# Istanbul New Airport ESIA

## Environmental Baseline and Impact Assessment

## Waste Management

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Prepared by:
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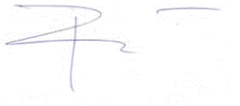
| Author (signature): | Karen Howells/Valéry Votrin  |
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# 7.7 Waste Management

## 7.7.1 Introduction

This chapter considers waste generation during earthworks, construction and operation, and waste disposal infrastructure associated with the INA development. The INA development comprises the area within the Project boundary and the associated Area of Influence as defined in **Chapter 3 Proposed Project and Project Description**.

For the purpose of this chapter, the definition of waste is taken from the IFC Environmental, Health and Safety (EHS) Guidelines (Ref. 7.7.1): "*A waste is any solid, liquid, or contained gaseous material that is being discarded by disposal, recycling, burning or incineration. It can be a by-product of a manufacturing process or an obsolete commercial product that can no longer be used for its intended purpose and requires disposal*".

## 7.7.2 Policy, Regulatory and Administrative Framework

### 7.7.2.1 Turkish Legal Requirements

The following Turkish legal requirements regulating waste management are relevant to the INA Project:

- **Regulation Concerning the General Principles of Waste Management, Official Gazette date: July 5, 2008, No: 26927**. Sets out principles governing waste management. The regulation applies to wastes listed in an annex and does not cover atmospheric gases, radioactive wastes, mining wastes, agricultural wastes, wastewater other than liquid wastes, or expired explosives and their wastes. Under this regulation, the importation of any type of waste to Turkey, including the free zones, is prohibited. Individuals and companies involved in recycling and disposal of wastes, or involved in transportation of wastes, are obliged to obtain a licence from the appropriate ministry. Household wastes are exempt from this obligation.
- **Hazardous Waste Control Regulation, Official Gazette date: March 14, 2005, No: 25755.** The objectives of this regulation are: to control the production and transportation of hazardous wastes; to minimise their production; and, in cases where the production is inevitable, to provide disposal at the point nearest to the place of manufacture; and to provide an environmentally compatible waste management system and to establish environmentally compatible waste disposal plants. The regulation further defines the required technical and administrative standards for the management of hazardous wastes and provides for the inspection of waste disposal plants. Finally, the regulation prohibits importation and places restrictions on the exportation of hazardous wastes.
- **Solid Wastes Control Regulation, Official Gazette date: March 14, 1991, No: 20814.** The regulation defines the principles of collecting, transporting, recycling and disposing of household wastes, bio-degradable wastes from parks, gardens and other green areas, non-hazardous industrial and commercial wastes, sludges from household purification systems, non-hazardous industrial purification sludge, and excavation soil and rubble. The regulation includes detail regarding cash incentives for recycling facilities and provides details for the collecting, transporting and storing of solid wastes.
- **Regulation on the Control of Excavation Materials, Construction and Demolition Wastes, Official Gazette date: March 18, 2004, No: 25406.** This regulation lays down

the general procedures and principles and sets forth the technical and administrative standards regarding collection, storage, recycling, recovery, disposal and transportation of excavation and construction wastes and wastes from demolition. The regulation also contains provisions regarding wastes related to natural disasters.

- **Regulation on the Control of Waste Oils, Official Gazette date: July 30, 2008, No: 26952.** Prevents the direct or indirect release of waste oils and ensures temporary storage, handling and disposal of waste oils. It sets out technical and administrative standards for management of waste oils and requires the installation of temporary storage and recovery facilities for waste oils. The regulation also sets out requirements for licences depending on activities undertaken and provision of transportation, recovery, storage and disposal arrangements.
- **Regulation on the Control of Waste Tyres, Official Gazette date: November 25, 2006, No: 26357.** The regulation sets out the prevention of direct and indirect delivery of tyres to receptors, which may harm the environment. The regulation defines requirements regarding installation of collection facilities and carriage of tyres for reuse or termination, forming a management plan and providing the necessary standards and necessary regulations for the management of end-of-life tyres. The regulation also sets out limitations and responsibilities for the import, export and transit of waste tyres.

- **Regulation on the Control of Used Batteries and Accumulators, Official Gazette date: August 31, 2004, No: 25568.** The regulation defines the principles covering control of used batteries and accumulators; so that waste management takes place in harmony with environmental protection.

- **Regulation on the Control of Medical Wastes, Official Gazette date: July 22, 2005, No**: 25883. The regulation sets out principles for control of medical waste, covering the generation, separate collection at source, temporary storage, removal and disposal.

- **Regulation on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment, Official Gazette date: May 30, 2008, No: 26891.** The regulation sets out restrictions and determination of functions that will be exempt from such regulations and defines the administrative, legal and technical measures to control the import of electrical and electronic equipment and to establish environmentally sound recovery and disposal of discarded electrical and electronic equipment in order to protect the environment and human health.

