

Annex E

Waste Management

E1 INTRODUCTION

This Annex presents the methodology, findings and recommendations of the assessment of potential waste management impacts related to the Gaziantep Integrated Healthcare Campus (the Project), located in Şahinbey District of Gaziantep, southeast Turkey.

E1.1 ASSESSMENT OBJECTIVES

The objective of the assessment has been to identify the potential impacts of the Project related to waste management practices during the construction and operation phases and to set out appropriate mitigation measures to address these impacts.

E1.2 SCOPE OF THE ASSESSMENT

The scope of the assessment includes:

- (i) an outline of existing local waste management infrastructure in Gaziantep;
- (ii) a description of waste generation and management during construction and operation phases of the Project; and
- (iii) an assessment of potential impacts related to inadequate waste disposal practices.

E1.3 STUDY AREA

The study area covered the Project Site as well as the whole of Gaziantep Province for the identification of suitable waste management facilities/infrastructure which will be used to treat, manage, or dispose of the wastes generated during the construction and operation phases of the Project.

E2.1

RELEVANT DOCUMENTS, STANDARDS AND GUIDELINES

Waste storage, transport and disposal practices during the construction and operation phases of the Project are required to be in full compliance with the Turkish regulatory framework. The Turkish regulations that govern the management of the wastes that will be generated during construction and operation of the Project are as follows:

- Waste Management Regulation (Official Gazette (OG) Date/Number: 02/04/2015/29314);
- Medical Waste Control Regulation (OG Date/Number: 22.07.2005/25883);
- Packaging Waste Control Regulation (OG Date/Number: 24.08.2011/28035);
- Waste Oil Control Regulation (OG Date/Number: 30.07.2008/26952);
- Regulation on Control of Waste Batteries and Accumulators (OG Date/Number: 31.08.2004/25569);
- Regulation on Control of Excavated Soil, Construction and Demolition Wastes (OG Date/ Number: 18.03.2004/25406);
- Regulation on Control of End of Life Tires (OG Date/Number: 25.11.2006/26357);
- Regulation on Control of Waste Vegetable Oils (OG Date/Number: 06.06.2015/29378);
- Water Pollution Control Regulation (OG Date/Number: 31.12.2004/25687);
- Urban Wastewater Treatment Regulation (OG Date/Number 08.01.2006/26047);
- Regulation on Environmental Permits and Licenses (OG Date/Number: 10.09.2014/29915);
- Communiqué on Road Transportation of Wastes (OG Date/Number: 18.01.2013/28532);
- Regulation on Road Transportation of Hazardous Materials (OG Date/Number: 24.10.2013/28801);

- Regulation on Control of Waste Electrical and Electronic Equipment (OG Date/Number: 22.05.2012/28300);
- Regulation on Wastes Generated from Radioactive Substances Use (OG Date/Number: 02.09.2004/25571);
- Radioactive Waste Management Regulation (OG Date/Number: 09.03.2013/28582);
- Communiqué on Recycling of Certain Non-hazardous Wastes (OG Date/Number: 17.06.2011/27967; and
- Regulation on Soil Pollution Control and Point Source Contaminated Sites (OG Date/Number: 08.06.2010/27605).

In addition to the Turkish regulations, waste management practices for the Project will also need to be in line with the following EBRD and IFC ⁽¹⁾ Guidelines:

- EBRD Sub-sectoral Environmental and Social Guidelines: Health Services and Clinical Waste Disposal;
- IFC General EHS Guidelines; and
- IFC EHS Guidelines for Health Care Facilities.

The Turkish regulatory framework requirements and the conditions set in the IFC and EBRD guidance documents provide mitigation measures that should be adopted to minimise the impacts resulting from waste generation.

E2.2

DESKTOP ANALYSIS

Baseline data on waste generation including medical wastes from the existing healthcare service in Gaziantep Province, on-going disposal practices, and a review of the waste disposal facilities in Gaziantep Province was gathered from websites of relevant authorities, through a review of available literature and official authority views obtained via official letters or during face-to-face meetings. Information sources for the baseline conditions and wastes that will be potentially generated during the construction and operation of the Gaziantep IHC were as follows:

- Gaziantep Environmental Status Report (2014);
- Gaziantep Metropolitan Municipality Strategic Plan for 2015-2019;
- Gaziantep Metropolitan Municipality, Water and Sewer Works Authority (GASKİ), Activity Report (2014);
- GASKİ Strategic Plan for 2015-2019; and

(1) There is no EIB waste-specific guideline.

- Literature Survey (including medical waste studies conducted in Turkey).

E2.3 **ENGAGEMENT WITH GOVERNMENTAL AUTHORITIES**

As part of the ESIA stakeholder engagement activities, face-to-face meetings were held with the representatives of the Gaziantep Metropolitan Municipality Department of Environmental Protection and Control and GASKİ in July 2015 in order to gather information on existing baseline conditions. The official views of these authorities were important sources for baseline information and also for identification of necessary mitigation measures relating to waste generation.

E2.4 **FIELD SURVEY**

No field surveys were undertaken specifically for the assessment of waste management impacts.

E2.5 **IMPACT ASSESSMENT METHODOLOGY**

The assessment of likely impacts was undertaken by determining the value/sensitivity of the resources/receptors that are affected, predicting the magnitude of impacts and then evaluating the significance of the impacts as described in *Volume II, Annex A*. Workers and the local community are considered highly sensitive to incidents related to the improper management of waste generated by the Project. The magnitude of impacts will depend on the volume, form and characteristics (eg toxic, hazardous) of wastes and may vary between negligible to large (eg small soil contamination from leakage to large improper disposal of infectious waste at the municipal landfill).

The significance criteria used in the assessment is outlined in *Volume I, Chapter 5, ESIA Methodology, Figure 5.2* and the generic significance definitions given in *Table 2.1* were used for assessing the impacts associated with waste management.

E3.1 OVERVIEW OF WASTE GENERATION IN GAZIANTEP PROVINCE

In accordance with Turkish legislation outlined in *Section E2.1* above, wastes should be classified into the following different types:

- solid waste (non-hazardous);
- domestic wastewater;
- excavation waste;
- hazardous waste;
- medical waste;
- waste packaging;
- waste mineral oils;
- waste batteries and accumulators;
- waste vegetable oil;
- end-of-life tyres;
- waste electrical and electronic equipment; and
- radioactive wastes.

In terms of waste generated within Gaziantep Province, the types of wastes together with the volume, rates (to the extent information is available) and disposal locations are discussed below. The location and the description of the disposal sites are set out in *Section 5.3.2* and *Figure E3.1*.

E3.1.1 *Solid Waste*

According to the information obtained from Gaziantep Environmental Status Report (2014), the Gaziantep Solid Waste Disposal Facility has been in operation since June 1996 and receives approximately 1,300 tonnes of solid waste per day. The facility is located at a distance of approximately 3 km from the Project Site.

E3.1.2 *Domestic Wastewater*

Domestic wastewater generated in Gaziantep Province is treated at three Wastewater Treatment Plants (WWTP) and six Package WWTPs ⁽¹⁾. The three main WWTPs comprise biological treatment systems. The central WWTP is the largest treatment plant in Gaziantep; the facility has been in operation since 1999 and is currently treating a wastewater flow of 300,000 m³/day.

(1) Package WWTPs are custom configured plants using proven design and components to treat wastewater. These types of plants are commonly used as decentralised treatment alternatives.

E3.1.3 *Excavation Wastes*

Information obtained during the face-to-face meeting with Gaziantep Metropolitan Municipality, Department of Environmental Protection and Control representatives, suggests that excavation wastes together with construction and demolition wastes arising in Gaziantep Province are disposed of in a designated disposal area. This disposal area is located near the Gaziantep Bus Terminal, in Beylerbeyi Village approximately 25 km from the Project Site. It is reported in the Environmental Status Report of the Gaziantep Province (2014) that, in 2014, approximately 4.4 million tonnes of excavation waste was produced and disposed of at this designated disposal area. An alternative, more suitable disposal site suitable for the disposal of excavation wastes from the Project has since been identified together with the Municipality, located closer to the Gaziantep IHC site (approximately 4.2 km). Accordingly, SPV has obtained a 'Waste Transportation and Acceptance Certificate' from Şahinbey Municipality (dated 23.05.2016) in line with the Regulation on Control of Excavated Soil, Construction and Demolition Wastes. The details related to the disposal site are given in *Section 5.4.3*.

E3.1.4 *Hazardous Wastes*

According to the data of Provincial Directorate of Environment and Urbanization, the total amount of hazardous wastes recycled in Gaziantep in 2014 was 1.9 million tonnes; whereas, the amount of hazardous wastes disposed of was 92,000 tonnes. All hazardous wastes generated in Gaziantep are collected and treated/disposed of by private companies regulated under the Turkish waste management licensing system.

E3.1.5 *Medical Wastes*

There is a medical waste sterilisation facility located within the Gaziantep Solid Waste Disposal Facility. This has a capacity to sterilise 24 tonnes of medical waste per day.

E3.1.6 *Packaging Wastes*

Eight of the nine District Municipalities in Gaziantep have Packaging Waste Management Plans which have been approved by the MEUP. Şahinbey Municipality, where the Project is located, does not have a packaging waste plan, however private licensed companies operate in the municipality and collect different types of waste, including packaging wastes. In the province, there are licensed authorised private companies collecting, separating and recycling packaging wastes.

E3.1.7 *Waste Mineral Oil*

According to the Gaziantep Environmental Status Report (2014), for the year 2014, a total of 315,378 tonnes of waste mineral oil was collected, of which 258,063 tonnes was recovered and 8,928 tonnes was recycled into useful products.

E3.1.8 *Waste Batteries and Accumulators*

According to the Gaziantep Environmental Status Report (2014), there are four licensed recycling facilities for waste accumulators (lead-acid batteries) in Gaziantep with a total capacity of 17,700 tonnes/year. In 2014, a total of 1,610 tonnes of waste accumulators were collected and 100% of this waste was recycled in licensed facilities. For the year 2014, a total of 5,993 kg of waste batteries were collected.

E3.1.9 *Waste Vegetable Oil*

According to the Gaziantep Environmental Status Report (2014), a total of 7,732 tonnes of waste vegetable oil was collected in Gaziantep in 2014. The collected waste vegetable oil was recycled in six licensed recycling facilities with a total capacity of 6,823 tonnes/year, the remaining was recycled in different facilities located in neighbouring cities.

