Aspects and Risk Assessment Procedure".* This procedure will define the methodology to be followed with respect to the assessment of the activities during construction and operation phases of the Project Components.

The EHSS Aspects/Risk Assessment study will define the (i) mitigation measures and required actions for the identified risks and impacts of the Project, (ii) source of the action (e.g. applicable legislation, Project ESIA commitments, Lender's requirements) and (iii) deadlines and responsible party for each program. The Aspect/Risk Assessment study will be performed considering but not limited to the following:

- Legal and other requirements (e.g. Lender's requirements)
- Type, scale and location of the Project
- Environmental and social baseline data

- Resource and energy use
- Waste generation
- Frequency, duration, possibility of the aspect/impact
- Opinion of relevant internal and external parties
- Affected party (e.g. community, environment)
- Regular and irregular situations and emergency situations

18.2.2 Legal and Other Requirements

The applicable legislation for the Project will be identified and followed by a "Legal and Other Requirements Follow-up List" in line with a *"*Legal and Other Requirements Determination and Compliance Procedure". A detailed "*EHSS Legislation Review"* has been prepared as part of the ESIA study (presented in Annex C) which can be used as a basis. This will provide an understanding of the legal (i.e. permits) requirements and ensure that employees are aware of the legal liabilities of their works and the Project operations. The list will also involve the other requirements (such as Lender's requirements) apart from the legal requirements. The list will be updated in case of any amendments in the legislation/other requirements or any change in the Project. Updates of this document will be reflected to the Project especially by means of the Environmental and Social Aspects and Risk Assessment, and accordingly additional plans and procedures as needed.

18.2.3 Targets, Objectives and Programs

EHSS objectives and targets will be set for the Project to comply with legal requirements and obligations for continuous improvement of the environmental and social quality targets and objectives of the Project. Targets and objectives will cover issues such as efficient use of raw materials, auxiliary materials/matters, natural resources/energy consumption and reduction, improvement awareness of employees. Targets and objectives will be specific, measurable and feasible and supported by the programs. Deadlines and responsible party for each program established to achieve desired results will be assigned. Environmental and social targets and programs will be documented and monitored.

18.3 Implementation of the ESMS

18.3.1 Responsibilities, Resources and Training

The overall responsibility for the establishment, implementation, maintenance and effectiveness of ESMS will lie with the Project Board of HEMA. For this purpose, necessary human and financial resources and technical infrastructure will be provided by the Project Board for all phases of the Project.

Prior to start of the construction, the Board will establish an organizational structure for the implementation of the ESMS and relevant personnel, especially those who have critical importance in the implementation and management of the ESMS (i.e. management representatives) will be appointed. Key environmental and social roles, responsibilities and authorities as well as qualifications will be clearly defined and announced to the relevant responsible personnel and to the rest of the employees working within the Project. For this purpose, an *"Environmental and Social Task Qualification Table"* will be developed by HEMA.

Personnel with direct responsibility for the Project's environmental and social performance such as health and safety specialist, environmental officer, emergency team members will be adequately qualified, trained and experienced to perform their work. Competencies of these employees will be met with national legal requirements and Lenders' expectations. External experts and/or consultancy services, if legally or technically necessary, will also be obtained during the Project phases. Determination and providing of the training needs, informing and increasing the awareness of the employees, contractors and suppliers regarding the ESMS Policy; significant environmental and social risks and impacts; and procedures will be defined in the *"Training and Improvement Management Process Procedure"* to be prepared.

HEMA will appoint an ESMS Manager having overall responsibility for the establishment, implementation and maintenance of the ESMS.

18.3.2 Communication

HEMA will develop procedures to establish and maintain an effective and strong internal and external communication within the scope of the Project. Internal communication will be provided via means such as boards, website of the Project and meetings. Grievances, requests and suggestions coming from all parties (employees, community and others) will be taken, recorded, evaluated and solved/responded in line with a *"Grievance and Request Management Process Procedure".* A Stakeholder Engagement Plan -SEP- has been developed for the Project that covers engagement activities for the duration of the ESIA study. Engagement activities for the duration of construction and operation phases are also briefly outlined in the SEP. Communication methods/tools defined in the SEP will be considered in the establishment of this procedure and updated as necessary as the Project proceeds.