- **Regulation for Control of Packaging and Packaging Waste (Renamed as Regulation for Packaging Waste Control) Official Gazette date: June 24, 2007, No: 26562.** The regulation sets out the principles on control of all varieties of packaging and packaging waste.

- **Regulation on Urban Wastewater Treatment, Official Journal date: 8 January 2006 No. 26047.** The purpose of this regulation is to protect the environment from the pollution caused by urban and industrial wastewater. It determines the rules and procedures of treatment, discharge, monitoring and inspection of urban and industrial wastewater discharge.

- **Water Pollution Control Regulation, Official Gazette date: December 31, 2004, No: 25687.** The regulation sets forth principles and procedures aimed at ensuring the protection of underground and surface waters. The State Hydraulic Works Department

shall ensure that water quality meets the required quality criteria. Surface waters are classified into: (i) high quality waters; (ii) minimal polluted waters; (iii) polluted waters; and (iv) highly polluted waters. Lakes, ponds and dam reservoirs are also classified. Underground waters are classified into: (i) high quality underground waters; (ii) medium quality underground waters; and (iii) low quality underground waters. Sea and coastal waters are classified into: (i) fishery areas; (ii) recreational areas; and (iii) areas for commercial, industrial and other use. Prohibitions imposed for all water resources and discharge conditions, as well as disposal and treatment procedures, are also set out.

- **Regulation on the Pollution of Water and its Surrounds by Hazardous Substances. Official Journal date: 26 November 2005, No. 26005.** The regulation aims to decrease and reduce pollution of water including surface waters and groundwater. It sets standards and defines technical and administrative principles on determining the hazardous substances causing pollution. The regulation also requires a policy programme to reduce pollution of water by hazardous substances to be developed and the creation of an inventory of hazardous substances, which are discharged into water.

- **Regulation amending the Regulation on the Pollution of Water and its Surrounds by Hazardous Substances. Official Journal date: 30 March 2010, No. 27537.** This regulation amends articles 4, 5, 7, 11 and 15 of the Regulation on the Pollution of Water and its Surrounds by Hazardous Substances. The regulation also amends Annex 3 and Annex 4 on technical information on wastewater discharge of hazardous substances and discharge control.

#### 7.7.2.2 Standards and Guidelines for International Financing

With regard to waste management, IFC Performance Standard 3 Resource Efficiency and Pollution Prevention (IFC PS3) (Ref. 7.7.2) states that:

"… *the client will avoid the generation of hazardous and non-hazardous waste materials. Where waste generation cannot be avoided, the client will reduce the generation of waste, and recover and reuse waste in a manner that is safe for human health and the environment. Where waste cannot be recovered or reused, the client will treat, destroy, or dispose of it in an environmentally sound manner that includes the appropriate control of emissions and residues resulting from the handling and processing of the waste material. If the generated waste is considered hazardous, the client will adopt GIIP alternatives for its environmentally sound disposal while adhering to the limitations applicable to its trans-boundary movement. When hazardous waste disposal is conducted by third parties, the client will use contractors that are reputable and legitimate enterprises licensed by the relevant government regulatory agencies and obtain chain of custody documentation to the final destination. The client should ascertain whether licensed disposal sites are being operated to acceptable standards and where they are, the client will use these sites. Where this is not the case, clients should reduce waste sent to such sites and consider alternative disposal options, including the possibility of developing their own recovery or disposal facilities at the project site*."

With regard to hazardous waste, IFC PS3 recognises that "*hazardous materials are sometimes used as raw material or produced as product by the project. The client will avoid or, when avoidance is not possible, minimise and control the release of hazardous materials. In this context, the production, transportation, handling, storage, and use of hazardous materials for project activities should be assessed. The client will consider less hazardous substitutes where hazardous materials are intended to be used in manufacturing processes*

*or other operations. The client will avoid the manufacture, trade, and use of chemicals and hazardous materials subject to international bans or phase-outs due to their high toxicity to living organisms, environmental persistence, potential for bioaccumulation, or potential for depletion of the ozone layer*."

### 7.7.3 Assessment Methodology

#### 7.7.3.1 Scope

The scope of this assessment included waste generation during earthworks, construction and operation and waste disposal infrastructure associated with the INA development.

#### 7.7.3.2 Method

Information provided in the Master Plan (2013) (Ref. 7.7.3), the amended Master Plan including new runway layouts and drawing (2015) (Ref. 7.7.4), and conceptual design (Ref. 7.7.5) has been reviewed in conjunction with Good International Industry Practice (GIIP) guidance to define typical types of waste that are likely to be created as a result of the excavation and construction phases of the development and the operational phase of the development. At this stage, exact waste volumes generated by the Project have not been defined and therefore indicative detail has been used to prepared this baseline and impact assessment. Detail regarding the waste management infrastructure in Turkey, and more specifically in the Istanbul region, was reviewed to provide an overview of the waste disposal options available to INA.