E3.1.10 *End-of-life Tyres*

According to the Gaziantep Environmental Status Report (2014), there is one temporary storage area for end-of-life tyres in Gaziantep. It is stated in the Strategic Plan of Gaziantep Metropolitan Municipality for the period 2015-2019 that a database has been established for the end-of-life tyres and their disposal is planned to be undertaken by means of pyrolysis in a Municipality-owned facility, which is currently in the planning phase.

E3.1.11 *End-of-life vehicles:*

In Gaziantep, there is one temporary storage area for end-of-life vehicles which has a capacity of 500 tonnes/year.

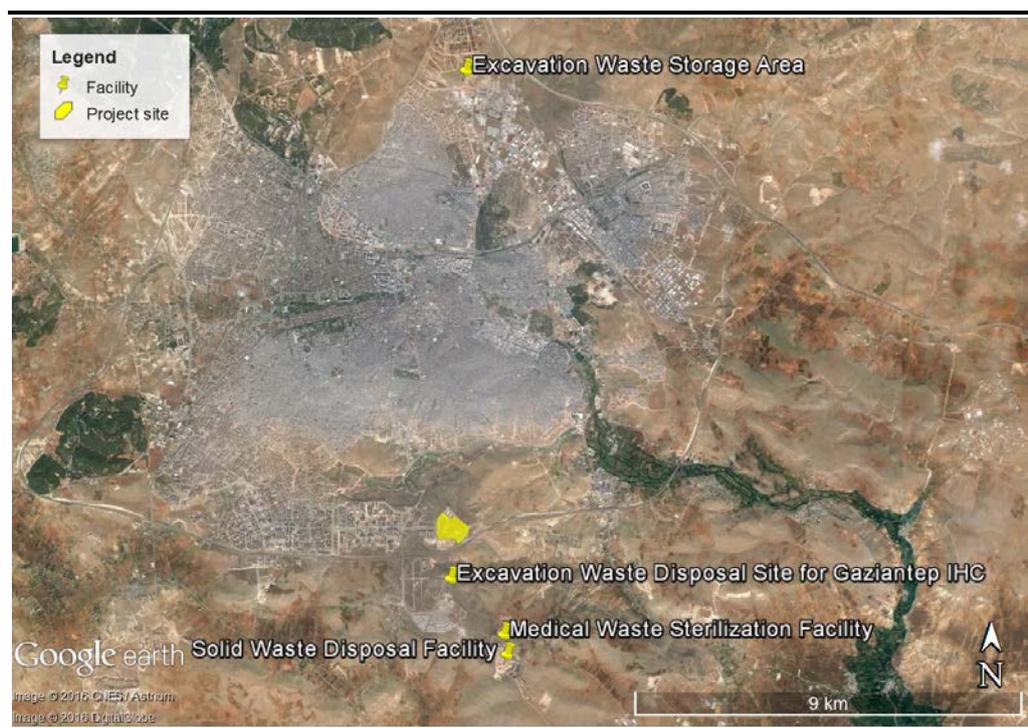
E3.2 *WASTE DISPOSAL AND TREATMENT IN GAZIANTEP*

The waste treatment facilities for the management of the waste streams generated in the Gaziantep Province and its vicinity are listed in *Table E3.1* and shown in *Figure E3.1*.

Table E3.1 Waste Treatment Facilities

Waste Type	Treatment Facility	Responsibility
Solid waste – non-hazardous	Gaziantep Solid Waste Disposal Facility	Gaziantep Metropolitan Municipality
Medical waste	Medical Waste Sterilization Facility	Gaziantep Metropolitan Municipality
Excavation wastes	Designated Disposal Area for Excavation Wastes	Gaziantep Metropolitan Municipality
Hazardous waste, packaging waste, waste mineral oils, waste batteries and accumulators, waste vegetable oil, end-of-life tyres, waste electrical and electronic equipment	Recycling and Hazardous Waste Treatment Facilities	Private Sector
Domestic wastewater	Wastewater Treatment Facility	GASKI Authority of Gaziantep Metropolitan Municipality

Figure E3.1 Locations of Solid Waste, Medical Waste and Excavation Waste Handling Facilities in Gaziantep



Note: the Excavation Waste Storage Site to the north of the Project will not be used (see Section E3.1.3 above).

E3.2.1 Gaziantep Solid Waste Disposal Facility (Landfill)

The Facility is located to the southeast of the city in Bağlarbaşı Village at a distance of approximately 11 km from the city centre and 3 km from the Project Site (see Figure E3.1).

The Facility is currently using an area of 1.5 million m² for disposal of the solid wastes; whereas the total storage area is 5 million m² and the total capacity of

the disposal area is 30 million m³ which is designed to operate effectively for 50 years.

The disposal area is completely isolated from the underlying ground by means of a bottom liner to prevent leakage to the subsurface. The current practice to treat the leachate collected from the drainage system, which is an integral part of the disposal area, involves a wastewater treatment system on site, which has been in operation since September 2013. The treatment facility has a capacity of 250 m³/day and incorporates reverse osmosis technology to treat and reuse the leachate on site. Landfill gas, generated by the degradation of the organic materials in the waste, is collected and used to generate electricity. The on-site electricity generation plant has an installed capacity of 5.65 MW. The components of the Solid Waste Disposal Facility are shown in Figure E3.2.

Figure E3.2 *Solid Waste Disposal Facility Site and Components*



E3.2.2 *Medical Waste Sterilisation Facility*

Medical waste which is collected from hospitals and other healthcare facilities is treated in the Medical Waste Sterilisation Facility which is owned by Gaziantep Metropolitan Municipality. The sterilisation facility is located in Bağlarbaşı Village, approximately 3 km from the Project Site within the Solid Waste Disposal Facility (see *Figure E3.2*). For the year 2014, the medical waste production in Gaziantep was recorded as 3.5 tonnes/day on average. The Gaziantep Medical Waste Sterilisation Facility is used for the treatment of medical wastes from several surrounding cities (ie Kilis, Osmaniye and Kahramanmaraş). The total annual amount of waste entering the facility from these cities is recorded to be approximately 4,500 tonnes. After being sterilised, the medical wastes are disposed together with the solid wastes in the Gaziantep Solid Waste Disposal Facility. The Medical Waste Sterilisation Facility is illustrated in *Figure E3.3*.

Figure E3.3 *Overview of the Medical Waste Sterilization Facility*



Source: <http://www.eracevre.com/index.php/projeler/biten-projeler/gaziantep-sterilizasyon-tesisi>

E3.2.3 *Designated Disposal Area for Excavation Wastes*

The Excavation Waste Disposal Facility is shown in *Figure E3.1* and located approximately 25 km from the Project Site. However, SPV has searched for closer alternative disposal sites and identified one in coordination with the Municipality as explained in *Section 5.4.3*. The location of the Excavation Waste Disposal Site to be used by the SPV is also illustrated in *Figure E3.1*. The amount of excavation waste produced in Gaziantep between 2008 and 2014 is summarised in *Table E3.2*.

Table E3.2 *Yearly Excavation Waste Generation (tonnes) in Gaziantep*

2008	2009	2010	2011	2012	2013	2014
538,142	639,498	1,558,206	2,447,834	4,266,144	3,962,300	4,446,449

Source: Gaziantep Environmental Status Report, 2014

E3.2.4 *Licensed Third Party Waste Management Facilities*

Licensed third party waste management facilities in Gaziantep Province are detailed in *Appendix A*. Wastes generated during the construction and operation phases of the Project will be managed at the facilities according to their class and type, whilst taking into consideration the status (validity) of the facility permit.

E3.2.5 *Wastewater Treatment*

The details of the main WWTPs in Gaziantep are discussed below and the facilities are illustrated in *Figure E3.4*.

The Central WWTP in Gaziantep is the largest in the city with a capacity to treat the wastewater from 1,000,000 people and a throughput of 400,000 m³/day. The facility is located in Gaziantep city centre, on Gaziantep Airport road near Hürmanız, approximately 4.5 km from the Project Site. The WWTP has been operational since 1999. It incorporates physical and biological treatment units and processes to treat the organic contaminants in the municipal wastewater. The WWTP consists of the units and processes set out below.

- Wastewater treatment line:
 - Screens (Automated cleaning);
 - Grit and oil removal unit;
 - Primary sedimentation tanks;
 - Aeration tanks; and
 - Secondary sedimentation tanks.
- Sludge treatment line:
 - Gravitational sludge thickeners;
 - Floatation tanks;
 - Sludge dewatering unit (decanter); and
 - Anaerobic sludge stabilization units.
- Energy production:
 - Cogeneration unit.

According to the GASKİ Activity Report (2014), a daily average wastewater flow of 300,000 m³ has been effectively treated (ie meeting the discharge criteria) in the treatment facility and the effluent stream was discharged into Sacır Creek. The wastewater treatment resulted in the production of 250 tonnes of waste biosolids per day, which were disposed of in an incineration facility. According to the information obtained during a face-to-face meeting with GASKİ representatives, the capacity of the Gaziantep Central WWTP will be increased (at the same location of the existing plant) to serve a population of 2.5 million and the expansion procedure is in the tender phase, however it is not known at this stage whether this will be operational before the Project is finalised.

Kızılhisar WWTP is designed to serve a population of 300,000 in an area comprising Kızılhisar Basın, Büyükşahinbey Organized Industrial District and Solid Waste Disposal Area. The facility comprises physical and advanced biological treatment units and processes to treat organic matter together with nitrogen and phosphorus. The treatment facility receives an average 18,000 m³ of wastewater per day resulting in 15 tonnes of biosolids per day.

Oğuzeli WWTP has a design capacity to serve a population of 40,000 in Oğuzeli District. The treatment facility is designed as an advanced biological treatment system and treats organic matter, nitrogen and phosphorus in the influent municipal wastewater. In 2014, the facility treated 5,500 m³/day of wastewater and produced 8 tonnes per day of biosolids.

The Burç, Işıkli, Arıl, Akçaburç-İncesu, Gülpınar and Gaskispor Package WWTPs perform wastewater treatment within the required limits set by the regulations. These treatment plants are used for treating municipal wastewater of several villages located remotely from the central districts of Gaziantep Province, their capacities range from 20 m³/day to 750 m³/day.

Figure E3.4 below shows images of treatment units and processes in Central, Oğuzeli and Kızılhisar WWTPs in Gaziantep.

Figure E3.4 Main Wastewater Treatment Facilities in Gaziantep



(a) Central WWTP, (b) Oğuzeli WWTP and (c) Kızılhisar WWTP

The types of wastes that will be generated during the construction phase include domestic waste, wastewater, packaging waste, excavation waste, hazardous waste, medical waste and special waste (eg waste mineral oil, waste electric and electronic equipment etc.). A list of these wastes, proposed management practices and relevant risks related to the load on existing management facilities are provided in *Table E4.1*.

