



Environmental and Social Impact Assessment for the Eurasia Tunnel Project Istanbul, Turkey

Annexes

Final Report
Volume III

September 2011

ERM Group, Germany and UK
ELC-Group, Istanbul

Avrasya Tüneli İşletme İnşaat ve Yatırım A.Ş.
(ATAŞ - the Eurasia Tunnel Operation,
Construction and Investment Inc. Co.)

Eurasia Tunnel Environmental and Social Impact Assessment

ANNEXES

Final Report

Volume III

September 2011



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PROJECT NO. P0106067

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Annex A

Consultancy Team

Consultancy Team

Team member and Position	Role	Years ESIA Experience	Academic and Professional Qualifications
Raimund Vogelsberger Partner ERM	Project Director	20	BSc Civil-Environmental Engineering, Penn State University MSc Technology Assessment & Risk Analysis, Clark University Massachusetts
Karen Raymond, Partner ERM	Assessment Team Leader	30	BSc Chemistry MSc Environment and Pollution Control IEMA Principal EIA Practitioner IEMA EIA Practitioner Examiner
Klaus Kaiser Partner ERM	Senior Advisor	20	MSc in Geology, University of Technology, Aachen
Margarete Langer Senior Consultant ERM	Project Manager and ESIA Specialist	10	MSc Geography, J.W. Goethe University Frankfurt
Olan Howell Senior Consultant ERM	SIA Coordinator and ESIA Specialist	10	BSc in Earth Science, University College Cork MSc in EIA, Auditing & EMS, University of East Anglia
Dr. Thomas Floren Senior Consultant ERM	Senior Air and Noise Specialist	20	MSc Physics PhD Physics, J.W. Goethe University Frankfurt Qualification in Medical Physics Qualification as Consultant for Environmental Protection and Technology
Miriam Hachelaf Consultant	GIS Specialist	2	MSC Geography, University of Marburg
Prof. Dr. Cem B. Avci Manager Senior Consultant ELC Consulting and Engineering Group Ltd (ELC)	Head of Local Expert Team	30	BSc Civil Engineering, Bogazici University, Istanbul MSc Water Resources, Princeton University PhD Hydraulic Engineering, Purdue University
Dr. Isil Gultekin Project Engineer ELC Consulting and Engineering Group Ltd (ELC)	Local Project Manager, Baseline Survey Manager, Regulatory Review	8	BSc Environmental Engineering, Yildiz University MSc Environmental Technology, Bogazici University, Istanbul PhD Environmental Technology, Bogazici University, Istanbul
Arzu Firidin Project Coordinator ELC Consulting and Engineering Group Ltd (ELC)	Local Baseline Survey	15	B.Sc., Geodesy and Photogrammetry Engineering, Yıldız Technical University

Team member and Position	Role	Years ESIA Experience	Academic and Professional Qualifications
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Gürkan Özbek Project Engineer ELC Consulting and Engineering Group Ltd (ELC)	Noise Survey and Regulatory Review	5	BSc Environmental Engineering, Istanbul Technical University MSc Environmental Engineering, Istanbul Technical University
Kubilay Erenay ELC Consulting and Engineering Group Ltd (ELC)	Senior EHS Specialist	15	B.Sc., Chemical Engineering, Middle East Technical University
Gökmen Bakılar ELC Consulting and Engineering Group Ltd (ELC)	Baseline Geology Survey	10	B.Sc., Geological Engineering, Istanbul University
Haluk Cetinkaya	Archaeologist with specialisation in Byzantology	12	Assist. Prof. Department of Archeology, Mimar Sinan University (see attached Curriculum Vita)

CURRICULUM VITAE of ÇETINKAYA HALUK

- 1. Family name:** Çetinkaya
2. First names: Haluk
3. Date of birth: 4 February; 1967
4. Nationality: Turkish
5. Civil status: Single
6. Education: Ph.D.

<i>Institution</i>	Marmara University Department of Journalism and Public relations
<i>Date</i>	1984 – 1989
<i>Degree or Diploma</i>	Bachelor's degree

<i>Institution</i>	Yildiz Technical University, Department of Museology
<i>Date</i>	1989 – 1992
<i>Degree or Diploma</i>	Master's degree in Museology

<i>Institution</i>	Istanbul University, Department of History of Art
<i>Date</i>	1995 – 2003
<i>Degree or Diploma</i>	Ph.D. (Dissertation: "The Middle Byzantine religious architecture in Constantinople")

7. Language skills (1 Learning - 5 Native):

<i>Language</i>	Reading	<i>Speaking</i>	<i>Writing</i>
Turkish	5	5	5
English	5	4	4
German	3	2	2
Spanish	2	2	2

8. Membership of professional bodies:

Founding member of Cultural Awareness Foundation / Istanbul
Member of Kosovo Archaeological Institute

9. Skills:

Computer, photography, mapping,

10. Present position:

Faculty member at Mimar Sinan Fine Arts University-Istanbul / Department of Archaeology

11. Years within the institution :

2002-present

12. Specific experience in the region:

Country	Date from - Date to
Kosovo	2007-2008
Turkey	1998-present

13. Professional Experience Record:

<i>Date:</i>	2002 - present
<i>Location:</i>	Findikli, Istanbul, Turkey
<i>Company:</i>	Mimar Sinan Fine Arts University, Department of Archeology
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<i>Description:</i>	Responsible for 5 undergraduate, 2 master's degree courses

<i>Date:</i>	1993 - 1994
<i>Location:</i>	Manila, Philippines
<i>Company:</i>	University of Santo Tomas
<i>Position:</i>	Guest lecturer
<i>Description:</i>	Christian Archaeology / Pilgrimage Sites

14. Other :

Work and Publications in Progress:

- "Kosmidion"
- "Turkish contribution to the Byzantine studies" to be published by the Institut Français d'Etudes Anatoliennes
- "A handbook of Byzantine architecture of Turkey"
- "Construction date of the monastic church of Peribleptos based on the material evidence: The construction material and technique"
- "Byzantine Burial Types" to be published in the Annual of History of Art of Istanbul University 2010
- "Historical-Archaeological Evaluation Report for European and Asian Sides" prepared within the scope of the Environmental and Social Impact Assessment Study for the Istanbul Strait Eurasia Tunnel Project, 2009

Articles in press

- "A Byzantine chapel in Gölyazı / Apolyont" in press (to be published in Anatolia Antiqua)
- "Arap camii in Istanbul: Its architecture and frescoes" in press (to be published in Anatolia Antiqua)
- "Byzantine graves according to historical and archaeological evidence" to be published in Annual of Ayasofya Museum 2010

Fieldwork:

- Participant of the archaeological surveys of different districts of Istanbul with Ferudun Özgümüş-Ken Dark 1998-2005
- Archaeological survey of the Byzantine monasteries at Bithynia as a participant of a French project under Marie France Auzepy 2005-2009

Advisorship

- Scientific advisor for the excavation of a Byzantine monastery at Harilaq Kosovo 2007
- Scientific advisor for the excavation of a Byzantine monastery at Harilaq Kosovo 2008
- Scientific advisor for the restoration of Arab camii-a 14th century Gothic church turned into a mosque 2007
- Scientific advisor for the documentary of “ In the depths of Hagia Sophia” 2009

Supervision

- Doctoral dissertation of Anais Lamesa of Paris IV university / France, titled “ Byzantine rock-cut churches of Cappadocia: methods of construction and environmental impact”
- Doctoral dissertation of Juni Sasaki of Tsukuba university / Japan, titled “ Dating the Early Byzantine mosaics of Hagia Sophia basing on technical measurements”

Articles:

- “ Earliest Christian architecture”, Rehber dünyası dergisi 12 (1998)
- “ İstanbul’dan iki arkeolojik haber”,(two archaeological news from Istanbul) Sanat Tarihi Araştırmaları dergisi 14 (1998)
- “ Bizans manastırlarını tarihsel gelişimi” (Historical development of the Byzantine monasteries), Sanat Tarihi Araştırmaları dergisi 15 (2000)
- “Ruins in the vicinity of Ayakapı chapel”, in the Past and Present of the Golden Horn, 22-23 May 2003, Istanbul
- With Stephan Westphalen, “Pittori greci nella chiesa domenicana dei Genovesi a Pera (Arap camii)”, Intorno al Sacro Volto: Genova, Bisanzio e l Mediterraneo (secoli XI-XIV), Venezia 2007
- With Marie France Auzepy, “Campagne de prospection 2006 de la Mission Marmara” Anatolia Antiqua XV (2007)
- With Marie France Auzepy, “Campagne de prospection 2007 de la Mission Marmara” Anatolia Antiqua XVI (2008)
- With Marie France Auzepy, “Campagne de prospection 2008 de la Mission Marmara” Anatolia Antiqua XVI (2009)
- “ An epitaph of a Gepid king at Vefa kilise camii in Istanbul”, Revue des etudes byzantines 67 (2009)
- “ Vefa kilise camiinde yeni gözlem ve buluntular ” (new observations and finds at Vefa kilise camii), Bir semte Vefa, Istanbul 2009

Papers Given at International Meetings:

- " Some recently discovered Byzantine monuments in Istanbul" , 20th International Byzantine congress, Paris 2001
- " The chapel of Ayakapı ", The Byzantine cultural heritage and the Balkans, International congress 5-8 September 2001 Plovdiv-Bulgaria
- " Icon in the architectural setting", Byzantine Past, Swedish Research Institute at Istanbul, 7 June 2002
- " Recent discoveries at Vefa kilise camii at Istanbul", 21th international Byzantine congress, London 2006
- " Vefa kilise camii and its vicinity from a historical perspective", 1st international symposium on Vefa / Istanbul, 4-6 November 2006
- " Recent discoveries in and around Vefa Kilise Camii " German Archaeological Institute at Istanbul, 17 November 2007
- " Kosmidion: A healing centre with its urban space", Byzanz-Konstantinopel-Istanbul: Stadtische Raume von der Antike bis zur Gegenwart symposium, German Archaeological Institute at Istanbul, 8-9 February 2008
- " Survey of Byzantine monasteries" in Ancient Bithynia symposium 30 april – 1 May 2009
- " Life in Ancient Lycia", in Kayaköy dwelling symposium 8-12 June 2009
- " Byzantine period of Gölyazı", in Gölyazı symposium 17-19 October 2009
- "Byzantine medicine and its influence on monastic architecture", symposium of Neurosciences in the Classical Greece, Byzantine and Ottoman empires, 2-5 February 2010

Annex B

MOEF EIA Decision Letter

T.C.
ÇEVRE VE ORMAN BAKANLIĞI
Çevresel Etki Değerlendirmesi ve Planlama Genel Müdürlüğü

Sayı : B.18.0.ÇED.0.01.02/227-03444- **11082**
Konu: İstanbul Boğazi Köprüsü Boğaz Tüp
Geçiş Projesi

16 Ekim 2007

T.C.
ULAŞTIRMA BAKANLIĞINA
(Demiryolları Limanlar Hava Meydanları İşleri Genel Müdürlüğü)

İlgil - a) 06.09.2007 tarih ve B.11.0.DL.H.0.09.00.03/1109-15895 sayılı yazınız
b) 21.09.2007 tarih ve B.18.0.ÇED.0.01.02/227-03444-11081 sayılı yazınız
c) 04.10.2007 tarih ve B.11.0.DL.H.0.09.00.03/208.16712 sayılı yazınız

İstanbul Tia. Avr. on. Yakaı Kazlıesme Kavşuđı ile Anadolu Yakaı Çatırcı Kavşuđı arasında Genel Müdürlüğünüzce yapılması planlanan "Karıyerli Boğaz (ieç) Tüneli Projesi" ile ilgili olarak hazırlanan Proje Tanımın Dosyası İlgil (a) da kayıtlı yazı ile Bakanlığımıza sunulmuştur.

Her (a) da kayıtlı yazı, öncece yer alan Proje Tanımın Dosyası incelenmiş olup, İstanbul Boğaz Geçiş Tüneli Projesi'nin ÇED Yönetmeliğı kapsamında değerlendirilmesi için mevcut yollar ile olan bağlantısı mevcut yollarla yapılacak değışiklikler ve tünele ait teknik bilgiler hakkında duyulduğı bilgileri yazınız ile bildirmiştir.

İlgil (b) de kayıtlı yazınız ekinde yer alan bilgi ve belgelerin 16 Aralık 2007 tarih ve 25338 sayılı Resmî Gazete'de yayımlanarak yürürlüğe giren Çevresel Etki Değerlendirmesi Yönetmeliğı hükümleri kapsamında incelenmesi neticesinde gerçekleştirilmesi planlanan projenin Çevresel Etki Değerlendirmesi Yönetmeliğı kapsamı dışında kaldığı anlaşılmıştır.

Bu anlamda bilöktür; anılan proje ile ilgili olarak 28/2 sayılı Çevre Kanunu ile 5/10 sayılı Çevre Kanunu'nda Değışiklik Yapılmasına Dair Kanun ve bu Kanuna istinaden çıkarılan yönetmeliklere uyulması ve mer'î mevzuatı çerçevesinde diğer ilgili karar ve kuruluşlardan gerekli izinlerin alınması gerekmektedir.

Bilgilerinize ve gereğini arz ve rica ederim.


ÖMER SOYLU
Bakan
Genel Müdür V.

DAĞITIM:

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T.C
MINISTRY OF ENVIRONMENT AND FORESTRY

General Directorate of Environmental Impact Assessment and Planning

No : B.18.0.CED.0.01.02/227-03-44
Subject : Eurasia Tunnel Project
Date : 16/10/2007

TC Ministry of Transport
(General Directorate for the Construction of Railways, Seaports and Airports)

Ref:

- a) 06/09/2007 dated and B.11.0.DHL.0.09.00.05/1109-15895 numbered letter
- b) 21/09/2007 dated and B.18.0.CED.0.01.02/227-03-41-10181 numbered letter
- c) 04/10/2007 dated and B.11.0.DHL.0.09.00.05/1208-16712 numbered letter

Letter Ref. (a) letter has been submitted to the Ministry with the Project Description File prepared regarding the 'Eurasia Tunnel' that is planned to be constructed between Europe side Kazlıçesme Junction and Asia side Göztepe Junction in Istanbul.

The Project Description File had been viewed and, as stated in Letter Ref. (b) the link between the Eurasia Tunnel and current roads, the modification plans for the roads and technical information about the tunnel and any other related information is required to be assessed within the EIA regulation.

As a result of review of the documents and the information included in Letter Ref. (c) according to the EIA Regulation as published in the Official Gazette on 16 December 2003 with no 25318; it is understood that, the project **is not** within the scope of the EIA Regulation.

Notwithstanding, in relation to the project, the Environmental Act no 2872, the Amending Act on Environmental Law no 5491 and related regulations on this Act are binding and should not be violated and the required authorizations must be obtained from the related institutions and public offices in accordance with these laws and regulations.

Sincerely,
Omer SOYLU

Annex C

Administrative and Regulatory Review

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This Annex summarises the institutional and regulatory framework within which the Project will be developed. It provides:

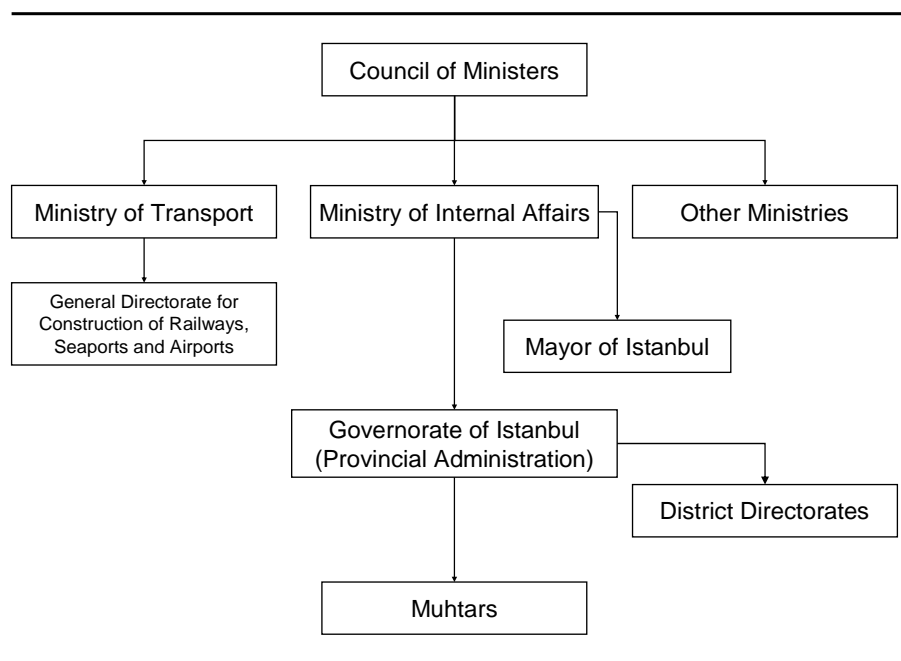
- C2: an overview of institutional structures in Turkey relevant to transport and the environment;
- C3: a summary of Turkish environmental and social laws and regulations deemed relevant to the Project;
- C4: an overview of international environmental and labour conventions and agreements to which Turkey is a signatory;
- C5: a summary of Turkish statutory provisions regarding the involuntary expropriation of land and other assets and resettlement of people and businesses affected by development.

C2 INSTITUTIONAL FRAMEWORK

2.1 INTRODUCTION

The structure of central and provincial government in Turkey is illustrated in Figure 1.

Figure 1 *Institutional Framework*



2.2 CENTRAL GOVERNMENT MINISTRIES

The main government ministries with an interest in the Project are briefly introduced below.

2.2.1 *Ministry of Transport*

The General Directorate for Construction of Railways, Seaports and Airports (DLH) is the department responsible for development of the Eurasia Tunnel Project. This is a directorate within the Ministry of Transport. The Ministry of Transport coordinates, regulates, and supervises land, sea, air, and railway transportation and communications, as well as the construction and maintenance of relevant infrastructure. The Ministry is represented by Regional Transport Directorates in the provinces.

It will cooperate with relevant directorates within the Governorate of Istanbul for monitoring and supervision of the Project.

2.2.2 *Ministry of Environment and Forestry*

The Ministry of Environment and Forestry is made up of a number of Directorates including the following:

- The General Directorate of Environmental Impact Assessment and Planning organises the procedures of EIA and follow-up in coordination with Governorate structures at the local level.
- The General Directorate of Environmental Management is the primary actor in environmental protection and monitoring procedures, holding the authority for assessment, supervision, and sanctioning in coordination with Governorate structures at the local level.
- The General Directorate of Nature Protection and National Parks is responsible for identifying and managing protected areas.

Provincial Environment and Forestry Directorates represent the Ministry within each Governorate and form part of the Provincial Administration. They act in accordance with the Ministry's and Governorate's activities with regards to environmental issues.

2.2.3 *Ministry of Culture and Tourism*

The High Commission for the Protection of Cultural and Natural Heritage is part of the Ministry of Culture and Tourism and is responsible for protection and restoration of cultural and natural properties, and reviewing and deciding on land use and spatial planning decisions affecting cultural heritage. The High Commission is supported by the Directorate General of Cultural Properties and Museums.

Regional Protection Committees for the Protection of Cultural and Natural Heritage are appointed by the Minister and are responsible for action at a local level including:

- registering the cultural and natural heritages that are identified by the Ministry or ordered to be identified by the Directorate General;
- classifying the cultural and natural heritages that should be protected,
- reviewing and deciding land use plans and amendments to them;
- giving decisions on implementation projects;
- determining the protection areas for cultural and natural heritage sites.

Ministry of Labour and Social Security

Regional Labour Directorates are ministerial agencies at regional level, conducting monitoring and enforcement of labour law, particularly

occupational health and safety. The Labour Inspection Board functions through its labour inspectors, monitoring all activities related to health and safety at the workplace and reporting to the Ministry. The General Directorate of Occupational Health and Safety defines standards of health and safety and coordinates all aspects associated with occupational health and safety.

2.2.4 *Ministry of Health*

The Ministry of Health coordinates, regulates, and supervises health care services and takes required measures for the protection of public health. Public health protection activities are conducted by the General Directorate of Basic Health Services. The Ministry is represented at Governorate level by the Provincial Health Directorates.

2.3 *GOVERNORATES/PROVINCIAL ADMINISTRATION*

The highest authority at the local level is the Governor who is directly responsible to the Ministry of Internal Affairs. Governors represent central government (ie the Council of Ministers) at the provincial level. Provincial directorates represent their respective ministries at provincial level and form the Provincial Administration under the authority of the Governor.

2.4 *LOCAL ADMINISTRATION*

Mayors and Muhtars are the heads of urban (over 2,000 inhabitants) and rural (under 2,000 inhabitants) settlements respectively. In urban areas each neighbourhood also has a Muhtar. They are elected by local elections. A Mayor is the head of the municipal organisation (Municipal Assembly and Municipal Council) and represents the municipality. The municipalities are autonomous in fiscal and administrative aspects but the Ministry of Internal Affairs has a mandate over the Mayor's activities. Muhtars are at the lowest level of the central government administrative structure. Whilst the governor is appointed by central government the mayor and muhtar are elected officials.

In the city, Muhtars are autonomous (1) presidents of self-governing assemblies (ihtiyar meclisi) and represent the state in each neighbourhood. Muhtars are supported by 'Aza's' (official helpers) and a group of elders. They are government agents with authority for minor administrative procedures.

(1) The word 'muhtar' itself means autonomous in Ottoman Turkish.

C3 **TURKISH LEGISLATION**

3.1 **OVERVIEW**

This section provides an overview of the Turkish legal system and a summary of relevant national legislation.

The legal framework in Turkey is governed by the Turkish hierarchy of norms which defines the different categories of Act and controls legal precedence in cases of any conflict. This is outlined in Table 1.

Table 1 *Turkish Hierarchy of Norms*

Parliamentary Acts

All parliamentary acts have to comply with Constitutional provisions and the constitutionality of these acts can only be contested at the Constitutional Court (*Anayasa Mahkemesi*). Parliamentary Acts are made up of Code Law (*Kanun*) and Decree Law (*Kanun Hükmünde Kararname*). Code Law forms the backbone of the Turkish legal system and is the fundamental reference point for all courts. Decree Laws are legislation prepared by the Council of Ministers and authorised by the Parliament.

Administrative Regulatory Acts

Public administrative bodies, such as Ministries, are responsible for the execution of Parliamentary Acts and as such have the authority to develop secondary legislation to ensure implementation of these Acts. Secondary law includes:

- (i) Decrees (*Tüzük*): Ministries (and in practice the Council of Ministers) are entitled to issue decrees. These regulatory acts are examined by the Council of State (*Danıştay*) before they are issued.
 - (ii) Regulations (*Yönetmelik*): These are issued by Ministries as well as other public bodies with authority of execution. Regulations have to be in compliance with the relevant decrees. Even though they occupy a lower grade than Decrees in the hierarchy of norms, they are usually substituted for Decrees, and tend to form the bulk of Turkish legislative documents.
 - (iii) Atypical regulatory acts: These have a variety of names, the most common of which is circular order (*genelge*). They are regulatory legislative documents issued by public administrative bodies to ensure implementation of parliamentary acts. They are considered minor legislation, but are nevertheless prominent in certain fields.
-

3.2 **RELEVANT LEGISLATION**

The key provisions of Environmental, Social and Labour legislation considered relevant to the Project are summarised in Table 2.

Environmental standards applying Turkey are summarised in Table 3 and compared with relevant international standards (EU, World bank/IFC and WHO).

Table 2 *Summary of Environmental, Health and Safety and Labour Legislation in Turkey*

Act, Regulation, Order (date and ref)	Brief summary of scope	Relevance to Development of Eurasia Tunnel (ref to relevant section)
ENVIRONMENT		
<i>Environmental Law</i> (Law No: 2872) (Official Gazette Date/Number: 16.08.1983/18132)	The purpose is to protect the environment, which is the common asset of all the living beings, in line with the principles of sustainable environment and sustainable development.	<p>Article 8: Prohibition on Pollution</p> <p>It is forbidden to discharge, store, carry and transfer any type of waste contrary to defined standards and methods given in relevant regulations and in a way that causes harm to the environment.</p> <p>When there is a possibility of pollution, the concerned parties are liable to prevent pollution. If pollution occurs, the concerned parties are liable to eliminate pollution and to take necessary measures to remove or minimize the effects of pollution.</p> <p>Article 10: Environmental Impact Assessment</p> <p>The institutions, businesses and enterprises, which may cause environmental problems as a result of the activities they are planning to perform, are obliged to prepare a Project Introduction File and if required an Environmental Impact Assessment Report.</p> <p>For projects subject to EIA, no permit, approval, incentive, licence to build or operate may be given for the proposed project and the investments cannot commence and be tendered unless an “EIA positive” or “EIA is not necessary” decision is received,.</p> <p>Article 11: Permitting, Treatment and Disposal</p> <p>The producers of waste are responsible for taking the necessary measures to minimise the amount of waste they create by using appropriate technologies and methods.</p> <p>Recoverable waste must be separately collected at source and recovered. . The principles pertaining to the preparation of waste management plans shall be arranged under regulations issued by the Ministry.</p> <p>Waste that cannot be recovered shall be disposed of by using the appropriate methods that are determined in the relevant regulations.</p> <p>Article 12: Inspection, Provision of Information and Declaration of Liability</p> <p>The concerned parties are obliged to provide information and documentation requested by the Ministry or other competent authorities responsible for inspection, and to cover the costs of measurements and analysis performed by</p>

Act, Regulation, Order (date and ref)	Brief summary of scope	Relevance to Development of Eurasia Tunnel (ref to relevant section)
		<p>the authorities or their staff and to provide every convenience during the inspection process.</p> <p>If requested by the Ministry or the authorized inspection unit, the concerned parties are obliged to provide information and documentation related to raw materials and fuel used, products and waste, production diagrams, emergency response plans, monitoring systems, pollution reports and other related information, regarding activities that may cause environmental pollution.</p> <p>Article 20: Administrative Fines:</p> <p>e) Any party that starts construction or operation before completing the EIA process shall be charged with an administrative fine of 2 percent of the project value. In these situations, the investor is obliged to reinstate the area to its previous condition.</p> <p>Any party that acts contrary to the commitment letter given during the EIA process shall be charged with an administrative fine of 10.000 Turkish Liras for each violation.</p> <p>Article 26: Fines of Judicial Nature</p> <p>Any party that supplies wrong or misleading information and acts against the liability defined in article 12 shall receive imprisonment ranging from six months to one year.</p>
Environmental Impact Assessment Regulation (Official Gazette Date/Number: 17.07.2008/26939)	<p>The regulation covers:</p> <p>(i) monitoring and auditing of projects that are within the scope of EIA, before, during and after operation (ii) for which types of projects EIA application file, EIA report or project introductory file is required, (iii) Administrative and technical procedures and principles in the EIA process, (iv)</p>	<p>Provincial roads are identified under Annex-II, while highways, express and state roads are subject to Annex-I of the EIA Regulation. Annex-I projects are obliged to prepare an EIA report. Annex-II projects first prepare a "project introduction file" and depending on the evaluation by the authority full EIA may or may not be required. DLH prepared a Project Introduction file which was reviewed by the Ministry of the Environment and Forests. The Ministry ruled that the Eurasia Tunnel Project is not within the scope of the 2003 Regulation which preceded was in force at the time of the submission (October 2007).</p>

Act, Regulation, Order (date and ref)	Brief summary of scope	Relevance to Development of Eurasia Tunnel (ref to relevant section)
	Studies related to establishment of a Scope Determination and Review and Assessment Commission .	
Protection of Air, Water and Soils		
Industrial Air Pollution Control Regulation (Official Gazette Date/Number: 03.07.2009/27277)	The regulations controls emissions to air including emissions from specified industrial installations.	<p>Annex 8 of the regulation lists facilities that are required to obtain an air emission permit. Roads, tunnels and ventilation shafts are not included in these lists and are therefore not subject to this regulation. The regulations also include provisions relating to other sources of air pollution and these must meet the limits given in the regulation (see Table 3). The Provincial Directorate of Environment and Forestry may request that air measurements are made for those facilities. This may be a case for the operational emissions from the ventilation shafts.</p> <p>For the temporary storage of excavated soils, precautions are defined in Annex 1</p> <ul style="list-style-type: none"> • placing Wind-barriers • covering the top of conveyors and other carriers. • loading and unloading without spreading dust • covering dusty materials with canvas or with materials that have particle sizes greater than 10 mm • maintaining top layers at a moisture content of 10%. .
Air Quality Assessment and Management Regulation (Official Gazette Date/Number: 06.06.2008/26898)	The purpose of this regulation is to determine and build the air quality targets, to assess the air quality, to protect the current condition where the air quality is good and to improve it where	The regulation sets limits for air quality parameters in Annex I and Annex IA and these limits shall be met in a long term as described in the Table 3 below.

Act, Regulation, Order (date and ref)	Brief summary of scope needed.	Relevance to Development of Eurasia Tunnel (ref to relevant section)
Water Pollution Control Regulation (Official Gazette Date/Number: 31.12.2004/25687)	The purpose of this Regulation is to set the legal and technical principles to be followed in the control of water pollution, in order to protect the ground and surface waters, and to prevent water pollution taking into consideration the sustainable development objectives.	<p>Article 16. It is prohibited to discharge wastewaters into sources used for abstraction of drinking and potable water even if they are treated.</p> <p>Article 23. It is forbidden to discharge excavated soils, debris, sludge and similar waste to seas and coastal waters.</p> <p>Article 25. Discharge of wastewaters to sewer system</p> <p>a. Discharge of all kinds of wastewaters to sewer system (where there is one) is a right and obligation.</p> <p>c. Natural persons or legal entities who create wastewater are liable to cover the expenses of using the sewer system, and/or treatment facilities.</p> <p>Article 37. Permits for wastewater discharge into receiving waters</p> <p>A permit must be obtained from the Provincial Directorate of Environment and Forestry for the direct discharge of any domestic and/or industrial wastewaters and site run off where this is discharged from a point source into receiving waters</p>
Regulation on Pollution Control Caused by Dangerous Substances in Aquatic Environment (Official Gazette Date/Number: 26.11.2005/26005)	This Regulation includes technical and administrative basis regarding the determination of dangerous substances in surface waters, estuary waters and regional waters; organization of pollution reduction programs; prevention and monitoring of pollution; creating an inventory of dangerous	Pursuant to Article 9 of the Regulation, direct discharge of wastewater containing hazardous substances to the receiving environment is forbidden unless a permit has been obtained from the Provincial Directorate of Environment and Forestry. Permits will contain conditions regarding pollution reduction programs and special programs that are to be prepared.

Act, Regulation, Order (date and ref)	Brief summary of scope	Relevance to Development of Eurasia Tunnel (ref to relevant section)
	substances discharged into water; determination of discharge standards and quality criteria.	
Dangerous Chemicals Regulation (Official Gazette Date/Number: 11.07.1993/21634)	The regulation lays down the principles for the production, storage, transportation, usage and marketing of dangerous chemicals. Products which contain chemical(s) listed in Annex 1 of the Dangerous Chemicals Regulation are subject to this regulation.	<p>Users of dangerous chemicals are liable to:</p> <ul style="list-style-type: none"> • hold Material Safety Data Sheets (MSDS) for all hazardous chemicals stored on site • provide the necessary training for the use of the MSDS sheets • provide an adequate storage area appropriately sealed, ventilated and have the necessary precautions against spillage • segregate hazardous chemicals based on compatibility <p>The Dangerous Chemicals Regulation will be abolished on 26.12.2009 and replaced by new regulations in line with EU standards:</p> <ul style="list-style-type: none"> • Regulation on Inventory and Control of Chemicals (Official Gazette Date/Number: 26.12.2008/27092) • Regulation on Classification, Packaging and Labelling of Dangerous Substances and Preparations (Official Gazette Date/Number: 26.12.2008/27092, this regulation will come into force on 26.12.2009) • Regulation on the Preparation and Distribution of Dangerous Substances and Preparations (Official Gazette Date/Number: 26.12.2008/27092, this regulation will come into force on 26.12.2009)
Soil Pollution Control Regulation (Official Gazette Date/Number: 31.05.2005/25831)	The purpose of the regulation is to determine the measures for the discharge, disposal, leakage of hazardous substances and wastes into soil as well as the principles regarding the controlled	<p>Article 5. General Liabilities</p> <p>Soils must comply with the limit values and liabilities set forth in the regulation (see Table 3). The Provincial Administration is responsible for determining areas of contamination risk, determining the measures to be taken and implementing these measures. Where there is a risk of contamination, potential polluters are required to prevent pollution. Where a site is contaminated the polluters are required to stop further contamination, determine the extent of contamination and carry out necessary work and measures to remediate the site.</p> <p>Article 7. Liabilities Regarding the Prevention and Removal of Soil Contamination</p>

Act, Regulation, Order (date and ref)	Brief summary of scope	Relevance to Development of Eurasia Tunnel (ref to relevant section)
	usage of sludge created as a result of the treatment of domestic and industrial wastewater.	<p>a- It is forbidden to dispose of any kind of waste that can cause harm to the soil directly or indirectly, by discharging into the receiving environment or storing waste in a way that is contrary to the standards and methods defined in Environmental Law and relevant regulations.</p> <p>b-Polluters are liable to decontaminate the soils that are contaminated by their activities including accidents. Following contamination of a site, analysis of parameters listed in Annex I-A of the regulation can be requested by the Ministry of Environment and Forestry and recorded by a report that the soil meets the limit values of the regulation.</p> <p>c- The procedures and principles for the detection and decontamination of contaminated soils are determined by the Ministry of Environment and Forestry.</p> <p>Article 8. Monitoring the Current Soil Contamination</p>
Waste		
Regulation on Control of Excavated Soil, Construction and Demolition Wastes (Official Gazette Date/Number: 18.03.2004/25406)		<p>Deposit of excavated soil, construction and demolition wastes in seas, lakes, rivers or any other place except recovery and storage facilities permitted by municipalities is forbidden. The producers of excavated soils and construction wastes must obtain a "Waste transportation and acceptance certificate" from the metropolitan municipality if the amount of waste exceeds 2 tons. Waste must be transported by a licensed waste carrier. Those carrying out excavations are responsible for taking measures to minimize noise and visual pollution and dust emissions. The use of excavated soils primarily within the construction area is promoted. If the responsible party owns at least 2000 square metres of land apart from the construction site excavated soil that will be used subsequently can be stored at this area temporarily. During excavation, the top soil must be collected separately from subsoil. Top soil should be stored onsite as stockpiles to be used subsequently.</p> <p>Asbestos, dye, fluorescent, mercury, acids and similar hazardous wastes contained in construction/demolition wastes shall be collected separately and disposed of in accordance with the provisions of the Hazardous Waste Control Regulation.</p>
Solid Waste Control Regulation (Official Gazette Date/Number: 14.03.1991/20814)	The Solid Waste Control Regulation lays down the principles and procedures for	It is forbidden to dump solid wastes into seas, lakes and similar receiving media and in streets, forests and places that may cause adverse effects on the environment. Solid wastes shall be kept in closed containers and disposed of in licensed disposal facilities. Producers of solid wastes are liable not to mix any hazardous wastes into the solid wastes and must participate in works related to recovery of solid wastes.