#### 7.7.3.3 Significance Criteria

Within this ESIA, impact categorisation and significance have been evaluated with reference to definitive standards, accepted/published criteria and legislation, where available. Where it has not been possible to quantify impacts and effects, qualitative assessments have been carried out, based on expert knowledge, GIIP and professional judgement as explained in detail in **Chapter 6 Impact Assessment Methodology**. In this regard, impacts are first identified and classified as adverse (negative) or beneficial (advantageous/positive). Then, those impacts are predicted either quantitatively or qualitatively, or, in certain instances, both.

Quantitative methods predict measurable changes as a result of the INA Project and rely on accurately measuring baseline conditions to make accurate predictions/estimations regarding the potential impacts. Qualitative assessment methods rely on expert judgement and experience.

The following prediction of severity (i.e. none/negligible, low, moderate or high) and likelihood (probable, possible, unlikely or improbable) criteria explained in **Chapter 6 Impact Assessment Methodology** have been used to evaluate the overall significance of the impacts. For determining the overall significance, the matrix given in Table 7.7.1 was used.

**Table 7.7.1 Matrix for Evaluating Overall Impact Significance**

| Likelihood of Impact | Severity of Impact | | | |
|---|---|---|---|---|
| | **Negligible** | **Low** | **Moderate** | **High** |
| **Probable** | Negligible | Low | Moderate | High |
| **Possible** | Negligible | Negligible | Low | Moderate |
| **Unlikely** | Negligible | Negligible | Negligible | Low |
| **Improbable** | Negligible | Negligible | Negligible | Negligible |

While it is important to identify the initial significant impacts associated with the Project, the key focus of the impact assessment has been to define the significance of residual impacts and effects following application and/or consideration of mitigation measures. A residual impact is one, which continues to be present following the application of avoidance and/or mitigation measures. In this regard, a summary table is provided in the final section of this Chapter indicating the potential significance of impacts and effects in the absence of mitigation to assist in demonstrating the anticipated effectiveness of proposed mitigation measures.

## 7.7.4 Baseline Information, Background and Sources of Information

### 7.7.4.1 Sources of information

- Environmental, Health and Safety (EHS) Guidelines, General EHS Guidelines: Environmental; Waste Management, IFC, 30 April 2007 (Ref. 7.7.1);
- Performance Standard 3, Resource Efficiency and Pollution Prevention, IFC, 01 January, 2012 (Ref. 7.7.2);
- Master Plan, Ove Arup and Partners, December 2013 (Ref. 7.7.3);
- Master Plan, Ove Arup and Partners, December 2013, as amended in March 2015 (new runway layouts and drawing) (Ref. 7.7.4);
- Istanbul New Airport Concept Design, Grimshaw Nordic, December 2013 (Ref. 7.7.5);
- Istanbul City Waste Report, AcuComm, 2013 (Ref. 7.7.6);
- Construction Camp Layout, CMLKK, March 2014 (Ref. 7.7.7);
- Saving Money, Resources and Carbon through SMARTWASTE, Building Research Establishment (BRE), 2012 (Ref. 7.7.8);
- Responsible Heathrow 2013, Heathrow Airport Limited, V1, May 2014 (Ref. 7.7.9);
- Trash Landings, Howe Airports Can Clean up their Recycling Programmes (Natural resources Defence Council (NRDC) 2006 (Ref. 7.7.10); and
- Waste Framework Directive, European Union, 2008/98/EC (Ref. 7.7.11).

Waste management in Istanbul, including the management of waste disposal sites and waste transfer stations is the responsibility of ISTAC (the Istanbul Environmental Protection and Waste Processing Corporation).

Prior to 1995, Istanbul's waste disposal facilities were entirely unmodernised and waste was dumped at unregulated landfill sites and straight into the sea. Since 1995, there has been an effort to modernise the City's provision. This process has largely entailed the closure of old dumps and their replacement with managed landfills. Turkey is in the process of aligning its national laws and procedures with the European Union (EU) Waste Directives, part of this process has included the preparation of a Waste Plan by ISTAC, which focuses on establishing modern landfill sites to replace old dump sites. Istanbul's population continues to grow creating an increased waste burden and therefore the capacities of its waste management facilities need to grow accordingly.