18.3.3 Documentation and Document Control

Documentation structure of the ESMS will include the following;

ESMS Manual: An official document that details how the ESMS is operated. The ESMS manual will include the ESMS policy, description of ESMS control, roles, responsibilities and relationships, plans, procedures, systems and similar.

EHSS Policy: Consists of all the commitments which are formally expressed by the Senior Management for the construction and operation phases of the Project Components and which help to determine the framework of the objectives and targets.

Procedures: Documents outlining the main activities and phases, defined procedures, authorities and responsibilities concerning the ESMS that is to be established separately during the construction and operation of the Project Components.

Plans: Documents supporting the procedures and describing the studies in detail.

Other Supporting Documentation: Forms, lists and other documents used within the scope of the ESMS.

External Documentation: Laws, regulations and standards which define the service conditions and are used mandatorily.

Controlled Copy: Documents in current use.

Uncontrolled Copy: Documents not requiring follow-up.

A *"Document and Data Control Procedure"* will be established within the scope of construction and operation phase ESMS to control and approve any document before it is issued, to determine writing format and numeration system to be used; to determine approval system; to provide controlled distribution, review and update of the documents; to provide relevant and updated documents in the relevant points; to abolish invalid documents and to manage external documents.

18.3.4 Operational control

An *ESMP* has been developed for the Project (covering construction and operation phases) in order to manage the adverse impacts on the environment. The ESMP is prepared based on the international standards and national laws and regulations. The ESMP of the Project is presented in Annex D of this report. The ESMP includes description of the mitigation measures to avoid, minimize or compensate the adverse impacts during the construction and operation phases of the Project Components; responsible parties for the implementation of the mitigation measures; the timing of implementation; monitoring and audit requirements. The ESMP focuses on the avoidance of impacts, and where this is not possible, presents technically and financially feasible and cost-effective mitigation measures to minimize possible impacts to acceptable levels. The ESMP is based on the results of the ESIA study and is a framework document that specifies the necessary work to be conducted for the Project such as preparation of detailed management plans for each topic (e.g. air quality control and monitoring, noise control and monitoring, traffic management). The ESMP will be kept up to date with any required additional mitigation throughout the Project and to reflect the requirements of new and/or amended laws and regulations.

The following plans are described in ESMP and will be developed to achieve EHSS objectives for the construction and operation phases:

For construction phase:

- Environmental and Social Management Plan
- Air Quality Control and Monitoring Plan
- Waste Management Plan
- Noise Control and Monitoring Plan
- Marine Ecology Monitoring Plan
- Emergency Preparedness and Response Plan
- Traffic Management Plan
- Stakeholder Engagement Plan
- Occupational Health and Safety Management Plan
- Community Health and Safety Management Plan
- Cultural Heritage Management Plan
- Fire Safety Master Plan
- Contractor Management and Monitoring Plan
- Livelihood Restoration Plan
- Site Rehabilitation Plan
- Biodiversity Action Plan

For operation phase:

- Environmental and Social Management Plan
- Air Quality Control and Monitoring Plan
- Noise Control and Monitoring Plan
- Waste Management Plan
- Stakeholder Engagement Plan
- Marine Ecology Monitoring Plan
- Emergency Preparedness and Response Plan
- Traffic Management Plan
- Community Health and Safety Management Plan
- Occupational Health and Safety Management Plan
- Fire Safety Master Plan
- Contractor Management and Monitoring Plan
- Livelihood Restoration Plan and Resettlement Action Plan (if needed)
- Site Rehabilitation Plan
- Biodiversity Action Plan

These plans will be supported with operational procedures and related instructions as necessary as part of the ESMS. The ESMS procedures and plans will be periodically (or when necessary) reviewed and revised. Additional procedures and plans will be developed as the Project progresses, as necessary.