Act, Regulation, Order (date and ref)	Brief summary of scope	Relevance to Development of Eurasia Tunnel (ref to relevant section)
	production, collection, temporary storage, recycling, and disposal of solid wastes. The regulation provides information on landfilling, composting and incineration of solid wastes.	
Packaging Waste Control Regulation (Official Gazette Date/Number: 24.07.2007/26562)	The regulation governs collection, recycling, and disposal of packaging waste.	Producers of packaging wastes are liable to collect packaging waste separately at their source and give the packaging waste free of charge to the municipal system. It is forbidden to dispose of packaging wastes, directly or indirectly, by discharging them into receiving bodies and storing them in landfills.
Hazardous Waste Control Regulation (Official Gazette Date/Number: 14.03.2005/25755)	The regulation lays down the principles and procedures for production, collection, temporary storage, transportation, exportation, recycling and disposal of hazardous wastes. The Regulation also provides design criteria and standards for hazardous waste management, and hazardous waste storage and treatment facilities.	<p>The amount and type of hazardous waste, if generated, any shall be recorded. Hazardous wastes shall be collected separately and kept in a "Temporary Storage Area" and finally disposed of in recovery and/or disposal facilities that are licensed by the Ministry of Environment and Forestry.</p> <p>Facilities producing hazardous wastes are responsible for submitting hazardous waste declaration forms to the relevant Provincial Environmental Directorate each year indicating the amount of hazardous wastes produced at their site.</p> <p>With the current revision of the regulation (amendments published in the Official Gazette dated 04.09.2009 and numbered 27339), a citation is made to the "Regulation on the General Principles of Waste Management (Official Gazette dated 05.07.2008 and numbered 26927)" for the list of hazardous wastes (Annex IV of the regulation) in accordance with EU standards</p>

Act, Regulation, Order (date and ref)	Brief summary of scope	Relevance to Development of Eurasia Tunnel (ref to relevant section)
Waste Oil Control Regulation (Official Gazette Date/Number: 30.07.2008/26952)	The purpose of the Waste Oils Regulation is to provide standards for storage, transportation and disposal of waste oils and to prevent their discharge into the receiving environment.	<p>Under the Waste Oils Regulation, waste oils are categorized into three categories and can be managed as defined below:</p> <ul style="list-style-type: none"> ○ The generation of Category I waste oils must be minimised and Category I waste oils must be disposed of by recycling (refining or regeneration) at oil recovery facilities holding a licence from the Ministry of the Environment and Forestry. ○ Category II waste oils are must be disposed of by use as a secondary fuel in facilities holding a licence from the Ministry of the Environment and Forestry . ○ Category III waste oils are not appropriate for refining and regeneration, and pose risk to human and environmental health if used as fuel, and therefore must be returned to harmless products by incineration in hazardous waste incineration facilities. <p>Article 9- Waste oil producers are liable to take all the necessary measures to minimize waste oil generation, to analyze waste oils (or have them analyzed) and temporarily store them separately depending on their categories, not to mix different category waste oils or with PCBs and any other hazardous wastes, to have waste oils transferred to licensed disposal facilities by licensed transporters, to keep records in line with article 26 of the regulation and to fill the waste oil declaration form given in Annex 2 and send it to the Ministry of Environment and Forestry by the end of February of the succeeding year.</p> <p>Pursuant to Article 22 of the Regulation; wastes that are not appropriate for recycling, Category III wastes that need to be disposed of in hazardous waste incineration facilities, hazardous wastes that are generated in recovery operations and materials contaminated with these wastes, and bottom sludges of waste oil storage tanks must be disposed of in licensed facilities in accordance with the provisions of Hazardous Waste Control Regulation.</p>
Environmental Noise		
Regulation on the Assessment and Management of Environmental Noise (Official Gazette Date and Number: 07.03.2008/26809)	The regulation applies to noise to which humans are exposed, in particular in built-up areas, in public parks or other quiet areas, near schools, hospitals and other noise-sensitive	<p>The regulation establishes standards for acceptable levels of noise and vibration during the day and at night in different environments (residential, commercial, industrial, etc), limits on increases in noise levels and standards for construction sites (see Table 3).</p> <p>Environmental noise levels originating from roads must not exceed the levels given in Table 1 of Annex-8 (see table 3 below).</p> <p>Environmental noise levels from activities at construction sites shall not exceed the limits given in Table 5 of Annex-8 (see table 3 below). Construction activities that are inside or close to residential areas shall not be carried out in</p>

Act, Regulation, Order (date and ref)	Brief summary of scope	Relevance to Development of Eurasia Tunnel (ref to relevant section)
	buildings or areas. The regulation also covers principles and criteria for buildings exposed to vibration.	<p>evening and night times. For projects that are identified as of public benefit including urban main roads, construction activities that would interrupt traffic during the daytime can be carried out in the evening and at night provided that (i) the limit values of 5dB(A) below the daytime limits are met in the evening and 10 dB(A) below at night (ii) a permit from is obtained the relevant authority taking into account the opinion of the Provincial Directorate of Environment and Forestry.</p> <p>Vibration levels at very sensitive areas, that will be created by activities such as driving piles during construction and by heavy construction machines, shall not exceed the levels given in Table 7 of Annex 8 (se Table 3 below).</p>
Coastal Waters		
Coastal Law (Law No: 3621) (Official Gazette Date/Number: 17.04.1990/20495)	Protection of the coastline of seas, lakes and streams	. C-27, No excavation which modifies the coast is permitted. Sand, gravel and similar materials shall not be taken or carried away.
and		Pursuant to article 15 of the law, it is prohibited to dump waste such as debris, soil, garbage, into the coastal environment. Those who dispose of waste in such a manner will be penalized based on the type of waste and its damaging effect on the environment.
Regulation on the Implementation of Coastal Law		Article 5 of the implementation regulation also prohibits the discharge of waste into the coast and states that the provisions of Water Pollution Control Regulation will apply.
(Official Gazette Date/Number: 03.08.1990/20594)		
Nature Conservation and Biodiversity		
Forest Law (Law No: 6831) (Official Gazette Date and Number: 08.09.1956/9402)	Regulates the protection of forests.	There are no forest areas along the project route. Therefore, this law is not applicable
National Parks Law (Law No: 2873) (Official Gazette Date and Number: 11.08.1983/18132)	This law regulates the designation of national parks and further types of protected area and arranges principles for their protection,	The purpose of this regulation is to select and designate national parks, natural parks, natural monuments and nature protection areas that have a value at a national and international level, and to arrange principles for their protection, improvement and management. This law is not applicable as there are no national parks in Istanbul; natural parks, natural monuments and nature protection areas that are present in Istanbul are not located in the project route.

Act, Regulation, Order (date and ref)	Brief summary of scope	Relevance to Development of Eurasia Tunnel (ref to relevant section)
	improvement and management.	
Aquatic Products Law (Law No: 1380) (Official Gazette Date and Number: 04.04.1971/13799)	The purpose of this law is to determine the principles for the protection, production and control of aquatic products.	Aquatic products are defined as plants, animals and their eggs that exist in seas and inland waters. Pursuant to article 20 of the law, it is prohibited to dump substances that are detrimental to the health of aquatic products, to the health of people who produce or consume aquatic products and to the production tools such as equipments and tools, into inland waters and production areas and their vicinity in seas. It is also prohibited to establish facilities that will discharge waste in these areas. The substances which are prohibited to be discharged are indicated in the regulation.
Aquatic Products Regulation (Official Gazette Date and Number: 10.03.1995/22223; updated 10.03.2010)	The regulation lists the substances prohibited to be discharged.	The substances which are prohibited to be discharged are listed in annex-5 of the regulation. According to article 11 of the regulation, water samples are taken at the point just before the discharge water mixes with the receiving body. Allowable waste discharge values are presented in annex-5 of the regulation.
Cultural heritage		
Law on Preservation of the Cultural And Natural Assets, (Law No: 2863), (Official Gazette Date/Number: 23.07.1983/18113)	The law defines the movable and immovable cultural and natural assets to be protected, arranges the actions and activities to be made, determines the establishment and duties of the organization that will take implementation decisions.	<p>Article 3 makes definitions:</p> <p>(1) "Cultural Assets": All movable and immovable assets on surface, under ground or under water regarding science, culture, religion and fine arts that belong to prehistoric and historic area or which have scientific or cultural genuine qualifications that belong to prehistoric and historic area.</p> <p>(2) "Natural Assets": Valuables from geological, prehistoric and historic era, on surface, under ground or under water, of which the preservation is essential due to their unique features and beauty.</p> <p>(3) "Site": Ancient sites and city ruins that come from various civilizations since prehistoric times and reflect the social, economical, architectural and similar features of their era, the locations where significant historic events took place and the locations that should be preserved together with their specified natural features.</p> <p>(5) "Preserved Area": The areas that must be protected in order to preserve immovable cultural assets in their historical surrounding/context.</p> <p>(6) "Ruin Area": Areas where manmade cultural assets, which are surviving products of various civilisations from prehistory until today and have significant homogenous features capable to be defined topographically and which are significant regarding historical, archaeological, artistic, scientific, social and technical means and partially constructed, join the natural assets.</p>

Act, Regulation, Order (date and ref)	Brief summary of scope	Relevance to Development of Eurasia Tunnel (ref to relevant section)
		<p>Article 4 defines the Notification Liability: Any individual who finds movable or immovable cultural and natural assets, who are aware of, or acknowledge that cultural and natural assets exist within their land they own or utilize should notify, at the latest within three days, the nearest museum management or muhtars in villages or public officials in other locations.</p> <p>Article 5 (Public property): The movable and immovable cultural and natural assets to be preserved that are known, or that are discovered in the future, shall be considered as State properties.</p> <p>Article 6 defines the cultural and natural assets to be preserved as follows:</p> <ul style="list-style-type: none"> a) The natural assets to be preserved and immovables that have been constructed up to the end of 19th century; b) The Immovables that have been constructed after the aforementioned date, however required to be preserved by the Ministry of Culture and Tourism regarding their importance and features; c) The immovable cultural assets present in Site areas; d) The buildings and areas that have witnessed significant historical events during the National War and the foundation of the Turkish Republic and the dwellings that have been used by Mustafa Kemal ATATÜRK, regardless of time and registration. <p>However, the immovables that have been found unnecessary to be preserved by the Protective Council regarding the architectural, historical, aesthetic or other significance and features, are not considered as immovable cultural assets to be preserved."</p> <p>Article 8 (Decision making authority for Preservation Areas): The decision making power for cultural and natural assets to be preserved that have been registered in accordance to Article 7, for determining their Preservation Areas and for determining whether any construction or installation is allowed within these areas, will be the responsibility of the Protective Councils. The decisions of the Protective Councils are subject to appeal in accordance to paragraph 2 of the Article 61.</p> <p>Article 9 explains the prohibition of unauthorised intervention and usage: Construction and physical interventions, re-opening for any usage or changing the use of immovable cultural and natural assets by violating the decisions of the Protective Councils which have been taken within the framework of the principal resolution of the Supreme Protective Council, are prohibited. Repair works, construction, installation, drilling, partial or complete destruction, excavating or similar activities will be considered as construction and physical intervention.</p>

Act, Regulation, Order (date and ref)	Brief summary of scope	Relevance to Development of Eurasia Tunnel (ref to relevant section)
		<p>Article 20 (Transfer of immovable cultural assets): The in-situ preservation of the immovable cultural assets and their parts is required. However, if there is a need to transport immovable cultural assets to elsewhere or if such a transport is necessary due to their nature, these assets can be transferred to the desired locations by the Ministry of Culture and Tourism with necessary measures taken, if found appropriate by the Protective Councils. If the proprietor faces any harm or loss due to the transfer of the cultural asset an indemnity that will be determined by a commission of the Ministry of Culture and Tourism will be paid to the injured parties.</p> <p>Article 65 (Fines):</p> <p>a) Those who cause immovable cultural and natural assets to be demolished, deformed, damaged or destroyed or harmed with any reason what so ever on purpose, shall be liable to imprisonment for two to five years and administrative fine. These fines are doubled if the cultural and natural asset to be preserved are to be smuggled abroad.</p> <p>b) Those who construct and physically intervene (or have it constructed and physically intervened) in the Protected Areas (Site) against the transition period preservation principles and usage requirements, protective physical development plans and requirements set forth in the Preserved Areas which are determined by the Protective Councils, shall be liable to imprisonment for two to five years and receive an administrative fine.</p> <p>Article 67 (Violating notification liability and cultural asset trade): Those who violate notification liability related to cultural and natural assets on purpose or without any excuse, shall be imprisoned for six months to three years.</p>
Principal Decision No. 421 (Date: 19.04.1996)	This decision regulates that also the topographic setting and silhouette of a historic site must not be disturbed.	Historical Sites are areas required to be preserved where important historical events occurred in terms of national history and military. Any action violating vegetation, topographic setting, silhouette and intended to give harm are prohibited.
Principle Decision No. 658 (Date: 05.11.1999)	This decision classifies archaeological sites and defines different levels of preservation and utilization	<p>This decision defines an archaeological site as settlements and areas where any kind of cultural asset is located reflecting products and social, economical and cultural characteristics of old civilisations on or underground or under sea. The sites are classified with different levels of preservation and utilization requirements. The classification considers the importance and the properties of the Archaeological Sites along with preservation and utilization conditions of these areas.</p> <p>1st Level Archaeological Site:</p>

Act, Regulation, Order (date and ref)	Brief summary of scope	Relevance to Development of Eurasia Tunnel (ref to relevant section)
	requirements	<p>Areas to be preserved as they are, except for scientific studies with preservation purpose. In these areas any kind of excavation, other than scientific excavations, and construction are prohibited. These areas should be determined as "Site areas to be preserved as they are" in the physical development plans. However, in case infrastructural developments to be carried out by public or private corporations are deemed necessary, approval from the museum administration and (if present) head of the excavation is required.</p> <p>2nd Level Archaeological Site: Site areas to be preserved as they are, except for scientific studies with preservation purpose. However, the preservation and service requirements will be set by Protective Councils. New constructions are not allowed in these areas. However;</p> <p>a) Basic maintenance for unregistered buildings in service can be done according to the current principle decisions.</p> <p>b-f) clauses including preservation and utilization requirements for 1st level archaeological sites are applicable.</p> <p>3rd Level Archaeological Site: Archaeological Sites where new arrangements can be allowed according to the preservation utilization decisions.</p> <p>a) Construction requirements should be set for the transition period as follows:</p> <ul style="list-style-type: none"> - Proposed building density should not exceed the density defined in the current development plan; - The functionality should be compatible with the area; - Solutions for required infrastructural applications, proposed structure dimensions, construction techniques and materials should provide the preservation and reclamation of current or possible archaeological assets.
Principle Decision No. 664 (Date: 05.11.1999)	This decision extends the protection of preservation areas to neighbouring parcels.	Neighbouring parcels or parcels (even if the roads are dividing) fronting the registered parcels which do not have determined preservation areas, are considered as preservation areas. To avoid any future interruptions, installations are prohibited in these areas unless there is a decision of the protective council.
Principle Decision No. 666 (Date: 05.11.1999) (re protection of trees)	This decision regulates the protection of trees of a certain value.	<p>Trees may be qualified as monumental due to their natural structure, size and other characteristics . The Preservation Council may define the trees of the types listed below as "monumental tree to be preserved" according to the Law no. 2863:</p> <p>a) Any of native or non-native trees which have relation with historical events;</p> <p>b) Trees which have shapes diverging significantly from their original form (fork, candlestick, lateral etc.) or which</p>

Act, Regulation, Order (date and ref)	Brief summary of scope	Relevance to Development of Eurasia Tunnel (ref to relevant section)
		<p>have plastic values regarding their beauty;</p> <p>c) Trees which have developed characteristics different from their natural style (unusual combinations and surviving examples such as having two or more species grown on same body and root);</p> <p>ç) Endemic and extinct local trees with approval from related experts and institutions, <i>Taxus baccata</i>, <i>Pinus halepensis</i>, <i>Arceuthos drupacea</i>, <i>Juniperus phoenicea</i>, <i>Quercus vulcanica</i>, <i>Buxus sempervirens</i>, <i>Betula verrucosa</i>, <i>Betula pubescens</i>, <i>Betula medwediewii</i>, <i>Abies equitrojani</i>, <i>Liquidamber orientalis</i>, <i>Abies cilicia ssp. isaurica</i>, <i>Acer divergens</i>, <i>Acer hyrcanum</i>, <i>ssp. Sphaerocaryum</i>, <i>Acer mons pessulanum ssp. aksalinum</i> and similar trees;</p> <p>d) Single or trees in row which complement the urban texture or affect the city image.</p>
Principle Decision No. 702 (Date: 15.04.2005)	This decision regulates urban Archaeological Sites and their preservation and utilization requirements	Areas, where urban textures are preserved together with the Archaeological Site covered under Law No. 2863 and which present integrity with this feature, are defined as "urban archaeological site" and require special planning for preservation.
Principle Decision No. 729 (Date: 19.06.2007)	This decision regulates protection of monuments.	When required, monument-sculpture that is created as a dedication to an event or a person(s) or to symbolize a social concept, and gained immovable status regarding its interaction with the located area and surrounding, can be registered as a cultural asset with the approval from related experts by report.
HEALTH AND SAFETY AND LABOUR LAW		
Labour Law (Official Gazette Date/Number: 10.6.2003/25134)	The purpose of this law is to regulate the working conditions and work-related rights and obligations of employers and employees working under an employment contract.	<p>Article 3. Declaring the establishment: The employer who sets up or takes over an establishment covered by this Act, who completely or partly changes the nature of his business, or who permanently closes down an establishment due to the completion of work or for any other reason must, within one month, notify the regional directorate of labour of the name and surname or trade mark and address as well as the names, surnames and addresses of employer representatives, if there are any.</p> <p>Article 8. Written form is required for employment contracts with a fixed duration of one year or more, Such written documents are exempt from the stamp tax and all kinds of fees.</p> <p>In cases where no written contract has been made, the employer is under the obligation to provide the employee with a written document, within two months at the latest, showing the general and special conditions of work, the</p>

Act, Regulation, Order (date and ref)	Brief summary of scope	Relevance to Development of Eurasia Tunnel (ref to relevant section)
		<p>daily or weekly working time, the basic wage and any wage supplements, the time intervals for remuneration, the duration if it is a fixed term contract, and conditions concerning the termination of the contract. This subsection shall not apply in the case of fixed term contracts whose duration does not exceed one month. If the employment contract has expired before the lapse of two months, this information must be communicated to the employee in written form on the expiration date at the latest.</p> <p>Article 28. The employer must furnish the employee leaving employment with a certificate stating the nature and duration of employment. The employee who suffers a loss or the new employer who has recruited him may claim compensation from the previous employer for the latter's failure to furnish the certificate on due time or for the incorrect information contained in the certificate. Such certificate is exempt from taxes and fees.</p> <p>Article 63. In general terms, working duration is at most forty-five hours a week.</p> <p>Article 69. Night hours and night work: Night work for employees must not exceed seven and a half hours.</p> <p>Suitability of employees for night work shall be certified by a health report that will be obtained before the employees start working. Night workers shall be subjected to a periodic health examination at least once every two years by the employer. The costs of workers' health examinations shall be met by the employer.</p> <p>The employer is liable to submit the list of night workers as well as a copy of the health reports issued before starting work and those that are periodical, to the relevant regional directorate of labour.</p> <p>Article 72. Restrictions on underground and underwater work: Men under the age of eighteen and women irrespective of their age must not be employed on underground or underwater work like in mines, cable-laying and the construction of sewers and tunnels.</p> <p>Article 73. Children and young employees under the age of eighteen must not be employed on industrial work during the night.</p> <p>Article 75. The employer shall arrange a personnel file for each employee. The employer is obliged to keep the employee's identity information and all the documents and records which he has to arrange in accordance with this</p>

Act, Regulation, Order (date and ref)	Brief summary of scope	Relevance to Development of Eurasia Tunnel (ref to relevant section)
		<p>law and other legislation in this personnel file and to show them to authorised persons/authorities upon request.</p> <p>Article 77: Occupational health and safety obligations of employers and employees:</p> <p>With a view to ensure occupational health and safety in their establishments, employers shall take all the necessary measures and maintain all the needed means and tools in full; and employees are under the obligation to obey and observe all the measures taken in the field of occupational health and safety.</p> <p>In order to ensure compliance with and supervision of the measures taken for occupational health and work safety at the establishment, the employer must inform the employees of the occupational risks and measures that must be taken against them as well as employees' legal rights and obligations and, in this connection, he must provide the employees with the necessary training on occupational health and safety.</p> <p>The principles and methods of training shall be indicated in the regulation to be issued by the Ministry of Labour and Social Security.</p> <p>Employers shall notify, in written form, any work accident and occupational disease which occurs in the establishment to the relevant Regional Directorate of Labour within two working days at the latest.</p> <p>The provisions contained in this chapter as well as in the bylaws and regulations related to occupational health and work safety shall also apply to the apprentices and trainees in the establishment.</p> <p>Article 85: Arduous and dangerous work:</p> <p>Young employees who have not completed the age of sixteen years, children and workers who have not got an occupational training about the work they are responsible must not be employed on arduous or dangerous work.</p>
Regulation on the Minimum Wage Official Gazette Date 01.08. 2004, No. 25540	Establishes the purpose of the regulation, its scope, bases and definitions.	<p>According to the regulation a Commission under the authority of the Ministry of Labour and Social Security is entitled to determine the minimum wage every 6 months.</p> <p>The minimum wage is defined for employees over 16 and under 16.</p> <p>For the period from 01/07/2009 and 31/12/2009 it is 546, 48-TL for the employees over 16 and, 472, 32-TL for the</p>

Act, Regulation, Order (date and ref)	Brief summary of scope	Relevance to Development of Eurasia Tunnel (ref to relevant section)
		employees under 16.
Regulation on Workplace Establishment and Acquisition of a Business Certificate. (Official Gazette No 25673)	This regulation deals with the grant of permits for setting up a workplace	Prior to the opening of a new workplace, a foundation permit is required in order to confirm that prospective facilities are in compliance with health and safety legislation. Government agencies authorized to grant foundation permits are the Regional Directorates of the Ministry of Labour. After construction of the workplace is complete, inspectors of the Directorate conduct examinations at the site to check for compliance.
Worker Health and Occupational Safety Bylaw (Official Gazette Date/ Number:11.01.1974/14765)	The bylaw defines safety requirements in places where workers stay, measures and tools to prevent illnesses caused by equipments, machinery and raw materials, necessary tools and safety measures to be taken to prevent work accidents.	Detailed requirements on health and safety at workplaces are set by this bylaw and the employer is liable to create a safe working environment, provide workers all the required personal protective equipments, regularly check all devices/machinery/fire equipments and ensure that they are working appropriately, take necessary measures to prevent occupational illnesses.
Occupational Health and Safety Regulation (Official Gazette: 09.12.2003 No:25311) This regulation is no longer in force but all the other HS regulations listed are based on this regulation. For this reason, it is included in this list.	This regulation determines the measures to improve the health and safety provisions in work places. For this purpose the following provisions are managed with this regulation: a) Prevention of occupational risk,	Article 6. Employer's General Liabilities a) To protect the health and safety of workers, the employer must prevent occupational risks, provide training and information, take all sorts of measures, establish organization and provide equipments. The employers shall aim to improve the health and safety measures. b) The employer shall obey the following general principles for the protection of health and safety: Prevention of risks

Act, Regulation, Order (date and ref)	Brief summary of scope	Relevance to Development of Eurasia Tunnel (ref to relevant section)
	protection of health and safety, removal of risk and accident factors, b) Training and informing of workers on health and safety, taking the workers' opinions and providing their balanced participation, c) Working conditions for the people who need to be protected specially due to their age, gender and special conditions.	<p>Evaluation of risks that can not be prevented</p> <p>Combating risks at their source</p> <p>Adaptation to the technical developments</p> <p>To substitute dangerous things with non-dangerous or less dangerous.</p> <p>Development of a prevention policy covering the factors related technology, work organization, working conditions, social relations and work environment.</p> <p>Giving priority to collective protection measures ahead of personal protection.</p> <p>Giving appropriate instructions to workers.</p> <p>c) Considering the characteristics of the work;</p> <p>The employer evaluates all of the risks on working equipment to be used, selection of chemicals and equipments, working environment in a workplace. Based on the result of this evaluation, the preventive measures taken, method of working and production methodology shall improve the protection level of workers related to their health and safety.</p> <p>The employer considers the adequacy of the worker related to his health and safety before giving a duty to the worker.</p> <p>The employer takes measures for the places of serious danger where only workers who are well-informed and instructed can enter.</p> <p>Article 7. Protective and preventive measures: The employer must assign one person or more in a workplace to perform health and safety risk prevention and protective measures. If there is no qualified person to perform this</p>

Act, Regulation, Order (date and ref)	Brief summary of scope	Relevance to Development of Eurasia Tunnel (ref to relevant section)
		<p>duty, the employer must get assistance from a competent expert or organization outside the workplace.</p> <p>Article 8. First Aid, Fire Fighting, Evacuation of people, Serious and Close Danger</p> <p>The employer must implement all the necessary preventive measures to reduce the risk of fire at workplace, to ensure appropriate first aid, and to enable evacuation for all employees in the facility.</p> <p>Employers must provide necessary equipment and training on first aid, fire fighting and evacuation responsibilities to employees.</p> <p>Article 9. The employer performs a risk assessment related to health and safety.</p> <p>The employer is responsible for providing all of the personal protective equipment and preventive measures based on the risk assessment conducted at site.</p> <p>Article 10. The employer is responsible for informing the workers about activities to be performed, health and safety risks, protective and preventive measures.</p> <p>Article 11. The employer is responsible for taking account of workers' opinions on health and safety issues, giving a right to workers to give suggestions and providing for their participation in meetings.</p> <p>Article 12. The employer is responsible for training workers on all aspects of the risks involved in the process as well as health and safety training, PPE usage and emergency plan implementation.</p> <p>Article 14. The employer is responsible for medical surveillance of the workers:</p> <p>At the beginning of employment, workers must hold a medical certificate showing that they are eligible for the relevant work.</p> <p>Depending on the characteristics of the work, medical examination may be performed regularly.</p>

Act, Regulation, Order (date and ref)	Brief summary of scope	Relevance to Development of Eurasia Tunnel (ref to relevant section)
Regulation on Health and Safety in Construction Works (Official Gazette Date/Number: 23.12.2003/ 25325)	The purpose of this regulation is to determine the minimum health and safety requirements to be taken in construction works.	<p>Article 5. In cases where there is more than one employer or subcontractor at a construction area, the employer or the person responsible for the project must assign one or more coordinators for health and safety issues. The employer or the responsible person must prepare a health and safety plan prior to commencement of construction works.</p> <p>In cases defined below, the employer or the responsible person is liable to declare the information defined in Annex III, to the relevant Regional Directorate of the Ministry of Labour and Social Security:</p> <ul style="list-style-type: none"> • If the construction works will last more than 30 days and there will be more than 20 permanent workers, • If the size of the work requires more than 500 daily paid workers.. <p>A signboard presenting the declared information must be placed in an appropriate location on the construction site and the information must be updated when required,.</p> <p>Article 7. The coordinator will prepare a health and safety plan (or have it prepared) that describes the principles to be implemented, taking into account the activities carried out at the construction area. If works identified in Annex-II are carried out at the construction site, special measures regarding these works will also be included to the plan. (Annex II identifies “works near high voltage lines”).</p> <p>The coordinator will prepare a file consisting of health and safety information to be taken into account during subsequent works that will be conducted on the construction.</p> <p>Article 9. The assignment of one or more coordinators for health and safety does not remove the responsibility of the employer or the project responsible.</p> <p>Article 11. The employer shall take the necessary measures for health and safety at the construction site by taking into account the minimum requirements defined in Annex-IV.</p> <p>Article 13. The workers will be informed on health and safety measures taken at the construction area.</p>

Act, Regulation, Order (date and ref)	Brief summary of scope	Relevance to Development of Eurasia Tunnel (ref to relevant section)
Bylaw on Worker Health and Occupational Safety in Construction Works (Official Gazette Date/Number: 12.09.1974/15004)	Health and safety measures apart from the ones stated in the "Worker Health and Occupational Safety Bylaw", to be taken are given in this bylaw.	Article 4. The employers are liable to carry out the construction works under technical supervision and responsibility of people with scientific competency. Article 5. The employer is liable to have a construction work notebook (with original and copy pages) at the site. The employer should have this notebook approved by the regional labour directorate via each page of the notebook to be stamped. The responsible person stated in article 4 keeps this notebook. It is obligatory to show the notebook to authorized officers during audits.
Arduous and Dangerous Works Regulation (Official Gazette Date/Number:16.6.2004/25494)	The purpose of this regulation is to decide which works will be considered as arduous and dangerous, and in which arduous and dangerous works women and young workers who completed 16 years of age but not at the age of 18 yet can be employable.	Article 4. It is forbidden to employ young workers below the age of 16 for arduous and dangerous works. Article 5. Medical Certificate At the beginning of the employment, depending on the characteristics and conditions of the work, workers should be determined as eligible and enduring by physical examination and if necessary by a doctor report based on laboratory findings. This report should be renewed once a year. It is forbidden to employ any worker without taking a medical certificate. Article 7. Employer is liable to keep a copy of identity cards of workers that work on heavy and dangerous works and show them to the auditors upon their request. Article 9. Appendix 1 shows which works are considered as arduous and dangerous, and in which arduous and dangerous works women and young workers who completed 16 years of age but not at the age of 18 yet can be employable. In Appendix I: tunnel and road construction is considered under "construction works" and : tunnel and no women and young workers are employable.
Regulation on the provisions of occupational health and safety training of employees (Official Gazette Date/Number: 07.04.2004/25426)	The regulation sets forth the principles for health and safety trainings to be given at workplaces to employees by the	Article 4. Liabilities of the employer Employers are responsible for (1) informing workers on their legal rights and responsibilities, (2) preparing occupational health and safety training programs on the occupational risks they are faced and the necessary precautions that need to be taken, (3) organization of the trainings, (4) ensuring the participation of employees to

Act, Regulation, Order (date and ref)	Brief summary of scope	Relevance to Development of Eurasia Tunnel (ref to relevant section)
	employers.	<p>these trainings.</p> <p>Employers are responsible for providing the necessary training to employees regardless of the type of employment contract.</p> <p>Article 9. Developing Training Programs</p> <p>A yearly training program is developed consisting information on the aim, subject, duration, and date of the training, the names and titles of the trainers, the number of the participants.</p> <p>Article 17. The trainings are recorded and kept in the workers' personal files.</p>
Regulation on the Use of Personal Protective Equipment in Workplaces (Official Gazette Date/Number: 11.2.2004/ 25370)	The purpose of this regulation is to determine the principles regarding the properties, supply and use of personal protective equipments in cases when risks are not prevented or minimised sufficiently with collective protection based on technical measures or working methods.	<p>Article 8. The employer shall supply the necessary personal protective equipment defined in Appendix II to the workers when it is not possible to prevent or restrict risks by collective protection methods in works and relevant workplaces defined in Appendix III.</p> <p>The employer shall take all the measures to ensure the proper use of personal protective equipment by the workers.</p> <p>Informing workers</p> <p>Article 9. The employer shall inform the workers and/or their representatives on the necessary measures to be taken with respect to health and safety in the use of personal protective equipment.</p> <p>Article 10. The employer shall take the opinions of workers and/or their representatives and ensure their participation about the issues stated in this regulation.</p>
Regulation on Health and Safety Requirements in the Use of Work Equipments, 2004 (Official Gazette Date/Number:11.2.2004/25370)	The regulation sets forth the minimum requirements to be met in terms of health and safety in the use of work equipments.	<p>Article 5. General Liabilities of the Employer</p> <p>The employer shall take all the necessary measures to ensure that work equipment is appropriate to the work to be done and this equipment does not endanger the health and safety of workers.</p> <p>While selecting the work equipment, by considering the specific working conditions and hazards regarding health and safety of workers the employer shall mind that the equipment will not pose an additional hazard. In cases where the work equipment is not free from danger, the employer shall take measures to reduce the risk to a</p>

Act, Regulation, Order (date and ref)	Brief summary of scope	Relevance to Development of Eurasia Tunnel (ref to relevant section)
		<p>minimum level. Article</p> <p>6. The employer will ensure that the work equipments meet the minimum requirements defined in Annex 1 of the regulation and that they are at an appropriate safe level in accordance with the defined issues in Annex 2.</p> <p>Article 7. Control of the work equipment</p> <p>In cases where the safety of the work equipment depends on its installation conditions, the equipment will be checked after its installation, before used for the first time and when its position is changed. Accordingly, a document will be prepared showing that the equipment is correctly installed and working safely. Periodical control of the equipment that may pose a hazard will be done by specialists. The results of the controls will be recorded and kept.</p> <p>Article 10. Informing workers</p> <p>The employer is responsible for informing the workers on work equipment and their use by giving them written instructions. Written instructions will consist of at least the following information: (i) the provisions of the use of work equipment, (2) the predictable abnormal conditions in the work equipment, (3) the results of the previous use experiences.</p> <p>Workers, even if they do not use the equipment, shall be informed about the hazards of the work equipment and hazards that arise upon modification of the work equipment.</p> <p>All the information and the written instructions shall be understandable by the relevant workers.</p> <p>Article 11. Training workers</p> <p>The workers who use the work equipment shall be trained on the risks that may be caused by the use of the work equipment and ways to avoid these risks. Workers who are responsible for repair, control and maintenance of work equipment shall be given an adequate special training.</p>
Regulation on Safety and Health Signs(Official Gazette)	The regulation sets forth the rules for the	Article 5. The employer must supply and properly use the health and safety signs when risks can not be prevented or restricted by working methods, work organization and collective protective measures.

Act, Regulation, Order (date and ref)	Brief summary of scope	Relevance to Development of Eurasia Tunnel (ref to relevant section)
Date/Number:23.12.2003/25325)	implementation of health and safety signs in workplaces.	Article 7. The employer shall inform workers and/or their representatives on health and safety signs and provide written instructions about the meaning of the signs and the required action of the sign.
Regulation on Workplace Health and Safety Units, and Common Health and Safety Units (Official Gazette Date/Number: 15.08.2009/27320)	The regulation determines the principles on the quality, number, recruitment, duties and responsibilities and training of workplace doctors and occupational safety specialists, as well as principles on the properties of the health units to be established, the required equipments and tools in these units, the personnel to be assigned and how these units provide service.	Workplaces with 50 employees or more, and workplaces with 50 workers or more where works regarded as industrial are carried out, are liable to establish a health and safety unit. The qualification, number and duties of the medical personnel and occupational safety specialists are set by this regulation.
Regulation on Occupational Health and Safety Boards (Official Gazette Date/Number: 07.04.2004/25426)	The regulations determines in which workplaces health and safety boards are established, and the working methods and responsibilities of these boards.	The employer is liable to establish an occupational health and safety committee at workplaces where (i) works regarded as industrial is carried out, (ii) with minimum 50 workers that work permanently, and (iii) with permanent jobs that last more than 6 months.

Act, Regulation, Order (date and ref)	Brief summary of scope	Relevance to Development of Eurasia Tunnel (ref to relevant section)
Noise Regulation (Official Gazette: 23.12.2003, No: 25325)	The purpose of this regulation is to determine the necessary measures to protect the workers from health and safety risks, especially from risks associated with hearing due to exposure to noise.	<p>Article 5. Exposure limit values and exposure effective values for noise are set.</p> <p>Article 6. Risk determination and assessment: The employer shall assess and, if necessary, measure the levels of noise to which workers are exposed.</p> <p>Article 7. Prevention and reducing exposure: Risks associated with the exposure to noise shall be prevented at source or reduced to a minimum level.</p> <p>Article 8. Personal protection: If the risks associated with noise can not be prevented, ear-protectors that exactly fits the worker will be given and these protectors will be used by the workers.</p> <p>Article 10. The employer is responsible for informing workers about these risks associated with noise and measures for their prevention, and training them on the appropriate use of ear protectors.</p> <p>Article 12. Medical Surveillance: Workers will be subject to medical surveillance when it is confirmed by the risk assessment that there is health risk.</p>
Vibration Regulation (Official Gazette: 23.12.2003, No: 25325)	The purpose of this regulation is to determine the necessary measures to protect the workers from health and safety risks due to exposure to mechanical vibration.	<p>Article 5. Exposure limit values and exposure effective values for hand-arm and for whole body vibration are set.</p> <p>Article 6. Risk Determination and assessment: The employer shall assess and, if necessary, measure the levels of mechanical vibration to which workers are exposed.</p> <p>Article 7. Risks associated with the exposure to mechanical vibration shall be prevented at source or reduced to a minimum level.</p> <p>Article 8. The employer is responsible for informing workers about these risks and measures for their prevention.</p> <p>Article 10. Workers will be subject to medical surveillance when it is confirmed by the risk assessment that there is health risk. To prevent the health problems due to exposure to mechanical vibration and for the purpose of early diagnosis, necessary protective measures will be taken by taking into account the medical surveillance results.</p>
Regulation on Working Duration Related to Labour	Regulates the principles for the	Article 4. The maximum working duration is 45 hours a week. The daily working duration can not exceed 11 hours

Act, Regulation, Order (date and ref)	Brief summary of scope	Relevance to Development of Eurasia Tunnel (ref to relevant section)
Law (Official Gazette Date/Number:06.04.2004/25425)	implementation of working duration.	in any case. Article 9. The employer should document the working durations of workers by appropriate means.
Regulation on Special Principles in Works Carried out by Employing Workers in Shifts (Official Gazette:07.04.2004/25426)	Principles on work durations, night work, week holidays and breaks in works with shifts are set forth in the regulation.	Article 3. The employer is liable to announce the start and end time of each shift, the names and surnames of workers who are working in shifts, their breaks and week holidays in a way that is easily seen and readable by the workers. Article 4. Shifts are arranged in a manner that there are at least 3 shifts in a duration of 24 hour. Article 12. The employer is liable to submit the list of night-shift workers as well as a copy of their health reports issued before starting work and those that are periodical, to the relevant regional directorate of labour.