ISTAC currently operates two municipal solid waste landfills: Odayeri Landfill, on the European side of the city, and Kömürcüoda Landfill, on the Asian side. Collectively, the landfills process 15,500 tonnes of waste per day, of which the Odayeri Landfill, the primary waste repository for the European side of Istanbul, processes 10,000 tonnes of waste per day (see Table 7.7.2 below). In 2008, a 34 MW landfill gas (LFG) to energy plant was commissioned by Ortadoğu Enerji at the Odayeri Landfill. Leachate is recovered and treated via physical and biological treatment followed by membrane technology at a rate of 2,000 tonne per year. The waste-to-energy plant has a heat recovery system and the heat is used in a greenhouse. The capacity of the plant is due to be increased to 50 MW in 2020. In 2013, Ortadoğu Enerji put into operation its second regional LFG plant with the projected capacity of 14.15 MW at Kömürcüoda Landfill.

To further decrease the reliance on landfill for waste disposal, ISTAC has drawn up plans for the construction of the City of Istanbul's first Waste to Energy (WtE) Incineration and Energy Production Facility (Ref. 7.7.6) and a tender was issued in 2012. The planned capacity of the WtE facility, to be located on the European side of Istanbul, is 3,000 tonnes/day. Production of electrical energy at a capacity of 70 MWh facility is also planned. However, due to high costs presented in the bids, the tender has been cancelled.

**Table 7.7.2 Summary of Existing Waste Facilities in Istanbul Region**

| Name | Location | Type | Capacity (t/day) | Operator | Distance from Project Area |
|---|---|---|---|---|---|
| Odayeri | Eyup District* | Managed Landfill | 10,000 | ISTAC | 24 km |
| Komurcuoda | Sile District (Anatolian side) | Managed Landfill | 5,000 | ISTAC | 110 km |
| Composting Plant | Eyup District | Managed Landfill | 400 | ISTAC | 10-40 km |
| Refuse Derived Fuel (RDF) Plant | Eyup District | RDF Manufacture | _ | ISTAC | 10-40 km |
| Medical Waste Incinerator | Eyup District | Medical Waste | 24 | ISTAC | 10-40 km |
| *Note: INA will be partially located in Eyup District | | | | | |

*Source: Ref. 7.7.6*

The Istanbul region continues to be heavily reliant on landfill as a waste disposal option, as Table 7.7.2 alternatives are being developed, but the appropriate waste acceptance capacities of such facilities remain small in comparison to landfill options. Over the life of the INA it is expected that a broader range of waste management options with appropriate capacities will

become available to IGA. ISTAC is still considering the installation of a waste incineration facility near the Project to accommodate additional waste volumes associated with the Project and a new finance model for the facility is currently being evaluated.

#### 7.7.4.2 Findings

The precise details of the solid and liquid waste streams (excluding wastewater which is assessed in **Chapter 7.5 Water Resources**) that will arise during the main phases of the Project cannot be fully provided until all the details of the supply of materials are known and the design decisions are finalised. However, a list has been developed based on typical waste types and sources found for similar developments, which will be amended, as appropriate, when the full details are available.

**Table 7.7.3 Potential Waste Creation during Excavation and Construction**

| Waste type | Form | Management methodology for treatment/disposal | Source | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Excavation | Site clearance | Offices | Vehicle maintenance and depot | Camp | Kitchens | Medical facility | Construction | Batching plants | Laboratory |
| **Inert waste** | | | | | | | | | | | | |
| Tree branches and roots | solid | Composting (onsite or off site), energy recovery | | X | | | | | | | | |
| Broken concrete | solid | Recycled on site/ waste management centre, landfill (off site) | X | X | | | | | | X | X | |
| Broken masonry | solid | Recycled on site/ waste management centre, landfill (off site) | | X | | | X | | | X | | |
| **Non-hazardous waste** | | | | | | | | | | | | |
| Scrap metal | solid | Waste management centre, landfill or recycling (off site) | | X | | X | | | | | | |
| Putrescible waste | solid | Waste management centre, landfill (off site) | | | X | | X | X | | | | |
| Grease and cooking oil | liquid | Waste management centre, recycling (off site) | | | | X | | X | | | | |
| Wooden pallets | solid | Waste management centre, recycling (off site) | X | X | | X | X | X | | X | X | |
| Vehicle Tyres | solid | Waste management centre, landfill (off site) | | | | X | | | | | | |
| Plastic | solid | Waste management centre, recycling (off site) | | X | X | X | X | X | | X | X | |
| Paper/cardboard | solid | Waste management centre, recycling (off site) | | X | X | X | X | X | X | X | X | |
| Household waste | solid | Waste management centre, landfill (off site) | | X | X | | X | X | | | | |
| Glass | solid | Waste management centre, recycling (off site) | | X | X | X | X | X | X | | | X |
| Sewage | liquid | Wastewater treatment facility (on site) | | | X | | X | X | | | X | |