E4.1

DOMESTIC WASTE AND DOMESTIC WASTEWATER

The construction workforce will generate waste and wastewater. It has been assumed that there will be 1.12 kg/day per capita domestic waste generation (Turkish Statistical Institute data of average solid waste generation in Turkey) during construction resulting in 3,593 kg/day (assuming the maximum number of workers is approximately 3,208 at the site). Domestic waste will be stored in waste containers and will be collected by the Şahinbey Municipality garbage trucks. The size and the number of containers as well as the locations of the containers will be determined in order for waste collection on-site during construction to be effective. In addition, it is important to note that during the site visit undertaken in July 2015 there was domestic waste materials present at the southwest end of the Project Site. It has been reported by the SPV that these waste materials have now been removed from the Project Site.

Wastewater generation has been estimated based on the water needs of the workforce and the construction activities. A factor of 150 l/day per capita potable water usage based on Turkish Statistical Institute water consumption data has been used. This results in a daily water requirement of 481 m³/day (assuming the maximum number of workers is 3,208 at the site). In addition, water will be used for dust suppression activities, spraying concrete, adding water to backfill material, equipment cleaning and site clean-up. The construction activity water requirement can be taken as 60-70% of the construction worker requirement based on case studies (Wrap UK, 2011 ⁽¹⁾). This would mean an additional 337 m³/day water consumption for construction activities. The total daily water requirement for the construction activities would be 818 m³/day. Assuming that all the water consumed is converted into wastewater, total daily domestic wastewater generation during the construction phase of the Project is estimated to be 818 m³/day.

Domestic wastewater generated during construction from the temporary site offices and the worker camp area will be discharged to the municipal sewerage system and ultimately sent to Gaziantep Central WWTP. An

(1) Waste & Resources Action Programme, 2011. URL: <http://www.wrap.org.uk/>

application (dated 06.04.2016) was submitted to GASKİ to obtain permission to discharge of wastewater to the sewerage pipeline during construction. GASKİ has verbally approved this, however, granted a 6 month temporary approval on 22.07.2016 (ie. Wastewater Connection Permit). Six months is the period anticipated for completing the construction of these mobilization facilities in their entirety. The letter confirmed that a permanent permit will be granted after completion of construction of mobilization facilities.

Impermeable septic tanks will also be installed at the construction site for workers' daily use at the mobile WC units, which will be emptied periodically by vacuum trucks and discharged to the City's sewerage network.

E4.2 **PACKAGING WASTE**

Packaging waste such as paper and cardboard, metal, plastic and glass materials will be collected separately in dedicated waste bins. The bins will be located at convenient points within the site and periodically collected by the authorised waste recycling company. Where possible, packaging waste materials will be recycled and recovered in accordance with the Turkish waste management and control regulations.

E4.3 **EXCAVATION WASTE**

It is anticipated that approximately 645,000 m³ of excavated material will be generated during construction. At the time of writing this report approximately 601,000 m³ of the total amount has already been excavated and;

- 52,000 m³ was already used to level the onsite mobilization roads and for backfilling;
- 170,000 m³ was stored in the temporary area west of the site, which is leased from the Municipality until construction is completed. There is a possibility that the Municipality will ask for this excavated material to remain after construction completion to level the storage area. Otherwise, these materials will also be transported to the designated excavation waste disposal area of Gaziantep Metropolitan Municipality after construction completion;
- 249,000 m³ stored on site or placed along the new municipality road alignment just outside the south-western boundary of the Project Site. Of this amount, selected material will be used for backfilling and the rest will be transported to the disposal area; and
- 130,000 m³ has already been transported to the designated excavation waste disposal area of Gaziantep Metropolitan Municipality.

According to the face-to-face meeting with the relevant representatives of Gaziantep Metropolitan Municipality, the designated excavated waste storage facility has sufficient capacity to receive wastes from the Project. However, due to the long distance between the Project Site and the excavated waste storage facility, the SPV has requested a closer site. As reported by the SPV, the excavation wastes generated during construction phase of the Project will be disposed of at a disposal site located at the south of the Project site at a distance of approximately 4.2 km. The location of the disposal site is illustrated in *Figure E4.1*. SPV has obtained 'Waste Transportation and Acceptance Certificate' from Şahinbey Municipality (dated 23.05.2016) in line with the Regulation on Control of Excavated Soil, Construction and Demolition Wastes for the disposal of up to 470,000 m³ of excavated materials.

Figure E4.1 Location of the Excavation Waste Disposal Site and its Access Route from the Project Site



E4.4 MEDICAL WASTES

Very small quantities of medical wastes will be generated during construction phase as a result of minor cuts and treatment that may be administered at the first aid facilities on-site. These wastes will be stored in special containers and areas in line with the regulations, then collected by dedicated Gaziantep Metropolitan Municipality trucks and sterilised in Gaziantep Medical Waste Sterilisation Facility.

E4.5

HAZARDOUS WASTES

Hazardous waste will include contaminated/oily fabrics and filters, contaminated packaging material, paint residue, used chemicals and similar. Hazardous waste will be collected separately from non-hazardous wastes. Hazardous waste will be stored in dedicated containers on-site in a dedicated area with a concrete base. Incompatible wastes will be kept separately and all hazardous waste containers will be labelled with the waste codes and waste types. Hazardous wastes will be sent to licensed hazardous waste recycling and/or disposal facilities according to their waste types and the facility licence type.

E4.6

SPECIAL WASTES

Special waste will be managed according to the relevant Regulation as set out below.

- Waste Mineral Oils will be collected in red coloured metal drums and will be delivered to licensed facilities.
- Waste Vegetable Oils will be collected by a licensed recycling facility. The necessary containers are provided by the recycling facilities.
- Waste batteries will be separately collected in a dedicated battery box. The box will be collected by TAP (the authorised waste battery collector) to recycle at the licensed recycling facility.
- Waste accumulators will be returned to the supplier. There will be no need to store the waste accumulators on-site.
- Fluorescent lamps will be collected by a licensed hazardous waste transportation company and delivered to IZAYDAS ⁽¹⁾.
- Waste Electronic and Electrical Equipment (WEEE) will be sent to licensed facilities.

E4.7

SUMMARY OF WASTE GENERATED DURING CONSTRUCTION

Table E4.1 summarises the waste generated during construction, its characteristics (including the waste code), on-site management and off-site disposal method, and the risk of a potential impact posed by these wastes.

(1) Izmit Waste and Residue Treatment Incineration Recycling Co.

Table E4.1 Waste Characteristics and Disposal Methods during Construction

Waste Class	Waste Type	Waste Code(*)	Characteristics	Governing Regulation	Proposed On-site Management	Disposal Method	Risk of potential adverse impact
Domestic Waste	Solid Wastes	20 03 01	Non-hazardous-household waste from the construction camp (estimated as 3,593 kg/day) There are existing on-site domestic waste materials illegally placed at southwest end of the Project Site (exact amount not known)	Waste Management Regulation (Official Gazette (OG) Date/Number: 02/04/2015/29314)	Impermeable and sealed waste containers	Gaziantep Solid Waste Disposal Facility	Low Risk. Facility already in use and has adequate capacity to receive waste.
	Domestic Wastewater	20 03 01	Generated by workers at the camp and during construction activities (estimated as 818 m ³ /day)	Water Pollution Control Regulation (OG Date/Number: 31.12.2004/25687)	Direct discharge into the nearby municipal wastewater collection system	Septic tank which will be emptied by vacuum trucks and sent to Gaziantep Central WWTP. An application (dated 06.04.2016) was submitted to GASKİ to obtain permission to discharge of wastewater to the sewerage pipeline during construction. GASKİ has verbally approved this, however granted a 6 months valid temporary approval	Low Risk. Number of workers represents a small increase in the wastewater being generated in the region and for treatment at the local WWTP.

Waste Class	Waste Type	Waste Code(*)	Characteristics	Governing Regulation	Proposed On-site Management	Disposal Method	Risk of potential adverse impact
						on 22.07.2016	
Excavation Waste	Excavated material-non contaminated	17 05 04	Non contaminated natural soil material due to levelling and excavation for foundations (up to 470,000 m ³)	Regulation on Control of Excavated Soil, Construction and Demolition Wastes (OG Date/Number: 18.03.2004/25406)	Storage in temporary area west of site and segregation according to its best use	Excavation waste disposal area designated by Gaziantep Metropolitan Municipality.	Low Risk. There is a specific area designated by the municipality for the disposal of excavation waste.
Packaging waste	Recyclable metal and glass waste	15 01 04 (metal) 15 01 07 (glass)	Non-hazardous - Generated from packaging of products brought to the site that will include certain plastic materials, textile waste. Non-hazardous-metal wastes will be disposed separately for reuse and recycling.	Packaging Waste Control Regulation (OG Date/Number: 24.08.2011/28035) Communiqué on Recycling of Certain Non-hazardous Wastes (OG Date/Number: 17.06.2011/27967)	Impermeable and sealed waste containers	Gaziantep Solid Waste Disposal Facility or other licensed facilities for packaging waste collection listed in Appendix A.	Low Risk. Packaging waste transport and disposal/ recycling are common practices that are well regulated by MEUP and there are several facilities in the province to collect the packaging waste.
Special Wastes	Waste 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 segregated and stored based on the waste oil category (specific type of oil).	Licensed waste oil recycling facilities listed in Appendix A.	Low Risk. Waste oil collection, transport and disposal/ recycling are common practices that are well regulated by MEUP.
	Waste Batteries Waste Accumulators	20 01 33 16 06 01	Generated from construction equipment used at the site	Regulation on Control of Waste Batteries and Accumulators (OG	Stored in special containers and areas in line with the regulations. Waste	To be collected by TAP to be recycled in a licensed facility	Low Risk since this is an established practice and the waste batteries and accumulators will

Waste Class	Waste Type	Waste Code(*)	Characteristics	Governing Regulation	Proposed On-site Management	Disposal Method	Risk of potential adverse impact
				Date/Number: 31.08.2004/25569)	batteries to be delivered to Association of Battery Producers (TAP) and waste accumulators to dealers.		not represent a large increase in the existing waste stream.
Hazardous wastes	Pharmaceutical waste, liquid fuel, chemical substances, antifreeze, vehicle/engine filters, oiled textile, old filters, polluted soil, etc.	e.g. Liquid fuel - 13 07, Polluted soil 17 05 03	Hazardous wastes will mainly be generated during maintenance of vehicles.	Waste Management Regulation (Official Gazette (OG) Date/Number: 02/04/2015/29314)	Hazardous wastes will be separated from other types of wastes generated on the site and stored based on their waste code. Wastes will be temporarily stored for a maximum of 6 months on the site in a designated area and labelled with special signs. These areas will have an impermeable surface and be covered in case of any spills or leakage of hazardous wastes.	Licensed waste recycling and disposal facilities including the ones listed in <i>Table 6.2</i> in the province as well as those outside the region (eg, IZAYDAS).	Low Risk. Hazardous waste collection, transport and disposal are common practices that are well regulated by MEUP.
Medical Waste	Infectious waste, pathological waste, sharps waste	18 01 01 - 18 01 10	Generated from infirmary during construction	Medical Waste Control Regulation (OG Date/Number: 22.07.2005/25883)	Stored in special containers and areas in line with the regulations. Medical waste to be collected by dedicated Gaziantep Metropolitan Municipality trucks.	Medical waste sterilization facility owned by Gaziantep Metropolitan Municipality	Low Risk since the medical waste sterilization unit is operational and has sufficient capacity.