Table 3 *Turkish Environmental Standards and Comparison with International Environmental Standards*

Environmental Pollutant	Details	Turkish Standards ⁽²⁾	EU Standards ⁽³⁾	World Bank/IFC ⁽⁴⁾	WHO ⁽⁵⁾
Ambient					
Air Quality	Averaging Period	Air Quality Assessment and Management Regulation Annex-1 and Annex-1A and Industrial Air Pollution Control Regulation Annex 2 Table 2.2 Maximum Limit ($\mu\text{g.m}^{-3}$)	Directives 1999/30/EC, 2000/69/EC & 2002/3/EC Maximum Limit ($\mu\text{g.m}^{-3}$)	General EHS Guideline value ($\mu\text{g/m}^3$)	Maximum Limit (mg/Nm^3)
Nitrogen Dioxide	1 hour	300-200 (2014-2024) (The limit value is $200 \mu\text{g.m}^{-3}$ and a tolerance share of $100 \mu\text{g.m}^{-3}$ is given starting at 1.1.2014 and this shall be reduced to zero by 1.1.2024 by decreasing it equally each 12 months). (protection of human health)	200	200	200
	24 hours	300 (2008-2013) (The limit value for 24 hour period will remain same until 1.1.2014). (protection of human health)	-	-	
	1 year	100-60 (2008-2013) (The limit value for 1 year period will be decreased equally each 12 months starting from 1.1.2009 until 1.1.2014 to reach the limit value of 60 (100-92-84-76-68-60) (protection of human health)	-	40	40
	1 year (protection of human health)	60-40 (2014-2024) (The limit value is $40 \mu\text{g.m}^{-3}$ and a tolerance share of $20 \mu\text{g.m}^{-3}$ is given starting at 1.1.2014 and this shall be reduced to zero by 1.1.2024 by decreasing it equally each 12 months).	40		
NO_x	1 year (protection of vegetation)	30 (1.1.2014)	30		
Sulphur Dioxide	10 minutes		-	500	125
	1 hour	900 (2008-2013) (The limit value for 1 hour period will remain same until 1.1.2014). 500-350 (2014-2019) (The limit value is $350 \mu\text{g.m}^{-3}$ and a tolerance share of $150 \mu\text{g.m}^{-3}$ is given starting at 1.1.2014 and this shall be reduced to zero by 1.1.2019 by decreasing it equally each 12 months). (protection of human health)	350		

Environmental Pollutant	Details	Turkish Standards ⁽²⁾	EU Standards ⁽³⁾	World Bank/IFC ⁽⁴⁾	WHO ⁽⁵⁾
Ambient					
Air Quality	Averaging Period	Air Quality Assessment and Management Regulation Annex-1 and Annex-1A and Industrial Air Pollution Control Regulation Annex 2 Table 2.2 Maximum Limit (µg.m ⁻³)	Directives 1999/30/EC, 2000/69/EC & 2002/3/EC Maximum Limit (µg.m ⁻³)	General EHS Guideline value (µg/m ³)	Maximum Limit (mg/Nm ³)
	24 hours	400-250 (2008-2013) (The limit value for 24 hour period will be decreased equally each 12 months from 1.1.2008 until 1.1.2014 to reach the limit value of 250 250-125 (2014-2019) (The limit value is 125 µg.m ⁻³ and a tolerance share of 125 µg.m ⁻³ is given starting at 1.1.2014 and this shall be reduced to zero by 1.1.2019 by decreasing it equally each 12 months). (protection of human health)	125	20	20
	1 year	150 (2008-2013) (The limit value for 1 year period will remain same until 1.1.2014).	20		
	OCT 1- MARCH 31(winter mean)	250-125 (2008-2013) (The limit value will be decreased equally each 12 months from 1.1.2009 until 1.1.2014 to reach the limit value of 125 (protection of human health)			
	Target limit(winter mean)	120 (2008-2013) (The limit value will remain same until 1.1.2014).			
	Target limit (annual mean)	60 (2008-2013) (The limit value will remain same until 1.1.2014).			
	1 year (Vegetation) – Agricultural crops		-		30 (annual and winter mean)
	1 year (Vegetation) – Forests and natural vegetation	60-20(2008-2013) (The limit value will be decreased equally each 12 months from 1.1.2009 until 1.1.2014 to reach the limit value of 20 (protection of vulnerable animals, flora and objects) 20 (2014) (annual and winter mean for the protection of ecosystems)	-		20 (annual and winter mean)

Environmental Pollutant	Details	Turkish Standards ⁽²⁾	EU Standards ⁽³⁾	World Bank/IFC ⁽⁴⁾	WHO ⁽⁵⁾
Ambient					
Air Quality	Averaging Period	Air Quality Assessment and Management Regulation Annex-1 and Annex-1A and Industrial Air Pollution Control Regulation Annex 2 Table 2.2 Maximum Limit (µg.m⁻³)	Directives 1999/30/EC, 2000/69/EC & 2002/3/EC Maximum Limit (µg.m⁻³)	General EHS Guideline value (µg/m³)	Maximum Limit (mg/Nm³)
	1 year (Vegetation) – Forests and natural vegetation		-		15 (annual and winter mean)
	Lichens		-		10 (annual and winter mean)
Carbon Monoxide	15 minutes				100 000
	30 minutes				60 000
	1 hour				30 000 (these are from WHO document based on Coburn-Foster-Kane exponential equation)
	8 hours	16 000-10 000 (2014-2017) (The limit value is 10000 µg.m ⁻³ and a tolerance share of 6000 µg.m ⁻³ is given starting at 1.1.2014 and this shall be reduced to zero by 1.1.2017 by decreasing it equally each 12 months). (protection of human health)	10 000		10 000 (these are from WHO document based on Coburn-

Environmental Pollutant	Details	Turkish Standards ⁽²⁾	EU Standards ⁽³⁾	World Bank/IFC ⁽⁴⁾	WHO ⁽⁵⁾
Ambient					
Air Quality	Averaging Period	Air Quality Assessment and Management Regulation Annex-1 and Annex-1A and Industrial Air Pollution Control Regulation Annex 2 Table 2.2 Maximum Limit ($\mu\text{g.m}^{-3}$)	Directives 1999/30/EC, 2000/69/EC & 2002/3/EC Maximum Limit ($\mu\text{g.m}^{-3}$)	General EHS Guideline value ($\mu\text{g/m}^3$)	Maximum Limit (mg/Nm^3)
					Foster-Kane exponential equation)
	24 hours	30 000-10 000 (2008-2013) (The limit value will be decreased equally each 12 months from 1.1.2009 to 1.1.2014 to reach the limit value of 10.) (protection of human health)			
	1 year	10000 (2008-2013) (The limit value will remain same until 1.1.2014). (protection of human health)			
Total suspended particles	24 hours				
	1 year				
Thoracic particles <10 μm (PM ₁₀)	24 hours	300-100(2008-2013) (The limit value will be decreased equally each 12 months from 1.1.2009 to 1.1.2014 to reach the limit value of 100). 100-50 (2014-2019) (The limit value is 50 $\mu\text{g.m}^{-3}$ and a tolerance share of 50 $\mu\text{g.m}^{-3}$ is given starting at 1.1.2014 and this shall be reduced to zero by 1.1.2019 by decreasing it equally each 12 months). (protection of human health)	50	50	50
	OCT 1- MARCH	200-90 (2008-2013) (The limit value will be decreased equally each 12 months from 1.1.2009 to			

Environmental Pollutant	Details	Turkish Standards ⁽²⁾	EU Standards ⁽³⁾	World Bank/IFC ⁽⁴⁾	WHO ⁽⁵⁾
Ambient					
Air Quality	Averaging Period	Air Quality Assessment and Management Regulation Annex-1 and Annex-1A and Industrial Air Pollution Control Regulation Annex 2 Table 2.2 Maximum Limit (µg.m⁻³)	Directives 1999/30/EC, 2000/69/EC & 2002/3/EC Maximum Limit (µg.m⁻³)	General EHS Guideline value (µg/m³)	Maximum Limit (mg/Nm³)
	31(winter mean)	1.1.2014 to reach the limit value of 90). (protection of human health)			
	1 year	150-60(2008-2013) (The limit value will be decreased equally each 12 months from 1.1.2009 to 1.1.2014 to reach the limit value of 60). 60-40(2014-2019) (The limit value will be decreased equally each 12 months from 1.1.2014 to 1.1.2019). (protection of human health)	40	25	20
Fine particles <2.5µm (PM_{2.5})	24 hours			25	25
	1 year		25 (2015) 20 (2020)	10	10
Ozone	8 hour daily max. (average of last three years)	120 (Target value for the year 2022:) (protection of human health)	120	100	100
	1 hour				
Lead	1 year	2-1 (2008-2013) (The limit value will be decreased equally each 12 months from 1.1.2009 to 1.1.2014 to reach the limit value of 1). 1-0.5 (2014-2019) (The limit value will be decreased equally each 12 months from 1.1.2014 to 1.1.2019). (protection of human health)	0.5		

Environmental Pollutant	Details	Turkish Standards ⁽²⁾	EU Standards ⁽³⁾	World Bank/IFC ⁽⁴⁾	WHO ⁽⁵⁾
Ambient					
Air Quality	Averaging Period	Air Quality Assessment and Management Regulation Annex-1 and Annex-1A and Industrial Air Pollution Control Regulation Annex 2 Table 2.2 Maximum Limit (µg.m ⁻³)	Directives 1999/30/EC, 2000/69/EC & 2002/3/EC Maximum Limit (µg.m ⁻³)	General EHS Guideline value (µg/m ³)	Maximum Limit (mg/Nm ³)
Ambient Noise	Type of Area	Assessment and Management of Environmental Noise Regulation Annex-8 Table 1-Environmental Noise Limit Values for Roads		General EHS Guidelines Maximum Limit	
	Residential rural areas, hospitals and gardens	Day ⁽¹⁾ : 60 dBA Night ⁽³⁾ : 50 dBA			
	Industrial areas (heavy industries)	Day ⁽¹⁾ : 67dBA Night ⁽³⁾ : 57 dBA			
	Residential, institutional and educational	Day ⁽¹⁾ :63dBA Night ⁽³⁾ : 53dBA		Day (4): 55 dBA Night (5): 45 dBA	
	Industrial and Commercial	Day ⁽¹⁾ : 65 dBA Night ⁽³⁾ : 55 dBA		Day (4): 70 dBA Night (5): 70 dBA	
	Or incremental increase in background noise levels at the nearest receptor location offsite.			Day (4): 3 dBA Night (5): 3 dBA	
		Assessment and Management of Environmental Noise Regulation Annex 8, Table-5 Environmental Noise Limit Values for Construction Sites			
		Day ⁽¹⁾ : 75 dBA (road construction)			
Vibration		Assessment and Management of Environmental Noise Regulation			

Environmental Pollutant	Details	Turkish Standards ⁽²⁾	EU Standards ⁽³⁾	World Bank/IFC ⁽⁴⁾	WHO ⁽⁵⁾
Ambient					
Air Quality	Averaging Period	Air Quality Assessment and Management Regulation Annex-1 and Annex-1A and Industrial Air Pollution Control Regulation Annex 2 Table 2.2 Maximum Limit (µg.m ⁻³)	Directives 1999/30/EC, 2000/69/EC & 2002/3/EC Maximum Limit (µg.m ⁻³)	General EHS Guideline value (µg/m ³)	Maximum Limit (mg/Nm ³)
(1-80 Hz Frekans band)		Table-7 Maximum ground floor vibration values allowed for driven pile and construction machines (peak value-mm/s)			
	Administrative and downtown areas	Continuous :5 Discontinuous: 10			
	Industrial and Commercial	Continuous :15 Discontinuous: 30			
Occupational Health & Safety					
Workplace Noise	Location/Activity	Assessment and Management of Environmental Noise Regulation Table-9 Indoor Noise Level Limit Values for Buildings		Noise Limits (dB)	
	Heavy industry (no demand for oral communication)			Equivalent level LAeq, 8h: 85 dB Maximum LAmax, fast: 110 dB	
	Light industry (decreasing demand for oral communication)			Equivalent level LAeq, 8h: 50-65 dB Maximum LAmax, fast: 110 db	
	Open offices, control rooms, service counters or similar	Closed Window: 50L _{eq} (dBA) Open Window: 60L _{eq} (dBA)		Equivalent level LAeq, 8h: 45-50 dB	
	Individual offices (no disturbing noise)	Closed Window: 45L _{eq} (dBA) Open Window: 55L _{eq} (dBA)		Equivalent level LAeq, 8h: 40-45	

Environmental Pollutant	Details	Turkish Standards ⁽²⁾	EU Standards ⁽³⁾	World Bank/IFC ⁽⁴⁾	WHO ⁽⁵⁾
Ambient					
Air Quality	Averaging Period	Air Quality Assessment and Management Regulation Annex-1 and Annex-1A and Industrial Air Pollution Control Regulation Annex 2 Table 2.2 Maximum Limit (µg.m ⁻³)	Directives 1999/30/EC, 2000/69/EC & 2002/3/EC Maximum Limit (µg.m ⁻³)	General EHS Guideline value (µg/m ³)	Maximum Limit (mg/Nm ³)
				dB	
	Classrooms, lecture halls	Closed Window: 45L _{eq} (dBA) Open Window: 35L _{eq} (dBA)		Equivalent level LAeq, 8h: 35-40 dB	
	Hospitals	Closed Window: 35 L _{eq} (dBA) Open Window: 25L _{eq} (dBA)		Equivalent level LAeq, 8h: 30-35 dB Maximum LAmax, fast: 40 db	
		Noise Regulation Article-4			
Personal noise exposure		1) Maximum exposed noise limit for personnel: LEX, 8h = 87 dB (A) and P _{peak} = 200 µ Pa ⁱ 2) Maximum exposed effective noise : LEX, 8h = 85 dB (A) and P _{peak} = 140 µ Pa ⁱⁱ 3) Minimum exposed effective noise : LEX, 8h = 80 dB (A) and P _{peak} = 112 µ Pa ⁱⁱⁱ			
Workplace Vibration		Vibration Regulation Article-5			
Personal vibration exposure		Hand– Arm Vibration; 1) Maximum exposed vibration limit: 8h=5 m/s ² , 2) Maximum exposed effective vibration: 8h=2,5 m/s ² . All Body Vibration; 1) Maximum exposed vibration limit: 8h=1,15 m/s ² , 2) Maximum exposed effective vibration: 8h=0,5 m/s ² .			

Environmental Pollutant	Details	Turkish Standards ⁽²⁾	EU Standards ⁽³⁾	World Bank/IFC ⁽⁴⁾	WHO ⁽⁵⁾
Ambient					
Air Quality	Averaging Period	Air Quality Assessment and Management Regulation Annex-1 and Annex-1A and Industrial Air Pollution Control Regulation Annex 2 Table 2.2 Maximum Limit (µg.m ⁻³)	Directives 1999/30/EC, 2000/69/EC & 2002/3/EC Maximum Limit (µg.m ⁻³)	General EHS Guideline value (µg/m ³)	Maximum Limit (mg/Nm ³)

Environmental Pollutant	Details	Turkish Standards ⁽²⁾		EU Standards ⁽³⁾	World Bank/IFC ⁽⁴⁾	WHO ⁽⁵⁾
Effluent discharges to water		Waste Water Regulation				
Water Limit values for the contaminants in levels of substances in discharge water effluents		Table 20.3: Service station, Road and Vehicle Washout Waste Water				
		Parameter	Unit	2 HOURS	24 HOURS	
		COD	(mg/L)	200	150	
		OIL and GREASE	(mg/L)	20	10	
		ZSF	-	20	-	
		pH	-	6-9	6-9	
		Table 21.1: Municipal Waste Water (Class 1: As Raw BOD 5-60 Kg/day, Population=84-1000)				
		PARAMETER	UNIT	2 HOUR	24 HOUR	
		BOI ₅	(mg/L)	50	45	
		KOD	(mg/L)	180	120	
		Suspended Solid	(mg/L)	70	45	
		pH	-	6-9	6-9	
		Table 20.2: Aqueous Filter Outlet Waters used for Air Pollution Control				

Environmental Pollutant	Details	Turkish Standards ⁽²⁾				EU Standards ⁽³⁾	World Bank/IFC ⁽⁴⁾	WHO ⁽⁵⁾
		PARAMETER	UNIT	2 HOUR	24 HOUR			
		COD	(mg/L)	250	200			
		Suspended Solid	(mg/L)	150	100			
		Sulphate (SO ₄ ²⁻)	(mg/L)	2500	1500			
		ZSF	-	10				
		Temperature	(°C)	35	30			
		pH	-	6-9	6-9			
		Table 19: Discharge Standards for Mixed industrial Waste Water (not to determined the sector)						
		PARAMETER	UNIT	2 HOUR	24 HOUR		General EHS Guideline values	
		COD	(mg/L)	400	300		125	
		SUSPENDED SOLID	(mg/L)	200	100		50	
		OIL AND GREASE	(mg/L)	20	10		10	
		TOTAL FOSFOR	(mg/L)	2	1			
		TOTAL CROME	(mg/L)	2	1			
		Cr ⁺⁶	(mg/L)	0.5	0.5			
		Pb	(mg/L)	2	1			
		TOTAL CN ⁻	(mg/L)	1	0.5			
		Cd	(mg/L)	0.1	-			
		Fe	(mg/L)	10	-			
		F ⁻	(mg/L)	15	-			
		Cu	(mg/L)	3	-			
		Zn	(mg/L)	5	-			
		Hg	(mg/L)	-	0.05			
		SULFATE (SO ₄)	(mg/L)	1500	1500			
		TOTAL KJELDAHELE NITROGEN	(mg/L)	20	15		10	
		ZSF	-	10	10			

Environmental Pollutant	Details	Turkish Standards ⁽²⁾			EU Standards ⁽³⁾	World Bank/IFC ⁽⁴⁾	WHO ⁽⁵⁾
		pH	-	6-9	6-9	6-9	
Soils					Dutchlist		
Compounds in soils	Limit values relevant for assessment of soil quality/contamination	a) Heavy Metal Limit values for soil					
		Heavy Metal (Total)	PH 5- 6 mg/kg Oven Dry Soil	pH>6 mg/kg Oven Dry Soil	Optimum/ Action mg/kg dry weight		
		Pb	50 **	300 **	85 / 530		
		Cd	1 **	3 **	0.8 / 12		
		Cr	100 **	100 **	100 / 380		
		Cu*	50 **	140 **	36 / 190		
		Ni*	30 **	75 **	35 / 210		
		Zn *	150 **	300 **	140 / 720		
		Hg	1 **	1,5 **	0.3 / 10		
		* these limit values can be increased by 50% by the Ministry when pH value is above 7					
** at sites where feed crops are grown, if it is proven by scientific works that it is not harmful to humans and the environment, these values can be exceeded.							
b) Limit values of the soil pollution parameters							
Pollution Parameters		UNIT	Limit Values	Optimum/ Action mg/kg dry weight			
Chlor ion		(mg Cl ⁻ /l)^(Total)	2 5	-			
Sodium		(mg Na/l) (Total)	1 25	-			
Cobalt		(mg/kg oven dry soil)	2	20 / 240			

Environmental Pollutant	Details	Turkish Standards ⁽²⁾		EU Standards ⁽³⁾	World Bank/IFC ⁽⁴⁾	WHO ⁽⁵⁾
			0			
	Arsenic	(mg/kg oven dry soil)	2	29 / 55		
			0			
	Molybdenum	(mg/kg oven dry soil)	1	10 / 200		
			0			
	Tin	(mg/kg oven dry soil)	2	-		
			0			
	Barium	(mg/kg oven dry soil)	2	200 / 625		
			00			
	Fluor	(mg/kg oven dry soil)	2	-		
			00			
	Free cyanide	(mg/kg oven dry soil)	1	1 / 20		
	Complex cyanide	(mg/kg oven dry soil)	5	5 / 650(pH<5) 50(pH>5)		
	Sulphur	(mg/kg oven dry soil)	2	-		
	Bromine	(mg/kg oven dry soil)	2	-		
			0			
	Benzene	(mg/kg oven dry soil)	0.05	0.05 / 2		
	Butyl benzene	(mg/kg oven dry soil)	0.05	-		
	Toluene	(mg/kg oven dry soil)	0.05	0.05 / 130		
	Xylene	(mg/kg oven dry soil)	0.05	0.05 / 25		
	Phenol	(mg/kg oven dry soil)	0.05	0.05 / 40		
	Selenium	(mg/kg oven dry soil)	5	-		
	Thallium	(mg/kg oven dry soil)	1	-		
	Uranium	(mg/kg oven dry soil)	5	-		
	Polycyclic aromatic hydrocarbon compounds	(mg/kg oven dry soil)	5	1 / 40		

Environmental Pollutant	Details	Turkish Standards ⁽²⁾		EU Standards ⁽³⁾	World Bank/IFC ⁽⁴⁾	WHO ⁽⁵⁾
		Organic chlorine compounds	(mg/kg oven dry soil)	0.5		
		Pesticides -Separate	(mg/kg oven dry soil)	0.5	-	
		Pesticides-Total		2	- / 2	
		PCB	(mg/kg oven dry soil)	0.5	0.02 / 1	
		Hexachlorobenzene	(mg/kg oven dry soil)	0.1	0.0025 / -	
		Pentachlorobenzene	(mg/kg oven dry soil)	0.1	0.0035 / -	
		Ψ- HCH (lindan)	(mg/kg oven dry soil)	0.1	0.05µg/l	

⁽¹⁾ Day (07:00-19:00);

⁽²⁾ Evening (19:00-23:00);

⁽³⁾ Night (23:00-07:00);

⁽⁴⁾ Day (07:00-22:00);

⁽⁵⁾ Night (22:00-07:00)

International conventions enjoy a unique status in Turkish legislation. They are considered as having equal powers with Turkish laws and are deemed constitutional per se, to the extent that they are ratified in accordance with the required procedure. At the regional and international level, Turkey has ratified the following conventions and agreements that are relevant to this Project.

- The UNESCO Convention on the Protection of the World Cultural and Natural Heritage, Paris (1972).
- Kyoto Protocol to the United Nations Framework Convention on Climate Change.
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, cf. Regulation on Hazardous Waste Control.
- Bern Convention on the Conservation of European Wildlife and Natural Habitats
- Stockholm Convention on Persistent Organic Polluters.
- Protocol Agreement on Conservation of Common Natural Resources.
- The UNESCO Man and Biosphere Program.

C5 **TURKISH LEGISLATION REGARDING INVOLUNTARY EXPROPRIATION**

5.1 **FORMS OF LAND OWNERSHIP**

There are three main forms of land ownership in Turkey:

- land owned by the *State* (e.g. *Treasury, Forestry or other state entity*) - the land may be either vacant, or used by the owner, or used by a private entity under a lease or informal arrangement, or under illegal use;
- land owned by the *municipality* - the land may be either vacant, or used by the municipality, a municipal company or a private entity under a lease or informal arrangement, or under illegal use;
- *private* land - the land may be either used by the owner, or by another private individual or enterprise through a lease or informal arrangement, or it may be under illegal use.

The following section describes procedures for the (i) expropriation of land/immovable property (referred to as property in the remaining of the text) on a land owned privately by people and (ii) transfer of land/property between public bodies.

5.2 **LEGAL FRAMEWORK**

5.2.1 ***Turkish Constitution***

According to Article 46 of The Turkish Constitution, where public interest requires it, the State and public corporations are entitled to expropriate or impose administrative servitude on all or part of the property on privately owned lands, provided that compensation is paid in advance.

5.2.2 ***Expropriation Law***

Expropriation is regulated by the Turkish Expropriation Law (Law No. 2942, amended in 2001 by Law No. 4650). A Declaration of Public Interest is necessary for expropriation of any property and this must be approved by the Governor, unless the development is carried out in accordance with an approved Development Plan or Special Plan or Project approved by the relevant Ministries. In these cases, a simple Declaration will be made indicating that the expropriation process will be initiated by the authorised executive body.

Only the legal owners of properties are eligible for compensation. Occupiers may be eligible in cases when the title deed for the property is not registered and there are no people claiming rights on the property.

Assets which are eligible for compensation include (i) a property or a resource in land, (ii) a plot, and (iii) buildings where these are owned by real persons or legal entities under private law.

The expropriation law requires compensation to be paid in cash and in advance of expropriation taking place.

5.2.3 *Expropriation Process*

There are a number of steps in the expropriation process.

- (i) **Commencement of expropriation:** The expropriation commences with the issue of the Declaration of Public Benefit by the relevant Ministry (in this case the Ministry of Transport) and the approval of the Governor (unless the project is already part of an approved plan or project).
- (ii) **Preparation of plans:** The authority undertaking the expropriation must prepare a scaled plan defining the boundaries, surface area and type of each of the properties or resources to be expropriated or over which right of easement is to be established .
- (iii) **Identification of the property owners:** The authority must define and document the owners of each property being expropriated, or the occupiers in cases where there is no registered title deed, and identify their addresses, using records kept at the title deed offices, tax offices and registries or by means of an external search. Where there are no registration or cadastral records at the title deed and cadastral offices , the authority must apply to the local civil administrator to appoint four experts, two principal and two substitute members, to undertake a land survey of the area.
- (iv) **Informing the title deed office about the expropriation decision:** After the expropriation decision is approved, the authority must notify the title deed office at which the properties subject to expropriation are registered, to have a note placed on the title deeds for the properties subject to expropriation. If the expropriation does not proceed within 6 months that note must be removed by the title deed office.

- (v) **Establishment of Valuation Commission:** A Valuation Commission or Commissions must be appointed by the authority carrying out the expropriation, to determine the value of the property. The Commission must comprise at least three individuals working at the authority who will carry out the expropriation.
- (vi) **Establishment of Reconciliation Commission:** The authority carrying out the expropriation must also appoint a separate Reconciliation Commission or Commissions, also comprising at least three individuals, to negotiate the amount of compensation and execute and complete the purchase.
- (vii) **Notifying the owner:** The authority must notify the owner by official registered letter of their intention to acquire the property or to offer a replacement property. At this stage the valuation is not given and there is an opportunity for the owner to agree a price or a suitable replacement property by negotiation.
- (viii) **Application to the authority by the owner:** If the owner is willing to sell the property he (or his authorized representative) can apply to the authority, within fifteen days and negotiations will be held on a date designated by the Reconciliation Commission. Provided the agreed price or the value of the exchange does not exceed the valuation, a minute is issued and signed by the owner or his representative and the members of the commission.
- (ix) **Payment to the owner:** The authority must prepare the payment within forty five days of the date of the minute, and send a written notification to the owner requesting transfer of the property to the authority at the title deed office on the specified date. When the transfer is complete the agreed price is paid. The property, resource or right of easement purchased or exchanged is considered as purchased by expropriation and the owner has no right of appeal against the expropriation or the value. The agreement must be reached and any monies paid or replacement property provided before the expropriation can take place.
- (x) **Determination of expropriation value by the court:** In cases where expropriation is not achieved by voluntary agreement, the authority can apply to the local civil court of first instance and request determination of the value of the property and its registration in the name of the authority. The court will notify the owner of the date of hearing within thirty days of the date of application by the authority. If the earlier searches have not

identified the owner's address this must be the hearing date must be announced in a local and a national newspaper.

- (xi) **Reaching an agreement:** On the date of the hearing, the judge will first invite the parties to agree on the value of the property and if the parties agree, the judge accepts the agreed value as the expropriation cost. The procedure then continues as in step (ix).
- (xii) **Disagreement:** In cases where the parties fail to reach agreement, the judge will set a date for an on-site survey to be undertaken by a Council of Experts¹ within fifteen days. The community leader (muhtar) is also invited to participate in the site survey. The experts report on the value of the property, taking into account statements from the parties and other related authorities, within fifteen days. A hearing is then held within thirty days to which the parties are invited. If the parties still do not reach agreement, a new expert council is appointed by the judge, to finalize the situation within fifteen days. The judge then sets a fair expropriation value based on the expert reports.

For the expropriation of places whose title deed is registered in the name of another person or where the land is ownerless or is not owned by the occupier, the occupier will be paid the minimum replacement cost for buildings and an amount that is appraised according to article 11 of the law, for trees.

5.3

COMPENSATION ARRANGEMENTS AND COMPENSATION RATES

As noted above the expropriating authority will establish a Valuation Commission to determine the expropriation value. During the valuation process, the authority will receive reports from experts, institutions or organizations and may if necessary use information from the Chamber of Industry and Trade as well as local real estate agencies.

¹ *Expert Council:* The expert council established in accordance with article 15 of the Expropriation Law takes part in the determination of the expropriation value. Each professional chamber affiliated to the Turkish Chamber of Engineers and Architects shall appoint a list of experts; and provincial and district administrative boards shall appoint experts among the owners of properties who are engineers and architects. The Governorships are given the list of these experts. The qualifications and working principles of the engineers and architects who will work as experts, shall be determined by a regulation to be prepared by the Ministry of Finance and Ministry of Public Works by considering the opinions of Turkish Chamber of Engineers and Architects. The expert council includes 5 experts, three of which are from the list of chambers and two of which are from the administrative board.

In cases where expropriation is not achieved by agreement valuation is performed according to Article 11 of the Expropriation Law. The Expert Council will visit the property, with the court commission, and listen to the views of affected people. The Expert Council must consider the following criteria during the valuation :

- (i) type and quality of the property;
- (ii) surface area;
- (iii) all the qualities and components of the property or the resource that can affect its value, and the value of each component
- (iv) the tax position, if any;
- (v) valuations made by official authorities on the date of expropriation;
- (vi) net revenue to be obtained from an property or a resource on land, provided that the property or the resource is used at that location and under the same conditions as on the date of expropriation, and is used in its original condition;
- (vii) for house plots, the sale value of similar land sold before the date of expropriation;
- (viii) for buildings, official unit prices, construction cost estimates and depreciation of the buildings;
- (ix) other objective measures that will affect the determination of the expropriation value.

The Expert Council will estimate the value of the property based on an evaluation report that includes comments on all the aforementioned criteria. Where a right of easement is taken, the decrease in the value of the property or the resource due to the expropriation shall be stated with its rationale and this will be considered as the compensation value.

The basis for valuation of the main types of property expected to be expropriated for the Eurasia Tunnel Project is outlined below

5.3.1 Valuation of Buildings

Compensation for buildings is provided at full replacement cost determined according to use and construction type. Every year a communiqué is published by the Ministry of Public Works and Settlement (MPWS) on "Average Unit Costs of Buildings used for Calculation of Costs for Architecture and Engineering Works". 2009 figures were promulgated in Official Gazette No. 26828 on 19.03.2009. In addition, building square metre construction costs are determined by the Ministry of Finance and MPWS and these values are used for different types of buildings (this part is not from the mentioned source but is revised). The condition of the building is taken into

account including whether any maintenance and repair has been done or not. The value of any materials that would be available for re-use after demolition of the building is not deducted from the compensation value.

If a building is in ruins, the value of ruins is calculated by considering the value of the materials that would be available after demolishing the remains.

5.3.2 *Partial Expropriation*

Where only part of a property is to be expropriated its value is estimated as under Article 12 of the Expropriation Law as follows:

- (i) In cases where no change occurs in the value of the non-expropriated part due to the expropriation, the value of the expropriated part shall be determined in proportion to the total value of the whole property according to Article 11 of the Expropriation Law.
- (ii) If a decrease in the value of the non-expropriated part occurs as a result of expropriation, this loss is estimated and added to the expropriation value of the expropriated part as defined according to paragraph (i).
- (iii) If an increase in the value of the non-expropriated part occurs as a result of expropriation, this increase is estimated and subtracted from the value of the expropriated part as defined according to paragraph (i).
- (iv) The decreased and increased amounts stated in paragraphs (ii) and (iii) are determined according to the valuation method under Article 11 of the expropriation law.
- (v) When the remaining part of the property after expropriation is found appropriate for use according to the zoning legislation, the expenses and costs for reinstatement of any buildings, surrounding walls, sewerage, water, electricity and gas supplies that are damaged shall be determined and added to the expropriation value.
- (vi) When the remaining part of the property is not appropriate for use, and no lawsuit is filed against the expropriation decision, the owner may apply in writing within thirty days of the date of notification of the expropriation decision, for the remaining part also to be expropriated.

5.3.3 *Compensation by exchange in kind*

If acceptable to the affected owner, compensation in kind may be provided by the authority by provision of an alternative property not used for public service, to cover all or part of the expropriation value. The value of the replacement property will be determined by the authority's Tender Commission or by any commission established for the purpose of valuation.

Any difference between the values of original and replacement properties shall be met by the parties in cash. The value of the replacement property must not exceed 120% of the expropriation value.

5.3.4 *Agreement by Negotiation*

As mentioned above, the expropriating authority must establish a Reconciliation Commission to execute the expropriation. Through negotiations and bargaining, the owner of the property may agree a value or exchange property not exceeding the designated valuation.

If the value cannot be agreed by negotiation the authority may apply to the court for determination of the expropriation value.

5.3.5 *Payment of Expenses*

The expropriating authority must bear all costs including legal fees in cases where the expropriation value is determined by the court, including remuneration of experts assigned by the courts, costs incurred by the community leader (muhtar) when he is consulted during the survey, title deed fees and any other required expenses.

5.4 *TRANSFERS BETWEEN PUBLIC INSTITUTIONS*

The properties, resources or right of easement that belong to a public institution or public legal entity cannot be expropriated by another public institution or public legal entity. The authority that requires the property determines the expropriation value as defined in the "purchasing procedure" according to Article 8 of the Expropriation Law. It then applies to the owning authority with a written petition stating the amount to be paid that is based on the designated expropriation value. If the owning authority does not give consent to the transfer or does not respond to the application within sixty days, the dispute will be resolved within two months by the relevant administrative department of the Council of State upon the application of the expropriating authority.

5.5

RESETTLEMENT

Direct resettlement is regulated by the Turkish Settlement Law (Law No: 5543) and the Settlement Law Implementation Regulation.

5.5.1

Eligibility for Resettlement

Article 12 of the Settlement Law regulates the principles for the settlement of people (i) who have to leave their places as a result of full or partial expropriation of their properties, and (ii) who settled in the expropriation area at least three years before the beginning of the fiscal year in which the settlement planning studies started but who do not own a property. These people, if they request, will be resettled at places to be indicated by the Ministry of Public Works and Settlement (MPWS) according to the provisions of the Settlement Law.

Settlement law provides for two types of resettlement: (i) agricultural resettlement, (ii) non-agricultural resettlement (also referred to as urban resettlement).

Resettlement is done according to plans and projects prepared by MPWS, by providing the following to those whose places are expropriated:

- (i) first, a residence and its land;
- (ii) to craftsman and artisans, their workplace and its associated land as a source of income and working capital;
- (iii) to farmers, agricultural land, necessary agricultural inputs, agricultural structures or in-kind replacement and cash for working and equipment capital;

In cases when the affected people find their own replacement land and this is approved by MPWS a settlement loan (collective or individual) may be provided.

Resettlement is provided to households not to individuals. In the implementation of the Settlement Law, the following are considered as a household:

- (i) wife and husband;
- (ii) unmarried children who live with their parents;
- (iii) married children, married grandchildren and widows without children who live with the family;
- (iv) orphan siblings who are settled together and with equal shares.

According to Article 4 of the Settlement Act Implementation Regulation, in order to be eligible for resettlement the people must need to leave their place due to expropriation of their property and the property must be expropriated in full or in cases of partial expropriations, the residence of the family must be expropriated. For those whose properties are partly expropriated and those who do not own a property, the household living standard and the condition of any property will be investigated by a technical committee with at least three individuals who will be agricultural engineers and if required topographic engineers, civil engineers and economists. The committee will decide on the loss of livelihood.

When the area of land is only taken temporarily, the affected households will be provided assistance with rent for temporary resettlement at a defined amount.

According to Article 12, the following people are not eligible for resettlement:

- those who have left their places prior to the beginning of the settlement planning studies and who own property that is to be expropriated;
- those who have not left their places but have sold their property by agreement within 3 years from the start date of settlement planning studies and have not bought a replacement property at a similar rate or higher;
- those families who want to be resettled by the State but do not apply within ninety days of the end of the announcement period for resettlement. If they have received compensation under the Expropriation law they must commit to pay the compensation that they have received/ will receive and in cases when the expropriation cost is lower than the resettlement valuation amount defined by MPWS, to pay the expropriation amount and the difference to the bank account of the Central Accounting Unit of MPWS.

Upon a written application, those who do not want to be resettled by the State can be resettled within their village boundaries, provided that a proposal is made by the relevant Governor and a positive opinion is received by the MPWS.

Transfer to the new settlement areas is provided by the State free of charge in accordance with a transfer plan which must be prepared.

Facilities such as electricity, schools, health facilities and infrastructure services in the new settlement areas must be established by the MPWS taking into account the opinions of the relevant institutions and organizations.

The rights of those who do not accept resettlement at the places identified by the MPWS will be cancelled by the local settlement commission and the households will be evicted. These families cannot request a second resettlement.

5.5.2 *Types of Lands and Plots to be used for Resettlement*

The following lands and plots may be used to provide for resettlement:

- (i) lands controlled and used by the state;
- (ii) lands and plots owned by the State but not allocated to public services;
- (iii) land owned jointly by one or several villages, towns or cities and registered in the name of the treasury;
- (iv) places transferred by the treasury to municipalities free of charge;
- (v) lands reclaimed by the State from salty, alkaline, stony and similar soils which are suitable for cultivation;
- (vi) lands and plots acquired or expropriated by MPWS, from real and legal entities;
- (vii) lands and plots that belong to a village legal entity.

5.5.3 *Announcement of the Resettlement and Application Period*

The type and condition of resettlement will be announced by the governorship in writing and posted in noticeable places such as municipality, school, and community leader (muhtar) offices for thirty days. Those who request to be resettled must apply to the governorship with a petition within the announcement period or at the latest within ninety days of the end of the announcement period.

5.5.4 *Project Loans*

For those who are resettled according to the Settlement Law, improvement measures and provision of additional incomes to enable the household to reach a defined minimum standard of living are set out in the plans and projects prepared by MPWS and other relevant institutions and organizations. These benefits will be provided to families that are resettled by the State and upon their request. There are two types of benefit: loans for equipment and loans for working capital.