| Waste type | Form | Management methodology for treatment/disposal | Source | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Excavation | Site clearance | Offices | Vehicle maintenance and depot | Camp | Kitchens | Medical facility | Construction | Batching plants | Laboratory |
| Historical landfill site waste not suitable for fill material | solid | Waste management centre landfill (off site) | X | X | | | | | | | | |
| **Hazardous waste** | | | | | | | | | | | | |
| Waste oil | liquid | Waste management centre, recycling (off site) | | | | X | | X | | | | |
| Waste oil filters and oily rags | solid | Waste management centre, recycling (off site) | | | | X | | | X | X | | |
| Batteries | solid | Waste management centre, recycling (off site) | | | X | X | X | | | | | |
| Medical waste | solid | Waste management centre, incineration (off site) | | | | | | | X | | | |
| Chemicals | liquid | Waste management centre, landfill (off site) | | | | | | | X | | | X |
| Contaminated soil (from areas of historical contamination or localised spillage) | solid | Waste management centre landfill (off site) | X | X | | X | | | | X | | |
| Cables containing substances | solid | Waste management centre landfill (off site) | | X | X | X | X | | | X | X | X |
| Asbestos containing materials | solid | Waste management centre landfill (off site) | X | X | | | | | | | | |

| Waste type | Form | Management methodology for treatment/disposal | Source | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Excavation | Site clearance | Offices | Vehicle maintenance and depot | Camp | Kitchens | Medical facility | Construction | Batching plants | Laboratory |
| Waste sludge from wastewater treatment facilities | liquid | Waste management centre landfill (off site) | | | | | X | | | | | |

**Table 7.7.4 Potential Waste Created during Airport Operations**

| Waste type | Form | Management Methodology for Treatment/Disposal | Source | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Terminals | Aeroplanes | Offices | Vehicle/ plane Maintenance | Airport maintenance | Catering | Medical facility | Cargo Facility |
| **Inert waste** | | | | | | | | | | |
| Broken concrete | solid | Recycled on site/ waste management centre landfill (off site) | | | | | X | | | |
| Broken masonry | solid | Recycled on site/ waste management centre landfill (off site) | | | | | X | | | |
| **Non-hazardous waste** | | | | | | | | | | |
| Scrap metal | solid | Waste management centre landfill or recycling (off site) | | | | X | X | | | X |
| Putrescible waste | solid | Waste management centre landfill/composting (off site) | | X | | | | X | | |
| Grease and cooking oil | liquid | Waste management centre recycling (off site) | X | | | | | X | | |
| Wooden pallets | solid | Waste management centre recycling (off site) | | | | X | X | | | X |
| Vehicle Tyres | solid | Waste management centre landfill (off site) | | | | X | | | | |

| Waste type | Form | Management Methodology for Treatment/Disposal | Source | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Terminals | Aeroplanes | Offices | Vehicle/ plane Maintenance | Airport maintenance | Catering | Medical facility | Cargo Facility |
| Plastic | solid | Waste management centre recycling (off site) | X | X | X | X | X | X | X | X |
| Paper/cardboard | solid | Waste management centre recycling (off site) | X | X | X | X | X | X | X | X |
| Household waste | solid | Waste management centre landfill (off site) | X | X | X | | | X | | |
| Glass | solid | Waste management centre recycling (off site) | X | X | X | X | X | X | X | X |
| Sewage | liquid | Wastewater treatment facility (on site) | X | X | X | | | X | X | X |
| Landscaping waste | solid | Waste recycling (on site) | | | | | X | | | |
| Waste electrical equipment | solid | Waste Recycling (off site) | X | X | X | X | X | X | X | X |
| **Hazardous waste** | | | | | | | | | | |
| Waste oil | liquid | Waste management centre recycling (off site) | X | | | X | X | X | | |
| Waste oil filters and oily rags | solid | Waste management centre recycling (off site) | X | | | X | | | | |
| Batteries | solid | Waste management centre recycling (off site) | X | X | X | X | X | | X | |
| Medical waste | solid | Waste management centre incineration (off site) | | | | | | | X | |
| Chemicals | liquid | Waste management centre landfill (off site) | | X | | X | X | | X | X |
| Contaminated soil | solid | Waste management centre landfill (off site) | | | | X | | | | |
| Cables containing substances | solid | Waste management centre landfill (off site) | X | X | X | X | X | X | X | X |

| Waste type | Form | Management Methodology for Treatment/Disposal | Source | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Terminals | Aeroplanes | Offices | Vehicle/ plane Maintenance | Airport maintenance | Catering | Medical facility | Cargo Facility |
| Waste sludge from runway oil/water interceptors and wastewater treatment facilities | liquid | Waste management centre landfill (off site) | | | | | X | | | |
| Runway sludge following runway marking maintenance | liquid | Waste management centre landfill (off site) | | | | | X | | | |

### 7.7.5 Potential Impacts

The potential impacts associated with waste are primarily associated with poor management practices, which could result in waste materials and substances escaping to the environment and impacting soil, groundwater, surface water, air quality, flora and fauna and people. The following sections provide details regarding the potential receptors of waste created as part of the INA Project. Mitigation measures identifying GIIP with regard to waste are set out in section 7.7.6.