18.3.5 Environmental and Social Emergency Preparedness and Response

An *"Emergency Preparedness and Response Procedure"* will be developed for emergency cases that consist of incidents such as accidents, explosions, fires, gas leakages, hazardous chemical and liquid waste spills, disease outbreaks and similar that occur unexpectedly due to equipment/infrastructure failures, employee errors, natural disasters (flooding, landslides, earthquakes, storms), sabotage and similar. Emergency cases are incidents that cause the activities to cease and also cause serious damages on environment, occupational health and assets.

The following needs to be detailed in the procedure:

- Emergency Response Team (Title, Responsibilities and key features)
- Emergency Response Plans, Emergency Drills, Internal Trainings (The drill scenarios should be conducted for different emergency cases)
- Maintenance and Control of Emergency Response Equipment (Fire Emergency Equipment, Pollution Prevention Materials, First Aid Cabinet, Material Safety Data Sheets, Personal Protective Equipment, Warning and Guiding Signs etc.)
- Measures to be taken in case of Emergencies/Natural Disasters (Communication in case of Emergency, Liquid Chemicals/Hazardous Liquid Wastes Spills, Gas Leakage (O_2, Natural Gas, LPG, LPG Forklift, etc.) and Explosion, Flash/Fire, Earthquakes

18.4 ESMS Control

18.4.1 Monitoring, Measurement and Review

For an effective environmental and social management, the ESMS should be continuously monitored and periodically reviewed.

HEMA will monitor:

- the compliance of the ESMS with the environmental and social provisions of the legal and other requirements as well as the commitments given in the ESMP;
- overall implementation of the ESMP and other plans and procedures; and
- improvements achieved as the Project goes forward.

Periodical internal audits, independent parties' audits, regular checks, site inspections and measurements, impact monitoring, implementation of the processes in accordance with the ESMS and regulations, regular audits of the overall implementation of the ESMP and site inspections will be used for this purpose. Realization of environmental targets and objectives, environmental and social performance, equipment calibrations, air emissions, energy, fuel and natural source consumption, noise, waste amounts, environmental and social complaints and similar issues will be monitored, measured and evaluated. Conformance with legal and other requirements will be periodically evaluated and recorded.

Internal audits will be conducted in line with an *"Internal Audit Process Procedure"* to be developed within the scope of the ESMS. The "*Legal and Other Requirements Determination and Compliance Procedure"* will be used to evaluate conformance with the legal and other requirements. Other relevant and required procedures for the monitoring and measurement processes will be established for the Project as needed.

18.4.2 Non-conformities and Corrective, Preventive and Improving Actions

Non-conformities, weaknesses, deficiencies, deviations and improvement opportunities will be identified by means of audits, checks and measurements and grievances; the non-conformities will be analyzed in order to identify their root cause and appropriate corrective/preventive/improving actions will be determined, initiated and tracked through to completion. Required amendments will be reflected to the management programs, procedures and plans including ESMP. A *"Management of Non-conformities and Corrective and Preventive Actions Procedure"* will be developed to manage this process.

18.4.3 Data Control

Any information and data relevant to the ESMS will be recorded in line with a *"Document and Data Control Procedure"* to be developed for the Project. This procedure will set procedures and principles related to the establishment, prevention, maintenance and disposal of the ESMS records.

18.4.4 Management Review

Management reviews will be conducted (at least once a year) to maintain effectiveness of the ESMS and to determine the modification necessities and improvement opportunities in line with a

"*Management Review Procedure"*. Internal and external audit results, conformance of the Project with legal and other requirements, external notifications including grievances, ESMS performance (e.g. achievement level to targets and objectives), corrective and preventive actions situations, decisions/actions coming from previous meetings, improvement recommendations will be taken as the inputs for the management reviews. Based on the results generated from the reviews, senior management will take the necessary and appropriate actions to ensure the policy is met, procedures and plans are implemented and are effective.