Annex D

D-1: Environmental and Social Management
Plan

D-2: Resettlement Policy Framework

Annex D

D-1: Eurasia Tunnel Project
Environmental and Social
Management Plan

Annex D-1: Environmental and Social Management Plan

PROJECT STAGE Topic Action	Responsibilities (EPCC = EPC Contractor)	Timing	Indicators of Delivery	Monitoring of Delivery
1. DESIGN				
1.1 Land				
The Project shall be designed to minimise the use of land and expropriation of property for development of the Project. A number of cases where the land take may be reduced have already been identified, and these shall be further investigated. If design modifications prove feasible and they are acceptable to DLH, the number of buildings to be expropriated will be reduced. Currently, there is the potential for 18 buildings to be acquired by the Project but it is expected that this will be significantly reduced once detailed design and further mitigation is undertaken.	ATAŞ / EPCC	All land take to be confirmed as being justified and fully required before completion of detailed design	All land take is justified in writing by design	Audit of final design for each section of route prior to construction
Design shall provide for reinstatement of use of all land temporarily used during construction and for enhancement where possible	ATAŞ	Before completion of design, implemented within 3 months after road construction	Design includes reinstatement and enhancement measures	Audit of design document, visual check of sites after 3 months
1.2 Access				
Design shall provide improved pedestrian crossings at designated points. This shall include eight pedestrian footbridges at all existing crossing locations on the European Side, including linking the Metro station with the Yenikapi ferry terminal. Pedestrian footbridges shall be designed with ramps to facilitate the use of pushchairs, wheelchairs and baggage trolleys. The planned pedestrian footbridge located at km4+615m shall be moved 200 m further to the east of Yenikapi to provide better connectivity to Kumkapi Train Station.	ATAŞ / EPCC	Before the completion of detailed design	Confirmation that final design includes the stated measures	Audit of final design documents; visual check after construction completion

PROJECT STAGE Topic Action	Responsibilities (EPCC = EPC Contractor)	Timing	Indicators of Delivery	Monitoring of Delivery
The five existing footbridges on the Asian Side shall be replaced with upgraded structures providing ramped access for all users.				
Design shall provide for replacement car parking areas and bus stops for people visiting the coastal park.	ATAŞ / EPCC	Before the completion of detailed design	Confirmation that final design includes the stated measures	Audit of final design documents; visual check after construction completion
Design shall include footpaths with a minimum width of 2.5 m and cycle paths on both sides of the approach roads	ATAŞ / EPCC	Before the completion of detailed design	Confirmation that final design includes the stated measures	Audit of final design documents; visual check after construction completion
1.3 Safety				
The structural elements (tunnel, roads, bridges, underpasses) of the project shall be (i) designed and (ii) constructed in accordance with Turkish standards and to comply with specified international standards for structural integrity and safety.	ATAŞ / EPCC	Before completion of design; during construction	Design includes the measures complying with specified standards	Audit of final design; inspection of completed elements
The tunnel shall be designed to comply with the American Design Code NFPA 502 in relation to safety and with EU Directive 2004/54 on the minimum safety requirements for tunnels in the Trans-European Road Network.	ATAŞ / EPCC	Before completion of design	Design includes the measures complying with specified standards	Audit of final design; inspection of completed elements
Further studies shall be carried to assess the risks from earthquakes, tsunamis, floods and storms and the Project shall be designed to address these risks, including meeting and exceeding the seismic standards required by the Turkish Seismic Code (2007), the BOT Contract and Japanese Standards on structural requirements for seismic events.	ATAŞ / EPCC	Before completion of design	Studies have been conducted; Design includes measures complying with specified standards	Audit of final design; inspection of completed elements
The height of the sea wall and the approach to the tunnel shall be designed so that the entrance is above wave heights forecast in the design scenarios incl. consideration of tsunamis and a freeboard (additional height) to account for future	ATAŞ / EPCC	Before completion of design	Design includes the stated measures	Audit of final design; inspection of completed

PROJECT STAGE Topic Action	Responsibilities (EPCC = EPC Contractor)	Timing	Indicators of Delivery	Monitoring of Delivery
sea level rise, storm surges and climate change.				elements
Further studies shall be carried to assess the risk from ground liquefaction (from earthquakes) and the tunnel and approach road structures shall be located at sufficient depth below the sea bed to protect the structure from liquefaction risk. Additionally, appropriate ground improvements shall be carried out as part of construction.	ATAŞ / EPCC	Before completion of design	Studies have been conducted; Design includes the stated measures	Audit of final design; inspection of completed elements
The Operations Building shall be designed to include parking for special fire trucks needed for the tunnel and a room for the emergency team.	ATAŞ / EPCC	Before completion of design	Design includes the stated measures	Audit of final design; inspection of completed elements
1.4 Visual Intrusion				
The Operations Building and the Toll Plaza shall be designed so that structures do not exceed 7 m above ground level to protect the skyline of the historic peninsula. Other tall Project structures (such as the ventilation shafts and the new pedestrian footbridges at Yenikapi) shall also be designed to be below 7m above ground level.	ATAŞ / EPCC	Before completion of design	Design includes the stated measures	Audit of final design; inspection of completed elements
1.3 Water Environment				
Further drainage studies shall be carried out during detailed design to ensure appropriate drainage arrangements are designed and provided.	ATAŞ / EPCC	Before completion of design	Studies have been conducted; Design includes the stated measures	Audit of final design; inspection of completed elements
The road drainage system shall be designed to accommodate a 50-year storm event and to allow for containment of foreseeable major spills of fuel or other transported liquids on roadways.	ATAŞ / EPCC	Before completion of design	Design includes the stated measures	Audit of final design; inspection of completed elements
1.5 Cultural Heritage				
The final design of the Project alignment will be detailed to ensure that the Project does not enter into the buffer zones around any protected buildings and structures.	ATAŞ / EPCC	Before completion of	Design includes the	Audit of final design; inspection of completed

PROJECT STAGE Topic Action	Responsibilities (EPCC = EPC Contractor)	Timing	Indicators of Delivery	Monitoring of Delivery
However, it is proposed to include a pedestrian underpass at Mermekule (see next page) as a mitigation measure and this specific element of the Project will enter this buffer zone.		detailed design	stated measures	elements
It is proposed that the junction at Yenikapi be designed as an at-grade structure to minimise the risk of disturbing archaeological deposits beneath the modern reclaimed ground. However, the Municipality is in favour of the existing at-grade design so the final design at this location will be developed with the Municipality during the detailed design stage.	ATAŞ / EPCC	Before completion of design	Design includes the stated measures	Audit of final design; inspection of completed elements
The Samatya underpass shall be relocated slightly to the west to minimize the risk of disturbing archaeological deposits.	ATAŞ / EPCC	Before completion of design	Design includes the stated measures	Audit of final design; inspection of completed elements
An additional pedestrian underpass on the southern section of the road shall be constructed to provide access to Mermerkule (Marble Tower).	ATAŞ / EPCC	Before completion of design	Design includes the stated measures	Audit of final design; inspection of completed elements
ATAŞ shall develop a route-wide public information and education scheme on both the European and Asian sides. The purpose shall be to inform the local community and visitors to the coastal park of the historical context of the area and its archaeological significance. The form and detail of this public scheme shall be developed in consultation with the Municipality of Istanbul and UNESCO.	ATAŞ / EPCC	Before completion of design	Design includes the stated measures. Evidence of consultations with CH authorities	Audit of final design; inspection of completed elements
1.6 Noise and Vibration				
A detailed Traffic Noise Study shall be completed during development of the detailed design to identify and predict traffic noise levels at all sensitive receptors along the route and determine the optimum noise abatement measures to achieve compliance with Turkish standards and with the IFC threshold of 3 dB(A) maximum additional noise impact for each receptor. Potential noise reduction measures may include:	ATAŞ / EPCC	Before completion of design	Study completed and measures identified and included in designs	Audit of final design; inspection of completed elements

PROJECT STAGE Topic Action	Responsibilities (EPCC = EPC Contractor)	Timing	Indicators of Delivery	Monitoring of Delivery
<ul style="list-style-type: none"> paving with porous asphalt to reduce road-noise; installation of noise barrier walls along the route where feasible (e.g. adequate space and does not disrupt visual aesthetics); insulating hospitals, schools and other sensitive structures (eg by double-glazing windows). 				
2. CONSTRUCTION				
2.1 Land, Access and Disturbance of the Community				
Temporary construction areas shall be established on existing vacant and construction sites as far as possible to minimise temporary use of other land.	ATAŞ / EPCC	During construction period	Vacant land used for temporary sites where available.	Prior inspection of proposed temp construction areas
No new borrow areas or quarries shall be established for the Project.	ATAŞ / EPCC	During construction period	Only existing sites used	Spot-check of EPCC files to verify source of materials
New and upgraded pedestrian crossing shall be installed before old crossings are removed.	ATAŞ / EPCC	During construction period	New Crossings built and adopted prior to removal of existing crossings	Regular inspection of crossing works
The tunnel boring operation shall be started from the Asian side to avoid impacting on the coastal park and the historic peninsula from tunnel related activities.	ATAŞ / EPCC	During construction period	TBM assembled on Asian side	Regular inspection of TBM area
Throughout the approach road works two lanes will be available for traffic in each direction. An additional two lanes to take directional flow in the morning and evening peaks on the European side. A traffic management plan will be developed for the construction of all U-turns and intersections to permit continued traffic	ATAŞ / EPCC	During construction period	Diversion lanes built before underpasses	Regular inspection of road works

PROJECT STAGE Topic Action	Responsibilities (EPCC = EPC Contractor)	Timing	Indicators of Delivery	Monitoring of Delivery
movement. Access will be maintained with all existing land uses, buildings and facilities along the route. Where temporary diversions and alternative access arrangements are required; the relevant land use, businesses or residents will be informed well in advance of the alternative access arrangements. This information will also be freely available on the Project website.				
Temporary work areas shall be reinstated as soon as possible after completion of works in the relevant section of the route.	ATAŞ / EPCC	During construction period	All temporary work areas no longer in use reinstated as soon as practicable	Regular inspection of construction areas
Expropriation of land and property, and resettlement of affected parties shall be implemented in accordance with the Project Resettlement Policy Framework (Annex D-2).	DLH supported by ATAŞ	During construction period	Expropriation and Resettlement implemented in accordance with RPF; agreements documented and filed	Audit of files; interviews with DLH and sampling of affected persons to verify adherence to RPF
ATAŞ shall set-up and manage an expropriation Grievance Mechanism which shall be implemented in accordance with international performance standards to receive and address specific concerns about compensation and relocation that are raised by displaced persons or members of host communities, including a recourse mechanism designed to resolve disputes in an impartial manner.	DLH supported by ATAŞ	During construction period	Expropriation and Resettlement implemented smoothly and as per RPF; respective protocols and agreements documented and filed	Audit of Grievance Mechanism files and records
Where public land is to be acquired it shall be transferred between the relevant state agencies under the terms of the law governing expropriation.	DLH supported by ATAŞ	Prior to completion of expropriation	Documentation of transfer	Audit of documents
ATAŞ shall compensate for loss of park area by carrying out improvements to the remainder of the park after construction (in agreement with the responsible park	ATAŞ	On completion of construction in	Replacement works to be completed within 3 of construction in	Audit 3 months after completion of construction

PROJECT STAGE Topic Action	Responsibilities (EPCC = EPC Contractor)	Timing	Indicators of Delivery	Monitoring of Delivery
authorities).		affected areas	affected areas	
2.2 Soils and Contaminated land during Construction				
Topsoil, overburden, and low-quality materials shall be properly removed, stockpiled near the site, and preserved for rehabilitation. Newly exposed soil surfaces shall be protected against rainfall erosion in periods of heavy rain.	ATAŞ / EPCC	During construction period	Topsoils are stockpiled and preserved	Regular inspection of soil and material piles
A Waste Management Plan covering all types of construction waste shall be developed and implemented during construction. Relevant construction workers and site personnel shall be trained in the measures required by the Plan and refresher courses provided periodically to all staff for the duration of the construction works.	ATAŞ / EPCC	Plan in place prior to Construction and implemented during construction period	Plan in place; planned measures are implemented	Audit of plan; regular inspection of implemented measures
In road sections where the existing road surface is replaced, old road surface material shall be re-used in paving or for other purposes as far as practicable. Old asphalt containing tar and polycyclic aromatic hydrocarbons shall be treated as a hazardous waste.	ATAŞ / EPCC	During construction period	Old road material is treated as waste only where re-use is not practicable; relevant materials are handled as haz wastes	Regular inspection of management of waste road materials
Fuels, oils and chemicals shall be stored on an impervious base protected by a bund, and drip trays shall be used for fuelling mobile equipment. Any spillages from handling with fuel and liquids shall be immediately contained on site and the contaminated soil removed from the site for suitable treatment and disposal.	ATAŞ / EPCC	During construction period	Proper storage areas exist for haz liquids; spill control equipment is present; areas do not show evidence of untreated spillages	Regular inspection of storage areas shows that spills are contained and cleaned up
Procedures shall be set up for identifying and dealing with contaminated materials when encountered during construction, including treatment and disposal of contaminated soils. Contaminated material shall be remediated or disposed of in an appropriately licensed disposal site.	ATAŞ / EPCC	Procedures in place before construction and implemented during construction period	Procedures in place; planned measures are implemented	Audit of procedures; Regular inspection of implemented measures

PROJECT STAGE Topic Action	Responsibilities (EPCC = EPC Contractor)	Timing	Indicators of Delivery	Monitoring of Delivery
2.3 Water Pollution during Construction				
Run-off from construction sites and drainage from excavations including dewatering of deep excavations, shall be collected, treated and discharged in accordance with required permits.	ATAŞ / EPCC	Procedures in place before construction and implemented during construction period	Procedures in place; permits are obtained and planned measures are implemented	Audit of procedures; Regular inspection of implemented measures; review of permits
There shall be no discharge to sea other than in accordance with relevant permits.	ATAŞ / EPCC	During construction period	Permits are obtained if needed; otherwise no water discharges are made to sea	Audit of permits; Regular inspection of project area to check if any discharges being made
Domestic sewage from the workforce shall either be collected onsite and transported by tanker for disposal at the local sewage treatment works or discharged direct to the city sewage system.	ATAŞ / EPCC	During construction period	Either local sewage collection facilities exist or pipes to the sewers; tanker trucks are taking sewage to local sewage works.	Regular inspection of sanitary facilities to confirm disposal methods and check of trucking records
Newly exposed soil surfaces shall be protected (eg covering with plastic sheets or other protective cover) during periods of heavy rainfall to minimise loss of soils and muddy runoff	ATAŞ / EPCC	During construction period	Newly exposed soils are covered or otherwise protected in heavy rain; absence of muddy runoff	Regular inspection of project area to confirm that soils are protected and absence of muddy runoff
The use of cement and wet concrete shall be carefully managed and controlled in or close to surface water to prevent contamination of water.	ATAŞ / EPCC	During construction period	Cement and concrete works near surface waters do not cause water contamination	Regular inspection of project area to confirm that waters are not impacted by such works (absence of discoloration, impacts)
All fuels, oils and chemicals shall be stored on an impervious base protected by a	ATAŞ / EPCC	During construction	Proper storage areas exist for fuel storage	Regular inspection of

PROJECT STAGE Topic Action	Responsibilities (EPCC = EPC Contractor)	Timing	Indicators of Delivery	Monitoring of Delivery
bund and drip trays shall be used for fuelling of mobile equipment.		period	and equipment fuelling	storage areas
Any spillages from handling with fuel and liquids shall be immediately contained on site and contaminated soil or water removed from the site for suitable treatment and disposal.	ATAŞ / EPCC	During construction period	Fuel handling areas do not show evidence of un-treated spillages	Regular inspection of storage areas shows that spills are contained and cleaned up
If grouting above the tunnel is required, this shall be undertaken only from within the tunnel to prevent any risk of pollution of the marine environment.	ATAŞ / EPCC	During construction period	Grouting activity is performed from tunnel-side; marine environment is not impacted by grouting works	Regular inspection during any grouting works to confirm correct procedures; no marine impacts observed
A Project Spill Response Plan shall be developed to ensure all construction related spills are immediately identified, contained, cleaned up and disposed of. Relevant construction workers and site personnel shall be trained in the measures required in the Plan and re-fresher courses periodically provided to all staff for the duration of the construction works. Oil spill equipment and supplies shall be provided on site and back-up services shall be in place as required by the Plan.	ATAŞ / EPCC	Prior to start of construction	Spill Response Plan in place, staff trained, and all measures required by plan implemented	Audit of Plan; regular inspection of measures; check on staff awareness of spill response action
2.4 Construction Waste and Resources				
The Project shall seek to minimise the generation of spoil, re-use excavated soils in the Project area as far as possible and find alternative beneficial uses of surplus spoil where practicable so as to minimise the requirement for off-site disposal. Surplus excavation material shall be made available to third parties for reuse on local development projects if it cannot be utilised on the Project site.	ATAŞ / EPCC	During construction period	Excavated material is reused directly or stockpiled for future; efforts to find alternative uses are documented	Regular inspection of material handling/reuse; audit of documents
All surplus spoil and construction materials shall be disposed of at suitably licensed	ATAŞ / EPCC	During construction	Contract exists for hauling spoil to	Audit of contracts and licences; spot-check on

PROJECT STAGE Topic Action	Responsibilities (EPCC = EPC Contractor)	Timing	Indicators of Delivery	Monitoring of Delivery
disposal sites.		period	licensed sites; copies of licences held on file	hauliers
Spoil transport shall be carefully managed and controlled (e.g. use of tarpaulins on trucks) to prevent spread of dust and dirt on roads. Trucks shall be visually checked prior to their departure to ensure that the spoil is safely and securely loaded .	ATAŞ / EPCC	During construction period	Haulage contract includes measures to prevent release and impacts, and hauliers are implementing	Audit of contracts and licenses; spot-check on hauliers
No excavated soil, construction and debris wastes shall be disposed of or deposited in seas, lakes, rivers, streets, forests or any other place that may cause adverse effects on the environment, except at recovery, storage, treatment and disposal facilities operating under a valid licence from the relevant authorities.	ATAŞ / EPCC	During construction period	Contracts include necessary provisions affecting hauliers and final disposal sites; no improper disposal of wastes	Audit of contracts and licenses; regular inspection of required measures on and off site and spot-check on hauliers and final disposal locations
All wastes shall be collected and stored on site and transported and disposed of in accordance with a written Waste Management Plan (WMP) to be prepared by the contractor in accordance with international best practice. Relevant staff shall be trained and aware of requirements affecting their work.	ATAŞ / EPCC	Plan in place before construction and implemented during construction	Plan in place ; measures implements and project staff familiar with relevant requirements	Audit of plan; regular inspection of required measures on and off site and spot-check on staff awareness
Waste disposal containers of suitable size and design shall be provided for each type of waste and clearly labelled. Containers shall be placed in dedicated areas and a plan showing where wastes of different types can be deposited shall be available to staff.	ATAŞ / EPCC	During construction period	Properly labelled waste containers are located at dedicated areas on site	Regular inspection to confirm presence and adequacy of waste containers
Biodegradable waste shall be collected daily and not allowed to accumulate such that it may present an environmental or health hazard to construction workers or the local environment.	ATAŞ / EPCC	During construction period	Contract exists for bio-waste containers to be collected daily; such wastes are not accumulated	Audit of contract; Regular inspection to confirm bio-waste containers are emptied and no fouling waste is accumulated

PROJECT STAGE Topic Action	Responsibilities (EPCC = EPC Contractor)	Timing	Indicators of Delivery	Monitoring of Delivery
Regular site inspections shall be carried out to ensure waste facilities and waste procedures are correctly used and that the various waste areas are kept clean and tidy.	ATAŞ / EPCC	During construction period	Responsibility for inspection allocated to suitable qualified staff; Inspection records maintained; waste mgmt facilities are tidy	Check on job description; regular inspection of waste management on site; check on records
All hazardous waste shall be collected and stored separately in Temporary Hazardous Waste Storage Areas and disposed of in accordance with the provisions of the Hazardous Waste Control Regulation. Access to hazardous waste areas shall be restricted to suitably trained and equipped staff. All associated procedures and other information shall be presented in the Hazardous Waste Management Plan.	ATAŞ / EPCC	During construction period	Haz waste areas with restricted access are designated and used; Contracts in place for proper disposal of haz wastes	Audit of haz waste disposal contract; Regular inspection to confirm haz waste areas are in place (containers present, access restricted) and are being used appropriately
All materials suitable for recycling (including stripped road surfacing material and demolition wastes) shall be segregated and recycled where appropriate facilities and markets are available. Materials not reused or recycled shall be disposed of in a suitably licensed facility.	ATAŞ / EPCC	During construction period	Evidence that markets have been sought for recyclable materials; materials segregated used as far as practicable	Audit of records; regular inspection of segregated storage
Waste oils (and related materials) and other liquid wastes shall be managed in accordance with the system of categorization under the Waste Oils Regulation. Relevant staff shall be trained in required measures and necessary facilities and disposal services in place.	ATAŞ / EPCC	Procedures in place and implemented during construction	Procedures in place; relevant staff familiar with requirements and measures implemented	Audit of procedures; regular inspection of waste oil handling and spot checks on staff awareness
All waste shall be transported in marked vehicles. Vehicles shall be checked to ensure they are suitable for transportation of the waste requiring disposal. Drivers employed shall be trained in the handling and disposal of their cargo and all vehicles shall carry documents describing the nature of the waste and its degree of hazard.	ATAŞ / EPCC	During construction period	Contract with waste haulier specifies requirements; trucks carry relevant documents and drivers trained and aware of	Audit of contract; regular checks on trucks and drivers

PROJECT STAGE Topic Action	Responsibilities (EPCC = EPC Contractor)	Timing	Indicators of Delivery	Monitoring of Delivery
			requirements	
All waste spills shall be promptly cleaned up.	ATAŞ / EPCC	During construction period	Spill-control equipment is readily available and being used; no evidence of significant long-term spill	Regular inspection of spill control equipment and of sites (for evidence of spills not cleaned up)
Full records of the type, quantity, composition, origin, disposal destination and method of transport for all wastes shall be maintained and available for inspection.	ATAŞ / EPCC	During construction period	Records held on file	Spot-check on records
High-volume construction materials shall be sourced from as close as possible to the Project location.	ATAŞ / EPCC	During construction period	Procurement procedures reference local sourcing; records kept on sources of materials	Audit of procedures; spot check of purchasing records
Aggregates and road asphalt shall be sourced from quarries, borrow pits, crushing plants and asphalt plants operating with valid environmental and other necessary permits and licenses.	ATAŞ / EPCC	During construction period	Procurement procedures reference requirement; copies of permits available if required	Audit of procedures and permits; spot check of facilities and compliance status
Implement procedures for identifying and dealing with contaminated materials when encountered during construction ("chance-find contamination. Relevant staff to be trained and aware of required measures. Contaminated material to be contained on site, remediated or disposed of in an appropriately licensed disposal facility.	ATAŞ / EPCC	During construction period	Procedures in place and implemented for chance-find contamination; staff familiar with requirements	Audit of procedures; spot check on staff awareness
2.5 Hazardous Materials in Construction				

PROJECT STAGE Topic Action	Responsibilities (EPCC = EPC Contractor)	Timing	Indicators of Delivery	Monitoring of Delivery
Specialist chemicals used in tunnelling shall be selected to be of no or low hazard to environment	ATAŞ / EPCC	During tunnelling	All chemicals low or no hazard	Audit of chemicals used
Selection, storage, use and disposal of hazardous materials shall be strictly controlled in accordance with legal requirements and good industry practice regarding worker health and safety, public health and safety and environmental protection. All procedures and related information shall be set out in the Waste Management Plan. Relevant staff shall be trained in required measures.	ATAŞ / EPCC	Plan in place and implemented during construction	Plan in place and measures implemented; staff aware of requirements	Audit of plan; regular inspection of haz waste handling, spot checks on staff awareness
2.6 Construction Noise and Vibration				
<p>A Noise Monitoring Programme shall be set up to measure noise levels at the closest sensitive receptors as work starts on each new section along the route. If levels at receptors exceed specified standards, remedial measures shall be taken to reduce noise emissions to more acceptable levels. Lessons-learnt from preceding work-sections shall be considered when setting up and performing the new sections of road works.</p> <p>ATAŞ shall ensure that local residents and managers of other sensitive facilities are kept advised of planned noisy periods and shall respond to any questions or complaints in accordance with the Grievance Procedure.</p>	ATAŞ / EPCC	During Construction	<p>Noise monitoring records available showing any limit exceedances.</p> <p>Documents exist to demonstrate that actions are taken to mitigate any limit exceedances, and to show that local residents/managers are informed of noisy work periods and activities.</p>	Audit of monitoring records and meeting minutes etc to show that remedial actions are undertaken for any noise-limit exceedances;
The Project shall conform with noise standards set out in the Turkish Regulation on the Assessment and Management of Environmental Noise (CGDYY) and the Turkish Regulation on Control of Excavated Soil, Construction and Demolition Wastes.	ATAŞ / EPCC	During construction	Monitored noise levels around construction sites	Audit of monitoring records during start of activity at each construction area

PROJECT STAGE Topic Action	Responsibilities (EPCC = EPC Contractor)	Timing	Indicators of Delivery	Monitoring of Delivery
<i>Timing of work activities</i> <ul style="list-style-type: none"> Construction activities during evening or night hours shall be avoided as far as is practicable. If late working is essential, for example to avoid unacceptable disruption to traffic, a separate permit must be obtained and construction activities must meet lower noise limits (70 dB(A) during evening and 65 dB(A) during night time). In such cases, local residents shall be kept informed of the planned works. If blasting or other very noisy activities cannot be avoided near schools, hospitals, places of worship, other sensitive areas, scheduling of such works shall be discussed with the relevant premises to agree on suitable working periods. Generally no noisy work shall be carried out when nearby schools or places of worship are in operation. 	ATAŞ / EPCC	During construction	<p>Compliance with evening and night-time limits</p> <p>Evidence that local residents are informed in advance of evening/night-time work, and that work-schedules have been discussed with representatives of local schools, hospitals, etc.</p>	<p>Audit of relevant permits, noise monitoring records and correspondence with local residents, schools, hospitals, etc.</p> <p>Spot checks with local residents</p>
<i>Specification of equipment</i> <ul style="list-style-type: none"> All construction equipment shall comply with the requirements of the European Directive 2000/14/EU on sound emission of equipment operated outdoors. 	ATAŞ / EPCC	During construction	All equipment is compliant	Spot-check of equipment in the field (Construction phase)
<i>Location of noisy equipment</i> <ul style="list-style-type: none"> Noisy activities taking place within construction sites shall be located as far as possible away from sensitive receptors including homes, places of worship, schools and hospitals. In particular: <ul style="list-style-type: none"> crushers shall be located at least 50 metres away from sensitive receptors; if piling is required within 100m of sensitive premises this shall be carried out using bored piling or casings driven by torque and hydraulic pressure. 	ATAŞ / EPCC	During construction	<p>Equipment locations conform to the minimum distances</p> <p>Correct technologies are used in sensitive areas for piling, excavation and demolition works</p>	Regular site inspections

PROJECT STAGE Topic Action	Responsibilities (EPCC = EPC Contractor)	Timing	Indicators of Delivery	Monitoring of Delivery
<ul style="list-style-type: none"> excavation of hard materials within 50 metres of sensitive receptors shall be carried out by hydraulic or electrical power (eg actuating rotary drills). <p>Where practicable, demolition works shall be carried out using equipment which breaks concrete by bending rather than by percussive methods.</p>				
<p><i>Shielding/screening of noisy equipment</i></p> <ul style="list-style-type: none"> On site structures such as containers, offices, boundary hoardings shall be used to screen sensitive receptors from noise sources as far as possible. Where necessary, movable noise barriers (2-2.5 m high) shall be erected to ensure receptor noise levels are less than the limit values adjacent to noisy activities. The slurry treatment plant (located at the Asian Side) shall be acoustically shielded such that the external sound pressure level is below 85 dB(A). Where construction equipment is provided with sealed acoustic covers or enclosures these shall be kept closed whenever the machines are in use. Machines shall be shut down or throttled down to a minimum when not in operation. Maintenance procedures shall be implemented in order to keep equipment in good working condition to minimise extraneous noises caused by poor performance. If practicable and safe, audible reversing alarms on construction vehicles shall not be used near sensitive receptors. 	ATAŞ / EPCC	During construction	<p>Noisy equipment is shielded and noise monitoring shows that noise limits (eg 85 dB(A) for slurry plant) are met</p> <p>Shielding is in place when equipment is operated (if feasible reverse-alarms are turned off or at least down); equipment is off or throttled to minimum when not in use</p>	<p>Regular inspections of construction sites to confirm shielding is used and equipment operated as required</p> <p>Audit of noise monitoring records</p>
Small fully controlled charges shall be used if any blasting is required on the approach roads.	ATAŞ / EPCC	During construction	Records kept of all blasting activity	Audit of blasting records

PROJECT STAGE Topic Action	Responsibilities (EPCC = EPC Contractor)	Timing	Indicators of Delivery	Monitoring of Delivery
Controlled blasting methods shall be used during NATM tunnelling which maximise blast efficiency, limit noise and vibration, protect the surrounding rock mass and maximise the accessibility of drilling work. An emulsion type explosive suitable for hard rock and wet conditions, with low production of smoke and odours and safe handling, shall be used.	ATAŞ / EPCC	During construction	Such blasting specifications are stated in the Work Plan; contractor is familiar with the specs and follows them	Audit of Work Plan specs; Spot-check interview of contractor; visual check in field when blasting to confirm
Piling (and related) works in the vicinity of sensitive premises shall be carried out using vibration-reduced techniques (bored piling or casings driven by torque and hydraulic pressure). Driven and hydraulic hammer piling shall not be used in sensitive locations.	ATAŞ / EPCC	During construction	Piling in sensitive areas is not being done via the restricted methods	Field inspection of piling works
<p>A Vibration Monitoring Program (VMP) shall be undertaken to demonstrate compliance guidance on acceptable vibration at the foundation of buildings in British Standard BS7385. Monitoring shall be carried out prior to and during piling activities at buildings within 100 m of work. The guideline values shall be reduced to 50% or less for historic buildings that may be in poor repair and houses.</p> <p>If the limits are exceeded on a regular basis (for more than 3 days in a 6-day period), then construction shall stop and the cause of the vibration shall be investigated and if necessary remedial action shall be undertaken, for example selecting a different construction technique. The new construction method shall be monitored to ensure it is operating within the vibration limits.</p> <p>The following structures shall be inspected prior to and during construction to check for any surface or structural damage and if any impact is detected work shall cease until remedial measures are taken and alternative methods shall then be used to avoid further damage:</p> <ul style="list-style-type: none"> • standing sections of the City Sea Walls along the Project route; • protected historic chimneys at Kazlıçeşme; 	ATAŞ/ EPCC	During construction	Vibration monitoring records available showing any limit exceedances.	Audit of vibration monitoring data to check compliance and remedial action (where required)

PROJECT STAGE Topic Action	Responsibilities (EPCC = EPC Contractor)	Timing	Indicators of Delivery	Monitoring of Delivery
<ul style="list-style-type: none"> • Mermerkule; • the Church of Ss. Sergius and Bacchus /Mosque of Küçük Ayasofya; • House of Justinian (in the Palace and Harbour of Boukoleon). 				
ATAŞ / Contractor shall monitor vibration during construction to ensure these requirements are met, and if the standards are exceeded measures shall be taken to reduce vibration. Discussions shall be held with the relevant parties related to sensitive equipment to ensure construction is managed and vibrations are monitored to avoid adverse effects on the equipment.	ATAŞ / EPCC	During construction	<p>Vibration monitoring is being performed and documented at the specified locations.</p> <p>Documentation exists to show that agreed procedures exist to protect any vibration-sensitive equipment.</p>	Audit of vibration monitoring records and docs re protection of sensitive equipment
2.7 Construction Dust and Air Quality				
<p>The following measures shall be taken to control the release of dust and other emissions from constructions:</p> <ul style="list-style-type: none"> • Dust generating activities and stockpiles of dusty material shall be planned and sited to minimise the potential for dust generation taking into account prevailing wind directions and the locations of sensitive receptors. Dust generation shall be controlled by use of wind shields and water spraying as necessary in dry periods. • The drop height of dusty materials shall be kept as low as possible. • If crushing of construction material or waste is required, crushers shall be located away from sensitive receptors. 	ATAŞ / EPCC	During construction	All measure undertaken as specified	Regular site inspections

PROJECT STAGE Topic Action	Responsibilities (EPCC = EPC Contractor)	Timing	Indicators of Delivery	Monitoring of Delivery
<ul style="list-style-type: none"> On-site speed limits shall be applied and enforced for trucks travelling on unpaved surfaces (10 km/h); Trucks transporting dusty materials off-site shall be covered before leaving the site. Construction vehicles shall not be permitted to keep engines running while waiting to enter the site or waiting on-site. Wheel washing facilities shall be available and used so that trucks leaving the site do not spread dirt onto neighbouring roads. Public roads used by site traffic shall be swept regularly to prevent accumulation of dirt. Machines shall be shut down or throttled down to a minimum when not in use. Equipment shall be regularly maintained to keep it in good working condition and minimise exhaust gas emissions caused by poor performance. 				
Dust deposition levels shall be monitored at nearest sensitive receptors using dust deposit gauges and if a level of 0.35 grams per square metre per month is exceeded measures to reduce emissions shall be undertaken.	ATAŞ / EPCC	During construction	Dust monitoring undertaken Remedial action undertaken where required	Audit of dust monitoring results and required remedial action
Training shall be provided to operators of equipment and truck drivers to ensure they are awareness of requirements for control of dust and other sources of air pollution.	ATAŞ / EPCC	During construction	Training undertaken	Audit of training records and spot checks on awareness of site workers.
Asphalt and hot-mix plants shall be located as far as possible from the nearest sensitive receptor, in a location to be approved by the local environmental authorities, and with emission controls in accordance with the local environmental	ATAŞ / EPCC	During construction	Plant located away from sensitive areas	Regular inspection of site

PROJECT STAGE Topic Action	Responsibilities (EPCC = EPC Contractor)	Timing	Indicators of Delivery	Monitoring of Delivery
regulations.				
2.8 Biodiversity and Nature Conservation				
A tree survey shall be carried out prior to construction to identify the species, age, height and condition of all trees to be felled.	ATAŞ	Prior to construction	Tree Survey is complete and documented	Audit of the survey document
The potential for loss of trees shall be considered in the planning and layout of temporary construction work areas.	ATAŞ / EPCC	Prior to construction	Number of trees felled in temporary work areas	
Vegetation clearance and felling of trees where birds may be nesting shall be undertaken only outside the nesting period (March to August).	ATAŞ / EPCC	During construction	No clearance of vegetation or felling of trees during March to August without prior checks for presence of nesting birds	
All trees shall be inspected prior to felling to identify whether bats are roosting or hibernating. If bats are found the affected animals shall be relocated to an alternative suitable site and if appropriate bat boxes (artificial roosts) shall located in suitable trees to provide replacement habitat	ATAŞ / EPCC	Prior to felling of trees	Number of trees felled where bats are detected Implementation of measures to protect bats	
All felled trees shall be replaced by new planting on at least a one-for-one basis, and three-for-one basis for large and old trees. Species shall be selected with a view to using native species where suited to the location. A mix of species shall be used to provide early cover using fast-growing species and longer term succession. If insufficient land is available for replacement tree planting along the roadside and in the coastal park, alternative planting areas shall be identified elsewhere in the city.	ATAŞ / EPCC	After completion of construction	Tree Survey includes replacement plans for felled trees	Audit of Tree Survey and inspection of new planting.

PROJECT STAGE Topic Action	Responsibilities (EPCC = EPC Contractor)	Timing	Indicators of Delivery	Monitoring of Delivery
Replacement plans shall be set out in the Tree Survey.				
Actions shall be taken to improve the amenity and biodiversity value of remaining and new areas of planting by replacing poor specimens, filling gaps and undertaking regular maintenance around areas under the control of ATAŞ during the BOT contract period.	ATAŞ	On completion of construction and during operations	Periodic inspections of vegetation/tree areas are made by qualified persons and maintenance and replacement undertaken as required	Regular site inspections
2.9 Cultural heritage				
<p>A chance finds procedure in accordance with international performance standards shall operate throughout construction on the European side. A Government-approved archaeologist shall be present on site at Yenikapi (and any other areas required by the Protective Councils) to observe during site clearance and excavation of areas identified as having a high potential for finds. Finds shall not be disturbed until they have been properly investigated and assessed by a competent and Government-approved specialist and they shall then be removed to an appropriate museum or similar facility.</p> <p>Where there is evidence of palaeo-environmental deposits (evidence of past history in fossils, organic residues, minerals, etc) soils shall be sampled and analysed by a suitably qualified specialist.</p> <p>Results of all investigations shall be published.</p>	ATAŞ / EPCC	Construction	Operation of chance finds procedure	Audit of chance finds procedure
2.10 Construction Labour and Working Conditions				
ATAŞ shall develop and implement a Project HR Policy and procedures in compliance with relevant requirements of Turkish law and the provisions international performance standards. A copy of the policy shall be given to all Project staff.	ATAŞ / EPCC	During construction	Project Policy and procedures in place	Annual audit of HR policy and implementation of procedures.