#### 7.7.5.1 Receptors

Sensitive receptors include groundwater and surface water resources that have the potential to be impacted by inappropriate management of waste streams. In addition, the health and amenity of occupants in the Project Area of Influence could be impacted by inappropriate management practices. More specifically, the following existing sensitive receptors may be impacted by the construction and operation of the proposed INA:

- Regional groundwater aquifer systems;
- Local communities;
- Local waste management facilities;
- Employees of INA and IGA who live and/or work on-site during excavation and construction and operation; and
- Local flora and fauna and migrating fauna.

#### 7.7.5.2 Earthworks and Construction

During the site clearance activities, trees will need to be removed. This activity will be undertaken by the Directorate of Forestry. Timber will be removed for commercial purposes. Therefore, it is not expected that there will be waste timber from this activity. However, IGA has responsibility for the removal of the tree roots and leaves. IGA estimates that 60,000 tonnes of biodegradable waste will be created and will need to be managed. Site clearance activities will also need to include clearance of any wastes (specifically metal storage drums and tanks that have been left behind following the closure of the mining operations). It is expected that the mining companies will remove all equipment that has a commercial reuse/value and therefore it is not possible to estimate the volume of waste created from this activity until the clearance work commences.

The programme of works required to complete earthworks and construction for the Phase 1 development requires the movement of 306 million $m^3$ of cut material around the Project Area. In some instances, the cut material will not be of sufficient quality to form fill material (i.e. potentially from the historical landfill and mining operations within the Project Area boundary) and therefore it will need to be removed. It has not been possible to estimate the volumes of waste that this activity could create until work commences. Responsible waste management practices will be adopted throughout the site preparation activities and Turkish legal requirements will be met.

The earthworks and construction activities will involve the use of 655 vehicles which will be maintained on-site, thereby creating a range of waste materials, many hazardous in nature (Table 7.7.3). These materials will need to be removed from Site and taken to licensed waste reception facilities. Responsible waste management practices will be adopted and Turkish legal requirements will be met.

Construction camps will be installed within the Project Area and will accommodate approximately 5,400 workers with a further 15,000 workers undertaking work activities at the peak of construction. Based on a typical waste production figure of 1.12 kg per person per day (Ref. 7.7.12) for this activity it is calculated that an estimated 22.8 tonnes per day of waste will be produced from the construction camp and worker welfare activities. The construction camps will create wastes similar to those of a small town (Table 7.7.3). Where practicable materials will be reused on site, if this is not possible wastes will be collected and removed from site. It is expected that responsible waste management practices will be adopted and that Turkish legal requirements will be met.

A range of industrial type wastes (Table 7.7.3) will be produced during the construction of terminals, support service facilities and runways. Based on information provided in the Master Plan (Ref. 7.7.3), the following estimates have been made using performance indicators published by the Building Research Establishment (BRE) (Ref. 7.7.8). These figures will be subject to change as designs are refined and finalised.

Construction waste associated with support services (as defined in the Master Plan) and terminal construction:

- Phase 1: 473,521 tonnes
- Ultimate Phase[1]: 795,646 tonnes

It is estimated that an average of 12,751 tonnes of construction waste (excluding excavation and demolition waste) will be produced per runway (not including taxiways, which will increase the figures substantially). Therefore, it is estimated that the following tonnage of waste will be created during runway construction:

- Phase 1 (three runways): 38,253 tonnes
- Ultimate Phase: 76,510 tonnes

In the management of these waste streams, GIIP in relation to construction waste management will be adopted and Turkish legal requirements will be met.

### 7.7.5.3 Operations

Waste materials created by an operational airport are similar to those produced by a town, with wastes generated containing a mixture of inert, household, and hazardous waste. Typical wastes created by a commercial airport are set out in Table 7.7.4. Waste producers and sources during the operation of INA are expected to be varied, and it is expected that these will include IGA as the airport operator, the airlines, passengers, visitors, operating companies, such as baggage handlers, aircraft and airport maintenance, refuelling, cargo, retail and catering.

INA will open with a capacity of 90 mppa (Phase 1) and expand to a planned capacity of 150 mppa (Phase 4). The overall airport operations to support this number of passengers will potentially produce an estimated 132,903 tonnes of waste per annum (364 tonnes per day) in Phase 1 and in the ultimate phase 221,505 tonnes of waste per annum (607 tonnes per day). These figures are based on comparable Heathrow Airport waste management performance figures for 2013 where a rate of 1.47 kg per passenger is generated per annum (Ref. 7.7.9).