* According to the Waste Management Regulation (OG Date/Number: 22.07.2005/25883)

The wastes that will be generated during the operation phase include medical wastes, hazardous and non-hazardous wastes, domestic wastes and wastewater. Specific waste categories, expected amounts of waste to be generated, relevant waste codes and potential disposal locations are presented and have been assessed in this section.

E5.1**MEDICAL WASTES**

Wastes which are of specific importance for the operation of this Project, are healthcare waste including medical waste, some types of hazardous wastes and other types of waste such as radioactive waste. One of the critical aspects is the estimation of the amount of medical waste to be generated during the operation of the Project and the suitability of the existing waste management facilities to handle these wastes. As mentioned previously, Gaziantep Metropolitan Municipality has a medical waste sterilisation facility within the province where the medical waste collected from existing hospitals, healthcare units and facilities is sterilised. It has a reported treatment capacity of 24 tonnes/day. In order to identify the amount of healthcare waste to be generated during the operation of the Project, a literature survey was conducted to determine the likely waste generation rate per bed.

Rates of waste generation per bed per day were obtained from available literature on medical institutions in several provinces across Turkey, including Gaziantep. This data is presented in *Table E5.1*. The research indicates that there are many factors that have an impact on rates of medical waste generation per bed, including the economic structure of the provinces, technical infrastructure of the medical institutions, bed occupancy rates, hospital's field of activity and capacities of the private branch hospitals.

Table E5.1 Medical Waste Generation in Turkey

Reference	Waste Generated kg/bed/day
Turkey average (Demir <i>et al.</i> , 2002 ⁽¹⁾)	0.66
Gaziantep (Aydoğan <i>et al.</i> , 2011 ⁽²⁾)	0.83
Edirne (Uysal and Tinmaz, 2004 ⁽³⁾)	0.28
Kırklareli (Uysal and Tinmaz, 2004)	0.49
Tekirdağ (Uysal and Tinmaz, 2004)	0.82
Konya (Evirgen, 2007 ⁽⁴⁾)	1.08
Istanbul (Birpınar, 2008 ⁽⁵⁾)	0.63
Bursa (Varınca <i>et al.</i> , 2009 ⁽⁶⁾)	1.15
Adana (Ege and Budak, 2012 ⁽⁷⁾)	0.85

The data for Gaziantep Province was selected as being the most appropriate since it is recent data and more likely to be reflective of waste generated in Gaziantep (although actual waste generated may differ from these numbers) for this Project and the value of 0.83 kg/bed/day was assumed to calculate the medical waste that will be generated during the operational phase of the Project. Accordingly, the total amount of medical waste generation for the Project was calculated as 1,556 kg/day (1,875 beds x 0.83 kg/bed/day) which corresponds to an annual medical waste generation of approximately 568 tonnes ⁽⁸⁾.

As mentioned previously, there is a medical waste sterilisation facility in Gaziantep that has a treatment capacity of 8,760 tonnes/year. Medical waste sterilisation facilities in Turkey are implemented in accordance with national regulations (ie. Medical Waste Control Regulation) which requires sterilisation facilities to be certified to international standards (ISO, CE or similar) in relation to mechanical safety and sterilisation performance. However, there are no specific regulations on the sterilisation of medical waste in Turkey. According to the information obtained from the Gaziantep Metropolitan Municipality, the existing rate of medical waste generation for Gaziantep is no more than 5 tonnes/day (ie maximum of 1,825 tonnes/year) although medical wastes from several neighbouring cities (such as Kilis, Osmaniye and Kahramanmaraş) are also sent to the medical waste

(1) DEMİR, A., ŞENGÜN, R.B., ÖZKAYA, B., 2002, The management of medical wastes in İstanbul. Appropriate Environmental and solid waste management Technologies for developing Countries, Cilt.1. İSTAÇ A.Ş., İstanbul, S. 283-288

(2) Aydoğan Ö., Varank G., Bilgili M.S. 2011. Medical Waste Management in Gaziantep. Journal of Engineering and Natural Sciences, 3, 132 – 140.

(3) UYSAL, F., TİNMAZ, E., 2004. Medical waste Management in Trachea Region of Turkey, Waste Management Research, 22; 403.

(4) EVİRGEN, H., 2007. Çumra Devlet Hastanesi Katı Atıklarının Potansiyeli, Bertarafı ve Değerlendirme Yöntemlerinin Belirlenmesi, Fen Bilimleri Enstitüsü Yüksek Lisans Tezi, Selçuk Üniversitesi, Konya.

(5) BİRPINAR, M.E., BİLGİLİ, M.S., ERDOĞAN, T., 2008. Medical waste Management in Turkey: A Case Study of İstanbul, Journal of Waste management, 10.1016/03-15.

(6) VARINCA, K.B., ESMEN, C., GÖNÜLLÜ, M.T., 2009, Bursa ili Tıbbi Atık Yönetim Sistemi Performans Değerlendirmesi, Türkiye’de katı atık yönetimi sempozyumu, 15-17 haziran, 2009, <http://www.yildiz.edu.tr/~kvarınca/Dosyalar/Yayinlar/yayin022.pdf>

(7) Ege, H., Budak, F., 2012. Health-Care Waste Management in Adana; Problems and Solution. Çukurova University Institute of Natural and Applied Science, Journal of Science and Engineering, 27, 5, 36-45.

(8) Note that the total figure is based on the assumption that Gaziantep IHC will operate at full capacity (ie, 100% bed occupancy throughout a year) which will provide the likely maximum rate of waste generation.

sterilisation facility in Gaziantep resulting in it receiving a further 4,500 tonnes/year. Accordingly, the facility is currently receiving a total of approximately 6,325 tonnes/year. It can therefore be concluded that the facility has sufficient capacity to handle the estimated additional 568 tonnes/year of medical waste that will be generated during the operation of the Project. Prior to the commencing of hospital operations, the SPV will ask for an official letter from the municipality related to obtaining confirmation for the approval of disposal of medical wastes.

In accordance with the IFC EHS Guidelines for Health Care Facilities, healthcare wastes are categorised into infectious wastes (including pathological waste), sharps, pharmaceutical waste, genotoxic/cytotoxic waste, chemical waste, radioactive waste, waste with high content of heavy metals, pressurised containers and general healthcare waste. Each of these classifications has a separate waste code and suitable disposal method in accordance with Turkish regulations. Based on the above mentioned information and the distribution percentages of different types of medical waste obtained from the World Health Organization (1999), the anticipated medical and domestic waste generation during operation has been estimated and is detailed in *Table E5.2*.

Table E5.2 *Project Medical and Domestic Waste Generation Rates*

Waste type	Waste generated Kg/bed	Percentage (%)	Waste Amount (kg/day)
Medical waste	0.83*	100	1,556
• Infectious		37.5	584
• Pathologic		37.5	584
• Pharmaceutical		5	78
• Sharps		5	78
• Genotoxic/cytotoxic waste		2	31
• Chemical waste		10	155
• High levels of metal content		2	31
• Pressurized containers		1	15
Domestic waste	2.35**	100	4,406
• Non-recyclable		95	4186
• Metal (recyclable)		2.5	110
• Plastics (recyclable)		2.5	110

* Aydoğan *et al.*, 2011 (Gaziantep data)

** Ege and Budak, 2012 (data for Adana is used)

Considering that approximately 1,300 tonnes of solid waste is brought daily to the solid waste disposal facility by Gaziantep Metropolitan Municipality, an additional 4.4 tonnes generated by the Project represents an increase in 0.3 %, and is not expected to lead to a significant overload on the capacity of the existing solid waste disposal facility. At the current disposal rate the facility is reported to have sufficient capacity for a 50-year period.

During operation, there will be water use related to general domestic and sanitary use (including laundry), food preparation processes, sterilisers and autoclaves, X-ray equipment (water used in the processing of prints), and water used for gardens. A daily water consumption value per bed was identified to vary between 1.25 m³/day (Altin et al., 1999 ⁽¹⁾) and 1.60 m³/day (data for large hospitals in the United States (U.S. Energy Information Administration, 2007)). Using the figures provided above, the water consumption of the IHC is predicted to vary between 2,344 and 3,000 m³/day (based on the total bed capacity of 1,875). Assuming that the wastewater production is equal to the water consumption, the maximum wastewater generation from the Project is 3,000 m³/day.

The existing treatment load of the Gaziantep Central WWTP, which will be receiving the wastewater stream from the Project, is 300,000 m³/day and the current capacity is 400,000 m³/day which is planned to be increased in the near future. The Project wastewater load will result in a 1% increase in the existing flow rate. This figure is expected to be within the treatment capacity of the Gaziantep Central WWTP. It was reported by SPV that there will be no wastewater treatment plant and that domestic wastewater will be discharged to the sewerage line that is connected to the Gaziantep Central WWTP. There is currently a sewerage pipeline at the southwest of the Project site and according to GASKI's letter (dated 13.06.2016) the capacity of the existing sewerage pipeline is adequate for disposal of the wastewater generated during the operation of the IHC.

Table E5.3 below (developed based on the information provided in IFC EHS Guidelines for Health Care Waste) provides guidelines for the wastes anticipated to be generated during operation based on the classification made together with waste codes, best practice disposal methods as defined in the mentioned IFC guideline and the likely disposal method that will be used for the Project.