PROJECT STAGE Topic Action	Responsibilities (EPCC = EPC Contractor)	Timing	Indicators of Delivery	Monitoring of Delivery
The Project shall endeavour to employ local people from Istanbul as far as possible. If workers are brought in from outside Istanbul they shall be housed in dedicated accommodation designed to meet the requirements of international performance standards and IFC/EBRD guidance on workers' accommodation.	ATAŞ / EPCC	During construction	Proportion of workforce from Istanbul. Worker housing meets standards and local residents are not disturbed by the workers	Inspection of worker housing locations; no complaints by workers or local residents
The Project shall not employ any persons under the age of 18 years old.	ATAŞ / EPCC	During construction	No workers under 18	Audit of employee records and spot checks on site
A fair, equitable and just wage shall be paid to all construction and operation workers on the Project and all salaries shall comply with the requirements of Turkish law.	ATAŞ / EPCC	During construction	All wages paid in accordance with applicable Turkish laws	Audit of employee records and spot checks on site
A specific workers' grievance mechanism shall be developed and communicated to the workers in accordance with international performance standards and IFC Labour Toolkit (September 2008).	ATAŞ	During construction	Grievance procedure in place and workers are aware of it	Audit of procedure; check on records and that any grievances are followed up
3. OPERATION				
3.1 Safety				
A comprehensive Emergency Preparedness and Response Plan (EPRP) shall be prepared for operation of the tunnel to address all foreseeable incidents including fire, explosion, road accidents, earthquake, tsunami, flooding, terrorist activity and other threats. The EPRP shall be prepared in consultation with the local emergency services, and shall include plans to prevent, prepare for and respond to emergencies affecting road users (vehicles and pedestrians) and the community. All necessary	ATAŞ	Prior to start of tunnel operations	Plan and all required equipment, facilities and services in place.; evidence of liaison with local emergency services and communications with	Audit of plan and required measures; spot-checks with relevant third parties

PROJECT STAGE Topic Action	Responsibilities (EPCC = EPC Contractor)	Timing	Indicators of Delivery	Monitoring of Delivery
information shall be conveyed to road users and the wider community.			potentially affected people	
3.2 Water Pollution				
All road and tunnel drainage shall be collected at sumps located at the low points along the route (at underpasses and in the tunnel) and discharged to the municipal stormwater sewer system in accordance with required permits. Road drainage which is contaminated by spills (of hazardous liquids) shall be separately collected and subjected to appropriate treatment prior to disposal in an appropriately licensed manner.	ATAŞ	During operation	All drainage collected and discharged as required Hazardous spills contained and cleaned up	Regular inspection of route
3.3 Waste				
All operational waste shall be managed in accordance with legal requirements, including wastes generated from treatment of road drainage and from clean up of spills.	ATAŞ / EPCC	During operations	All operational waste disposed of appropriately	Regular inspection of route
3.4 Noise and Air Quality				
The Project shall work with the municipal traffic authorities (Istanbul Traffic Control Centre (IBB)) and take other initiatives to encourage drivers to minimize emissions, eg regular vehicle inspections, appropriate driving behaviour.	ATAŞ	During operations	Meetings are held with the IBB and third parties to agree actions; signs are posted along the project route	Check on records of meetings and evidence of other activities
Electronic traffic signs shall be used to provide information to drivers to facilitate smooth traffic flow to reduce noise and emissions, e.g. advice on driving speed, upcoming traffic, and general tips for minimizing vehicle emissions.	ATAŞ	During operations	Electronic signs show useful guidance	
Ambient air quality shall be monitored continuously at a station near km 2+100; if pollutant concentrations approach or exceed the quality limits, then feedback shall	ATAŞ / IBB	During operations	Air quality monitoring in place; speed reductions	Audit of air monitoring records

PROJECT STAGE Topic Action	Responsibilities (EPCC = EPC Contractor)	Timing	Indicators of Delivery	Monitoring of Delivery
be given to the traffic managers to reduce traffic speeds using electronic signs.			implemented when limits are approached.	
Noise monitoring shall be undertaken at representative receptor locations along the route for at least one year after opening of the Tunnel to determine if the Turkish and IFC noise standards are met.	ATAŞ	For 1 year after opening	Noise monitoring in place; speed reductions implemented when limits are approached.	Audit of noise monitoring records

Annex D

D-2: Resettlement Policy Framework

1 INTRODUCTION

1.1 INTRODUCTION

This Resettlement Policy Framework (RPF) is one of a number of outputs prepared as part of the Environmental and Social Impact Assessment (ESIA) of the Eurasia Tunnel Project (the Project). The requirement for ESIA arises because ATAS is seeking finance from international lenders in order to support the development of the Project. One of the key requirements of this funding is that the Project must comply with various international performance standards and requirements, including those of the European Bank for Reconstruction and Development (EBRD PR5: Land Acquisition, Involuntary Resettlement and Economic Displacement) and the International Finance Corporation (IFC PS5: Land Acquisition and Involuntary Resettlement). This RPF has been developed to guide the process of acquisition of land and other assets and displacement of people in accordance with these standards. The main relevant requirements EBRD PR5 are summarised in a table at the end of this RPF.

It should be noted that responsibility for acquisition of the land needed to build the Project will rest with DLH (the BOT Contract employer) and not with ATAS. Under the BOT Contract ATAS's responsibility is only to identify those parcels of land which will require expropriation. However, where needed, ATAS will seek to complement DLH's and other relevant parties' work to reach full compliance with EBRD PR 5/IFC PS5, including contributing to consultation with affected parties and supporting development and implementation of a detailed Resettlement Action Plan based on this framework and on the requirements of PR5.

The requirements of EBRD PR 5 in relation to Government-managed resettlement are presented below.

Private sector responsibilities under government-managed resettlement: There may be cases where land acquisition and resettlement are the responsibility of the host government. In such cases, the client will collaborate with the responsible government agency, to the extent permitted by the agency, to achieve outcomes that are consistent with the objectives of this PR. In addition, where government capacity is limited, the client will play an active role during resettlement planning, implementation and monitoring. The client will prepare a plan (or a framework) that, together with the documents prepared by the responsible government agency, will meet the requirements of this PR. The client may need to include in its plan: (i) a description of the entitlements of displaced persons provided under applicable laws and regulations; (ii) the measures proposed to bridge any gaps between such entitlements and the requirements of this PR; and (iii) the financial and implementation responsibilities of the government agency and/or the client.

It is also relevant to note that a large part of the land needed for the Project is publicly owned land forming the coastal park along Kennedy Caddesi. This land will be transferred to DLH and compensation provided under the terms of legislation governing transfers between public entities. As noted in Chapter 4 of the ESIA Report, the coastal park is an important recreational resource for the city. The reduction in availability of this resource and changes in accessibility, both short term during construction and long term once the road is open, are considered to be significant impacts. Compensation of the general public for loss of this type of asset is not directly addressed by international performance standards but a range of measures to mitigate the impact have been identified and are presented in Chapter 4.

1.2 *PROJECT POLICY*

In developing the Project ATAS will comply with EBRD's PR5 and the following principles:

- Involuntary resettlement and land acquisition will be avoided where feasible, or minimized by exploring all viable alternatives.
- Where involuntary resettlement and land acquisition is unavoidable; resettlement and compensation activities will be planned, developed and executed to give the persons displaced by the Project financial compensation and assistance. Displaced and compensated persons will be meaningfully consulted and will have opportunities to participate in the planning and implementation of resettlement and compensation programs.
- Displaced and compensated persons will be assisted in their efforts to improve their livelihoods and standards of living or at least to restore them, in real terms, to pre-displacement levels or levels prevailing prior to the beginning of the Project implementation.

This policy will apply to all people and businesses affected by:

- the involuntary taking of land and other assets resulting in:
- relocation or loss of shelter;
- loss of assets or access to assets;
- loss of income sources or means of livelihood, whether or not the affected persons must move to another location;

- the involuntary restriction or access to legally designated parks and protected areas results in adverse impacts on the livelihood of the displaced persons.

It will apply to all displaced persons regardless of the total number affected, the severity of the impact and whether or not they have legal title to the land. Particular attention will be paid to the needs of vulnerable groups among those displaced, especially any who are below the poverty line, landless, elderly, women, children, indigenous groups and ethnic minorities, and to displaced persons who may not be protected through Turkish land compensation legislation.

A Resettlement Action Plan will be developed for each affected party and in consultation with them in advance of expropriation taking place and these will be subject to approval by lenders to ensure international standards are met. Removal of assets, displacement or restriction of access will not occur before necessary measures for compensation and resettlement are in place such that the affected party is placed in a position at least equivalent to their situation prior to displacement. Measures will include provision of financial compensation or compensation in-kind and of other assistance prior to, during or after relocation.

Affected parties and their communities will be meaningfully consulted, have the opportunity to participate in the planning process and the process will be fair and transparent. A Grievance Mechanism will be implemented and this will provide affected parties with a mechanism to express any issues and problems that they may have with the expropriation and resettlement process for the Project. Affected parties will also have ultimate recourse to the Courts in accordance with the provisions of Turkish law.

1.3

COMPARISON WITH NATIONAL REQUIREMENTS IN TURKEY

There is an established legal regime for expropriation of land and assets in Turkey. Further details of this are provided in Annex C (Review of Environmental, Health, Safety and Social Legislation and Standards).

In certain aspects international performance standards require measures additional to those required under Turkish Law. A comparison of Turkish law with the requirements of EBRD PR5 is presented in tabular format at the end of this Annex. Please note that this 'gap analysis' is not a legal review of the differences between PR5 and Turkish Law but is intended to highlight the main areas of difference. Areas where this RPF adopts extended requirements are in provision for:

- compensation for all those who have no legal or established rights to occupy or use the affected land (Turkish law extends only to those who have lived in the property or on the land for at least three years before the beginning of the fiscal year in which expropriation is planned);
- assistance to all tenants who are displaced (Turkish law extends only to those who have lived in the property for at least three years (as above) and do not own any registered property);
- compensation for loss of income and livelihoods;
- compensation for loss of access to assets;
- consideration of opportunities for improving the living conditions of those affected;
- prior consultation and consideration of alternatives with the affected parties and development of a specific Resettlement Action Plan for each affected party;
- special consideration of vulnerable groups and indigenous people;
- a grievance mechanism;
- monitoring and final check on completion.

ATAŞ will agree with DLH and other involved parties, including the Municipality, a process that ensures full compliance with lenders' requirements, including EBRD PR5. This process will be sanctioned in a Resettlement Action Plan to be developed prior to commencement of expropriation. The acceptability to lenders of this Resettlement Action Plan will be made a condition of effectiveness to lenders' further involvement.

2 *EXPROPRIATION AND RESETTLEMENT REQUIREMENTS*

2.1 *INTRODUCTION*

This section outlines the resettlement principles and procedures that ATAS will seek to work with DLH to apply to the Eurasia Tunnel Project. ATAS' objective will be that all resettlement is undertaken in accordance with relevant international performance standards, including those requirements which go beyond the requirements under Turkish Law.

2.2 *RESPONSIBILITIES*

Under the BOT Implementation Contract, ATAS is obliged to identify and inform DLH of the expropriation required to enable ATAS to fulfil its obligations for the construction and operation of the Project. All technical and administrative documents relating to expropriation including fully detailed land definitions showing the land borders, ownerships, coordinated plans and expropriation programme will be prepared and submitted by ATAS to DLH in advance of any expropriation works. The expropriation transactions will be undertaken and completed by DLH and all expropriation and related costs will be borne by DLH.

DLH will complete the required expropriation procedures relating to the passage rights, rights of easement and other access rights to expropriated areas and all other areas required for the performance of the Project and related works. These will permit DLH to expropriate the required lands and access rights and DLH will allocate use of and access to these lands to ATAS until the end of their contractual obligations.

ATAS will submit all the required technical and administrative expropriation documents to DLH within 4 months of the Site Hand-Over Date. During this period the Resettlement Action Plan describing the plans for each affected plot will be prepared and agreed. The expropriation procedures will then be finalized by DLH within a 12 month period.

2.3 *EXPROPRIATION AND RESETTLEMENT PROCESS*

The proposed process is described in this section. This is not intended to replace the existing legal mechanisms and procedures in Turkey but to act as a supplementary framework for action alongside existing legal processes to achieve compliance with international standards.

2.3.1 *Identification of Expropriation Requirements*

ATAŞ will survey the area and prepare scaled plans defining all land requiring to be expropriated. The expropriation plans will also define the rights of easement and access required for the project. The plans will be accompanied by identification of the registered property owners. Where owners cannot be initially identified, ATAŞ will comply with the relevant legal procedures in order to make best efforts to identify the owners.

2.3.2 *Establishment of a Cut-Off Date*

Eligibility for compensation or other action will be determined by a cut off date which shall be the date of the census and survey (see below). The survey and census will identify only those affected parties with interests in the land on or before that date to avoid unnecessary and potentially fraudulent claims for compensation.

Persons who encroach on the area after the cut-off date will not be entitled to compensation or any other form of resettlement assistance (this applies in particular to persons informally/illegally occupying land). The cut-off date will be communicated to owners and users of land in the vicinity of the Project by formal notification in writing and in person and will be advised to the local Muhtars by appropriate means. The cut-off date will also be widely publicised during the consultations on the draft ESIA, via leaflets, other publications, the Project website and the Stakeholder Engagement Plan.

Where it is not clear who is using the land, Muhtars and other community leaders (religious, etc) will be asked to help to identify and locate the land users and to let them know about the cut-off date and its significance.

2.3.3 *Census and Inventory*

This stage will identify affected people and economic interests affected by expropriation of the identified land and access rights and provide an inventory of their affected assets. The census will identify all categories of affected people including:

- (i) *Affected Individuals* – An individual who suffers loss of assets or investments, land or property, or access to natural and/or economic resources as a result of the development. This could include individuals owning or using structures on the site, owners of businesses run from the site or people using the land for producing food or other purposes.

- (ii) *Affected Households* – Affected households will include other people affected by occupation of land for the development. A “household” may include:
- men, women and children who live with, and dependent relatives and friends, and tenants of affected individuals;
 - relatives or other vulnerable individuals (e.g. the elderly, the ill, people who cannot participate in production, consumption, or co-residence for cultural reasons) who depend on the household for their daily existence; and
 - relatives who may not eat together but undertake housekeeping and other domestic chores.
- (iii) *Affected businesses* – a business is any economic entity affected by the loss of land or assets including formal enterprises (shops, petrol stations, etc) and informal enterprises such as market and roadside traders;
- (iv) *Affected local community* – A community is affected if the development affects their socio-economic and/or social-cultural relationships or cohesion. For example a development could lead to such changes in economic status that the cultural coherence of a community is eroded.

In particular the census will identify:

- (v) *Vulnerable Individuals and Households* – Vulnerable individuals and households may have different needs from most households or needs unrelated to the amount of land available to them. They could include:
- unmarried women;
 - the elderly;
 - the infirm or ill;
 - ethnic minorities;
 - indigenous peoples; and
 - orphans.

The legal status, socio-economic status and affected assets of each affected party will be determined by survey and preparation of an asset inventory:

- number of persons living on or using the land or property;

- demographic information about the affected people and information about their economic activities;
- the total area of land occupied and its use and the proportion of this that will be expropriated and any effect on the viability of the remaining area;
- number, type, size and condition of buildings to be affected;
- number, type, size, condition and use of other structures to be affected;
- the details of any businesses affected and of their turnover and incomes generated;
- whether property is owned, rented, occupied by customary or traditional rights or illegal/squatter;
- area and type of cultivated land and land in agricultural and related uses, quantities and types of standing crops, trees, beehives and other productive assets, and proportion that this land and assets comprise of the total assets of affected people.

The census and inventory will include all affected people including private landowners, tenants, other holders of rights to land and any person occupying or using the land for shelter, business or other sources of livelihood including squatters and scavengers.

It should also cover people who are not present in the area at the time including seasonal resource users such as herders, fishermen, hunters and gatherers and those who have interdependent economic relations with communities located within the project area that will be adversely affected by resettlement (although these are unlikely to be relevant for this Project). The existence of such populations and economic relationships will be determined through interviews and consultation.

The process of census and inventory will involve a visit to the affected land, interviews with affected people and economic operators and carrying out the census and recording of assets. Any buildings, other structures and other physical assets will be photographed or sketched and all support services identified. The type and quantity of materials used in their construction will be recorded. As no significant resettlement is expected for this project the involvement of a Resettlement Expert is not proposed.

The asset inventory will be completed, shown to the affected person and agreed. It will then be signed and copy given to the affected person as a record. This document will form the basis for the valuation of assets.

2.3.4 *Valuation of Affected Assets and Agreement on Proposed Actions*

The valuation of land and assets to be acquired will be undertaken as required under Turkish Law through a Valuation Council and Expert Council (see Annex C).

The Valuation Council will be led by a valuation expert appointed by DLH and a standardised procedure for asset valuation will be developed for the Eurasia Tunnel Project.

A valuation procedure will ensure that all valuations are in accordance existing legal principles established under the Land Expropriation Law (Law No: 2942, amended in 2001 with Law No: 4650) and Turkish Settlement Law (Law No: 5543) and extended to address additional requirements of PR 5. It will define methods for establishing monetary compensation but also options for other types of action including assistance with finding new accommodation or premises, replacement of lost assets and resettlement of people.

The principles that will be applied are set out below.

Buildings and structures

- Monetary compensation or replacement will be provided for land, dwelling houses and business premises acquired for the project or which must be abandoned.
- Monetary compensation or replacement will be provided for all other useful structures including stalls, storage buildings, sheds, pens, fences, etc.
- The affected person will have the right to salvage material for the building to be lost without reduction in the amount of compensation.
- Compensation will also be provided for buildings damaged by the development.
- Buildings and other structures will be valued at their replacement value, at either the market cost of replacement or the cost of re-building to a similar quality, taking into account the provision of utilities and services, but not taking account of depreciation.
- Rates will be determined by reference to standard schedules of rates for materials established by government and where these are not available to market prices for construction materials in the local area.
- Costs of transporting materials to the new site and construction labour will be taken into account.
- Where illegal occupiers are resettled this will be to a resettlement scheme or to some other location where they may establish legal title.
- Where a dwelling is rented the owner will receive compensation for the loss. The tenant will be provided with assistance in finding an equivalent property, support for renting for an interim period, moving costs and a disturbance allowance.
- If required assistance will be provided with job placement and skills training in the new location.

Businesses

- When a business is displaced the affected person will be provided with monetary

compensation or resettlement.

- If the affected person chooses resettlement an equivalent parcel of land will be provided at an acceptable location and with similar commercial potential and secured tenant status.
- Compensation will include costs of moving and legal and transaction fees.
- A disturbance payment will be made equivalent to net income for an agreed period (based on tax records from the affected or a comparable business).
- Where business premises are rented the owner will receive compensation for the building and the tenant will be provided with assistance in finding an equivalent location, support for renting for a period to allow the business to re-establish, and moving costs.
- Informal street vendors will receive compensation equivalent to 2 months net income based on tax records or information from comparable businesses, assistance in finding a new site to re-establish the business and costs of relocation.

Cultivated Land

- Compensation will be provided for land that is in cultivation or being prepared for cultivation or has been cultivated during the last season, recognizing the investment of labour made by farmers.
- Compensation for cultivated land will be based on a standard value per unit of area taking account average value and a rate for loss of actual or potential crops.
- Where notification of proposed acquisition occurs after a critical date when the grower will no longer have enough time to prepare other land without help (or at all) further assistance will be provided to hire additional labour or mechanical equipment so that replacement land is ready by the sowing date.
- Where a person is prevented from growing food for everyday use compensation will be provided to allow the purchase of food in the market until such time as new crops can be grown. The level of compensation will be based on the average amount a town dweller spends on buying the relevant items per person per year multiplied up for the appropriate number of people and the relevant period.

Trees

- Trees will be valued at the cost of replacement or replacement trees will be provided.
- Compensation will be provided for the value of fruit lost over the period until new trees reach full production and the value of labour that has been invested in the trees lost.
- If trees have to be lopped (branches removed) compensation will be calculated on the basis of the reduction in surface area of the canopy. No compensation will be paid for minor pruning where this is required to avoid damage.
- Shade trees used by the public will be replaced elsewhere in the community.

Other Assets

- If other productive assets are lost or have to be moved (e.g. beehives) the keepers will be compensated for the loss of one season's production plus reasonable costs associated with relocating the hives.

General provisions

- Where the loss forms only part of the assets of the affected person if the remainder of the asset is no longer viable or its value is reduced this will be taken into account in determining the level of compensation.
- Where people require assistance to put themselves back in the position they had before the

expropriation this will be provided in the form of information, advice, access to credit or other means.

- Consideration will be given to opportunities to improve the livelihoods of affected people by training, assistance with finding alternatives jobs, etc.
- Affected people will be consulted to establish the form of compensation they prefer.
- Compensation in kind will include land, buildings, other structures, crops, trees, gardens, and other assets.
- Landless people or illegal occupiers who may not be eligible for compensation for land and fixed assets will be entitled to compensation for any improvements made to the land (such as structures, shelters, crops and trees) and for any loss of access to resources they suffer as a consequence of the development. They may also be offered a new location to live and may gain additional benefit through regularisation of their status when resettled on new land.
- Where losses cannot easily be valued or compensated for in monetary terms (e.g. access to public services, customers, and suppliers; or to fishing, grazing, or forest areas), every attempt will be made to establish access to equivalent and acceptable resources and earning opportunities.
- Where significant time elapses between valuation and payment valuation will take account of inflation.
- An allowance will be made for all moving costs including transport and labour and any legal or other transaction costs.

2.3.5 *Public Consultation and Participation*

Consultation and participation by the affected communities and individuals is an essential element of the land acquisition, compensation and resettlement process. Throughout the process there will be consultation and involvement of affected parties and the a Draft Resettlement Action Plan will be published for comment before the plans are finalised.

Through this affected parties will be made aware of, and understand:

- the plans for development of the property or land;
- their options and rights pertaining to resettlement and compensation;
- technically and economically feasible options for compensation and resettlement;
- the process of and proposed dates for compensation and resettlement;
- the availability of compensation at full replacement cost for loss of assets and services; and
- other assistance available to maintain or improve their living standards.

They will also be made aware of, and have access to a grievance mechanism which they can use if dissatisfied with the process or its outcome and they will be advised of their rights to seek redress through the Courts if the grievance mechanism is not successful in resolving the problem. The Grievance Procedure is described in Section 2.3.8 below and full details are set out in the Project Stakeholder Engagement Plan.

At the earliest possible opportunity, DLH will notify land owners, occupiers and users of the intended development and its likely implications in terms of expropriation and compensation. This will involve formal notification in writing and, if people are illiterate, notification in person. The local Muhtar will be kept informed.

The aim will be to involve affected people and the wider community so that their views and wishes are heard and they have an opportunity to participate in the process of identifying, valuing and deciding on appropriate action to compensate for their lost assets.

Engagement will continue during the processes of census, survey, valuation and agreement on proposed action, and the Resettlement and Compensation Committee will review and confirm the results and arrange meetings with any individuals or households concerned about the process.

2.3.6 *Resettlement Action Plan Preparation*

When the survey census, inventory and valuation of assets is completed and affected parties have agreed to the form of compensation to be provided this will be set out in a Resettlement Action Plan (RAP). This will:

- identify the affected party;
- identify and detail the value of assets;
- present the results of consultation with the affected party about acceptable alternatives;
- describe the compensation and/or other assistance to be provided;
- explain the procedures for grievances;
- explain the arrangements for implementation and monitoring; and
- detail the timetable and cost.

The RAP will be disclosed for comments and submitted to Lenders for approval prior to implementation.

2.3.7 *Implementation*

Once the RAP is agreed expropriation and compensation, relocation or other agreed measures will be implemented. Any necessary contracts will be prepared, compensation payments will be made and any other actions undertaken as set out in the RAP.

Contracts will list all property and land being surrendered, and the type of compensation (cash and/or in-kind) selected, and dates for possession of land, payment of cash compensation and provision of compensation in kind will be defined.

Land and related assets will be taken away and civil works will commence only after compensation has been paid and other agreed measures have been taken.

Consultation with affected parties and the wider community will continue to ensure they are kept informed of what is happening.

2.3.8 *Grievance Process*

Throughout the process of preparing and implementing expropriation, affected parties will have access to a process for expressing dissatisfaction and seeking redress. The grievance process will be run by ATAS and will be in addition to existing legal mechanisms and processes.

The grievance process is designed to meet international performance standards. It will receive and address any concerns about expropriation and compensation that are raised by displaced parties or affected communities.

It will cover grievances concerning the conduct of any aspect of the resettlement process including non-fulfilment of contracts, levels of compensation, or seizure of assets without compensation. It will also be available for raising complaints about any other aspect of the development including concerns from neighbours or other external parties about disturbance during construction, aspects of the design, traffic issues, jobs or impact on local services or amenity.

The grievance process will be administered by ATAS Environmental and Complaints Manager in consultation with DLH.

The procedure for handling grievances will be as follows:

- 1. Identification of grievance** through personal communication with the ESIA team, phone, letter, grievance form, during meeting, or any other

route. Grievance is recorded and classified in the 'Grievance Log' (written and electronic) by the Environment and Complaints Manager ⁽¹⁾ employed by ATAS. The Grievance Log will be held at ATAS's office.

2. **Grievance is formally acknowledged** through a personal meeting, phone call, or letter as appropriate, within 5 working days of submission. If the grievance is not well understood or if additional information is required, clarification will be sought from the complainant during this step.
3. **The Environment and Complaints Manager will inform Senior Management, as appropriate and where required.** The Environment and Complaints Manager will support the Project team in deciding who should deal with the grievance, and determine whether additional support is necessary.
4. **The Environment and Complaints Manager formally delegates grievance** in writing to the relevant department(s)/personnel /contractor for development of an appropriate response.
5. **A response is developed** by the delegated team and Environment and Complaints Manager with input from the Senior Management and others, as necessary. Should the need arise, the Project will consider the establishment of a conflict resolution "committee" for the management of complex grievance issues.
6. **Required actions are implemented** to deal with the issue, and completion of these is recorded on the grievance log;
7. **The response is signed-off** by the appropriate manager The sign-off may be a signature on the grievance log or in correspondence which should be filed with the grievance to indicate agreement, and referenced in the grievance log.

(1) During the ESIA Disclosure phase if any grievances are raised about the process these will be managed by the ESIA Team in consultation with ATAS management as ATAS's Environment and Complaints Handling Manager has yet to be appointed.

8. **The response is communicated to the affected party;** the Environment and Complaints Manager ensures that a suitable approach to communicating the response to the affected party is agreed and implemented.
9. **The response of the complainant is recorded** to help assess whether the grievance is closed or whether further action is needed. The Environment and Complaints Manager will use appropriate communication channels, most likely telephone or face to face meeting, to confirm whether the complainant has understood and is satisfied with the response. The complainant's response will be recorded in the grievance log.
10. **The grievance is closed** with sign-off from the Environment and Complaints Manager, who determines whether the grievance can be closed or whether further attention and action is required. If further attention is required the Environment and Complaints Manager will return to Step 3 to re-assess the grievance and then take appropriate action.

In the event that grievances cannot be resolved informally the Reconciliation Commission established under Turkish Law will investigate and agree expropriation requirements. The Commission will include an expert in expropriation and resettlement under international standards.

2.3.9 *Monitoring and Evaluation*

To ensure that the objectives of the RPF are being met, monitoring will be undertaken to track progress. This will be undertaken by the Environment and Complaints Manager.

A Monitoring Report will be prepared 6-monthly and provided to Lenders on:

- any requirements for involuntary resettlement identified;
- progress with development and implementation of RAPs;
- any grievances and their resolution;
- timely completion of planned resettlement actions.

ATAS will maintain a register of all affected parties.

Comparison of EBRD Performance Requirement 5 and Turkish Expropriation and Resettlement Law

Summary of PR 5 provision	Key Points of Turkish Law	Gaps
Project Design: The client will consider feasible alternative project designs to avoid or at least minimise physical and/or economic displacement, while balancing environmental, social, and financial costs and benefits.	Not Turkish law does not require the avoidance or minimisation of expropriation or resettlement requirements.	Turkish law does not require the avoidance or minimisation of expropriation or resettlement requirements.
<p>Consultation: Following disclosure of all relevant information, the client will consult with affected persons and communities, including host communities and facilitate their early and informed participation in decision-making processes related to resettlement, in accordance with PR 10:</p> <p>Affected persons shall be given the opportunity to participate in the negotiation of the compensation packages, eligibility requirements, resettlement assistance, suitability of proposed resettlement sites and the proposed timing.</p> <p>Special provisions shall apply to consultations which involve Indigenous Peoples (See PR 7) as well as individuals belonging to vulnerable groups.</p>	<p>Turkish Law requires notification of affected parties when the expropriation requirements are known and valuation is complete.</p> <p>There are provisions for nomads in the Settlement Law. The following conditions must be met to be able to get a right ownership for resettlement: Families who did not practice settled agricultural activities; who earn their living by migratory husbandry, without depending on a fixed and permanent dwelling; who migrate inside the country depending on the nature and climatic conditions; who continue this type of living immemorially; who have kinship relations and carry out husbandry activities in groups.</p>	<p>There are no requirements for prior consultation and participation in decision processes or any ongoing consultation. There is also no requirement to monitor outcomes.</p> <p>Apart from the specifying nomads, there appears to be no other provision for indigenous peoples in Turkish Law.</p>
Grievance Mechanism: The grievance mechanism to be established by the client in accordance with PR 10 will be set up as early as possible in the process, consistent with this PR, to receive and address in a timely fashion specific concerns about compensation and relocation that are raised by displaced persons and ./or members of host communities, including a recourse mechanism designed to resolve disputes in an impartial manner. A summary of complaints and the	Grievances are addressed by a Reconciliation Committee appointed by the expropriating authority	There is no independent grievance mechanism in Turkish Law.

Summary of PR 5 provision	Key Points of Turkish Law	Gaps
measures taken to resolve them shall be made public on a regular basis, in accordance with PR 10.		
<p>Resettlement Planning and Implementation: Where involuntary resettlement is unavoidable, the client will engage a suitably qualified specialist to carry out a census and a socio economic baseline assessment within a defined affected area, and assist in the preparation of the Resettlement Action Plan (or Livelihood Restoration Framework).</p> <ul style="list-style-type: none"> The census and socio-economic baseline assessment will identify the persons who will be displaced (fully or partially) by the project, determine who will be eligible for compensation and assistance and, by setting a cut off date, discourage inflow of people who are ineligible for these benefits. In the absence of national government procedures, the date of completion of the census and assets inventory represents the cut off date for eligibility. Information regarding the cut off date will be well documented and disseminated throughout the project area. Seasonal resource users may not be present in the project area during the time of the census and so special consideration should be given to the claims of these communities. 	<p>The authority undertaking the expropriation will prepare (or have developed) scaled plans defining the boundaries, surface area and type of each of the properties or resources to be expropriated. The expropriation plans will also define the rights of easement and access to be expropriated for the project.</p> <p>The authority will define and document the owners of each of the properties or resources being expropriated. Where there is no registration or cadastral records at the title deed and cadastral offices, the authority must apply to the local civil to undertake a land survey of the area so as to identify the property owners.</p> <p>The Settlement Law provides the principles for the settlement of people (i) who have to leave their places as a result of full or partial expropriation of their properties, and (ii) who settled in the expropriation area at least three years before the beginning of the fiscal year in which the settlement planning studies started but who do not own a property.</p> <p>Notification of the intention to execute resettlement will be formally announced by the governorship in writing and posted in public locations and buildings such as municipality offices, schools, and community leader (Muhtar) offices for thirty days. Those who wish to be resettled must formally apply in writing to the governorship within ninety days of the Announcement Period.</p>	<p>Turkish Law does require the expropriation and resettlement requirements to be defined but Turkish Law does not require a socio-economic baseline survey to be undertaken.</p> <p>A cut-off date is established at 3 years prior to the beginning of the fiscal year in which resettlement planning starts.</p>

Summary of PR 5 provision	Key Points of Turkish Law	Gaps
<p>Resettlement Action Plan: The RAP will:</p> <ul style="list-style-type: none"> Be designed to mitigate the negative impacts of displacement, identify potential development benefits and establish the entitlements of all categories of affected persons (including host communities), with particular attention paid to the needs of the poor and the vulnerable. Document all transactions to acquire land rights, as well as compensation measures and relocation activities. Establish procedures to monitor and evaluate the implementation of resettlement plans and take corrective action as necessary. <p>The scope and level of detail of the RAP will vary with the magnitude of displacement and the complexity of the measures required to mitigate adverse impacts. In all cases it will describe the manner in which the objectives of this PR will be achieved.</p> <ul style="list-style-type: none"> State the resettlement objectives. Describe project impacts, identify all people to be displaced and provide an inventory of affected assets Demonstrate that displacement is unavoidable and has been minimised Describe the legal framework for land acquisition and compensation Describe the process of consultation with affected 	<p>People to be resettled will be resettled at places to be indicated by the Ministry of Public Works according to the provisions of the Settlement Law.</p> <p>Resettlement is undertaken in accordance with plans and projects prepared by Ministry of Public Works. Facilities such as electricity, schools, health facilities and infrastructure services in the new settlement areas will be established by the MPW, taking into account the opinions of the relevant institutions and organizations.</p>	<p>Resettlement will be undertaken in accordance with plans and projects prepared by MPW. However these plans do not address all applicable requirements of PR5.</p> <p>There appears to be no provision to mitigate - the negative impacts of displacement, identify development opportunities and establish the entitlements of all categories of affected peoples (including host communities) with particular attention paid to the needs of the poor and vulnerable.</p> <p>Turkish Law does not require any resettlement monitoring.</p> <p>Turkish Law does not require a final check to determine if the resettlement is complete (defined in PR5 as when the adverse impacts of resettlement have been addressed in a manner that is consistent with the objectives stated in the resettlement plan or framework as well as the objectives of this Performance Standard).</p>

Summary of PR 5 provision	Key Points of Turkish Law	Gaps
<p>people regarding acceptable resettlement alternatives, and the level of their participation in the decision-making process</p> <ul style="list-style-type: none"> • Describe the entitlements for all categories of displaced people • Enumerate the rates of compensation for lost assets and demonstrate that these rates are adequate, that is, at least equal to the replacement cost of lost assets • Describe the process for selection, allocation, preparation and land titles relating to housing replacement • Describe relocation assistance to be provided • Provide details of arrangements for improving or, at a minimum, restoring the livelihoods and standards of living of displaced persons • Outline the institutional/organisational responsibility for the implementation of the RAP and procedures for grievance redress • Provide a timetable and budget for the implementation of the RAP • Provide details of arrangements for monitoring, evaluation and reporting • Where the land acquisition does not result in any loss of livelihoods or loss of income, provide fair compensation for the acquired land and any lost assets on such land at their replacement cost. 		