[1] The Ultimate Phase covers waste creation from all four phases of the INA Project, therefore representing the total waste produced during construction including the Phase 1 figure reported.

It is estimated by airport operators that passenger activities alone can account for between one quarter to one third of this waste production (Ref. 7.7.9 and Ref. 7.7.10).

Where practicable, materials will be reused on site. If this is not possible, wastes will be collected and removed from the Site. Responsible waste management practices, including waste segregation, will be adopted and Turkish legal requirements will be met. The disposal options for solid wastes are limited due to the limited number of waste management facilities available in the Istanbul region. A large proportion of the waste generated from the INA Project will be disposed of to landfill due to the limited options that are available for any other form of waste disposal. There will, however, be opportunities to use other disposal routes. There is a composting plant, a refuse-derived fuel (RDF) plant and a medical waste incinerator located within the Eyup District of the Istanbul region. Capacities of the existing waste management facilities (Table 7.7.2) will be impacted by the additional waste volumes created by INA excavation, construction and operational activities. While figures indicate that the facilities in the region, and within a maximum of 40 km distance from the Project Area theoretically have the capacity to accommodate these volumes of waste from the INA Project, the future waste disposal volumes that are expected to be generated considering that the population of Istanbul continues to increase at between 1-2% per year (Ref. 7.7.6) are unknown. ISTAC is considering the installation of a waste incineration facility near the Project to accommodate additional waste volumes associated with the Project and a new finance model for the facility is currently being developed.

The impacts of solid wastes on the regional waste management facilities will be fully established once volumes of waste materials are defined.

### 7.7.6 Mitigation and Residual Impacts

The principles of GIIP in relation to waste management will be applied at INA during excavation, construction and operation. IGA will prepare a Waste Management Plan. Given that a large proportion of the waste (potentially as much as three quarters of the annual volume of waste) created during operations will relate to support service contracts and concessionaire contracts, it will be important for IGA to incorporate responsible waste management practices, including the principles of the waste management hierarchy, into supply chain contracts and tenancy agreements.

The Waste Management Plan will be updated as needed during the course of the development of the Project, initially to cover the excavation and construction phases, and then for the operational phase. During the operational phase, the Waste Management Plan will be reviewed and updated regularly as part of the ongoing management of environmental and social issues and GIIP. In addition, major lending institutions require these independent regular reviews, which are likely to take place every two to five years, depending on the phase of the Project, changes to the operational plan, and/or other issues relevant to waste management.

**Location and Construction of Waste Storage Facilities**

All waste facilities (for excavation, construction and operational phases) will be located on purpose built hard standing to avoid leakage to ground and groundwater. There will be separate areas for collection of hazardous and non-hazardous waste. Waste will be stored in a manner that prevents escape, the commingling or contact between incompatible wastes, and allows for inspection between containers to monitor for leaks or spills. Examples include sufficient space between incompatibles or physical separation, such as walls or containment curbs.

Waste storage arrangements will be implemented as follows:

- wastes will be stored in closed containers away from direct sunlight, wind and rain;
- secondary containment systems will be constructed with materials appropriate for the wastes being contained and adequate to prevent loss to the environment;
- secondary containment will be included wherever liquid wastes are stored in volumes greater than 220 litres. The available volume of secondary containment will be at least 110% of the largest storage container, or 25% of the total storage capacity (whichever is greater), in that specific location;
- adequate ventilation will be provided where volatile wastes are stored; and
- an appropriate size and number of receptacles will be provided to allow segregation of waste at source.

Excavation and construction – designated waste management collection facilities will be placed in strategic locations around the excavation and construction site.

Operation – The planning of the waste handling is based on transportation separated from the passenger flow. It is planned for the reception of goods and the dispatch of waste to be processed externally at a goods centre located close to the cargo centre(s) (Ref. 7.7.3 and Ref. 7.7.5). The number of solid waste management collection areas increases over the construction of the four phases to accommodate increased passenger numbers. The Master Plan identifies four waste collection facilities in the ultimate phase (when all four phases of construction are complete). The Master Plan makes an assumption that the capacity of these waste storage areas are calculated based on 22 $m^2$ per mppa.

**Controlling Waste**

At all times waste will be kept safe against:

- corrosion or wear of waste containers;
- accidental spilling or leaking or inadvertent leaching from waste unprotected from rainfall;
- accident or weather breaking contained waste open and allowing it to escape;
- waste blowing away or falling while stored or transported;
- odour emissions through incorrect storage provisions and maximum storage durations of organic waste, which is subject to biological decay;
- scavenging of waste by animals or humans;
- wastes will be collected on a regular basis from the remote collection/storage locations and placed in a central location;
- waste will be collected from the central location by external contractors and taken to an appropriate treatment facility;
- waste will be collected regularly to avoid build-up of waste; and
- all waste facilities will be secured against unauthorised use.