(1) Altin, A., Degirmenci, M., Altin, S., 1999. Determination of Amount and Characteristics of Hospital Wastewater in Sivas City, DEU Journal of Engineering Sciences, 1(2), 33-47

Table E5.3 Waste Characteristics and Disposal Methods during Operation

Waste Class	Type of waste	Waste Code (*)	Governing Regulation	Summary of Storage Treatment and Suitable Disposal Options (based on IFC EHS Guidelines for Healthcare Facilities and Turkish Regulations (**))	Anticipated Volume Generated	Proposed Transport of Waste / Waste Management Facility	Risk of Potential Adverse Impact
MEDICAL WASTE	Infectious waste: Includes waste suspected to contain pathogens (eg bacteria, viruses, parasites, or fungi) in sufficient concentration or quantity to cause disease in susceptible hosts.	18 01 03	Medical Waste Control Regulation (OG Date/Number: 22.07.2005/2588 3)	Waste Segregation Strategy: Yellow or red colored bag / container, marked 'infectious' with international infectious symbol. Strong, leak proof plastic bag, or container capable of being autoclaved. Treatment: Chemical disinfection; Wet thermal treatment; Microwave irradiation; Safe burial on hospital premises; Sanitary landfill; Incineration (Rotary kiln; pyrolytic incinerator; single-chamber incinerator; drum or brick incinerator). Highly infectious waste, such as cultures from lab work, should be sterilized using wet thermal treatment, such as autoclaving.	584 kg/ day	Gaziantep Medical Waste Sterilisation Facility Gaziantep Metropolitan Municipality	Low Risk. The municipality has its own medical waste sterilisation unit with sufficient capacity.
	Pathologic waste: Includes pathological and anatomical material (eg tissues, organs, body parts, human fetuses, animal carcasses, blood, and other body fluids), clothes, dressings, equipment / instruments, and other items that may have come into contact with infectious materials.	18 01 02		Anatomical waste should be treated using Incineration (Rotary kiln; pyrolytic incinerator; single-chamber incinerator; drum or brick incinerator).	584 kg/ day		
	Sharps: Includes needles, scalpels, blades, knives, infusion sets, saws, broken glass, and nails etc.	18 01 01		Waste Segregation Strategy: Yellow or red color code, marked 'Sharps'. Rigid, impermeable, puncture-proof container (eg steel or hard plastic) with cover. Sharps containers should be placed in a sealed, yellow bag labeled 'infectious waste'. Treatment: Chemical disinfection; Wet thermal treatment; Microwave irradiation;	78 kg/ day		

Waste Class	Type of waste	Waste Code (*)	Governing Regulation	Summary of Storage Treatment and Suitable Disposal Options (based on IFC EHS Guidelines for Healthcare Facilities and Turkish Regulations (**))	Anticipated Volume Generated	Proposed Transport of Waste / Waste Management Facility	Risk of Potential Adverse Impact
				<p>Encapsulation; Safe burial on hospital premises; Incineration (Rotary kiln; pyrolytic incinerator; single-chamber incinerator; drum or brick incinerator)</p> <p>- Following incineration, residues should be landfilled.</p> <p>-Sharps disinfected with chlorinated solutions should not be incinerated due to risk of generating POPs.</p> <p>-Needles and syringes should undergo mechanical mutilation (eg milling or crushing) prior to wet thermal treatment</p>			
HAZARDOUS WASTE	<p>Pharmaceutical waste: Includes expired, unused, spoiled, and contaminated pharmaceutical products, drugs, vaccines, and sera that are no longer needed, including containers and other potentially contaminated materials (eg drug bottles vials, tubing etc.).</p>	18 01 06	<p>Waste Management Regulation (Official Gazette (OG) Date/Number: 02/04/2015/293 14)</p>	<p>Waste Segregation Strategy: Brown bag / container. Leak-proof plastic bag or container.</p> <p>Treatment: Sanitary landfill; Encapsulation; Discharge to sewer; Return expired drugs to supplier; Incineration (Rotary kiln; pyrolytic incinerator); Safe burial on hospital premises as a last resort.</p> <p>Small quantities: Landfill disposal acceptable, however cytotoxic and narcotic drugs should not be landfilled. Discharge to sewer only for mild, liquid pharmaceuticals, not antibiotics or cytotoxic drugs, and into a large water flow. Incineration acceptable in pyrolytic or rotary kiln incinerators, provided pharmaceuticals do not exceed one percent of total waste to avoid hazardous air emissions. Intravenous fluids (eg salts, amino acids) should be landfilled or discharged to sewer. Ampoules should be crushed and disposed of with sharps.</p> <p>Large quantities: Incineration at temperatures exceeding 1200°C. Encapsulation in metal drums. Landfilling not recommended unless encapsulated in metal drums and groundwater contamination risk is minimal</p>	78 kg/day	<p>Licensed Waste Transportation Company / Hazardous and Medical Waste Incineration Facility; IZAYDAS Hazardous Waste Incineration Plant</p>	<p>Low Risk. Hazardous waste collection, transport and disposal are common practice that is well regulated by MEUP.</p>

Waste Class	Type of waste	Waste Code (*)	Governing Regulation	Summary of Storage Treatment and Suitable Disposal Options (based on IFC EHS Guidelines for Healthcare Facilities and Turkish Regulations (**))	Anticipated Volume Generated	Proposed Transport of Waste / Waste Management Facility	Risk of Potential Adverse Impact
	<p>Genotoxic / cytotoxic waste: Genotoxic waste may have mutagenic, teratogenic, or carcinogenic properties, and typically arises from the faeces, urine, and vomit of patients receiving cytostatic drugs, and from treatment with chemicals and radioactive materials. Cytotoxic drugs are commonly used in oncology and radiology departments as part of cancer treatments.</p>	18 01 08		<p>Waste Segregation Strategy: See above for 'infectious waste'. Cytotoxic waste should be labeled 'Cytotoxic waste'.</p> <p>Treatment: Return expired drugs to supplier; Chemical degradation; Encapsulation; Inertization; Incineration (Rotary kiln, pyrolytic incinerator);</p> <ul style="list-style-type: none"> - Cytotoxic waste should not be landfilled or discharged to sewer systems. - Incineration is preferred disposal option. Waste should be returned to supplier where incineration is not an option. Incineration should be undertaken at specific temperatures and time specifications for particular drugs. Most municipal or single chamber incinerators are not adequate for cytotoxic waste disposal. Open burning of waste is not acceptable. - Chemical degradation may be used for certain cytotoxic drugs - Encapsulation and inertization should be a last resort waste disposal option. 	31 kg/day	Licensed Waste Transportation Company / Hazardous and Medical Waste Incineration Facility: - IZAYDAS Hazardous Waste Incineration Plant	Low Risk. Hazardous waste collection, transport and disposal are common practice that is well regulated by MEUP.
	<p>Chemical waste: Waste may be hazardous depending on the toxic, corrosive, flammable, reactive, and genotoxic properties. Chemical waste may be in solid, liquid, or gaseous form and is generated through use of chemicals during diagnostic / experimental work, cleaning, housekeeping, and disinfection. Chemicals typically include formaldehyde, photographic chemicals,</p>	18 01 06		<p>Waste Segregation Strategy: Brown bag / container. Leak-proof plastic bag or container resistant to chemical corrosion effects.</p> <p>Treatment: Facilities should have permits for disposal of general chemical waste (eg sugars, amino acids, salts) to sewer systems.</p> <ul style="list-style-type: none"> - Small hazardous quantities: Pyrolytic incineration, encapsulation, or landfilling. - Large hazardous quantities: Transported to appropriate facilities for disposal, or returned to the original supplier using shipping arrangements that abide by the Basel Convention. Large quantities of chemical waste should not be encapsulated or landfilled. 	155 kg/day	Licensed Waste Transportation Company / Hazardous and Medical Waste Incineration Facility: - IZAYDAS Hazardous Waste Incineration Plant	Low Risk. Hazardous waste collection, transport and disposal are common practice that is well regulated by MEUP.

Waste Class	Type of waste	Waste Code (*)	Governing Regulation	Summary of Storage Treatment and Suitable Disposal Options (based on IFC EHS Guidelines for Healthcare Facilities and Turkish Regulations (**))	Anticipated Volume Generated	Proposed Transport of Waste / Waste Management Facility	Risk of Potential Adverse Impact
	halogenated and non-halogenated solvents, organic chemicals for cleaning / disinfecting, and various inorganic chemicals (eg acids and alkalis).						
	Waste with high content of heavy metals: Batteries, broken thermometers, blood pressure gauges, (eg mercury and cadmium content).			Waste Segregation Strategy: Waste containing heavy metals should be separated from general health care waste. Treatment: Safe storage site designed for final disposal of hazardous waste. - Waste should not be burned, incinerated, or landfilled. Transport to specialized facilities for metal recovery.	31 kg/day	Licensed Hazardous Waste Transportation Company / IZAYDAS Hazardous Waste Incineration Plant or Licensed Hazardous Waste Recycling Facility	Low Risk. Hazardous waste collection, transport and disposal are common practice that is well regulated by MEUP.
	Pressurized containers: Includes containers / cartridges / cylinders for nitrous oxide, ethylene oxide, oxygen, nitrogen, carbon dioxide, compressed air and other gases.			Waste Segregation Strategy: Pressurized containers should be separated from general health care waste. Treatment: Recycling and reuse; Crushing followed by landfill - Incineration is not an option due to explosion risks - Halogenated agents in liquid form should be disposed of as chemical waste, as above.	15 kg/day	Licensed Hazardous Waste Transportation Company / IZAYDAS Hazardous Waste Incineration Plant or Licensed Hazardous Waste Recycling Facility	Low Risk. Hazardous waste collection, transport and disposal are common practice that is well regulated by MEUP.
RADIOACTIVE WASTE	Radioactive waste: Includes solid, liquid, and gaseous materials that have been contaminated with radionuclides.		Regulation on Wastes Generated from Radioactive Substances Use	Waste Segregation Strategy: Lead box, labeled with the radioactive symbol. Treatment: Radioactive waste should be managed according to national requirements and current guidelines from		Inform TAEK (Turkish Atomic Energy Authority)	Low Risk. These wastes will be handled by TAEK.