Summary of PR 5 provision	Key Points of Turkish Law	Gaps
<p>The RAP should specifically take into account any individuals or groups that may be disadvantaged or vulnerable. In particular, the RAP should include measures to ensure that vulnerable and 'at-risk' groups 16 and women are not disadvantaged in the resettlement process, are fully informed and aware of their rights, and are able to benefit equally from the resettlement opportunities and benefits, by ensuring in particular that the documentation for ownership or occupancy, such as title deeds and lease agreements, and compensation (including the bank accounts established for payment of compensation) is issued in the names of both spouses or women single head of households, as relevant to each situation, and that other resettlement assistance, such as skills training, access to credit and job opportunities are equally available to women and adapted to their needs. Under circumstances in which national law and tenure systems do not recognise the rights of women to hold or contract in property, provision should be made to ensure, to the extent possible, that the access of women to security of tenure is equivalent to that of men.</p> <p>The RAP should incorporate measures to ensure that displaced people are provided, where possible, with legal assistance to enable them to complete administrative requirements prior to land acquisition and, if needed, to seek redress from the courts.</p> <p>The client should summarise the information contained in the RAP for public disclosure to ensure that affected people understand the compensation procedures and know what to expect at the various stages of the project</p>		

Summary of PR 5 provision	Key Points of Turkish Law	Gaps
<p>(for example, when an offer will be made to them, how long they will have to respond, grievance procedures, legal procedures to be followed if negotiations fail).</p> <p>Monitoring of the RAP will be carried out in accordance with PR 1 and may involve the participation of key stakeholders such as affected communities.</p> <p>Resettlement will be considered complete when the adverse impacts of resettlement have been addressed in a manner that is consistent with the objectives stated in the RAP as well as the objectives of this PR.</p> <p>Depending on the scale of a project's resettlement, it may be appropriate for the client to commission an external completion audit of the RAP to determine that the provisions have been met. The completion audit should be undertaken after all inputs in the RAP – including any developmental initiatives – have been completed, but well before the client's financial commitments to the EBRD have been met.</p> <p>The timing of the audit will enable the client to complete corrective actions, if any, as recommended by the auditors before the project is complete. Based on the outcome of the completion audit, EBRD and the client shall jointly determine if the objectives of this PR have been met. In the majority of cases, the completion of corrective actions identified by the completion audit should bring the client's responsibility for resettlement, compensation, livelihood restoration and development benefits to a close.</p>		

Summary of PR 5 provision	Key Points of Turkish Law	Gaps
<p>Compensation and benefits for displaced persons:</p> <p>When displacement cannot be avoided, the client will offer displaced persons and communities compensation for loss of assets at full replacement cost 17 and other assistance to help them improve or at least restore their standards of living or livelihoods, as provided in this PR. Standards for compensation will be transparent and consistent within the project. Where livelihoods of displaced persons are land-based, or where land is collectively owned, the client will offer land-based compensation, where feasible. The client will make every effort to provide opportunities to displaced persons and communities to derive appropriate development benefits from the project.</p>	<p>Turkish Law does not specifically provide for economic displacement. Article 12 of the Settlement Law provides the principles for the settlement of people (i) who have to leave their places as a result of full or partial expropriation of their properties, and (ii) who settled in the expropriation area at least three years before the beginning of the fiscal year in which the settlement planning studies started but who do not own a property.</p> <p>Settlement Law provides for two types of resettlement:</p> <ul style="list-style-type: none"> i. agricultural resettlement; and ii. non-agricultural resettlement (can be referred to as urban resettlement). <p>However, additional compensation is provided to specific types of peoples who are displaced:</p> <ul style="list-style-type: none"> 1. craftsman and artisans: a workplace and land as income sources and working capital; 2. farmers: agricultural land, necessary agricultural inputs, agricultural structures or in-kind replacement and cash for working and equipment capital; and 3. settlement loans: (collective or individual) to families, following a formal request and approval by MPW. 	<p>Turkish Law does not provide compensation for those who lose their employment or livelihood as a result of expropriation and resettlement.</p>
<p>Displacement: Displaced persons may be classified as persons: (i) who have formal legal rights to the land (including customary and traditional rights recognised under national laws); (ii) who do not have formal legal rights to land at the time of the census, but who have a claim to land that is recognised or recognisable under</p>	<p>The Settlement Law provides compensation for:</p> <ul style="list-style-type: none"> i. those who have to leave their places as a result of full or partial expropriation of their properties, and 	<p>Turkish Law does not recognise the resettlement rights of peoples who do not own the property of land being expropriated, unless they have been living in the property or on the land for at least</p>

Summary of PR 5 provision	Key Points of Turkish Law	Gaps
<p>the national laws; or (iii) who have no recognisable legal right or claim to the land they occupy. The census will establish the status of the displaced persons. Persons moving into the project location after the cut-off date (see paragraph 14) such as opportunistic squatters and recently arrived economic migrants are not entitled to compensation or other assistance. Persons covered under paragraph 31 (i) and (ii) are provided compensation for the land they lose, and other assistance in accordance with paragraphs 34 and 35. Persons covered under paragraph 31 (iii) are not entitled to compensation for land, but they should be compensated for the structures that they own and occupy and for any other improvements to land at full replacement cost. In addition, they should be offered resettlement assistance sufficient to restore their standards of living at a suitable alternative site. Options for resettlement assistance should be generated through consultation with the displaced persons and reflect their priorities and preferences. These provisions apply to persons who are occupying all or part of the project area prior to the cut-off date.</p> <p>Land acquisition for the project may result in the physical displacement of people as well as their economic displacement. As a result, requirements for both physical displacement and economic displacement may apply.</p>	<p>ii. those who settled at the expropriation area at least three years before the beginning of the fiscal year in which the settlement planning studies started and who do not own a property.</p> <p>These people, if they request, are settled at places to be indicated by the Ministry of Public Works according to the provisions of the Settlement Law.</p> <p>There are provisions for nomads in the Settlement Law. The following conditions must be met to establish a right ownership for resettlement: Families who did not practice settled agricultural activities; who earn their living by migratory husbandry, without depending on a fixed and permanent dwelling; who migrate inside the country depending on the nature and climatic conditions; who continue this type of living immemorially; who have kinship relations and carry out husbandry activities in groups.</p>	<p>three years before the beginning of the fiscal year in which the settlement planning studies commence.</p>
<p>Physical Displacement: If people living in the project area must move to another location, the client will: (i) offer displaced persons choices among feasible resettlement options, including adequate replacement housing or cash compensation where appropriate; and (ii) provide relocation assistance suited to the needs of each group of displaced persons, with particular</p>	<p>People eligible for resettlement are relocated to areas designated by the MPW, in accordance with the provisions of the Settlement Law. In cases when the resettlement area is defined or designated, temporary resettlement occurs and free of charge rent assistance (at a defined amount) is provided.</p>	<p>Turkish Laws do not require that alternatives are made available to resettled people (although these people can request that they be resettled within the boundary of their existing village – but this must be approved).</p>

Summary of PR 5 provision	Key Points of Turkish Law	Gaps
<p>attention paid to the needs of the poor and the vulnerable. Alternative housing and/or cash compensation will be made available prior to relocation. New resettlement sites built for displaced persons will offer improved living conditions.</p> <p>In the case of physically displaced persons under paragraph 31 (i) or (ii), the client will offer the choice of replacement property of equal or higher value, with equivalent or better characteristics and advantages of location, or cash compensation at full replacement value where appropriate.</p> <p>In the case of physically displaced persons under paragraph 31 (iii), the client will offer them a choice of options for adequate housing with security of tenure so that they can resettle legally without having to face the risk of forced eviction.</p> <p>Where these displaced persons own and occupy structures, the client will compensate them for the loss of assets other than land, such as dwellings and other improvements to the land, at full replacement cost, provided that these people occupy the project area prior to the cut-off date for eligibility.</p> <p>Compensation in kind will be offered in lieu of cash compensation where feasible, unless the conditions described in footnote 20 can be demonstrated to exist at a level acceptable to the EBRD. This applies to those who have customary and traditional rights recognised under the laws of the country; to claimants who, prior to the cut-off date, do not have formal legal rights to land, but who have a claim to such land or assets, for example, through adverse possession; and, subject to the qualifications noted in paragraph 31, to those who have no recognisable legal right or claim to the land they</p>	<p>Relocation to the new settlement areas is provided free of charge by the State and is undertaken in accordance with plans and projects prepared by MPW.</p> <p>Turkish Law provides in-kind and in cash compensation, in advance of resettlement (or payment in instalments).</p> <p>Households to be resettled may decide whether they are resettled by the State or not. If they request to do so, they have to be resettled at areas designated by MPW. No prior consultation is carried out.</p> <p>Those who do not want to be resettled by the State can formally apply to be resettled within their village boundaries, provided that the application is approved by MPW.</p> <p>Settlement loans (collective or individual) can be requested by families who are being resettled. They must be formally applied for and approved by MPW.</p>	<p>There does not appear to be a requirement to pay “particular attention paid to the needs of the poor and the vulnerable” regarding relocation assistance.</p> <p>There does not appear to be a requirement that resettlement should offer “improved living conditions”, although relevant facilities (schools, etc.) must be provided.</p>

Summary of PR 5 provision	Key Points of Turkish Law	Gaps
<p>occupy.</p> <p>Based on consultation with such displaced persons, the client will provide relocation assistance sufficient for them to restore their standards of living at an adequate alternative site.</p> <p>The client is not required to compensate or assist those who encroach on the project area after the cut-off date.</p> <p>Where communities of Indigenous Peoples are to be physically displaced from their communally held traditional or customary lands under use, the client will meet the applicable requirements of this PR as well as those of PR 7.</p>		
<p>Economic displacement: If a transaction of the types described in paragraph 7 causes loss of income or livelihood, through for example interruption or elimination of a person's access to his/her employment or productive assets, regardless of whether or not the affected people are physically displaced, the client will:</p> <ul style="list-style-type: none"> Promptly compensate economically displaced persons for loss of assets or access to assets at full replacement cost. Where compensation is to be paid by a responsible government agency, the client should collaborate with the agency to help accelerate the payments. Where prompt compensation payments cannot be made due to government policy or practice, the client shall explore resettlement assistance options to help the displaced people with temporary loss of income. Compensate, in cases where land acquisition affects commercial structures, the affected business 	<p>Only legal property or land owners can receive monetary compensation (or an alternative property or land).</p> <p>In cases where there is a tenant in the property being expropriated, the tenant's contract will terminate upon execution of the expropriation. If tenant continues to stay in the property following expropriation, they are obliged to pay monthly rent to the administrative body.</p> <p>If an occupier of property or land to be expropriated has resided in the property in question for least 3 years before the starting date of planning studies, the occupier is eligible to be resettled by the State on condition that the occupier does not own any registered property.</p>	<p>Turkish Laws do not require that alternatives are made available to resettled people (although these people can request that they be resettled within the boundary of their existing village – but this must be approved).</p> <p>There does not appear to be a requirement to pay “particular attention paid to the needs of the poor and the vulnerable” regarding relocation assistance.</p> <p>There does not appear to be a requirement that resettlement should offer “improved living conditions”, although relevant facilities (schools, etc.) must be provided.</p>

Summary of PR 5 provision	Key Points of Turkish Law	Gaps
<p>owner for (i) the cost of re-establishing commercial activities elsewhere, (ii) lost net income during the period of transition, and (iii) the costs of the transfer and reinstallation of the plant, machinery or other equipment, as applicable.</p> <ul style="list-style-type: none"> • Provide replacement property (for example, agricultural or commercial sites) of equal or greater value, or cash compensation at full replacement cost where appropriate, to persons with legal rights or claims to land which are recognised or recognisable under the national laws (see paragraph 31 (i) and (ii)). • Provide assistance that will off-set any loss of a community's commonly held resources. This could take the form of initiatives that enhance the productivity of the remaining resources to which the community has access, in-kind or cash compensation for loss of access or provision of access to alternative sources of the lost resource. • Compensate economically displaced persons who are without legally recognisable claims to land (see paragraph 31 (iii)) for lost assets (such as crops, irrigation infrastructure and other improvements made to the land) other than land, at full replacement cost. The client is not required to compensate or assist opportunistic settlers who encroach on the project area after the cut-off date. • Provide additional targeted assistance (for example, credit facilities, training, or job opportunities) and opportunities to improve or at least restore their income-earning capacity, production levels, and standards of living to economically displaced persons whose livelihoods 		

Summary of PR 5 provision	Key Points of Turkish Law	Gaps
<p>or income levels are adversely affected. In case of businesses experiencing downtime or having to close as a result of project-related displacement, both the owner of the business and employees losing pay or employment are eligible for such assistance.</p> <ul style="list-style-type: none"> • Provide transitional support to economically displaced persons, as necessary, based on a reasonable estimate of the time required to restore their income-earning capacity, production levels, and standards of living. <p>Where communities of Indigenous Peoples are economically displaced (but not relocated) as a result of project-related land acquisition, the client will meet the applicable principles of this PR, as well as those of PR 7.</p>		
<p>Loss of public amenities: Where a project involves the loss of public amenities, the client shall undertake meaningful consultation, in accordance with PR 10, with the locally affected community to identify and agree upon a suitable alternative where possible.</p>	<p>Only legal property or land owners can receive monetary compensation (or an alternative property or land).</p>	<p>Turkish Law does not address compensation and resettlement for peoples who have no recognizable legal right or claim to the land they occupy Unless they have occupied the land for at least three years prior to the fiscal year in which resettlement planning commences.</p> <p>Consultation with these people is not required.</p>

Annex E

Route Alternatives

This Annex presents an extract from the 2005 Feasibility Study undertaken for DLH ⁽¹⁾ relating to the consideration of alternative routes for the tunnel and approach roads. This study compared routes in terms of their length, ease of construction, accessibility and risk, and a high level assessment of their environmental and social impact focussing on cultural heritage and expropriation. The study concluded that Route 4 (the current proposed route) was the preferred alternative. The Turkish text from the feasibility report Section 2.1 is attached and is followed by an English translation.

The Project presented in this ESIA is based on the route selected by that study as presented in the initiation to tender for the BOT contract issued by DLH. As the successful tenderer, ATAS was obliged to submit a proposal which complied with the outline tender design. ATAS has not therefore examined other alternatives to the preferred route during development of the proposals presented in the ESIA Report.

Although good practice in ESIA requires consideration of alternatives a full study of possible alternative has not been undertaken during the assessment studies, in part because of time but also because, as noted above, other alternatives are not in practice open to ATAS to pursue. Nevertheless it is recognised that lenders and other external stakeholders will expect more detailed explanation of the advantages and disadvantages of the preferred route compared to feasible alternatives as part of the assessment.

The ESIA team has therefore undertaken a slightly more detailed comparison of the environmental and social impacts of the five alternative routes and the results are presented in the last part of this Annex.

(1) Nippon Koei Ltd; Karayolu Boğaz Geçiş Tüneli Fizibilite Çalışması; for Ministry of Transport (Türkiye Cumhuriyeti Ulaştırma Bakanlığı'na); 2007

The five route alternatives examined in the feasibility Study are illustrated in Figure E1-1 to E5-3. For each route a plan of the overall line and a plan of the indicative approach routes at the European and Asian sides is presented. It should be noted that these are all indicative corridors and do not represent actual alignment proposals.

The five routes have been appraised for their preface against a number of environmental and social criteria and the results are presented in Table E-1.

Comparison of the routes indicates that, in environmental and social terms, Route 1, an 18 km tunnel running from the outskirts of the city on the European side to the outskirts on the Asian side has the lowest potential for adverse impacts on people and the natural environment. However, because of its length and the depth of the tunnel it has substantially higher cost and technical risk and for this reason was not selected as the preferred route.

Of the other four alternatives, these have varying advantages and disadvantages. The least attractive in environmental and social terms are Routes 3 and 5.

- Route 3 involves widening existing roads over about 9 km, a similar distance to the preferred route (Route 4) but involves road widening through the centre of the old city and the southern shore of the Golden Horn. There is likely to be substantial displacement of existing land uses in the old city, risk of disturbance of historic buildings and buried archaeology and impacts of increased traffic within the historic peninsula.
- Route 5 involves a much shorter length of road widening (only 2.4 km) but this runs through the western part of the old city, within the land walls and the UNESCO World Heritage Site boundary. This, and construction of the tunnel portal within the old city, will have a major potential for impact on historic buildings and buried archaeology and for increased traffic to affect the amenity of protected areas. There is limited land available for construction on both sides of the tunnel.

The last alternative, Route 2, has a similar overall environmental performance to Route 4 but involves a longer tunnel and is therefore more costly. It is also likely to require a greater level of expropriation than Route 4.

In conclusion , high level appraisal of the alternatives considered by DLH supports the selection of Route 4 as the preferred route.

Extract from Feasibility Study Report Section 2.1

Nippon Koei Ltd; Karayolu Boğaz Geçiş Tüneli Fizibilite Çalışması; for Ministry of Transport (Türkiye Cumhuriyeti Ulaştırma Bakanlığı'na); 2007

Karayolu Boğaz Geçiş Tüneli Fizibilite Çalışması

2. BÖLÜM TEMEL MÜHENDİSLİK FAKTÖRLERİ

2.1. GÜZERGAH SEÇİMİ

İstanbul Teknik Üniversitesinden Prof. Dr. Haluk Gerçek'le yapılan görüşmeler ve İstanbul otoyol ve karayolu şebekesindeki incelemelere dayalı olarak Şekil 2.1.1'de gösterildiği gibi geçiş tüneli için beş güzergâh alternatifi belirlenmiştir. Her güzergâh için ayrıntılı arazi çalışması yapılmış ve her güzergâhın ana özellikleri Tablo 2.1.1'de gösterilmiştir. Bu beş güzergâh, temel olarak İstanbul Boğazı üzerindeki iki köprünün konumu, bağlantı yolları ve tarihi miras gözeticilerle seçilmiştir. Seçimin sonucunda Tablo 2.1.1'de gösterilen bu beş alternatiften kabul edilebilecek tek güzergâhın, aşağıda belirtilen avantajları sebebiyle 4 numaralı güzergâh olduğu anlaşılmıştır.

- En kısa tünel mesafesine sahip olması (en az inşaat maliyeti),
- İnşaat için en elverişli doğal şartlara sahip oluşu (hem topografik hem de geometrik açıdan),
- Her iki yakada tünel giriş inşaatı için yeterli alanın mevcut olması ve bu arazilerin çoğunun devlete ait oluşu,
- Avrupa yakasındaki tarihi mirası etkilememesi,
- Bu tünel güzergâhı, Boğaziçi Köprüsü, ve Fatih Sultan Mehmet Köprüleri arasındaki mesafenin hemen hemen aynı olması sebebiyle üçüncü boğaz geçişi için en iyi yerlerden birisi olması.

Tablo 2.1.1 Beş Güzergâh Alternatifinin Özellikleri ve Değerlendirilmesi

Alt. No.	Yeri	Tünel Uzunluğu	Azami Deniz Derinliği	Açıklamalar	İnşaat Maliyet Oranı	Değerlendirme
I	Fatih Sultan Mehmet Köprüsü ile Boğaziçi Köprüsü'nün ortasında	18 km	100 m	<ul style="list-style-type: none">Yeni gelişen şehir merkezi ile Asya yakasını birleştirir.Bu güzergâh üzerinde bir köprü inşası ile ilgili plan mevcuttur ancak arazi görünümüne etkisi ve istismar sebebi ile büyük muhtalef mevcuttur.Denizin en derin noktası 100 metredir. Bu yüzden, beş alternatif arasında en uzun tünel uzunluğuna sahiptir.Derinliğin çok fazla olması sebebiyle inşaat ve bakım riskleri vardır.	2.5	Uygun Değil
II	Taksim'in altından geçiş	8 km	44 m	<ul style="list-style-type: none">İkinci Avrupa hem de Asya yakasındaki tünel girişinde arazi istismar güçlüğü vardır.Tünelin boyu uzun olacaktır.	1.6	Uygun Değil
III	İstanbul-Ankara Karayolu başlangıcı ile Tarihi Yörmedada bulunan Kennedy Caddesi üzerindeki Galata Köprüsü ve Atatürk Köprüsü arasında	5,5 km	43 m	<ul style="list-style-type: none">Diğer beş alternatif arasında en kısa tünel uzunluğuna sahiptir.Avrupa yakası çıkıştaki trafiğin dağıtılması güçlüğü vardır.Ücret toplama işlemlerinin yeri olarak deniz kenarındaki parkın bir kısmının kullanılması gereklidir.Tünel güzergâhının, Galata Köprüsü'nün temellerinden kaçınılması için köprü ana açıklığının ortasından geçirilmesi gerekmektedir.Demiryolu top tüneli ile oluşturulacağı risk mevcuttur.Halle' in 40 m. su derinliği Halle kıyısındaki yol ile tünelin birleşimi en uygun olacaktır.	-	Uygun Değil
IV	İstanbul-Ankara Karayolu başlangıcı ile Tarihi Yörmeda'nın güneyindeki Kennedy Caddesi bağlantısı	5,5 km	52 m	<ul style="list-style-type: none">Diğer beş alternatif göre en kısa tünel uzunluğuna sahiptir.Avrupa yakasında çıkıştaki trafiğin dağıtılması deniz kenarındaki yolun 4 şeridinin 1 km boyunca 6 şeride çıkarılması ile mümkündür.Tünel giriş kamulaştırmaları daha kolaydır.Boğaziçi köprüsünün, Fatih Sultan Mehmet Köprüsüne olan uzaklığı ile bu tünelin olan uzaklığı harita üzerinde hemen hemen aynıdır.Tarihi kültür mirasına olan olumsuz etkiler en az düzeydedir.Ücret toplama işlemlerinin yeri olarak deniz kenarındaki parkın bir kısmının kullanılması gereklidir.	1.0	Kabul edilebilir
V	Asya yakasındaki O-1 yolu ile Avrupa yakasındaki O-3 Yolu bağlantısı	10 km	60 m.	<ul style="list-style-type: none">Bu güzergâh merkezi ring yolu tamamlanmaktadır.Asya yakasındaki tünel girişinde kamulaştırma güçlüğü vardır.Avrupa yakasında inşaat sırasında tarihi eserlerin çıkması ihtimali vardır.	2.0	Uygun Değil



2.2. ŞERİT SAYILARI

Bu çalışmada dört şerit (her iki taraftan 2'şer şerit) önerilmiştir. Avrupa yakasında tünele bağlanacak mevcut yol (Kennedy Caddesi) hali hazırda 4 şeritlidir. Avrupa yakası girişinin yaklaşık 1 km batısındaki Mustafa Kemal Caddesi kavşağından itibaren Kennedy Caddesi 6 şeride genişletilmiştir. Sadece bu 1 km uzunluğundaki 4

Translation of Feasibility Study Report Section 2.1

SECTION 2 FUNDAMENTAL ENGINEERING FACTORS

2.1 ROUTE SELECTION

Five route alternatives were determined for the tunnel passing as presented in Figure 2.1.1 depending on interviews with Prof. Dr. Haluk Gerçek from Istanbul Technical University and observations of Istanbul highway and road network. Detailed site studies were undertaken for each route and main specifications of these are given in Table 2.1.1. These five routes were selected mainly regarding the locations of two bridges across Bosphorus, access roads and historical heritage. The only acceptable alternative was determined to be route no. 4 between the five alternatives as a result of its advantages listed below:

- The shortest tunnel length (lowest construction cost);
- The most available natural conditions for construction;
- Sufficient spaces for tunnel entrance construction are available at both sides and these areas are mostly owned by state;
- The historical heritage on European side is not affected;
- One of the best locations for third Bosphorus passing, regarding that the distances between this tunnel route, Bosphorus Bridge and Fatih Sultan Mehmet Bridge are nearly similar.

Table 2.1.1 Specifications and Evaluation for Five Alternative Routes

Alt. No.	Location	Tunnel Length	Max. Sea Depth	Considerations	Constr. Cost Rate	Evaluation
1	At the middle of Fatih Sultan Mehmet and Bosphorus Bridges	18 km	100 m	Connects the new developing city centre to the Asian side. There is an existing plan for bridge construction at this route, which is highly criticized for impact on the silhouette of the area and expropriations. Since the highest sea depth is 100 m., tunnel length is the longest one among the five alternatives. There are construction and maintenance risks as a result of the very high depth.	2,5	Not acceptable

Alt. No.	Location	Tunnel Length	Max. Sea Depth	Considerations	Consrt. Cost Rate	Evaluation
2	Passing beneath Taksim	8 km	44 m	Both tunnel entrances on the European and Asian sides have expropriation difficulties. Long tunnel length.	1,6	Not acceptable
3	Across Istanbul-Ankara Highway starting point and between Galata Bridge on Kennedy Street and Ataturk Bridge on Historical Peninsula	5,5 km	52 m	The shortest tunnel length among five alternatives. Traffic distribution difficulties on the exit on the European side. A part of the park along the shoreline has to be used for toll gates. To avoid Galata Bridge foundations, tunnel route should be passed at the middle of main bridge gap. There is a risk for Railway tube tunnel. 40 m of sea depth of Halic blocks the joining of the tunnel and the road at Halic shore.	-	Not acceptable
4	Across Istanbul-Ankara Highway starting point and Kennedy Street connection to the east of Historical Peninsula	5,5 km	52 m	The shortest tunnel length among five alternatives. The traffic distribution of the exit on the European side is possible by widening the road on the shore line from four lanes to six lanes along 1 km. Relatively simple expropriations for tunnel entrances. The distance from Bosphorus Bridge to this tunnel route is very similar to the distance from Bosphorus Bridge to the Fatih Sultan Mehmet Bridge on the map. Negative impacts on the historical heritage are at the lowest level. A part of the park along the shoreline has to be used for toll gates.	1,0	Acceptable
5	The connection of	10 km	60 m	This routes completes the central	2,0	Not

Alt. No.	Location	Tunnel Length	Max. Sea Depth	Considerations	Constr. Cost Rate	Evaluation
	O-1 Highway on the Asian side and O-3 Highway on the European side.			ring way. There are expropriation difficulties on the entrance on the Asian side. Encountering historical artefacts during construction is possible.		acceptable

Retrospective Environmental Appraisal of Feasibility Study Route Options

The colours indicate a relative assessment of the expected effects of the route options related to the criterion:

	<i>Lowest impact</i>
	<i>Intermediate impact</i>
	<i>Highest impact</i>

Criterion	Route Options				
	1	2	3	4	5
Potential for disturbance from new road construction and/or road widening on approaches to the tunnel (based on length of new and widened roads)	No road widening.	Total length of road widening 1.0. km	Total length of road widening 9.1 km	Total length of road widening 9.2 km	Total length of road widening 2.4 km
Displacement of existing land uses along approach roads	Displacement of existing land use is not expected.	Displaced land uses are mosque, cemetery and commercial premises on the approach roads of the Asian side.	The approach roads follow existing road corridors on both sides. On the European side, displaced land uses are mainly parks, residents,	The approach roads follow existing road corridors. Displaced land uses are mainly existing roadside land, park and open space and a small number of	Displaced land uses are public buildings, schools, mosques and residents on the approach road on the European side.

Criterion	Route Options				
	1	2	3	4	5
			public buildings and commercial premises.	commercial and residential premises.	
Proximity to and likely level of disturbance of residential areas during construction and operation of the approach roads and tunnel.	14km of the tunnel passes beneath residential areas at both sides, with potential for impacts from settlement and ground borne noise and vibration.	<p>The Asian approach road passes through a dense commercial area, including a cemetery and a mosque.</p> <p>A part of the tunnel is passing beneath residential areas (Uskudar and Besiktas) on both sides, with potential for impacts from settlement and ground borne noise and vibration.</p>	<p>The European approach road passes through the old city and traffic will affect densely populated mixed residential, commercial and tourist area (5.3 km).</p> <p>The Asian approach passes through a low density urban area with mixed residential, industrial and commercial land uses (3.8 km).</p>	<p>The European approach road passes outside the old city walls and is separated from a densely populated mixed residential, commercial, tourist area by the sea walls and the railway (5.4km).</p> <p>The Asian approach passes through a low density urban area with mixed residential, industrial and commercial land uses (3.8km)</p>	The European approach road passes through densely populated mixed residential and commercial area including public buildings, mosques and schools (2.4 km).

Criterion	Route Options				
	1	2	3	4	5
Proximity to and likely level of disturbance of other land uses during construction and operation of approach roads	Some green land likely to be affected during construction work at the Asian tunnel access.	No land use other than residential and commercial identified:	One branch of the European approach roads runs along the route of an existing road along the shore of the Golden Horn. There is likely to be an increase in disturbance for visitors to the shoreline.	The European approach runs along the route of an existing road through the coastal park. There is likely to be an increase in disturbance for park users from traffic.	No land use other than residential and commercial identified:
Proximity to and likely level of disturbance of historic sites during construction and operation of approach roads and tunnel.	Route is not close to any historic sites.	Tunnel passes beneath land close to Dolmabahce Palace, with potential for impacts from settlement and ground borne noise and vibration.	Road widening through the old town is very likely to impact on historic structures. Traffic is likely to affect the amenity of the old city and the World Heritage Site together with the Fatih and Eminonu "Protected Urban Sites".	The European approach runs mainly through reclaimed land outside the sea walls and the old city. It does not impact directly on any historical structures or the World Heritage Site (although it will place the Marble Tower between the two carriageways of the approach road).	European approach road crosses the historical peninsula and tunnel portal would be located within the old city. Traffic is likely to affect the amenity of the old city and the World Heritage Site together with the Fatih "Protected Urban Site".
Likely extent of below ground structures in original ground and risk of disturbing buried archaeology	There is a small risk of encountering buried archaeology at both sides due to the long tunnel length under	There is a risk of encountering buried archaeology under Besiktas and Uskudar.	Significant potential for disturbance of archaeology within historic peninsula during construction of	There is a risk of encountering buried archaeology where structures extend below the reclaimed fill on the	Significant potential for disturbance of archaeology within historic peninsula during construction of

Criterion	Route Options				
	1	2	3	4	5
	land (18 km).		approach road.	European side	approach road.
Likely extent of above ground structures, impact on skyline of old city and historic buildings	There is no direct interaction with the skyline of the old city.	There is no direct interaction with the skyline of the old city.	There is no direct interaction with the skyline of the old city from the sea. Views from the north will be affected.	Structures will generally lie below the skyline of the old city as viewed from the sea and effects on the silhouette are not expected.	There is no direct interaction with the skyline of the old city.
Proximity to and likely level of disturbance of sites of importance for nature conservation during construction and operation of approach roads	There are no sites of known nature conservation importance in the Project area. The tunnel runs beneath the Bosphorus Important Bird Area but there should be no impact on the marine environment or ecology.	There are no sites of known nature conservation importance in the Project area. The tunnel runs beneath the Bosphorus Important Bird Area but there should be no impact on the marine environment or ecology.	There are no sites of known nature conservation importance in the Project area. The tunnel runs beneath the Bosphorus Important Bird Area but there should be no impact on the marine environment or ecology.	There are no sites of known nature conservation importance in the Project area. The tunnel runs beneath the Bosphorus Important Bird Area but there should be no impact on the marine environment or ecology.	There are no sites of known nature conservation importance in the Project area. The tunnel runs beneath the Bosphorus Important Bird Area but there should be no impact on the marine environment or ecology.
Potential for increase in pressure for development around the approach roads to the tunnel	Project may encourage development in green space around European access junction	There is no space for additional development on either side	There is no space for additional development on either side	There is no space for additional development around the European approach. The introduction of the new crossing may facilitate development in the east of Istanbul I accordance	There is no space for additional development on either side

Criterion	Route Options				
	1	2	3	4	5
				with the City Development Plan.	
Availability of land for construction	There is land available for construction on undeveloped and vacant sites.	There is limited land available for construction on both sides.	There is land available for construction on open land near the Golden Horn, and adjacent to the Asian ventilation shaft and approach road. However, land would be very restricted for the length of the approach road that crosses the old city.	There is land available for construction on land in the coastal park near the European approach, and adjacent to the Asian ventilation shaft and approach road.	There is limited land available for construction on both sides.
Waste generation	Highest spoil generation from 18 km tunnel	Spoil generation from 8 km tunnel	Spoil generation from 5.5 km tunnel	Spoil generation from 5.5 km tunnel	Spoil generation from 10 km tunnel

Annex F

Scoping Findings

Scoping Findings: Summary of Potential Significant Effects of the Project and Comments from Scoping Consultees

Impact topic	Sources of potential impact	Initial assessment plus <i>Comments from Consultees</i>	Mitigation Options plus <i>Response to Comments</i>	Proposed assessment approach plus <i>Response to Comments</i>
Displacement of Existing Land Uses, Property and People	Permanent and temporary land acquisition for development of the project	<p>Widening of the road and construction of other permanent works will permanently require land some of which currently used for other purposes. Land will also be temporarily required for construction compounds and associated activities. Present information suggests that land need for the project is predominately within the existing road corridor. Other land to be acquired is in areas mainly owned by the municipality and currently used as public open space and for formal and informal recreation. In a small number of cases, land under formal or informal commercial or residential use may be acquired by the project.</p> <p><i>IFC Scoping Comment: The widening of the road may affect the accessibility of existing land uses such as the parks, playgrounds, market and restaurants in the European side coastal park and the Yenikapi Ferry Terminal.</i></p>	<p>Permanent displacement of existing land uses and the people engaged in them can be mitigated by resettlement and compensation in accordance with IFC Performance Standards and World Bank Operational Policy. Temporary displacement may lead to permanent displacement and should be mitigated in the same manner. Alternatively temporary relocation may be possible with the land being restored to its previous use and users returning on completion of construction. A Resettlement Policy Framework will be developed as part of the ESMP setting out how resettlement for permanent acquisition will be managed and mitigated. Plans will be redeveloped for restoration or resettlement of land uses temporarily displaced as a result of construction.</p>	<p>The ESIA will identify and quantify all permanent and temporary (<i>ie</i> construction) land acquisition required for the project. Parties affected will be identified and impacts on their welfare and livelihoods and on the amenity of individuals and the community will be assessed.</p> <p><i>Impacts on accessibility to existing land uses will also be investigated and measures to maintain access at the same or better than current levels will be identified where possible.</i></p>
Resources & Waste	Materials required for the construction of the scheme and waste generated during the construction	<p>Construction of the project will require substantial quantities of materials and energy. Sourcing of these may lead to impacts elsewhere.</p> <p>The project will generate a large quantity of surplus spoil and other construction wastes.</p>	<p>Materials should be sourced with careful attention to sustainable procurement principles and from as close as possible to the project so as to minimise impacts of production and transport. Options include use of recycled materials and materials certified as being from “green” or Low Carbon</p>	<p>The ESIA will provide estimates of the quantities of materials used and requiring disposal. It will investigate options for minimising waste and will define the principles and practices to be adopted in sourcing materials and</p>

Impact topic	Sources of potential impact	Initial assessment plus <i>Comments from Consultees</i>	Mitigation Options plus <i>Response to Comments</i>	Proposed assessment approach plus <i>Response to Comments</i>
	process	<p>Where these cannot be re-used or recycled they will require disposal with the potential for impacts during transport and at the disposal site.</p> <p><i>Ministry of Environment and Forestry, General Directorate of Nature Protection and National Parks Comment on PID : Transport and storage of excavated soils may have negative effects.</i></p>	<p>Sources etc.</p> <p>The project should seek to identify beneficial uses or opportunities for recycling construction spoil and other wastes wherever possible.</p> <p>The final sites for disposal of spoil and other wastes will be selected and operated by the Municipality but the project should ensure that appropriate methods are used for disposal. Routes for transport of spoil should be selected taking into account the potential for impact on people using and living on the affected roads.</p> <p><i>Appropriate measures will be proposed regarding storage of soils to minimize erosion from the soil heaps. Measures to prevent soil/dust emissions from trucks during transportation of soil will be implemented.</i></p>	disposing of waste.
Geology, Soils and Contaminated land	Excavation works during construction including off-site quarrying	<p>Excavation works have the potential to affect geological sites and features of importance to science and to cause land instability.</p> <p>The nature of the areas to be affected by the project (mainly reclaimed or previously developed land or strata beneath the seabed of the Bosphorus) means that there is low likelihood of encountering any features of geological importance. The works are not expected to cause any risk of land instability.</p>		The ESIA Baseline studies will confirm whether there are any geological features of importance or any risks associated with land instability by reference to existing data and previous studies.
	Construction activity on soils	If construction was to take place on soils used for productive purposes (eg agriculture) it could cause physical damage through	A plan to prevent pollution during construction and to prevent and respond to accidents involving hazardous loads during operation should be	The ESIA will identify the risks to soils from construction and operation and the ESMP will include

Impact topic	Sources of potential impact	Initial assessment plus <i>Comments from Consultees</i>	Mitigation Options plus <i>Response to Comments</i>	Proposed assessment approach plus <i>Response to Comments</i>
		compaction. The open land affected by the project is mainly public open space or commercial use and no adverse impacts are therefore expected to occur. There is also a risk of spills of oils, fuel or other materials causing contamination of soils during construction and as a result of accidents involving hazardous loads during operation.	prepared.	appropriate measures to minimise these risks
	Excavations and other construction activity disturbing previously contaminated land	The construction of the project will take place on lands that may have been or are currently used for purposes that could give rise to contamination. The infill in reclaimed areas from the 1940s and 60s may also contain contamination. If contaminated soils are disturbed they may present risks to workers, neighbouring land uses or the aquatic environment	Risks from contamination should be addressed through adoption of good construction site management, and procedures for dealing with contaminated materials when encountered including treatment and disposal of contaminated soils. Contaminated material should be remediated or disposed of in an appropriately licensed disposal site.	The ESIA will review historic land uses along the corridor and identify any risks of encountering contaminated ground. The ESMP will set out appropriate measures for managing any contaminated soil.
The Water Environment	Changes in surface water features	Initial information indicates that there are no significant surface water features within the site that could be affected by the project (eg by removal or diversion) Significant impacts are not therefore expected to occur.		The ESIA will confirm the location of any surface waters in the vicinity of the project and identify any uses of water that could be at risk from pollution.
	Changes in ground water	The project is expected to result in minor changes to the water table in the vicinity of excavations. Initial information indicates that there are no groundwater resources used for potable or other supply and adverse impacts are not therefore expected to occur. Deep excavations are expected to require limited		The ESIA will confirm the distribution of groundwater in the vicinity of the project and identify any uses of groundwater that could be at risk from pollution.