18.5 Stakeholder Engagement

Stakeholder engagement has started before and continued during the ESIA study. The consultation activities will also continue during the construction and operation phases of the Project Components and will aim to maintain constructive relationships both with the local communities and other stakeholders. In brief, the following activities will be undertaken during the construction and operation phases of the Project Components:

Construction Phase

- Project information will be disclosed from the project website which will be updated as deemed necessary.
- Ongoing meetings, as deemed necessary with national and local authorities will continue during construction phase related to permitting and other issues.
- Ongoing meetings, as deemed necessary with the local residents and facilities will continue.
- The stakeholder list will be updated regularly and any new stakeholder identified will be included in the list.
- Any activities likely to cause particular disturbance (such as noisy activities etc.) to the nearby neighborhoods will be announced through handouts to be distributed to local people via headmen offices. This information will also be provided in the Project website.
- All comments and grievances will be managed in accordance with the Grievance Management Procedure.
- The security staff at the construction site will be informed about the Grievance Mechanism and in case a local person wants to submit a comment or grievance, the security person will be able to convey this person to the responsible staff.

Operation Phase

- The Project website will be updated to include information on operation activities and any changes in environmental policy, plans and procedures that are followed.
- Ongoing meetings, as deemed necessary will be conducted with the national and local authorities to inform them of any changes in project activities and related to permitting.
- Ongoing meetings, as deemed necessary with the local residents and facilities will continue.
- The stakeholder list will be updated regularly and any new stakeholder identified will be included in the list.
- All comments and grievances will be managed in accordance with the Grievance Management Procedure.

- The security staff will be informed about the Grievance Mechanism and in case a local person wants to submit a comment or grievance, the security person will be able to convey this person to the responsible staff.

18.6 Grievance Management

A Grievance Management Procedure will be established in order to ensure that all comments, suggestions and objections received from the Project stakeholders especially from local communities that are mostly affected by the Project are dealt with appropriately and in a timely manner. It is important to note that there will also be a separate grievance management procedure for workers during construction and operation phases.

Local communities will be informed about the grievance management system during the consultation and disclosure activities. All grievances will be recorded, responded and resolved in a defined timeframe. Comments and grievances can be sent to HEMA via mail, e-mail, and fax during the construction and operation stages as well as through the Project website and telephone.

The procedure to handle grievances is described below:

1. All grievances submitted by the stakeholders in verbal and written will be considered. Verbal grievances will be written on grievance forms by the responsible person as defined below.
2. All grievances will be reflected in a grievance log to ensure that each grievance is assigned an individual number and that consistent tracking and corrective actions are carried out. The grievance log will contain:
    - Date of submission of the grievance
    - Reference number
    - Contact details of the complainant
    - Content of the grievance
    - Identification of parties responsible for the resolution
    - Dates when the investigation was initiated and completed
    - Findings of the investigation
    - Proposed corrective action
    - Date of response sent to the complainant (unless it is anonymous)
    - Statement of satisfaction of the complainant
    - Date of closing out the grievance
    - Any outstanding actions for non-closed grievances
3. The grievance will be evaluated by the relevant staff and management to identify what actions need to be taken, and an appropriate response will be developed. The complaint action form (as presented in SEP) will be filled accordingly.
4. The complainant will be informed about the proposed corrective action in writing and the date of response to the complainant will be recorded in the grievance log,
5. The complainant will be contacted through telephone or face-to-face meeting, if needed to confirm that the proposed corrective action taken is satisfactory, and the complainant's response will be recorded in the grievance log,

6. The grievance will be closed out and the close out date will be recorded, if the complainant is satisfied with the action taken. If not, further assessment is needed and reevaluation of the grievance is required.
7. It is envisaged that the grievances will be resolved within one month after receipt. If this is not possible, the complainant will be informed about the progress on a regular basis.
8. Any grievances related to contractors' activities will be managed in line with the mechanism described here.

In addition to grievances, comments will be reviewed once a week to identify if they require a response. In case the comment requires a response, an appropriate response will be developed by the Project team in a month after the submission date of the comment. Comments will be reflected to a comment log that will include information on the date of the comment submission, details of the person submitting the comment, issue of comment, response required or not, and date of response.