Waste Class	Type of waste	Waste Code (*)	Governing Regulation	Summary of Storage Treatment and Suitable Disposal Options (based on IFC EHS Guidelines for Healthcare Facilities and Turkish Regulations (**))	Anticipated Volume Generated	Proposed Transport of Waste / Waste Management Facility	Risk of Potential Adverse Impact
	Radioactive waste originates from activities such as organ imaging, tumour localization, radiotherapy, and research / clinical laboratory procedures, among others, and may include glassware, syringes, solutions, and excreta from treated patients.		(OG Date/Number: 02.09.2004/2557 1) Radioactive Waste Management Regulation (OG Date/Number: 09.03.2013/2858 2)	the International Atomic Energy Agency (IAEA (2003), Management of Waste from the Use of Radioactive Materials in Medicine, Industry and Research. IAEA Draft Safety Guide DS 160, 7 February 2003).			
SPECIAL WASTE	Fluorescent Lamp	20 01 21		Waste Segregation Strategy: Separately collect in cardboard boxes to avoid being broken. Disposal: Crushing in dedicated drums		Licensed Hazardous Waste Transportation Company / IZAYDAS	Low Risk. Special waste collection, transport and recycling / disposal are common practice that is well regulated by MEUP and by the related licensed facilities.
	Waste mineral oils	13 01 .. 13 02 ..	Waste Oil Control Regulation (OG Date/Number: 30.07.2008/2695 2)	Waste Segregation Strategy: Red-colored metal drums with 'Waste Oil' label. Recycling of 1 st category waste mineral oils; Energy recovery as fuel supplement in cement kilns of 2 nd category waste oils; disposal in incineration plants of 3 rd category waste oils.		Licensed Waste Transportation Company / Licensed Waste Oil Recycling Facilities or other Hazardous Licensed Facilities	
	Waste vegetable oils	20 01 25	Regulation on Control of Waste Vegetable Oils (OG Date/Number: 19.04.2005/2579 1)	Waste Segregation Strategy: Collect in plastic drums Treatment: Recycling to produce biodiesel fuel.		Licensed Waste Transportation Company / Licensed Recycling Facility	
	Waste accumulators	16 06 01	Regulation on Control of Waste Batteries and Accumulators (OG Date/Number: 31.08.2004/2556	Waste Segregation Strategy: Separately store in hazardous waste storage area up to 90 days on-site. Treatment: Recycling of the plastic, lead and acid solutions.		Licensed Waste Transportation Company / Give waste accumulators back to the supplier.	

Waste Class	Type of waste	Waste Code (*)	Governing Regulation	Summary of Storage Treatment and Suitable Disposal Options (based on IFC EHS Guidelines for Healthcare Facilities and Turkish Regulations (**))	Anticipated Volume Generated	Proposed Transport of Waste / Waste Management Facility	Risk of Potential Adverse Impact
	Waste batteries	20 01 33	9)	Waste Segregation Strategy: Separately collect in battery box. Treatment: Recycling		Licensed Waste Transportation Company / Give the waste batteries to TAP.	
DOMESTIC WASTE	General health care waste (including food waste)	20 03 01	Waste Management Regulation (Official Gazette (OG) Date/Number: 02/04/2015/293 14)	Waste Segregation Strategy: Black bag / container. Halogenated plastics such as PVC should be separated from general health care facility waste to avoid disposal through incineration and associated hazardous air emissions from exhaust gases (eg hydrochloric acids and dioxins). Treatment: Disposal as part of domestic waste. Food waste should be segregated and composted. Component wastes (eg paper, cardboard, recyclable plastics [PET, PE, PP], glass) should be segregated and sent for recycling.	4,406 kg/day	Gaziantep Metropolitan Municipality/ Solid Waste Disposal Facility	Low Risk. Facility already in use and has sufficient capacity to receive waste.
	Domestic wastewater	20 03 01	Water Pollution Control Regulation (OG Date/Number: 31.12.2004/2568 7)	Direct discharge into the nearby municipal wastewater collection line via permitted collection to the infrastructure. -Should be separately collected and not be mixed with medical wastewater.	3,000 m ³ /day	Gaziantep Central WWTP	Low Risk. Facility already in use, the capacity is planned to be increased the near future and IHC wastewater load results in an additional 1% in the existing flow rate.
PACKAGING WASTE	Metal, Glass or Plastic packaging waste: Generated from packaging of products brought to the site that will include certain plastic, glass and metal.	15 01 04 (metal)	Packaging Waste Control Regulation (OG Date/Number: 24.08.2011/2803 5)	Impermeable and sealed waste containers		Licensed Packaging Waste Collection Company / Licensed Packaging Recycling Facilities listed in <i>Table 8.1</i> or other Waste Recycling Companies	Low Risk. Facilities already in use and has adequate capacity to receive waste
		15 01 07 (glass)					
		15 01 02 (plastic)					
		15 01 10 (Contaminated)					
				Waste Segregation Strategy: Separately collect in containers. Disposal: RDF production or disposal			

Waste Class	Type of waste	Waste Code (*)	Governing Regulation	Summary of Storage Treatment and Suitable Disposal Options (based on IFC EHS Guidelines for Healthcare Facilities and Turkish Regulations (**))	Anticipated Volume Generated	Proposed Transport of Waste / Waste Management Facility	Risk of Potential Adverse Impact
NON-HAZARDOUS WASTE	Metal Scrap	20 01 40	Communiqué on Recycling of Certain Non-hazardous Wastes (OG Date/Number: 17.06.2011/2796 7	Stored in dedicated impermeable base area		Licensed Waste Transportation Company / Licensed recycling facility	Low Risk. Non-hazardous waste collection, transport and recycling are common practice that is well regulated by MEUP and by the related licensed facilities.
	Wood scrap	17 02 01					
	Plastic scrap	17 02 03					

* According to the Waste Management Regulation (OG Date/Number: 22.07.2005/25883)

** Retrieved from IFC Environmental, Health and Safety Guidelines for Healthcare Facilities for medical wastes, hazardous wastes and radioactive wastes. For the categories of special wastes, domestic waste, packaging waste and non-hazardous waste; the options are adapted from Turkish legislation.

E6.1 POTENTIAL IMPACTS DURING CONSTRUCTION

E6.1.1 Solid Waste Generation

Solid wastes likely to be generated during construction will include excavation waste, sanitary and domestic wastes from site offices and kitchens, construction related wastes such as scrap materials, packaging and pallets from deliveries, tyres and similar. If not handled and disposed of in an appropriate manner, the generation of these wastes could give rise to major impacts. Excavated soil on the other hand, has the potential to cause local nuisance due to dust generation during construction phase. It is important to note that there were on-site domestic waste materials present at southwest end of the Project Site. It was reported by the SPV that these waste materials have been removed by the Municipality.

Excavated soils will be reused to the extent possible and the parts that cannot be reused will be disposed of in line with the Turkish Regulation on Control of the Excavated Soil, Construction and Demolition Wastes. Construction materials will also be reused and/or recycled to the extent possible and where practical.

Domestic solid waste, especially food and food packaging, attracts vermin and other disease carriers. If not managed properly, solid wastes may generate irritant odour in and around the Project Site.

Given the amount of the excavated materials to be generated (up to 470,000 m³) and the large workforce generating domestic waste, it is likely that the magnitude of impacts to the environment, workers and community will be large. However, with the embedded mitigation measures that will be part of the Project design (eg compliance with existing regulations), the impact is considered to be of **minor** significance.

E6.1.2 Accidental Spills, Contaminated Soils and Hazardous Wastes

Contaminated soils may be generated during the construction phase through spills of hazardous chemicals. In addition, other hazardous wastes such as contaminated/oily fabrics, contaminated packaging materials, and used chemicals will be generated. Any oil and/or chemical spills and other hazardous wastes generated during construction activities may create adverse health and safety impacts to the workers as well as environmental impacts (ie to soil).

In case such impacts occur, the sensitivity of any receptor (eg soil, workers) would be potentially high, and the magnitude of impacts could be large depending on the size of the spill, the environment where the spill has occurred and the response time to the incident. Contaminated soils, if

generated, will be disposed of in line with the Turkish Regulation on Soil Pollution Control and Point Source Contaminated Sites. Additionally, suitably sized impervious bunds or other containment will be installed where hazardous materials are handled (such as fuel storage and loading areas, concrete mixing, hazardous material storage area). Impacts of **minor** significance are therefore predicted.

E6.1.3 *Special Wastes*

Special wastes likely to be generated during construction include waste mineral oils, waste vegetable oils, batteries and accumulators, waste electrical and electronic equipment. Improper handling and disposal of these wastes may give rise to adverse impacts to human and environmental health due to the properties of these wastes (eg hazardous, toxic and polluting).

The sensitivity of any receptor (eg soil, workers) that would be exposed to this waste in the event of an incident would be potentially high, and the magnitude of impacts could be considered as large depending on the properties and volume of wastes. All types of waste will be segregated according to their category and will be disposed of at relevant licensed facilities in accordance with regulatory requirements. Also, record keeping on waste generation, storage and transportation to third party waste management facilities will be maintained according to national legislation. Impacts of **minor** significance are therefore predicted to occur.

E6.1.4 *Domestic Wastewater*

Domestic wastewater will be generated during the construction phase from the work areas and accommodation camps. Improper discharge of domestic wastewater can have significant impacts on the soil, surface waters and the local environment potentially resulting in health impacts and nuisance.

Domestic wastewater generated during construction from the temporary site offices and the worker camp area will be discharged to the municipal sewerage system and ultimately sent to Gaziantep Central WWTP. An application (dated 06.04.2016) was submitted to GASKİ to obtain permission to discharge of wastewater to the sewerage pipeline during construction. GASKİ has verbally approved this, however, granted a 6 month temporary approval on 22.07.2016 (ie. Wastewater Connection Permit). Six months is the period anticipated for completing the construction of these mobilization facilities in their entirety. The letter confirmed that a permanent permit will be granted after completion of construction of mobilization facilities.

Impermeable septic tanks will also be installed at the construction site for workers' daily use at the mobile WC units, which will be emptied periodically by vacuum trucks and discharged to the City's sewerage network.

E6.1.5 Medical Wastes

It is likely that there will be a site clinic at the construction site where medical waste will be generated as a result of first aid treatment for minor cuts, etc. Although the amount of medical waste generated is expected to be small, significant impacts might occur such as transmission of infectious diseases, if these wastes are not managed properly. Therefore, medical wastes will not be mixed with other types of wastes and will be collected separately, transported via licensed haulers and disposed of at licensed facilities according to the provisions of the Turkish Medical Waste Control Regulation. As a result, impacts of **minor** significance are predicted.

E6.2 POTENTIAL IMPACTS DURING OPERATION

E6.2.1 Healthcare Wastes

Healthcare wastes (particularly medical wastes, infectious waste, pathological waste and sharps) may cause extreme adverse impacts on human and environmental health if not managed properly.

There will be a substantial amount of medical waste (1,556 kg/ day) generated during the operation of the Project. There is a Medical Waste Sterilisation Facility in Gaziantep where medical wastes generated by the Project will be sent for treatment. This facility is not fully utilised and therefore is expected to have capacity to accept and treat healthcare wastes generated by the Project. Prior to the commencing of hospital operations, the SPV will ask for an official letter from the municipality confirming approval for the disposal of medical wastes.