Impact topic	Sources of potential impact	Initial assessment plus <i>Comments from Consultees</i>	Mitigation Options plus <i>Response to Comments</i>	Proposed assessment approach plus <i>Response to Comments</i>
		dewatering and the impacts of this are discussed below.		
	Discharge of site run off and sewage; discharges from dewatering of sub-surface construction sites; accidental spills	There is a risk of coastal and ground water pollution from leaks and spills of hydrocarbons and other materials, poor management of construction runoff, and poor management of dewatering effluents from excavations below the water table.	Impacts on surface water and groundwater can be minimised by adoption of good construction site practices such as careful storage and maintenance of all plant and equipment and use of bunded hydrocarbon storage tanks. Dewatering effluents can be managed and planned such that it does not contaminate the local hydrological system. It is proposed that all dewatering effluent shall be treated in a separate wastewater treatment system and then returned to the sea. There will be no construction works that will take place within of adjacent to the Bosphorus.	The ESIA will identify risks of water pollution from construction and the ESMP will set out good site practices that will be adopted to minimise these risks
	Discharge of effluents from TBM slurry treatment	Tunnel boring will generate a slurry containing soils and rock, drilling mud (bentonite) and chemical additives. This material will be treated to recover useful materials but the treatment plant will create an effluent requiring disposal. Discharge to surface waters raises the potential for water pollution of not appropriately controlled.	Impacts will be mitigated by selection of an effective slurry treatment process and discharge of treated effluent to an appropriate location where water resources, aquatic ecology and fish will not be adversely affected.	The ESIA will describe the proposed method for treatment and discharge and assess the impacts. Appropriate requirements will be incorporated in the ESMP.
	Run-off and other discharges during operation of the tunnel and approach roads	During operation routine deposits from vehicles (from tyre and brake erosion and air emissions) can cause contamination of the road surface which can be carried into water in road drainage. Risks of contamination can also arise from accidents involving spillage of vehicle fuel and hazardous loads. There will also be sewage discharges from the	Contaminated runoff can be managed and mitigated through the use of appropriately designed drainage system ensuring that no untreated surface runoff is discharged to surface or groundwater. Use of petrol and oil interceptors shall also manage this potential impact. Impacts from sewage can be mitigated by	The ESIA will identify risks of water pollution from operation and the ESMP will set out sustainable drainage proposals and emergency plans to minimise these risks.

Impact topic	Sources of potential impact	Initial assessment plus <i>Comments from Consultees</i>	Mitigation Options plus <i>Response to Comments</i>	Proposed assessment approach plus <i>Response to Comments</i>
		operations building.	discharge to the municipal sewerage system	
	Flooding	The project is not expected to cause any change in flood risk in the area however, it will itself be at possible risk from flooding during extreme rainfall with potential consequences for users of the tunnel.	The project should be designed to withstand risks from expected flooding caused by rainfall and emergency arrangements should address plans in the vent of flooding. The design should take into account the effects of sea level rise cause by climate change.	The ESIA and ESMP will explain how the project has been designed to minimise risks of flooding and the emergency plans that will operate if flooding does take place.
Air Quality & Climatic Factors	Generation of construction dust from earthmoving and excavation; handling, transport and storage of friable materials; construction activities on unsealed ground (eg vehicle movements).	Various construction activities can impact on workers and neighbouring sensitive receptors around construction sites and access roads through the generation of dust. Examples of sensitive receptors near the site are expected to include residential populations, workers in nearby businesses, users of community facilities and recreational areas, and cultural, historic and protected heritage structures. Impacts from dust can range from soiling of surfaces to potential health impacts from inhalation. Dust can also damage flora and fauna and impact on water quality.	These impacts can typically be mitigated by adoption of good construction site practices such as covering of friable materials, vehicle speed limits, damping down dusty surfaces in dry weather, sheeting of trucks, etc.	The ESIA will identify receptors around the construction area that could be sensitive to dust deposition or inhalation and the ESMP will set out good site management practices to minimise dust.
	Exhaust emissions from construction traffic and construction plant and equipment and changes in patterns of local traffic emissions	Emissions will arise from construction traffic delivering materials to the construction sites, removing spoil and other wastes, moving material and equipment around the construction sites and transporting workers to and from the sites. Emissions from these vehicles have the potential to cause adverse impacts on local air quality both in the vicinity of the construction sites and along routes used by this traffic.	Impacts from construction emissions can be mitigated by careful selection and maintenance of equipment and vehicles, routing of construction traffic away from sensitive area as far as possible and training of operators and drivers, preventing construction traffic from using roads through the historic peninsula or small residential streets will be important.	The ESIA will identify construction sites, transport routes and levels of construction traffic and estimate effects on air quality in key locations where there are sensitive receptors. The ESMP will set out measures to be adopted to minimise emissions during construction.

Impact topic	Sources of potential impact	Initial assessment plus <i>Comments from Consultees</i>	Mitigation Options plus <i>Response to Comments</i>	Proposed assessment approach plus <i>Response to Comments</i>
	Exhaust emissions from traffic during operation of the road and tunnel	<p>The operation of the scheme will result in changes in traffic flows and related air emission along the approach roads and on the wider road network. There will also be point-source emissions from the tunnel portals and ventilation shafts. These emissions will affect local air quality, with possible impacts on human health and welfare, fauna and flora, and materials around affected roads. There may also be wider changes in regional air quality. In general overall traffic is likely to increase as a result of the project although there are likely to be increases in some areas and decreases in others. There will also be changes in traffic speeds and congestion with resulting impacts on air quality.</p> <p><i>IFC Scoping comment: In urban automobile tunnel projects with special circumstances previously carried out e.g. in Australia, Italy, Norway, Japan, exhaust emissions (NOx, SPM) from tunnel ventilation were significant.</i></p> <p><i>DSI comment on PID: Air quality within in the tunnel may be poor due to exhaust gas emissions of the traffic.</i></p>	<p>The impact of emissions from the tunnel can be mitigated by careful design of the ventilation system including the location, form and operation of the vent shafts. Heavy vehicles (trucks and buses) will not be permitted to use the tunnel avoiding emissions from these sources.</p> <p>Emissions from traffic are more difficult to mitigate and the key will be to ensure that traffic flows do not cause air quality standards to be exceeded along the approach roads or elsewhere on the wider network. Maintenance of fuel-efficient vehicle speeds and avoidance of congestion by good traffic management will be important. Speeds will be limited to 80km/hr reducing the risk of emissions from high speeds.</p> <p><i>If required the ventilation system will be designed to include additional exhaust gas treatment as applied in other urban tunnel projects in Australia, Italy, Norway or Japan.</i></p> <p><i>Air quality within the tunnel will be monitored.</i></p>	<p>Prediction of changes in air quality around roads where traffic flows change as result of the project will be made using available traffic data using the LaGrange-Type Model, Austal. Assessments will be made for the future situation with and without the project and comparisons made with current conditions. The assessment will also consider regional emissions and the potential for changes in regional emissions as a result of changes in congestion and journey times (possibly benefits).</p> <p><i>The assessment will determine whether additional exhaust gas treatment is required to prevent unacceptable impacts on air quality</i></p>
	Traffic emissions	An increase in overall traffic as a result of the project has the potential to cause an increase in	See above	The ESIA will provide an estimate of regional CO2 emissions based on

Impact topic	Sources of potential impact	Initial assessment plus <i>Comments from Consultees</i>	Mitigation Options plus <i>Response to Comments</i>	Proposed assessment approach plus <i>Response to Comments</i>
	during operation	<p>regional greenhouse gas emissions from the transport sector with consequences for climate change.</p> <p><i>IFC Scoping comment: Changes in congestion and journey times may possibly result in benefits related to the overall amount of GHG emissions. Also the intensity of the total CO2 emissions from the region may improve due to expected reduction of overall automobile traffic congestion.</i></p>		<p>traffic estimates with and without the tunnel and compare these with any relevant national or international targets for emissions reductions.</p> <p><i>The assessment will consider changes in in regional GHG emissions as a result of changes in congestion and journey times.</i></p>
Noise & Vibration	<p>Noise and vibration from:</p> <ul style="list-style-type: none"> • movement of construction vehicles on and offsite • operation of construction equipment • piling or blasting; • diversion of existing local traffic during construction 	<p>Noise and vibration during construction poses a potential risk to the welfare and health of workers and sensitive neighbouring receptors such as residential areas, schools, hospitals, tourist sites and recreation areas. In addition, vibration can disturb people and cause damage to buildings. Historic structures can be at particular risk of vibration as a result of their age and structural condition.</p> <p>The current proposals envisage the need for piling in some locations but no blasting is expected to be needed except possibly in the NATM section beneath the existing road on the Asian side. Blasting would only be required if exceptional hard ground is found during tunnelling and sensitive receptors should not be affected in this area.</p>	<p>Noise and vibration impacts from construction can typically be mitigated by adoption of good construction site practices including use of worker PPE, limiting working hours close to sensitive receptors, using specific mitigation on plant and equipment (acoustic shielding etc.), avoiding 'noisy' activities where possible, and careful management of the construction site and operations. Noise and vibration from piling can be avoided by using bored rather than driven piling where conditions allow.</p> <p>Vibration can be reduced by locating heavy machinery away from sensitive receptors and structures.</p> <p>If blasting proves to be required it will be important to ensure that neighbours are informed</p>	<p>The ESIA will identify sensitive receptors and provide a qualitative assessment of the risks from construction noise and vibration. The ESMP will set out measures to be taken to minimise these risks including limits of working times and informing people about exceptionally noisy activities which cannot be avoided.</p>

Impact topic	Sources of potential impact	Initial assessment plus <i>Comments from Consultees</i>	Mitigation Options plus <i>Response to Comments</i>	Proposed assessment approach plus <i>Response to Comments</i>
			to avoid any concerns.	
	Noise and vibration from operational traffic	<p>The operation of the scheme will result in changes in traffic flows and related noise emission along the approach roads and on the wider road network. There will also be point-source emissions from the tunnel portals and ventilation shafts including higher levels of ventilation noise during emergency evaluation of smoke. These emissions will affect local noise levels, with possible impacts on amenity and human health and welfare.</p> <p>Vibration from traffic can cause adverse effects on sensitive receptors within about 40 metres of roads. Initial information indicates that there are few if any receptors identified within this distance.</p>	Mitigation measures including use of low noise surfaces and noise barriers can be identified to ensure standards for acceptable levels of noise and vibration are met.	<p>The noise model Soundplan will be used to model noise from operational traffic in future years with and without the project. The ESMP will detail required noise mitigation. (See however, footnote to Air Quality and Climatic Factors section)</p> <p>Sensitive receptors that could be affected by traffic vibration will be identified and appropriate measures taken to protect them from vibration.</p>
Biodiversity & Nature Conservation	Temporary and permanent land take for the project.	Land will be occupied permanently and temporarily during construction requiring clearance of existing vegetation and possible removal of habitats and species of nature conservation interest. Initial information indicates that affected areas are largely occupied by amenity grassland and planting around the road and neighbouring buildings. There appears to be little if any natural or semi-natural habitat in affected areas and hence low potential for impacts on resources of nature conservation interest. There are no areas protected for nature conservation reasons in the vicinity of the project.	Loss of existing amenity planting and trees can be mitigated by improving the remaining planting areas and planting replacement trees.	A level 1 survey will be undertaken to identify types of habitat in the affected area and to confirm whether any resources of nature conservation interest are affected. The ESMP will include proposals for landscaping the project including improvements to adjacent planting and replacement of trees.

Impact topic	Sources of potential impact	Initial assessment plus <i>Comments from Consultees</i>	Mitigation Options plus <i>Response to Comments</i>	Proposed assessment approach plus <i>Response to Comments</i>
		There are substantial numbers of trees planted in the park area along the European shore and some of these will need to be felled.		
	Disturbance from construction noise, dust, runoff etc and from operational traffic	As noted above it is understood that there are no habitats or species of nature conservation importance along the route and significant impacts are therefore not predicted to arise.		The absence of important habitats and species along the route will be confirmed and if appropriate an assessment of impacts on any that are present will be undertaken and mitigation measures identified in the ESMP.
	<i>Discharges to and disturbance of marine environment</i>	<i>Ministry of Environment and Forestry, General Directorate of Nature Protection and National Parks Comment on PID: The sea ecosystem and biodiversity should be evaluated incl. consideration of planned and on-going projects at the Istanbul Strait</i>	<i>The Eurasia Tunnel will be a bored tunnel located at least 25 m below the seabed and constructed from access points set back from the coast. The tunnel itself will not therefore have any direct impact on the marine environment</i>	
Archaeological & Built Heritage	Excavation works during construction	Construction of the project may result in disturbing known archaeological features and the discovery of as yet unknown archaeological finds, especially on the European side of the scheme. The majority of the project will be constructed in infill material on land reclaimed since the 1940's. As a result the likelihood of disturbing any archaeological artefacts is low, It is possible that in some areas excavations will extend below the recent fill to either historical fill or original ground and there is the possibility of encountering archaeology in these areas.	The ESIA process will involve further archaeological work (details in the next column) along the entire scheme. If significant finds are located consideration will be given to modifying the route. Where areas of potential cannot be avoided plans will be developed, in consultation with the relevant authorities, for intrusive investigation and if necessary rescue excavation. A chance find procedure in accordance with IFC Performance Standards will be implemented during the construction of the project.	A desk-based study will be completed to identify areas of known or potential archaeological interest that may be disturbed. Where appropriate these will be subject to further non-intrusive investigation, in order to determine the impact on important resources. A detailed plan for mitigation of impacts will be set out in the ESMP.
	Movement of	Construction traffic, general construction	Impacts can be minimised by measures to prevent	The ESIA will identify particular

Impact topic	Sources of potential impact	Initial assessment plus <i>Comments from Consultees</i>	Mitigation Options plus <i>Response to Comments</i>	Proposed assessment approach plus <i>Response to Comments</i>
	construction traffic and operation of equipment and construction activities close to historic features during construction and diversion of local traffic onto alternative routes	activities and operation of equipment may cause accidental damage to nearby structures of historic interest or cause harm through vibration or dust deposition. In addition the presence of a major construction site in proximity to the historic peninsula on the European side and to several historic buildings on the Asian side could affect their setting and cultural integrity setting through changes in views into and from sites, noise and dust, increased traffic, diversion of local traffic onto unsuitable roads and general disturbance.	traffic and equipment working in locations where historic buildings could be damaged and by controlling traffic into historic areas through construction traffic management. The adoption of good construction practices will minimise the impacts of noise, vibration and air emissions site. Consideration should be given to the impact on views when planning the layout of construction operations and the location of tall plant and equipment (cranes etc). The protection of vulnerable structures close to the works can be assisted by prior inspection and recording of their existing condition so that any damage caused by the works can be quickly identified and remedied.	structures or areas at risk of physical damage or adverse impact on their setting or integrity. The ESMP will set out the measures that will be taken to minimise these risks.
	Increase in operational traffic flows in the vicinity of historic sites	The project may result in changes in the volume of traffic travelling to and through the historic areas on both sides of the Bosphorus with the potential for direct (eg structural damage from accidents or vibration) and indirect impacts (eg soiling erosion of building facades by air emissions) on historic buildings and wider impacts on the setting and integrity of the historic areas of the city including the World Heritage Site.	An Operational Traffic Management Plan will ensure that traffic into and through historic areas does not affect individual features or the wider area.	Flows of traffic into and through historic areas will be considered during the ESIA and proposed operational traffic management measures will be set out in the ESMP. (See however, footnote to Air Quality and Climatic Factors section)
Landscape and Visual Impacts	Presence of above ground structures during construction and operation.	Permanent above-ground structures such as the ventilation shafts, toll gates, operations building and pedestrian overbridges all have the potential to impact on the landscape setting and views of historic areas and	Impacts on the silhouette of the old city have been reduced by keeping the height of the ventilation shaft to 5 metres and designing belowground-intersections and U-turns throughout the route. Landscape impacts can be further mitigated by	The ESIA will include a qualitative assessment if impacts on key views of the city, with specific reference to cultural heritage and views of historic buildings. The ESMP will set out

Impact topic	Sources of potential impact	Initial assessment plus <i>Comments from Consultees</i>	Mitigation Options plus <i>Response to Comments</i>	Proposed assessment approach plus <i>Response to Comments</i>
		<p>buildings. Temporary structures during construction such as cranes and towers may also have an adverse effect.</p> <p><i>Ministry of Environment and Forestry, General Directorate of Nature Protection and National Parks Cooment on PID: suggest to consider also international best practice with regard to cultural and visual impacts.</i></p>	careful architectural design and treatment of features such as the shafts, tunnel portals, toll plaza and operations building. Landscaping can also be used to enhance the appearance of junctions and screen them from nearby areas such as the coastal park.	<p>principles to be followed in the architectural design and landscape treatment of the works and identify any specific measures to mitigate particular adverse effects..</p> <p><i>The assessment will consider relevant international guidelines such as the European Landscape Convention</i></p>
Socio Economic Impacts	Employment of construction workforce and supply of goods and materials to the project	<p>Construction of the project will create a large number of jobs for construction workers during the 4 year construction period will offer opportunities for jobs for local people. Some of these opportunities may be available to and taken up by local people bringing economic benefits to households and the local economy.</p> <p>The project will also require large quantities of materials for construction and other services to supply the project (office services, catering, accommodation, etc). To the extent that these can be provided locally they will benefit the local community and economy.</p>	At present of the order of 95% of the construction workforce are expected to be recruited locally offering significant benefits during the construction period. Employment and procurement policies which seek to maximise opportunities for local people and businesses and to train workers in new skills to improve their present and future employability can help to retain benefits in the locality.	The ESIA will provide an estimate of the types and level of construction employment offered by the project and the nature and financial value of required goods and services. These will be compared with data on local unemployment and skills and economic activity to establish the potential for local take-up. The ESMP will set out policies and practices to maximise local opportunities.
	Permanent employment and supply of goods and services	There will be a small number of people employed and goods and services needed to operate the tunnel and its associated facilities. These workers may come from the local community and will in any event become permanent residents bringing a small level of		

Impact topic	Sources of potential impact	Initial assessment plus <i>Comments from Consultees</i>	Mitigation Options plus <i>Response to Comments</i>	Proposed assessment approach plus <i>Response to Comments</i>
		economic benefit.		
	Changes in journey times and accessibility around the city	<p>Major transport investments are typically designed to provide positive economic benefits in terms of net value to the economy in improved accessibility to places of workplaces, shops and leisure facilities, reduced journey times and improved reliability, reductions in accidents and removal of barriers to economic development in industry, commerce and tourism. Initial predictions indicate that journey times from Europe to Asia will reduce from up to 100 minutes today to as little as 15 minutes with the project suggesting there are likely to be substantial benefits in terms of accessibility and reliability. The replacement of at-grade pedestrian crossings with overbridges and the improvement in traffic conditions should also lead to reduced accidents.</p> <p><i>IFC Scoping Comment: There is a risk that increases in traffic approaching the tunnel will lead to congestion on existing roads with adverse impacts on other travellers. Development of the tunnel could also affect the future of the existing ferry services. It is understood that the Harem-Sirkeci vehicle ferry running on a route just to the north of the tunnel will close but that passenger ferry routes will remain as at present.</i></p>		<p>The ESIA will draw upon the results of the parallel transportation studies being undertaken for the project to highlight the economic value of the project and any particular areas of changes in accessibility. (See however, footnote to Air Quality and Climatic Factors section regarding timing of studies).</p> <p><i>The assessment will draw on the findings of the Transport Studies to identify whether congestion on existing roads is likely to become a problem with operation of the tunnel.</i></p> <p><i>The assessment will also consider the potential for the tunnel to affect the viability of passenger ferry services.</i></p>
Community	Construction and	The project has the potential to impact on	Impacts of severance will be mitigated by	The ESIA will consider the impact of

Impact topic	Sources of potential impact	Initial assessment plus <i>Comments from Consultees</i>	Mitigation Options plus <i>Response to Comments</i>	Proposed assessment approach plus <i>Response to Comments</i>
Health and Safety	operation of the project	<p>neighbouring communities through changes in noise and air quality, visual impact and changes in accessibility (see above), but also by causing severance between people's homes and places they want to visit (such as the coastal park).</p> <p>There is likely to be a loss of community facilities in the coastal park with reduction in its areas and relation of restaurants and sports facilities.</p> <p><i>IFC Scoping comment: Negative effects on community health and safety may occur during construction due to poor construction site management.</i></p>	<p>provision of replacement crossing points. These will be segregated from traffic and present lower risk of accidents. Improvements in the coastal park and relocation of facilities displaced by the works offer the opportunity for providing alternative and possibly improved community facilities.</p> <p><i>An environmental, health and safety management system will be established during construction to manage negative effects on community health and safety. Regular inspections and monitoring will be carried to ensure adherence to the management system.</i></p>	the project on severance and identify measures to be taken to avoid severance and enhance accessibility to facilities.
	Import of construction workers from outside the area	Where major construction projects involve the introduction of large numbers of foreign workers this can lead to increased local incidence of diseases such as HIV/ AIDS, to increases in crime, prostitution and other antisocial behaviour and to pressures on local services (health, leisure, police, etc)	<p>As noted above a large proportion of the workforce is expected to be local reducing the risks of adverse impacts from in-migration.</p> <p>If there is any significant influx of non-local workers the project will apply strict worker management policies to ensure that any residual risks are minimised. These could include measures such as health screening for migrant workers, provision of onsite health, welfare and leisure facilities at workcamps, increased security, restricted camps etc.</p>	The ESIA will provide information on recruitment and policies to manage the risk of adverse impact from workers on local communities

Impact topic	Sources of potential impact	Initial assessment plus <i>Comments from Consultees</i>	Mitigation Options plus <i>Response to Comments</i>	Proposed assessment approach plus <i>Response to Comments</i>
			Measures might also be required to ensure that excessive burdens are not placed on local services to the detriment of the local community.	
	Housing of construction workers	It is usual for a significant proportion of workers on major construction projects to be housed in one or more compounds. The siting of these can present risks of disturbance for neighbours and cause direct impacts on current land uses and other resources on and around sites.	Careful attention will be given to the requirement for and location of construction camps. The recruitment of local workers should reduce the need for special housing but where this is required provision of facilities and services to reduce pressures on local community facilities can be of assistance.	The ESIA will describe proposals for worker housing.
	Unforeseen events during construction and operation such as accidents or natural disasters (earthquake, flooding)	Unforeseen events such as flooding, fire and explosion, and seismic events present risks to the health and safety of users of the tunnel and people in neighbouring areas <i>IFC Scoping Comment: Concern has been raised about design of emergency evacuation arrangements in the tunnel. Fire and explosion should also be considered as unforeseen events. Security risks should also be addressed.</i>	The roads and tunnel will be designed to comply with strict standards for protection of the structures and users from natural hazards, fire and explosion. Emergency Prevention and Response Plans will be developed for construction and operation covering all potential hazards. <i>Besides natural hazards, also accidents, fire and explosion as well as security risks will be considered in the Emergency Prevention and Response Plans.</i>	The ESIA will identify risks from accidents and natural hazards, in particular reviewing the evidence of seismic and other natural risks affecting the project, and the measures that have been taken in design to minimise these risks. The ESMP will set out the plans for emergency prevention and response <i>The ESIA will consider hazards related to fire or explosion events. The assessment will describe the current plans for emergency evacuation and report the standards to which these are being designed.</i>
Working Conditions	Construction and operation of the project	Major construction projects can present high levels of risks to workers from small incidents to major accidents. Tunnelling, major	An HSE management systems has been developed for the project in accordance with international good practice.	The ESIA will identify risks to worker health and safety and describe the HSE management System

Impact topic	Sources of potential impact	Initial assessment plus <i>Comments from Consultees</i>	Mitigation Options plus <i>Response to Comments</i>	Proposed assessment approach plus <i>Response to Comments</i>
		<p>excavations, and working in the vicinity of active roads and the sea are all high risk activities which will require special attention.</p> <p>Where large numbers of workers are imported or local people are employed without due regard to conditions employment, adverse impacts can arise from inappropriate employment practices including child labour, discrimination, unfair wages, etc. The employment of the majority of workers locally in accordance with Turkish labour law should avoid these risks.</p> <p><i>IFC Scoping Comment: The assessment should also address international standards.</i></p>	<p><i>Human Resources policy and procedures will be in place in accordance with international standards on construction work and IFC's Performance Standard 2 about labour conditions. The policy and procedures will apply to both direct and indirect (sub-contractor) employees. The requirements will be clearly set within the contractor and sub-contractor agreements. Effective inspection mechanisms will be established to ensure compliance.</i></p>	<p><i>Human resources management policy and procedures will be reviewed in accordance with the IFC's standards on labour conditions and other relevant international standards</i></p>

Annex G

G1:Project Information Document
G2:Summary of Results of Stakeholder
Consultations during Preparation of
ESIA

Annex G-1

Project Information Document in
Turkish and English
Cover Letter in Turkish and English
Erratum in Turkish and English

İSTANBUL AVRASYA TÜNEL PROJESİ ÇEVRESEL VE SOSYAL ETKİ DEĞERLENDİRMESİ HUSUSUNDA HAZIRLIK GÖRÜŞMESİ

ERM ve ELC Grup

tarafından

TKJV

adına hazırlanmıştır.

Ekim 2009

GİRİŞ

İstanbul Boğazı altında inşaa edilecek karayolu tüneli olan Avrasya Tünelinin tasarımı ve inşaatı için T. C. Ulaştırma Bakanlığı, Demiryollar, Limanlar ve Hava meydanları İnşaatı Genel Müdürlüğü (DLH) tarafından, TKJV (Türk - Kore İşbirliği) seçilmiştir.

Proje, Avrupa yakasındaki tarihi yarımada'nın güney ucundaki sahil yolundan başlayarak Asya yakasında Selimiye'de bitecek olup İstanbul Boğazının altından geçecek 5.4 km'lik iki katlı bir yol ile Kennedy Caddesi ve D100-Ankara Devlet karayolu boyunca tünele bağlanan yaklaşım yollarının genişletilmesini kapsamaktadır.

Aşağıda görüldüğü gibi toplam 14.6 km'lik bir güzergahı kapsamaktadır. Proje, TKJV tarafından tasarım ve inşaa edilecektir. Yol genişletme çalışmaları tamamlandığında yaklaşım yollarının işletilmesi İstanbul Büyükşehir Belediyesine devredilecektir. TKJV, T.C. Ulaştırma Bakanlığı ile yapılan sözleşme kapsamında tüneli yaklaşık 26 yıl işletecektir.

Tünel 3 bölümden oluşmaktadır. Avrupa Yakasındaki girişlerden aç kapa tüneline giren bölüm tünelin ilk bölümüdür. Tünelin İstanbul Boğazının altında kalan 2. ve ana bölümü tünel delme makinası (TBM) ile oluşturulacak ve Asya yakasındaki son bölüm ise Yeni Avusturya Tünel Metodu (NATM) ile inşaa edilecektir. Tünelin TBM bölümü deniz yatağının en az 25 m altına yerleştirilecektir. Tünelin her iki ucunda, yangın durumunda oluşacak dumanın çıkışını sağlayan acil durum pervaneleriyle donatılmış 5 m. yüksekliğinde iki adet havalandırma bacası bulunacaktır. Havalandırma bacalarının yüksekliği tarihi yarımada'nın silüeti üzerindeki görsel etkileri engellemek için olabildiğince kısa tutulmuştur. Tünel boyunca uluslararası

standartlarla uyumlu olarak tasarlanmış acil çıkış düzenlemelerini içeren acil durum sistemleri temin edilecektir.



Avrupa yakasındaki yaklaşım yollarının düzenlenmesi mevcut yolun güney kısmında Kennedy Caddesinin altından (6) sekiz (8) şeride genişletilmesi ile Florya - Sirkeci sahil yolu üzerinde Kazlı Çeşme'den başlayacaktır. Asya tarafında ise Göztepe kavşağına kadar D100 karayolu sekiz (8) şerite çıkarılacaktır.

Mevcut tüm kavşak ve kesişmeler seviyelendirilmiş alt geçitlerle yer değiştirecek ve yaya geçişleri üst geçitler ile sağlanacaktır. Denizde yapılacak veya mevcut kıyı şeridinde herhangi bir çalışma ihtiyacı olmayacak, tünel ve alt geçitler için hafredilen malzeme Büyükşehir Belediyesi tarafından gösterilen resmi olan bir hafriyat depolama alanına götürülecektir. Yaklaşım yollarının çalışmaları tarihi şehir duvarlarına veya tarihi şehre direkt doğrudan herhangi bir etki yaratmayacak şekilde tasarlanmıştır.

Proje Neden Teklif Edilmiştir?

İstanbul, ulaşımında önemli miktarda altyapı gelişimine ve yatırıma ihtiyaç duymaktadır. Son yıllardaki hızlı nüfus artışı ve ekonomik gelişim ile birlikte özel araç sayısında ciddi bir artış görülmüş ve bun durum mevcut ulaşım sisteminde kayda değer bir baskı oluşturmıştır. Araba ile yolculuktaki artış ile birlikte şehrin topografik engelleri ve yoğun kentsel yapısı; şehirde yaşayan ve çalışanlara işe gidiş gelişlerinde ve park konusunda ciddi sorunlar yaşatmaktadır.

En yaygın şehir-içi ulaşım türü özel araç olup, seyahatlerin %6.6'sı raylı sistemle ve %3.4'u vapurla (deniz yoluyla) yapılmakta iken %90'ı özel araçla yapılmaktadır. Günlük bazda şehirde 1.3 milyondan fazla araç sirkülasyonu vardır. Sonuç olarak İstanbul Boğazı üzerindeki iki köprünün hem tasarım kapasitelerinin oldukça üstünde işletilmesi hem de her gün uzun saatler süren trafik tıkanıklıklarının oluşması, iki kıta arasındaki bağlantıyı önemli bir sorun haline getirmiştir.

Avrasya Tüneli boğazda 3. bir geçiş sağlayarak, yolculara ve iş dünyasına kayda değer bir fayda getirmeyi ve bu baskıyı hafifletmeyi planlamıştır. Yeni güzergah, Kazlıçeşme ve Göztepe arasındaki yaklaşık 100 dakikalık mesafeyi 15 dakikaya düşürmektedir. Böylece yakıt tüketiminde, sera gazları ve diğer emisyonlarda, gürültü kirliliğinde genel bir azalma ve erişimin kolaylaşması seyahat sürelerinin azalması artan güvenilirlik ile önemli ekonomik faydalar sağlanabilir.

Teklif Güzergahındaki Mevcut Arazi Kullanımları

Avrupa yakasındaki mevcut sahil yolunda, Kennedy Caddesi 6 şeritte (her yönde 2 şerit ve 2 yön seçimli şerit) ve 5 kavşağa sahiptir. Trafik, trafik lambaları ile kontrol edilmekte olup, iki tane yaya üst geçidi ve birkaç yaya geçidi ile yolun her iki tarafında yaya kaldırımları vardır. Mevcut yol, 1940 yılından itibaren yapılan deniz ıslahı çalışmaları nedeni ile genel olarak tarihi şehir duvarlarının dışındaki araziden geçmektedir. Mevcut yolun tarihi şehir duvarlarından geçtiği 2 yer, Kızılirma caddesi ve şehir duvarlarının bittiği güney uçtur. Yol güzergahı yakınlarında pek çok tarihi yer bulunmaktadır. Bunların arasında İstanbul'un tarihi alanları içinde de yer alan UNOSCO dünya mirası yerleri olan dört merkez; Sultanahmet Arkeoloji parkı, Süleymaniye Camii, Zeyrek Camii ve Theodosias'un Şehir Duvarları da bulunmaktadır.

Kennedy Caddesinin güneyindeki açık alan, rekreasyon alanı olarak kullanılmaktadır. Bu alanların içinde oyun bahçeleri, spor ve egzersiz alanları

ve bahçeler bulunmaktadır. Burada aynı zamanda balık hali ve popüler restaurantların bulunduğu bir liman sahası yer almaktadır.

Tünelin NATM ile inşaa edilecek bölümünün bulunduğu Asya yakasında liman deposu ve askeri arazi (Kışla ve Hastane) yer almaktadır. Mevcut yaklaşım yolunun her iki taraftaki arazi ticaret ve yerleşim amaçlı kullanılmaktadır. Buradaki önemli binalar arasında; Medipol Hastanesi, Doğuş Üniversitesi, Haydarpaşa Tren Garı ve Konteyner Terminali bulunmaktadır. Haydarpaşa civarındaki birkaç bina Osmanlı döneminden kalan ve tarihi önemi olan yapılardır.

Çevresel ve Sosyal Etki Değerlendirmesi Nedir?

TKJV, proje için yapılacak Çevresel ve Sosyal Etki Değerlendirmesini (ESIA) yapmak üzere ERM ve ELC Grup'un uluslararası ve yerel çevre danışmanlarından oluşmuş bir ekip tayin etmiştir.

Çevresel ve Sosyal Etki Değerlendirmesi'nde (ESIA), projenin çevre ve toplum üzerindeki etkilerini tanımlayacak ve değerlendirecek ve genelde azaltıcı önlem olarak bilinen, olumsuz etkileri engelleyecek veya azaltacak önlemlerin alınabileceği ve fayda sağlanabilecek yerleri belirleyecektir. Çevresel ve Sosyal Etki Değerlendirme çalışması, gelişmeyi destekleyen fonları sağlayan birçok uluslararası finans kurumunun gerekliliklerini karşılayacak şekilde yürütülmektedir. Bu değerlendirme, Uluslararası Finans Kurumu'nun (IFC) Sosyal ve Çevre Performans Standartlarla uyumlu olacak ve azaltıcı önlemler, Uluslararası Finans Kurumu'nun Çevre Sağlık ve Güvenlik ilkeleriyle uygun olarak geliştirilecektir.

Değerlendirme çalışmalarının sonucunda Çevresel ve Sosyal Değerlendirme Raporu hazırlanacak ve bu rapor, projenin Çevre ve Sosyal Yönetim Planı (ESMP) ile birlikte yayınlanacaktır. Çevre ve Sosyal Yönetim Planı (ESMP), Çevresel ve Sosyal Etki Değerlendirme süreci boyunca geliştirilmiş tüm azaltıcı önlemleri tanımlayacak ve detaylı tasarım, inşaat ve işletme aşamalarında bunların nasıl uygulanacağını ortaya koyacaktır.

Bu dokümanlar, konuyla ilgilenen tüm kurumların ya da şahısların yorum yapabilmesi için açık tutulacaktır. Tüm yorumlar ve teklifler, Çevre ve Sosyal İdare Planını (ESMP) sonuçlandırılırken dikkate alınacaktır. Sonrasında TKJV, ESMP'de ortaya konan tüm önlemlerin geliştirme süreci boyunca yürütülmesinden sorumlu olacaktır.

Çevresel ve Sosyal Etki Değerlendirmesi yeni başlamış olup 2010 yılı ilkbaharı başında tamamlanacaktır. Aynı zamanda bu proje bilgi dokümanı bir çok farklı kuruma Çevresel ve Sosyal Etki Değerlendirme (ESIA) çalışmalarının

tüm ilgili konuları içermesini sağlamak, dikkate değer tüm çevresel ve sosyal konularda yorumlarını almak ve bunların değerlendirme içinde araştırılması için gönderilmektedir.

Demiryollar, Limanlar ve Hava meydanları İnşaatı Genel Müdürlüğü'ne, (DHL) T.C. Çevre ve Orman Bakanlığı tarafından proje için ÇED ile ilgili ulusal mevzuat kapsamında, 2007 yılında sunulmuş Proje Tanıtım Dosyasına dayanarak "2008 ÇED Yönetmeliği"ne göre ÇED raporu gerekmediği yönünde görüş bildirilmiştir.

Bu nedenle, Çevre ve Sosyal Etki Değerlendirmesi süreci, Çevre ve Orman Bakanlığı'nca resmi bir değerlendirmeye tabi değildir. Ancak, Çevresel ve Sosyal Etki Değerlendirme çalışmasında, Uluslararası Finans Kurumu (IFC) kılavuzları ve diğer kılavuzlarla birlikte uygulanabilir tüm Türk Çevre Mevzuatı dikkate alınacaktır.

Çevresel ve Sosyal Etki Değerlendirmesi (ESIA) Hangi Konuları Kapsamaktadır?

İstanbul gibi tarihi ve yoğun nüfuslu bir şehirde büyük bir ulaşım altyapı projesinin geliştirilmesi, önemli derecede olumsuz çevresel ve sosyal tepki potansiyelinin oluşmasının yanında bazı faydaları da ortaya çıkarmaktadır. TKJV ve ESIA ekibi tarafından yürütülmüş başlangıç çalışmaları aşağıda belirtilen bazı ana konuları şimdiden tanımlamıştır;

- 1- Bölgesel trafik emisyonlarındaki azalmalardan kaynaklanan çevresel faydalar ve azalan yolculuk maliyeti ve zamanı, gelişmiş erişilebilirlik ve düşük trafik kaza oranlarından kaynaklanan sosyo-ekonomik faydalar,
- 2- İnşaat aşamasında iş gücü istihdamı ve ekonomik hareketliliğin oluşması,
- 3- Trafik hareketleri, emisyonları ve gürültü yapısındaki değişiklikler nedeniyle tarihi alanlar ve tarihi şehrin genel yerleşimi üzerinde oluşacak etkiler,
- 4- İnşaat çalışmaları ve artan titreşimden dolayı tarihi yapılarda meydana gelebilecek olan fiziksel hasar riskleri,
- 5- Henüz keşfedilmemiş arkeolojik kalıntılara zarar verilmesi riski,
- 6- Yüksek yapılar nedeniyle tarihi yarımadanın silüetinde oluşacak zarar,
- 7- Yerel trafik emisyonları ve gürültü nedeni ile çevre sakinleri ve ziyaretçiler üzerindeki etkiler,

- 8- İnşaat süresince ortaya çıkan toz, gürültü, titreşim kirliliği, trafik ve bunlardan kaynaklanan rahatsızlık,
- 9- Hafriyat malzemesinin taşınması ve bertarafından kaynaklanan etkiler,
- 10- Mevcut arazi kullanımının ve mülkiyetin değişmesi ve yeniden yerleştirme sırasında tazminat ödeme şartları,
- 11- İnşaat sırasındaki iş gücü ile iş sağlığı ve güvenliğinin yönetimi,
- 12- Deprem riski, sel, yangın ve araç kazaları dahil olmak üzere acil durum ve kaza yönetimi.