**Waste Hierarchy**

IFC promotes adoption of the waste hierarchy in its waste management guidance (Ref. 7.7.1) and within Europe the five steps for dealing with waste, ranked according to environmental impact, or the 'waste hierarchy' is applied. The waste hierarchy defines prevention, which offers the best outcomes for the environment, at the top of the priority order, followed by preparing for minimising, re-use, recycling, other recovery and disposal, in descending order

of environmental preference. The INA Project will adopt the waste management hierarchy in its management of waste during excavation, construction and operation of the INA.

**Table 7.7.5 Waste Hierarchy**

| Stage | Approach |
|---|---|
| Prevention: | Using less material in design and manufacture, keeping products for longer, re-use, using less hazardous materials |
| Preparing for re-use: | Checking, cleaning, repairing, refurbishing, whole items or spare parts |
| Recycling: | Turning waste into a new substance or product, includes composting if it meets quality protocols |
| Other recovery: | Includes anaerobic digestion, incineration with energy recovery, gasification and pyrolysis which produce energy (fuels, heat and power) and materials from waste, some backfilling |
| Disposal: | Landfill and incineration without energy recovery |

*Source: Ref. 7.7.1*

**Disposal of Waste by Licensed Contractors**

Appropriately licensed waste management contractors and facilities will be identified from the Istanbul region and the appropriate waste manifests and documents will be prepared and retained in accordance with Turkish national legal requirements and IFC requirements.

## 7.7.7 Summary of Impacts

Table 7.7.6 provides a summary of the environmental and social impacts associated with waste management during excavation, construction and operation of INA.

**Table 7.7.6 Summary of Impacts**

| Topic | Receptor/ Beneficiary | Phase | Impact Categorisation | Potential Significance Prior to Mitigation | Design, Enhancement or Mitigation Measures | Management Plan | Residual Significance |
|---|---|---|---|---|---|---|---|
| Large volumes of waste creation | Regional landfill facilities | Excavation, Construction, Operational | **Type:** Negative **Duration:** Short term **Extent:** Local/Regional **Reversibility:** Reversible **Sensitivity:** Low sensitivity | **Likelihood:** Probable **Severity:** Moderate **Significance:** Moderate | • Application of the waste management hierarchy to avoid or reduce volumes of waste created.<br>• Introduction of waste segregation to allow reuse, recycling and energy recovery options. | Waste Management Plan | **Low (Adverse)** |
| Increasing the volumes of waste sent to regional waste management facilities | Existing regional waste management facilities | Excavation, Construction, Operational | **Type:** Negative **Duration:** Short term **Extent:** Local/Regional **Reversibility:** Reversible **Sensitivity:** Low sensitivity | **Likelihood:** Probable **Severity:** Moderate **Significance:** Moderate | • Application of the waste management hierarchy to avoid or reduce volumes of waste created.<br>• Evaluation of actual volumes of waste created. | Waste Management Plan | **Low (Adverse)** |

| Topic | Receptor/ Beneficiary | Phase | Impact Categorisation | Potential Significance Prior to Mitigation | Design, Enhancement or Mitigation Measures | Management Plan | Residual Significance |
|---|---|---|---|---|---|---|---|
| Incorrect storage of waste leading to emissions to environment | Soil/ flora and fauna | Excavation, Construction, Operational | **Type:** Negative **Duration:** Short term **Extent:** Local **Reversibility:** Reversible **Sensitivity:** Medium sensitivity | **Likelihood:** Probable **Severity:** Moderate **Significance:** Moderate | • Appropriately constructed waste management facilities (based on GIIP).<br>• Contracts with waste management contractors to ensure regular waste collection.<br>• Procedures and information to workers to ensure correct disposal of waste. | Waste Management Plan | **Low (Adverse)** |

### 7.7.8 Conclusions

The disposal options for solid wastes to be generated by the Project are limited due to the limited number of waste management facilities available in the Istanbul region. However, the waste management hierarchy to avoid or reduce volumes of waste created will be implemented where possible and reuse, recycling and energy recovery options have been and will continue to be identified. The capacities of the existing waste management facilities in the region will be impacted by the additional waste volumes created by INA excavation, construction and operational activities. However, the facilities in the region, and within a maximum of 40 km distance from the Project Area, theoretically have the capacity to accommodate these volumes of waste. This will continue to be monitored as the existing volumes of waste currently received by these facilities and future waste disposal volumes are not fully defined. On this basis, the Project has been assessed to have a **Low (Adverse)** residual impact significance within a national, regional or local context with the implementation of the mitigation measures and GIIP.

## References


| | |
|---|---|
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| Ref. 7.7.5 | Istanbul New Airport Concept Design, Grimshaw Nordic, December 2013 |
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