In addition to medical wastes, there will be the generation of pharmaceutical waste, genotoxic/cytotoxic wastes, chemical wastes, waste with high content of heavy metals and pressurized containers (regarded as hazardous wastes). These other wastes have the potential for causing pollution of the land and surface water if not managed properly. Direct contact with toxic components or uptake of components such as heavy metals through the food chain may cause major impacts to human and environmental health. There are, however, disposal facilities in the region that will be used during the operation of the Project. In addition to the above mentioned waste types, there will be generation of radioactive wastes that will originate from activities such as organ imaging, tumour localisation, radiotherapy, and research / clinical laboratory procedures, among others, and may include glassware, syringes, solutions, and excreta from treated patients.

The following embedded mitigation measures will be incorporated in the Project design to manage healthcare waste appropriately:

- Medical wastes will not be mixed with other types of wastes and will be collected separately, transported via licensed haulers and disposed of at

licensed facilities according to the provisions of the Medical Waste Control Regulation.

- There will be a dedicated temporary waste storage building inside the health campus that will be designed for the temporary storage of different kinds of wastes according to the provisions of the waste regulations.
- Wastes will be transported to the temporary waste storage area via designated vehicles (eg trolleys/carts) which will be cleaned and disinfected regularly. These vehicles will be the appropriate size to handle necessary loads and the number of vehicles will be appropriate to the hospital needs.
- Domestic wastewater coming from the nuclear medicine will be conveyed to an appropriate waste disposal plant (e.g. neutralisation tank) for the storage and decay of organic wastewater deriving from the use of radioactive substances. Sewage water from laboratory sources will flow through dedicated discharge pipelines to an outside tank for collection and disposal by authorised providers.
- Aerosol cans and other gas containers will be segregated to avoid disposal via incineration and related explosion hazard.
- Mercury will be stored separately in sealed and impermeable containers in a secure location.
- Cytotoxic wastes will be stored separately from other waste in a secure location.
- Radioactive waste will be stored in containers to limit dispersion, and secured behind lead shields. Turkish Atomic Energy Authority (TAEK) will be informed about the radioactive waste generation and the radioactive waste management options will be identified before implementing any practice with TAEK.

The impacts resulting from healthcare wastes during operation of the Project will be of **minor** significance considering the above-mentioned embedded mitigation and measures that will be followed.

E6.2.2 *Domestic Waste and Domestic Wastewater*

Domestic waste will be generated during the operation due to daily activities (eg from offices, kitchen, cafeteria, etc.). The domestic waste that will be generated in the hospital is estimated to be 4,400 kg/day which is a negligible increase on the 1,300 tonnes/day of solid waste that is currently disposed of at the Gaziantep Solid Waste Disposal Facility. If the domestic wastes are not handled in an appropriate manner, the magnitude of impact on the environment and local population could be large.

Domestic wastewater generated during operation will contain a variety of pathogens, organic pollutants, nitrogen, phosphorous and suspended solids due to its sewage content. Water consumption during operation is estimated to be 3,000 m³/day. All the water consumed is assumed to be converted into wastewater. If not managed properly, discharge of untreated domestic wastewater could have large impact on the water supplies and the local population.

A wastewater treatment plant is not planned as part of the project and domestic wastewater will be discharged to the sewerage pipeline that is connected to the Gaziantep Central WWTP. According to GASKI's letter (dated 13.06.2016) the capacity of the existing sewerage pipeline is adequate for disposal of the wastewater generated during the operation of the IHC. Therefore, the impacts will be of **minor** significance.

E6.2.3 *Contaminated Wastewater*

Contaminated wastewater may result from discharges from medical wards and operating theatres (eg body fluids and excreta, anatomical waste), laboratories (eg microbiological cultures, stocks of infectious agents), pharmaceutical and chemical stores; cleaning activities (eg waste storage rooms), and x-ray development facilities. Wastewater may also result from treatment disposal technologies and techniques, including autoclaving, microwave irradiation and chemical disinfection. These waste streams will be collected separately.

The following embedded mitigation measures will be incorporated in the Project design to manage contaminated wastewater appropriately.

- Contaminated wastewater will not be mixed with the domestic wastewater stream.
- Procedures and mechanisms will be in place for the separate collection of urine, faeces, blood, and vomit from patients treated with genotoxic drugs to avoid their entry into the wastewater stream.
- Sewage water from laboratory sources will flow through dedicated discharge lines to an outside tank for collection and disposal by authorised providers.
- Wastewater that is contaminated with radioactive substances (ie from nuclear medicine department) will be collected separately and/or subject to neutralisation prior to being discharged into the sewer system. Several conditions are set for liquid wastes contaminated with radioactive substances in the Regulation on Wastes Generated from Radioactive Substances Use (Official Gazette date/no: 02.09.2004/25571) related to discharging this type of wastewater into the sewer system will be met.

Therefore, with the implementation of the embedded mitigation set out above impacts of **minor** significance are expected.

E6.2.4 *Special Wastes*

Special wastes likely to be generated during operation include waste mineral oils, waste vegetable oils, batteries and accumulators, waste electrical and electronic equipment. Improper handling and disposal of these wastes may give rise to adverse impacts to human and environmental health due to the properties of these wastes (eg hazardous, toxic). In the event these wastes are not managed in an appropriate manner, the magnitude of impacts could be considered as medium depending on the properties and volume of wastes. Embedded mitigation includes the segregation of all types of special waste according to their category, which will then be disposed of at relevant licensed facilities in accordance with regulatory requirements. Record keeping with regard to waste generation, storage and transportation to third party waste management facilities will be maintained according to national legislation. Impacts of **minor** significance are therefore predicted to occur.

E6.3 *MITIGATION MEASURES*

In addition to the embedded mitigation measures (described in *Section E6.1* and *E6.2* of this Annex) that are already part of the Project design and/or required by national legislation, the following additional mitigation measures should be implemented in relation to waste management both during construction and operation phases:

- All wastes generated during construction and operation will be collected, segregated, labelled and stored on site at a designated waste storage area.
- All wastes generated during construction and operation will be managed according to the Waste Management Plan (WMP) that is to be developed for the Project. The WMP will address waste minimisation, segregation, labelling, storage, transportation and recycling/disposal to meet the national regulatory requirements and international standards.
- Periodic inspections will be conducted in the waste recycling/disposal facilities to ensure proper disposal practices are implemented.
- Regular periodic integrity testing for hazardous material storage equipment will need to be conducted and appropriate leak detection systems will be in place.
- A Hazardous Material Management Plan should be developed to ensure proper handling of hazardous materials during construction and operation.

- An Emergency Preparedness and Response Plan should be developed to ensure mitigation of spills from hazardous materials during construction and operation.

In addition to the above, the following mitigation measures will be specific to the construction phase:

- Construction workers and relevant staff will be trained in the implementation of good construction site practices and on spill response and prevention measures.
- No fuelling of vehicles or equipment will take place within excavated areas; no hazardous materials will be stored in excavated areas and all handling of hazardous materials will take place under special supervision. Fuelling will only be carried out in designated areas away from surface drainage pathways exiting the site.
- All staff and subcontractors will be required to report any incidents and these will be subject to investigation, and remedial and preventive actions will be taken as needed.

In addition to the above, the following mitigation measures will be specific to the operation phase:

- The Project will establish, operate and maintain a Healthcare Waste Management System adequate for the scale and type of activities and identified hazards in accordance with the IFC EHS Guidelines for Healthcare Facilities.
- The waste management practices given in the IFC EHS Guidelines for Healthcare Facilities will be implemented.

E6.4

RESIDUAL IMPACTS

With the implementation of the mitigation measures, both embedded and the additional measures set out above, and considering that there are relevant waste handling facilities and companies in Gaziantep, the residual impacts are estimated to be of **negligible** significance.

E6.5

CUMULATIVE IMPACTS

The previous discussions indicate that the Turkish regulatory framework is in place for assigning specific waste codes to each of the wastes to be generated in the construction and operation phases of the Project and the waste disposal infrastructure for domestic, medical, hazardous and wastewater streams are available and operational in Gaziantep. The estimated waste amounts from the Project are not considered to result in any overloading of the existing

waste treatment facilities and shouldn't reduce the availability of these facilities for other users; therefore, no cumulative impacts are foreseen.

Appendix E1

Licensed Private Sector
Waste Management
Facilities

Name of Company	Permit Type	Permit Issue Date	Permit Expiry Date
BOZHÜYÜK PLASTİK SAN. VE TİC. LTD. ŞTİ.	Package waste recycling	31.12.2010	31.12.2015
PLAS-SAN PLASTİK SAN.VE TİC.	Package waste recycling	17.01.2011	17.01.2016
FİLİZ PLASTİK NAYLONTRB.VE PLS.AYK.S AN.VE TC.LTD.ŞTİ	Package waste recycling	15.08.2011	15.08.2016
RİTAŞ KİMYA VE TEKSTİL SAN. TİC. A.Ş.	Package waste recycling	06.06.2012	01.02.2016
YAŞAR AMBALAJ KAĞITBOB HAVA TUR.SAN VE TİC.A.Ş.	Air emissions, Wastewater discharge, Package waste recycling	12.07.2012	12.07.2017
NAKSAN PLASTİK VE ENERJİ SAN.VE TİC.A.Ş.	Air emissions, Package waste recycling	13.07.2012	13.07.2017
KIZILIRMAK GERİ DÖNÜŞÜM HURDA TEKS SAN VE TİC LTD.ŞT	Package waste recycling, Package waste collection and separation	06.08.2012	30.07.2017
EBAT İNŞAAT PLASTİK VE KİMYA SAN.TİC.LTD.ŞTİ.	Non-hazardous waste recycling, Package waste recycling	19.12.2012	19.12.2017
KAMİL KÖMÜRCÜ-PETKA PLASTİK SAN. VE TİC.	Non-hazardous waste recycling, Package waste recycling	09.01.2013	09.01.2018
BERKSAN AMBALAJ GERİ DÖNÜŞÜM TEKSTİL SANAYİ VE Tİ C LTD.ŞTİ	Package waste recycling	14.01.2013	14.01.2018
AYYILDIZ ELYAF SANAYİ VE TİC LTD.ŞTİ	Non-hazardous waste recycling, Package waste recycling	15.01.2013	15.01.2018
NESİL PLASTİK AMBALAJ TEKSTİL SANAYİ VE TİCARET LİMİTED ŞİRKETİ	Non-hazardous waste recycling, Package waste recycling	14.02.2013	14.02.2018
DOĞAN ELYAF SAN.VE TİC.LTD.ŞTİ.	Package waste recycling, Package waste collection and separation	12.03.2013	12.03.2018
BAYPAK TEKSTİL ELYAF VE İPLİK SAN. LTD ŞTİ.	Non-hazardous waste recycling, Package waste recycling	29.05.2013	29.05.2018
TEBSAN PLASTİK TURİZM PETROL ÜRÜNLERİ HAYVANCILIK TARIM ÜRÜNLERİ SANAYİ VE TİCARET LİMİTED ŞİRKETİ	Non-hazardous waste recycling, Package waste recycling	12.07.2013	12.07.2018
TEKSAN AMBALAJ SANAYİ TİCARET ANONİM ŞİRKETİ	Non-hazardous waste recycling, Package waste recycling	14.08.2013	14.08.2018
GÖZDE PLASTİK AMBALAJ.SAN.VE TİC.A.Ş	Non-hazardous waste recycling, Package waste recycling	08.10.2013	08.10.2018
HÖSÜKOĞLU PLASTİK SAN. VE TİC. LTD. ŞTİ - ORGANİZE SANAYİ BÖLGESİ ŞUBESİ	Non-hazardous waste recycling, Package waste recycling	26.12.2013	26.12.2018
KIRATLI PLASTİK SANAYİ VE TİCARET LİMİTED ŞİRKETİ	Non-hazardous waste recycling, Package waste recycling, Package waste collection and separation	14.01.2014	14.01.2019

Name of Company	Permit Type	Permit Issue Date	Permit Expiry Date
ÇELİKLER PLASTİK - MUSTAFA HAKKI ÇELİK	Non-hazardous waste recycling, Package waste recycling	06.03.2014	06.03.2019
ASER AMBALAJ SANAYİ VE TİCARET LİMİTED ŞİRKETİ	Air emissions, Non-hazardous waste recycling, Package waste recycling	17.03.2014	17.03.2019
MTM PLASTİK GERİ DÖNÜŞÜM TOPLAMA VE AYIRMA KİMYA TEKSTİL DANIŞMANLIK SAN. VE TİC. LTD. ŞTİ.	Non-hazardous waste recycling, Package waste collection and separation, Package waste recycling	16.04.2014	14.05.2017
PETSA TEKS AMB. PLS.SAN. TİC. LTD ŞTİ	Package waste recycling	25.04.2014	25.04.2019
ARABPET HURDA TEKSTİL İNŞAAT TURİZM GIDA SANAYİ VE TİCARET LİMİTED ŞİRKETİ	Non-hazardous waste recycling, Package waste recycling	13.06.2014	13.06.2019
EKOPET GERİ DÖNÜŞÜM SANAYİ TİCARET ANONİM ŞİRKETİ	Air emissions, Non-hazardous waste recycling, Package waste recycling	27.06.2014	27.06.2019
ES-PET SANAYİ VE TİCARET LTD.ŞTİ.	Package waste recycling	24.07.2014	24.07.2019
EYYÜP ÇALIŞKAN-ÇALIŞKAN PLASTİK	Non-hazardous waste recycling, Package waste recycling	17.11.2014	17.11.2019
EKONET TEKSTİL VE AMBALAJ SAN. TİC. A. Ş./ŞUBE	Air emissions, Package waste recycling	24.11.2014	24.11.2019
MUSTAFA KUTLAR - PLASTÜR PLASTİK	Package waste collection and separation, Non-hazardous waste recycling, Package waste recycling	24.04.2015	24.04.2020
GAZİANTEP ATIK VE GERİ DÖNÜŞÜM SAN TİC LTD ŞTİ	Package waste collection and separation	01.04.2011	01.04.2016
AKPINARİBRAHİM HALİL	Package waste collection and separation	21.04.2011	21.04.2016
GÖK-AY HURDA TEKSTİL GIDA SANAYİ VE TİCARET LİMİTED ŞİRKETİ	Package waste collection and separation	22.04.2011	22.04.2016
TEKNİK KATI ATIK YÖN. TİC. LTD. ŞTİ.	Package waste collection and separation	18.02.2013	18.02.2018
İBRAHİM HALİL AKPINAR-AKPINAR HURDA PLASTİK KIRMA VE TELİS TİCARETİ	Non-hazardous waste recycling, Package waste collection and separation	12.07.2013	12.07.2018
ÇEVKASAN KAĞIT VE PLASTİK AMBALAJ PAZARLAMA NAKLİYAT SAN.VE TİC.LTD.ŞTİ	Package waste collection and separation	08.10.2013	08.10.2018
CEYHANLAR ATIK VE GERİ DÖNÜŞÜM SANAYİ TİCARET LİMİTED ŞİRKETİ	Package waste collection and separation	08.10.2013	08.10.2018
ULUKÖK KURŞUN TİCARET VE SANAYİ LİMİTED ŞİRKETİ	Air emissions, Non-hazardous waste recycling, Waste batteries and accumulators recycling	02.08.2013	02.08.2018

Name of Company	Permit Type	Permit Issue Date	Permit Expiry Date
AKIM AKÜ SANAYİ-KERİM GÜNDOĞAN	Air emissions ,Hazardous waste recycling, Non-hazardous waste recycling, Waste batteries and accumulators recycling	07.08.2013	07.08.2018
KÖROĞLU KURŞUN İZABE - FATİH KÖROĞLU	Air emissions, Waste batteries and accumulators recycling	19.08.2014	19.08.2019
EKOR KURŞUN METAL PLASTİK SAN VE TİC LTD ŞTİ	Air emissions ,Non-hazardous waste recycling, Waste batteries and accumulators recycling	13.03.2015	13.03.2020
ŞAH-SAN MADENİ YAĞ. NAK. İNŞ. VE TUR. SAN. TİC. LTD. ŞTİ.	Air emissions, Waste mineral oil recycling	06.09.2012	06.09.2017
SUDEOİL PETROL ÜRÜNLERİ SAN. VE TİC. LTD. ŞTİ.	Air emissions, Waste mineral oil recycling	12.04.2013	12.04.2018
ŞAHİNBEY DENİZCİLİK PETROL ÜRÜN.SAN. VE TİC.LTD.ŞTİ.	Air emissions, Waste mineral oil recycling	25.04.2013	25.04.2018
PAR-SAN MADENİ YAĞ GERİ DÖNÜŞÜM NAK. İNŞ. SAN. VE TİC. LTD. ŞTİ.	Air emissions, Waste mineral oil recycling	07.05.2013	07.05.2018
LİMAK ÇİMENTO SAN. VE TİC. A.Ş. GAZİANTEP ŞUBESİ	Air emissions, Non-hazardous waste recycling, Incineration and co-incineration	14.08.2013	14.08.2018
FİLİKZİYA HAKAN SADETTİN	Air emissions, Waste vegetable oil recycling	22.12.2011	22.12.2016
AY ULUS. DENİZ KARA TAŞ. İTH. İHR. İNŞ. OTO. PET. TEKS. GIDA SAN. VE TİC. LTD. ŞTİ.	Air emissions, Wastewater discharge, Waste vegetable oil recycling	06.03.2012	06.03.2017
HACİBEKİR KİMYA YAĞ NAKLİYAT SANAYİ VE TİCARET LİMİTED ŞİRKETİ	Air emissions, Waste vegetable oil recycling	04.06.2012	04.06.2017
KARAKOÇ YAĞ SABUN KİMYA GIDA İNŞAAT NAKLİYAT SANAYİ VE TİCARET LİMİTED ŞİRKETİ	Air emissions, Waste vegetable oil recycling	17.11.2012	17.11.2017
ÖMER FARUK ŞAHİN-ŞAHİN SABUN VE YAĞ SANAYİ	Air emissions, Waste vegetable oil recycling	10.06.2013	10.06.2018
ÖZYURT GIDA VE KİMYA SAN.TİC.LTD.ŞTİ.	Air emissions, Waste vegetable oil recycling	23.08.2013	23.08.2018
DURMAZ MOTORLU ARAÇLAR OTOMOTİV SERVİS YEDEK PARÇA SAN.ve TİC. LTD. ŞTİ.	Air emissions, End-of-life vehicle temporary storage	01.06.2012	01.06.2017
GEC KİMYA GIDA-TURZ-VE TARIM ÜR SAN TİC A.Ş.	Air emissions, Hazardous waste recycling, Non-hazardous waste recycling	08.02.2013	08.02.2018
ARKİM BOYA KİMYA GERİ DÖNÜŞÜM SANAYİ VE TİCARET LİMİTED ŞİRKETİ	Tank cleaning, Hazardous waste recycling	12.06.2013	12.06.2018

Name of Company	Permit Type	Permit Issue Date	Permit Expiry Date
KUSVA PETROL DAĞITIM NAKLIYE PAZARLAMA SANAYİ VE TİCARET LİMİTED ŞİRKETİ	Tank cleaning, Hazardous waste recycling	14.06.2013	14.06.2018
BELİCE GERİ DÖNÜŞÜM GERİ KAZANIM SAN. İÇ VE DIŞ TİC. LTD. ŞTİ	Hazardous waste recycling, Tank cleaning	22.01.2014	19.07.2016
YENER PAMUK TEKSTİLSANAYİ TİCARET LTD. ŞTİ.	Non-hazardous waste recycling	09.05.2012	09.05.2017
CMS İPLİK SANAYİİ VE TİCARET LTD ŞTİ	Non-hazardous waste recycling	17.10.2012	17.10.2017
DOĞAN GERİ DÖNÜŞÜM VE TEKSTİL SAN VE TİC LTD.ŞTİ	Non-hazardous waste recycling	01.11.2012	01.11.2017
ASLAN SOY PAMUK SAN VE TİC A Ş	Non-hazardous waste recycling	05.11.2012	05.11.2017
MERT ÇEMBER PLASTİK AMBALAJ GERİ DÖNÜŞÜM VE MAKİNE SANAYİ TİCARET LİMİTED ŞİRKETİ	Non-hazardous waste recycling	25.07.2013	25.07.2018
Yılmaz Tarım Ürünleri - Mehmet YILMAZ	Non-hazardous waste recycling	30.06.2015	30.06.2020
BELTUREC TEKSTİL SANAYİ VE TİCARET ANONİM ŞİRKETİ	Non-hazardous waste recycling	23.07.2015	23.07.2020
METRO TIBBİ ATIK VE GERİ DÖNÜŞÜM SANAYİ TİCARET LİMİTED ŞİRKETİ	Air emissions, Medical waste sterilization	19.06.2015	19.12.2018

Source: Ministry of Environment and Urban Planning website