Ayrı bir trafik değerlendirmesi, Çevresel ve Sosyal Etki Değerlendirmesi için trafik tahmin bilgilerini sağlayacak, uluslararası uzman bir şirket olan Jacobs tarafından yapılmaktadır.

Halkın Katılımı

Halkın katılımı, Çevresel ve Sosyal Etki Değerlendirme sürecinin önemli bir bölümüdür. Yukarıda belirtildiği üzere, Çevresel ve Sosyal Etki Değerlendirme (ESIA) Raporu ve Çevre ve Sosyal İdare Planı (ESMP) 2010 ilkbaharının başında tamamlanacak olup halkın katılımı ve eleştirisine uygun olarak sunulacaktır. Dokümanlar incelenmek üzere, İstanbul'da belirli bölgelerde basılı olarak ve internette bulunacaktır. Çevresel ve Sosyal Etki Değerlendirmesinin ana sonuçlarının açıklandığı ve yorum ve tartışmaya olanak sunan en azından 1 adet halkın katılımı toplantısı yapılacaktır. Bu halkın katılımı süreci, yerel gazetelerde ilan yolu ile duyurulacaktır.

Nasıl Yardımcı Olabilirsiniz?

Çevresel ve Sosyal Etki Değerlendirme (ESIA) sürecinin başladığını bildirmek ve görüşlerinizi almak için bu dokümanı tarafınıza sunuyoruz.

Özellikle, ana sorunlar ve bunların nasıl değerlendirileceğine dair görüşlerinizi almayı amaçlamaktayız.

Yorumlarınızı iletmek veya herhangi bir bilgiye ulaşmak isterseniz, lütfen aşağıda yer alan e-mail ya da posta adresinden iletişime geçiniz:

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PRELIMINARY CONSULTATION ON THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE EURASIA TUNNEL PROJECT, ISTANBUL PROJECT INFORMATION DOCUMENT

Prepared by

Environmental Resources Management and ELC Group

on behalf of

Turkey Korean Joint Venture

October 2009

Introduction

TKJV (Turkish Korean Joint Venture) has been selected by the Turkish Ministry of Transport General Directorate of Railways, Seaports and Airport Construction (Demiryollar Limanlar ve Hava Meydaniari İnşaatı Genel Müdürlüğü DLH) to design and build a new road tunnel beneath the Bosphorus in Istanbul – the Eurasia Tunnel.

The project will involve the construction of a 5.4 km twin deck tunnel beneath the Bosphorus running from Sultanahmet on the European side to Selimiye on the Asian side, together with widening of approach roads to the tunnel along Kennedy Caddesi and the D100 Istanbul-Ankara State Highway.

The route will cover a total distance of 14.6 km as illustrated below. The project will be designed and built by TKJV. Once widening is complete the approach roads will be transferred to and operated by the Municipality. TKJV will then continue to operate the tunnel for approximately 26 years under contract with the Ministry of Transport.

The tunnel will be in three sections. A toll plaza on the European side will lead into a short stretch of cut and cover tunnel. The main tunnel will be created using a tunnel boring machine (TBM) and the final section on the Asian side will be built using the New Austrian Tunnelling Method (NATM). The TBM section under the Bosphorus will be located at least 25 metres below the seabed. There will be two 5 metre high ventilation shafts at each end of the tunnel, which will be equipped with emergency fans to remove smoke in the event of fire. The height of the shafts has been kept as low as possible to avoid affecting the valued silhouette of the historical peninsula. Emergency

systems will be provided throughout the tunnel including escape arrangements designed in accordance with international standards.



The improvements to the approach roads will begin at Kazlıçeşme on the Florya-Sirkeci Coast Road, with widening of Kennedy Caddesi from 6 to 8 lanes on the south side of the existing road. On the Asian side the D100 will be increased to 8 lanes as far as the Göztepe Intersection.

All existing intersections and junctions will be replaced by grade-separated underpasses and pedestrian crossings will be provided by footbridges. There will be no requirements for works in the sea or on the existing shoreline and material excavated for the tunnel and underpasses will all be disposed of on land at an official facility approved by the Municipality. The approach road works have been designed to avoid any direct effect on the historic city walls or within the historic city.

Why is the project being proposed?

Istanbul requires a substantial investment and improvement in its transportation infrastructure. Together with rapid population growth and economic development in recent years, there has been a significant increase in

car ownership, placing considerable pressure on the existing transport system. Growth in car travel, together with the difficult topography and dense urban structure of the city; result in severe commuting and parking problems for the residential and working populations of Istanbul. The most common inner-city means of transportation is the private car, with 90% of trips being made by car compared to 6.6% by rail and 3.4% by ferries. There are more than 1.3 million vehicles circulating in the city on a daily basis. As a result the connection between the two continents has become a major issue with the two bridges crossing the Bosphorus both operating well above their design capacity and experiencing severe congestion over long periods every day.

The Eurasia Tunnel is planned to alleviate this pressure, providing a third road crossing of the Bosphorus and bringing considerable benefit to travellers and businesses in Istanbul. The new route will reduce the journey between Kazlıçeşme and Göztepe from approximately 100 minutes to 15 minutes. This should lead to an overall reduction in fuel consumption, greenhouse gases and other emissions, and noise, and provide substantial economic benefits in improved accessibility, reduced journey times and improved reliability.

What are current land uses along the proposed alignment?

The existing coastal road on the European side, Kennedy Caddesi, has 6 lanes (2 lanes in each direction and 2 bidirectional lanes) with 5 at-grade intersections. Traffic is controlled by signals. There are 2 pedestrian overpasses and several crosswalks with sidewalks on each side of the road. The road runs mostly through land outside the historic city walls that has been reclaimed from the sea since the 1940s. It crosses the city walls in two locations, at Kizilelma Caddesi and at the southern end of the land walls where the Marble Tower is south of the road. Many historic sites are located nearby including the four core areas of the UNESCO “Historic Areas of Istanbul” World Heritage Site: the Sultanahmet Archaeological Park, the Sulemaniye and Zeyrek Mosques and the Land Walls of Theodosius.

The land south of Kennedy Caddesi is mainly open space used for formal and informal recreation, including playgrounds, sports and exercise facilities, and gardens. There are several harbours, a government fish market and an area of popular restaurants.

On the Asian side, the NATM tunnel as far as Haydarpaşa is located below port storage and military areas (barracks, hospitals). Land on either side of the approach road is mainly in commercial and residential use. Important buildings include the Medipol Hospital, Dogus University and the Haydarpaşa Railway Station and Container Terminal. Several buildings

around Haydarpaşa date from the Ottoman period and are of historical interest.

What is the Environmental and Social Impact Assessment?

TKJV has commissioned a team of international and local environmental consultants from Environmental Resources Management (ERM) and ELC Group to undertake an Environmental and Social Impact Assessment (ESIA) for the project ⁽¹⁾. The ESIA will identify and assess the effects of the project on the environment and the community and identify where measures can be taken to avoid or reduce any adverse effects and to provide benefits, commonly referred to as “mitigation measures”. The ESIA is being undertaken to meet the requirements of a number of international financial institutions who will be providing funds to support the development. It will comply with international standards including the International Finance Corporation (IFC) *Performance Standards on Social & Environmental Sustainability*, and mitigation will be developed in accordance with the IFC’s Environmental, Health and Safety Guidelines.

At the end of the assessment studies an ESIA Report will be prepared and published together with an Environmental and Social Management Plan (ESMP) for the project. The ESMP will identify all the mitigation measures developed through the ESIA process and set out how these will be implemented during the detailed design, construction and operation of the project.

These documents will both be made widely available for comment by any interested organisations or individuals and all comments will be taken into account in finalising the proposals and the ESMP. TKJV will then be responsible for ensuring that all the measures set out in the ESMP are carried out as the development proceeds.

The ESIA has just started and it is expected that the work will be completed early in Spring 2010. In the meantime, to ensure that the ESIA studies address all the relevant issues, this Project Information Document is being sent to a range of different organisations seeking their comments on the environmental

(1) With reference to local regulatory requirements relating to Environmental Impact Assessment, DLH has been advised by the Turkish Ministry of Environment and Forests (MoEF) that, on the basis of a Project Information File submitted to the MoEF in 2007, a second stage Environmental Impact Assessment (EIA) Study according to the 2008 Environmental Impact Assessment Decree is not required for this project. Therefore the ESIA process will not involve further formal review by the MoEF. However, the ESIA study will take into account all applicable Turkish environmental regulatory obligations together with IFC and other guidelines.

and social topics that are considered to be of concern and that should therefore be investigated in the assessment.

With reference to local regulatory requirements relating to Environmental Impact Assessment, DLH has been advised by the Turkish Ministry of Environment and Forests (MoEF) that, on the basis of a Project Information File submitted to the MoEF in 2007, a second stage Environmental Impact Assessment (EIA) Study according to the 2008 Environmental Impact Assessment Decree is not required for this project. Therefore the ESIA process will not involve further formal review by the MoEF. However, the ESIA study will take into account all applicable Turkish environmental regulatory obligations together with IFC and other guidelines.

What issues will the ESIA cover?

The development of a major transport infrastructure project in an historic and densely populated city such as Istanbul raises the potential for significant negative environmental and social effects but also some benefits. Work already undertaken by TKJV and the ESIA Team has already identified some key issues and these are outlined below.

1. Environmental benefits from reductions in regional traffic emissions and socio-economic benefits from reduced travel costs and time, improved accessibility and lower accident rates.
2. Creation of local employment and economic activity during construction
3. Impacts on historic sites and the general setting of the historic city caused by changes in patterns of traffic movement, traffic emissions and noise.
4. Risks of physical damage to historic features caused by construction work or increased vibration.
5. Risk of disturbing as yet undiscovered archaeological deposits.
6. Harm to the silhouette of the historic peninsula caused by tall structures.
7. Impacts of local traffic emissions and noise on the health and welfare of residents and visitors.
8. Disturbance and pollution during construction from dust, noise, vibration, site run-off and traffic.
9. Impacts from transport and disposal of spoil.
10. Displacement of existing land uses and property and provisions for compensation and resettlement.

11. Management of the construction workforce and health and safety issues during construction.
12. Management of accidents and emergencies including earthquake risks, flooding, vehicle accidents and fire.

A separate traffic assessment is being made by the specialist international firm Jacobs which will provide information on traffic forecasts for the ESIA.

Public consultation

Public consultation is an important part of the ESIA process. As noted above the ESIA Report and ESMP will be completed in Spring 2010 and will be made available for public review and comment. The documents will be available for inspection in hard copy at key locations around Istanbul and on the internet. At least one public meeting will be held where the key conclusions of the ESIA will be explained and there will be an opportunity for comment and discussion. This disclosure process will be widely advertised at the time in local newspapers and through public notices.

How can you help?

We are writing to you to inform you that the ESIA process has started and to invite you to present your initial thoughts on the proposed project. In particular, we would welcome your views on what you think the key issues are and how you think these can be addressed. Additionally, we would welcome any information that you have that you think may be relevant to the ESIA studies.

If you would like to comment or you require any further information please contact us by email or mail at:

ELC Group

Kavacık Mah. Şehit Mustafa Yazıcı Sok. No:20

KAVACIK/ ISTANBUL

Email: isilg@elcgrup.com.tr or margarete.langer@erm.com

We look forward to hearing from you in the near future and thank you in advance for your time and assistance.

If you wish to contact TKJV please address correspondence to:

Resit Yildiz

Civil Engineer, M.Sc.

Yapı Merkezi Insaat ve San. A.S - TKJV Office

Kısıklı Cad. No:3/5

Altunizade - Istanbul / Turkey

Email: resit.yildiz@tkjv.net

Sayın,

İstanbul Avrasya Tünel Projesi için Çevresel ve Sosyal Etki Değerlendirmesi çalışması ile ilgili hazırlık görüşmesi

Avrasya Tünel Projesi için Türk - Kore işbirliği (TKJV) tarafından uluslararası danışmanlık firması olan ERM (Environmental Resource Management) şirketi ile yerel firma olan ELC Group Ltd. Şti. Çevresel ve Sosyal Etki Değerlendirmesi çalışmasını (ESIA) yapmak üzere görevlendirilmişlerdir. TKJV, Avrasya araç geçişi tünel projesinin inşaatı ve işletmesi için seçilmiş olup T.C. Ulaştırma Bakanlığı Demiryollar, Limanlar ve Hava Meydanları İnşaatı Genel Müdürlüğü (DLH) ile 30 yıl süreli bir sözleşme imzalayacaklardır.

TKJV projenin geliştirilmesini desteklemek amacıyla uluslararası finansal destek aramaktadır. Bu desteğin sağlanabilmesi amacıyla uluslararası standartlara uygun şekilde Çevresel ve Sosyal Etki Değerlendirmesinin (ESIA) yapılması gerekliliği söz konusudur. Değerlendirme yeni başlamış olup ilk adım olarak Çevresel ve Sosyal Etki Değerlendirme (ESIA) ekibi değerlendirmenin kapsamını tanımlamaktadır. Bu kapsam değerlendirmede incelenecek olan konular ve potansiyel etkilerdir.

İlgili tüm konuların tanımlanmasını sağlamak için kurumunuzun Çevresel ve Sosyal Etki Değerlendirmesine (ESIA) dahil edilmesini gerekli gördüğü çevresel ve sosyal konuları anlamak amacındayız. Kurumunuzda bulunan ve değerlendirme sürecinde faydalı olabileceğini düşündüğünüz tüm bilgileri öğrenmekten müteşekkir oluruz.

İlgili olası konuları tanımlamanıza yardımcı olmak için projenin genel özelliklerini ve önceden tanımlanmış bazı konuları özetleyen Proje Bilgilendirme Dokümanı ekteki gibi hazırlanmıştır.

Çevresel ve Sosyal Etki Değerlendirme (ESIA) çalışmalarının planlanmasına katkıda bulunmak isterseniz, mümkün olan en kısa zamanda tercihen 11 Aralık 2009 tarihinden önce bilgilendirmenizi rica ederiz. İletişim bilgilerimiz Proje Bilgilendirme Dokümanının son kısmında yer almaktadır.

Yardıminız ve katkınız için şimdiden teşekkür ederiz.

Saygılarımızla,

Karen Raymond, Partner ERM
Prof. Dr. Cem Avcı, Teknik Danışman ELC Group Ltd.

Dear

Preliminary Consultation on the Environmental and Social Impact Assessment
for the Eurasia Tunnel Project, Istanbul

The international consultants Environmental Resources Management and the local ELC Group have been appointed by the Turkish Korean Joint Venture (TKJV) to undertake an Environmental and Social Impact Assessment (ESIA) of the proposed Eurasia Tunnel project. TKJV have been selected to build and operate the tunnel project and they will shortly enter into a 30 year contract for this purpose with the General Directorate of Railways, Seaports and Airport Construction (Demiryollar Limanlar ve Hava Meydaniari İnşaatı Genel Müdürlüğü DLH)

TKJV are seeking international finance to support the development of the project and are required to undertake an ESIA in accordance with international standards. The assessment has just commenced and as the first stage the ESIA Team are identifying the scope of the assessment; that is the topics and potential impacts that it should investigate.

To ensure we identify all the relevant issues, we are keen to understand the environmental and social issues of concern to your organisation that you think should be included in the ESIA. We would also be grateful to know about any information your organisation holds or sources of which you are aware that may be useful for the assessment. To help you identify possible issues of concern we have prepared the attached Project Information Document outlining the key features of the project and some of the issues which we have already identified.

If you are able to contribute to our planning for the ESIA studies, we would be very pleased to hear from you at the earliest opportunity, and preferably by December 11th 2009. Details of how you can contact us are provided at the end of the Project Information Document.

We look forward to hearing from you and we thank you in advance for your contribution and assistance.

Yours

Karen Raymond
Partner ERM
Cem Avci
ELC Group

Avrasya Tüneli Proje Bilgilendirme Dokümanı: Düzeltme

İstanbul Avrasya Tüneli Projesi Çevresel ve Sosyal Etki Değerlendirmesi (ÇSED) çalışması kapsamında 13.11.2009 tarihinde tarafınıza gönderilmiş olan Proje Bilgilendirme Dokümanı içerisinde **Çevresel ve Sosyal Etki Değerlendirmesi Nedir?** başlığı altında son iki paragrafın aşağıdaki şekilde değiştirilmesi gerekmektedir:

“İstanbul Avrasya Tüneli Projesi’nin Çevresel Etki Değerlendirmesi (ÇED) Yönetmeliği kapsamında değerlendirilebilmesi için T.C. Ulaştırma Bakanlığı Demiryollar, Limanlar ve Hava Meydanları İnşaatı Genel Müdürlüğü (DLH) tarafından Çevre ve Orman Bakanlığı’na (ÇOB) 2007 yılında bir Proje Tanıtım Dosyası sunulmuştur. Proje Tanıtım Dosyasının 16 Aralık 2003 tarih ve 25318⁽¹⁾ sayılı Resmi Gazete’de yayımlanarak yürürlüğe giren ÇED Yönetmeliği kapsamında incelenmesi neticesinde planlanan projenin ÇED kapsamı dışında kaldığı, bununla birlikte proje ile ilgili olarak 2872 sayılı Çevre Kanunu ile 5491 sayılı Çevre Kanunu’nda Değişiklik Yapılmasına Dair Kanun ve bu Kanuna istinaden çıkarılan yönetmeliklere uyulması gerektiği ÇOB tarafından DLH’ya bildirilmiştir. ÇSED çalışmasında, uygulanabilir tüm Türk Çevre Mevzuatı yanında Uluslararası Finans Kurulu (IFC) standartları ve diğer kılavuzlar da dikkate alınacaktır.”

(1) Bahsi geçen ÇED yönetmeliği, 17 Temmuz 2008 tarih ve 26929 sayılı Resmi Gazete’de yayımlanarak yürürlüğe giren yeni ÇED Yönetmeliği ile değiştirilmiştir.

Bilgilerinize arz ederiz.

Saygılarımızla,

C. Avcı

18 December 2009

Our ref: 0106067

Dear Sirs

Direct lines

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Eurasia Tunnel Project Scoping Report : ERRATUM

With reference to the Scoping Report for the Eurasia Tunnel provided to you via the Project website on ...date..... please note that we have been advised by the Ministry of Environment and Forests that Section 1.1 paragraph 5 which currently reads as follows:

“With reference to local regulatory requirements relating to Environmental Impact Assessment, DLH has been advised by the Turkish Ministry of Environment and Forests (MoEF) that, on the basis of a Project Information File (1) submitted to the MoEF in 2007, a second stage Environmental Impact Assessment (EIA) Study according to the Turkish Environmental Impact Assessment Decree (2) is not required for this project. Therefore the ESIA process will not involve further formal review by the MoEF. However, the ESIA study will take into account all applicable Turkish environmental regulatory obligations together with IFC and other guidelines.”

should be amended as follows

“With reference to local regulatory requirements relating to Environmental Impact Assessment, DLH has been advised by the Turkish Ministry of Environment and Forests (MoEF) that, on the basis of a Project Information File submitted to the MoEF in 2007, the Eurasia Tunnel Project is not within

the scope of the Environmental Impact Assessment Decree of 16.12.2003 Number 26318 and an EIA is not therefore required for this project. MoEF have confirmed that the project must nevertheless comply with Environmental Act No 2872, the Amending Act No 5491 and related regulations. The ESIA study will take into account all applicable Turkish environmental regulatory obligations together with IFC and other guidelines.”

It may be noted that the EIA Regulations have since been replaced by Environmental Impact Assessment Decree of 17.07.2008 Number 26929.

(1) TAR. Ministry of Transportation General, Directorate of Railroads, Ports and Airports Constructions; Bosphorus Crossing Motorway Tunnel Project Introduction File; November 2007

(2) Turkish EIA Regulation of 16.12.2003 Official Gazette 25318 #

These make some minor amendments to the categorisation of projects requiring EIA but do not alter the Ministry's decision.

If you have any questions regarding this please contact Karen Raymond at ERM.

Thank you for your attention

Yours faithfully

Karen Raymond

Partner

karen.raymond@erm.com

ANNEX G-2

Summary of Results of Stakeholder Consultations during Preparation of ESIA

EURASIA TUNNEL PROJECT STAKEHOLDER REGISTER

UPDATE: 20 JANUARY 2010

Ref	Organisation/ Individual	Type (1)	Date	Details of contacts made	Names and contact details (names have been removed for reasons of personal confidentiality)	Summary of comments received on Project and scope of ESIA
0001	Istanbul Metropolitan Municipality	CG	06/03/2009	Initially informed about the project in a meeting held on 06.03.2009 by DLH	Representatives of 4 directorates participated in the meeting – see below.	No minutes available
			13/11/2009	Sent PID with cover letter inviting comment on issues of concern, together with the authorization letter from DLH. Erratum re EIA Regulations issued 11/12/2009.	Mayor Istanbul Metropolitan Municipality Kemalpaşa Mah. Şehzadebaşı Cad. No.25 34134 Fatih / İstanbul	04/12/2009-A call was received from the Department of Environmental Protection and Control and a copy of the DLH Project Information File prepared in 2007 was requested to be able understand the project at a wider scope.
			11/12/2009	Sent PID with cover letter inviting comment on issues of concern, together with the authorization letter from DLH.	Istanbul Metropolitan Municipality, Department of Environmental Protection and Control Kemalpaşa Mah. Atatürk Bulvarı	12/01/2010- Response received stating that the directorate will deliver its opinion letter and the directorate requested from various

(1) G = national government; RG = regional government; CG = city government; LG = local government; C = community; B = private business; P = private individual; R = research/academic; N - other non-governmental including interest groups

Ref	Organisation/ Individual	Type (1)	Date	Details of contacts made	Names and contact details (names have been removed for reasons of personal confidentiality)	Summary of comments received on Project and scope of ESIA
				Erratum re EIA Regulations issued 11/12/2009	No:162 Sarachane Eminönü/İstanbul	<p>departments of the Municipality to review the Project Information Document and to send their opinions (See Document ref 0001.1)</p> <p>16/03/2010- Opinion letter has been received from Directorate of Environmental Protection, Department of Environmental Protection and Control (0038.1). It recommends that the project should protect the sustainable environmental conditions while it aims lowering the traffic load in the bridges in Istanbul. The letter states that issues previously mentioned in the Project Introductory File prepared in 2007, should be monitored, controlled and assessed in the project area and impact area as to cover the pre-operation, operation and post-operation stages of the project. It further recommends that the project should receive all permits and meets the requirements of Environmental Law and related regulations.</p>
			22/12/2009	Received request for copy of MOEF EIA Opinion. Opinion		

Ref	Organisation/ Individual	Type (1)	Date	Details of contacts made	Names and contact details (names have been removed for reasons of personal confidentiality)	Summary of comments received on Project and scope of ESIA
				letter sent.		
0002	Department of Housing and Urban Development, Directorate of Planning	G	06/03/2009	Attended meeting with Municipality held on 06.03.2009 by DLH	-Planning Head -Deputy Head -Chief-Architect -Civil Engineer -Technical Personnel	No minutes available
0003	Department of Housing and Urban Development, Directorate of Conservation, Implementati on and Control (KUDEB)	G	06/03/2009	Attended meeting with Municipality held on 06.03.2009 by DLH	-Reporter,Architect -Reporter,Architect -Urban Planner -Deputy Head, Urban Planner	
0004	Istanbul Metropolitan Municipality Department of Transportatio n, Directorate of	CG	06/03/2009	Attended meeting with Municipality held on 06.03.2009 by DLH	-Deputy Head -Deputy Head	No minutes available

Ref	Organisation/ Individual	Type (1)	Date	Details of contacts made	Names and contact details (names have been removed for reasons of personal confidentiality)	Summary of comments received on Project and scope of ESIA
	Transportation Planning					
0005	Istanbul Protection Sites Site Management Directorate	CG	06/03/2009	Attended meeting with Municipality held on 06.03.2009 by DLH	-Chair	No minutes available
0006	Fatih District Municipality	LG	06/03/2009	Attended meeting with Municipality held on 06.03.2009 by DLH	-Deputy Head -Representative member	No minutes available
			13/11/2009	Sent PID with cover letter inviting comment on issues of concern, together with the authorization letter from DLH. Erratum re EIA Regulations issued 11/12/2009	District Mayor T.C. Fatih Belediye Başkanlığı Akşemsettin Mahallesi (Hocaüveyz Mevkii) Adnan Menderes Vatan Bulvarı No:54 Fatih/İstanbul	
0007	Üsküdar District Municipality	LG	06/03/2009	Attended meeting with Municipality held on 06.03.2009 by DLH	-Technical Chair Deputy -Planning Head	No minutes available
			13/11/2009	Sent PID with cover letter inviting comment on issues of concern, together with the authorization letter from DLH. Erratum re EIA Regulations	District Mayor T.C. Üsküdar Belediye Başkanlığı Mimar Sinan Mahallesi, Hakimiyet-i Milliye Caddesi No: 35	

Ref	Organisation/ Individual	Type (1)	Date	Details of contacts made	Names and contact details (names have been removed for reasons of personal confidentiality)	Summary of comments received on Project and scope of ESIA
				issued 22/12/2009	Üsküdar/İstanbul	
0008	Zeytinburnu District Municipality	LG	06/03/2009	Attended meeting with Municipality held on 06.03.2009 by DLH	-Planning Chief	No minutes available
			13/11/2009	Sent PID with cover letter inviting comment on issues of concern, together with the authorization letter from DLH. Erratum re EIA Regulations issued 22/12/2009	District Mayor T.C. Zeytinburnu Belediye Başkanlığı Kazlıçeşme Mahallesi Abay Caddesi No:165 Zeytinburnu/İstanbul	
0009	Ministry of Public Works and Settlement	G	06/03/2009	Attended meeting with Municipality held on 06.03.2009 by DLH	-Department Head -Urban Planner -Urban Planner	No minutes available
			13/11/2009	Sent PID with cover letter inviting comment on issues of concern, together with the authorization letter from DLH. Erratum re EIA Regulations issued 22/12/2009	Minister T.C. Bayındırlık ve İskan Bakanlığı Vekaletler Cad. No. 1 Ankara	29/12/2009- Opinion letter received. (See Doc Ref 0009.1). This advised that the MPWS would not comment at this stage but would address the project once further work being undertaken by the Municipality and in connection with investigations by the Ministry of Culture and Tourism.
0010	Ministry of Transportatio	G	06/03/2009	Attended meeting with Municipality held on 06.03.2009	-General Manager	No minutes available

Ref	Organisation/ Individual	Type (1)	Date	Details of contacts made	Names and contact details (names have been removed for reasons of personal confidentiality)	Summary of comments received on Project and scope of ESIA
	n, DLH			by DLH	-Deputy General Manager -DLH Consultant, Urban Planner	
			13/11/2009	Sent PID with cover letter inviting comment on issues of concern, together with the authorization letter from DLH. Erratum re EIA Regulations issued 22/12/2009	General Manager T.C. Ulaştırma Bakanlığı Demiryollar, Limanlar ve Hava Meydanları İnşaatı Genel Müdürlüğü Hakkı Turaylıç Cad. No: 5 Emek/ Ankara	
0011	Ministry of Transportation, Istanbul Regional Transportation Directorate	RG	06/03/2009	Attended meeting with Municipality held on 06.03.2009 by DLH	Regional Manager	No minutes available
			13/11/2009	Sent PID with cover letter inviting comment on issues of concern, together with the authorization letter from DLH. Erratum re EIA Regulations issued 22/12/2009	Regional Manager T.C. Ulaştırma Bakanlığı İstanbul Bölge Müdürlüğü Atatürk Hava Limanı B Kapısı Krşısı Shell Benzin İstasyonu Yanı Yeşilköy/İstanbul	08/12/2009- Opinion letter received. (See Doc Ref 0011.1). In summary: The study should comply with the EU EIA Directive 97/11 EC. It should be prepared in English and in Turkish. The study should establish

Ref	Organisation/ Individual	Type (1)	Date	Details of contacts made	Names and contact details (names have been removed for reasons of personal confidentiality)	Summary of comments received on Project and scope of ESIA
						environmental/social impact assessment matrixes; detail direct and indirect impacts of the project; explain mitigation measures against potential impacts; include environmental maps (including nature protection areas, habitat, forest areas, land use, wetlands, settlement); include a the monitoring plan (schedule showing which issues will be monitored, where and when); examine alternative project approaches in terms of their feasibility, environmental and social impacts; assess international impacts of the project in addition to its national impacts. Limiting factors (lack of data, insufficient data, etc.) that are faced during the preparation of the report should be presented
0012	Eminönü District Municipality (The municipality does not exist anymore,	LG)	06/03/2009	Attended meeting with Municipality held on 06.03.2009 by DLH	-Zoning Head	No minutes available

Ref	Organisation/ Individual	Type (1)	Date	Details of contacts made	Names and contact details (names have been removed for reasons of personal confidentiality)	Summary of comments received on Project and scope of ESIA
	merged with Fatih Municipality under the name of Fatih Municipality).					
0013	Maltepe District Municipality	LG	06/03/2009	Attended meeting with Municipality held on 06.03.2009 by DLH	-Deputy Chair (Representative of V. Council)	No minutes available
0014	Kartal District Municipality	LG)	06/03/2009	Attended meeting with Municipality held on 06.03.2009 by DLH	-Planning and Projects Head (Representative of V. Council)	No minutes available
0015	Ministry of Culture and Tourism- General Directorate of Cultural Heritage and Museums	G	06/03/2009	Attended meeting with Municipality held on 06.03.2009 by DLH	-Culture and Tourism Expert, Archaeologist	No minutes available
0016	Istanbul Archaeologica l Museums	CG	06/03/2009	Attended meeting with Municipality held on 06.03.2009 by DLH	-Representative	No minutes available
0017	Cultural and Natural	RG	06/03/2009	Attended meeting with Municipality held on 06.03.2009	-Chair	No minutes available

Ref	Organisation/ Individual	Type (1)	Date	Details of contacts made	Names and contact details (names have been removed for reasons of personal confidentiality)	Summary of comments received on Project and scope of ESIA
	Assets Protection Council No. IV.			by DLH	-Various Members	
0018	Cultural and Natural Assets Protection Council No. V.	RG	06/03/2009	Attended meeting with Municipality held on 06.03.2009 by DLH	-Chair -Head -Representative from Istanbul Metropolitan Municipality -Member -Reporter	No minutes available
0019	Cultural and Natural Assets Protection Council No. VI.	RG	06/03/2009	Attended meeting with Municipality held on 06.03.2009 by DLH	-Chair -Deputy Chair -Head -Members -Reporter, Culture Expert -Reporter-Archaeologist	No minutes available
0020	Istanbul Restoration Sites Council	CG	06/03/2009	Attended meeting with Municipality held on 06.03.2009 by DLH	-Chair -Head -Members	No minutes available

Ref	Organisation/ Individual	Type (1)	Date	Details of contacts made	Names and contact details (names have been removed for reasons of personal confidentiality)	Summary of comments received on Project and scope of ESIA
					-Reporter	
0021	Istanbul Governorship	RG	13/11/2009.	Sent PID with cover letter inviting comment on issues of concern, together with the authorization letter from DLH. Erratum re EIA Regulations issued 22/12/2009	Governor T.C. Istanbul Valiliği Ankara Cad. 34410 Cağaloğlu Fatih/İstanbul	
0022	Istanbul City Special Administratio n	CG	13/11/2009	Sent PID with cover letter inviting comment on issues of concern, together with the authorization letter from DLH. Erratum re EIA Regulations issued 22/12/2009	General Secretary T.C. Istanbul İl Özel İdaresi Yerebatan Cad. No:10 Sultanahmet Fatih/İstanbul	12/01/2010- Response received stating that the opinion that has been asked is not within the competence of the Province Special Administration according to the Province Special Administration Law No. 5302 and the issue can be evaluated by the Istanbul Metropolitan Municipality. (see Doc ref 0022.1)
0023	Fatih District Governorship	LG	13/11/2009	Sent PID with cover letter inviting comment on issues of concern, together with the authorization letter from DLH. Erratum re EIA Regulations issued 22/12/2009	Local Governor T.C. Fatih Kaymakamlığı Vatan Cad. Orduevi Karşısı Fatih/İstanbul	

Ref	Organisation/ Individual	Type (1)	Date	Details of contacts made	Names and contact details (names have been removed for reasons of personal confidentiality)	Summary of comments received on Project and scope of ESIA
0024	Ministry of Transportation, General Directorate of Highways, 17th Regional Directorate	RG	13/11/2009	Sent PID with cover letter inviting comment on issues of concern, together with the authorization letter from DLH. Erratum re EIA Regulations issued 22/12/2009	Regional Manager T.C. Ulaştırma Bakanlığı Karayollari Genel Müdürlüğü Karayollari 17. Bölge Müdürlüğü Barbaros Bulvarı No:56 34340 Zincirlikuyu/İstanbul	10/12/2009- Opinion letter received. (See Doc Ref 0024.1) The ESIA should address impact of the project on urban traffic in general, on the route and access routes, particularly in the historic peninsula, and throughout the city and on the Bosphorus; impacts on the Marmaray Project and sea transportation; dimensions and locations of escape arrangements; vehicle flow through the tunnel; impact of the amount of traffic at thresholds inside the tunnel; actions to be taken in emergencies; impacts of exhaust and particulate matter; investigation of the air quality around the ventilation shafts on both sides.
0025	Ministry of Environment and Forestry, General Directorate of	G	13/11/2009	Sent PID with cover letter inviting comment on issues of concern, together with the authorization letter from DLH. Erratum re EIA Regulations	General Manager T.C. Çevre ve orman Bakanlığı Çevresel Etki Değerlendirmesi ve	04/12/2009-A call was received and ESIA team was informed that the project hasn't received an "EIA is not required" decision, but has been evaluated as out of EIA Regulation

Ref	Organisation/ Individual	Type (1)	Date	Details of contacts made	Names and contact details (names have been removed for reasons of personal confidentiality)	Summary of comments received on Project and scope of ESIA
	Environmental Impact Assessment and Planning			issued 22/12/2009	Planlama Genel Müdürlüğü Söğütözü Cad. No: 14/E 17. kat Ankara	based on the project information file submitted in 2007. 09/12/2009- Opinion letter received. (see Doc Ref 0025.1) confirming the details above.
0026	Ministry of Environment and Forestry, General Directorate of Nature Protection and National Parks	G	13/11/2009	Sent PID with cover letter inviting comment on issues of concern, together with the authorization letter from DLH. Erratum re EIA Regulations issued 22/12/2009	General Manager T.C. Çevre ve Orman Bakanlığı Doğa Koruma ve Milli Parklar Genel Müdürlüğü Söğütözü Cad. No: 14/E Ankara	04/12/2009- Opinion letter has been received. (See Doc Ref 0026.1). The ESIA should address the following issues pre-activity, throughout the activity and post-activity: Negative impacts on the four Archaeological and Historical sites that are on the UNESCO World Heritage List and are present on the road route. Amount of change in the current ownership pattern. Fish passes throughout their spawning periods cumulative impacts with other planned projects at the Bosphorus

Ref	Organisation/ Individual	Type (1)	Date	Details of contacts made	Names and contact details (names have been removed for reasons of personal confidentiality)	Summary of comments received on Project and scope of ESIA
						and transportation projects under construction . Marine ecosystem and biodiversity. Transport and storage of excavated soils, including measures to minimize nature destruction. Natural, cultural and visual landscape analysis according to the European Landscape Convention.
0027	State Hydraulic Works, Istanbul 14 th Regional Directorate	RG	13/11/2009	Sent PID with cover letter inviting comment on issues of concern, together with the authorization letter from DLH. Erratum re EIA Regulations issued 22/12/2009	Regional Manager General Directorate of State Hydraulic Works (DSİ) DSİ 14 th Regional Directorate Libadiye Cad. Yeni Çamlıca Mah. Küçük Çamlıca/İstanbul	08/12/2009-A call was received, map in electronic format, detailed project information and general construction information was requested.
			09/12/2009	ESIA team called the regional directorate to inform that the requested information could be provided. Contact person could not be reached.		11/12/2009- Opinion letter received. (See Doc Ref 0027.1). The letter was received in advance of sending the requested documents. In summary:

Ref	Organisation/ Individual	Type (1)	Date	Details of contacts made	Names and contact details (names have been removed for reasons of personal confidentiality)	Summary of comments received on Project and scope of ESIA
						<p>An Environmental Management Plan must be prepared to establish a road map for the monitoring, evaluation and control of the impacts (dust, noise, vibration, water and wastewater quality, public communication, waste management, etc.)</p> <p>Adequate provision should be made for the cost of Environmental Investigations</p> <p>The contract should refer to the Environmental Management Plan and environmental legislation</p> <p>An experienced team needs to be established by the Employer and the Contractor to control the environmental works. The head of this team (Environmental Manager) must report to the Project Manager on the contractor side. If subcontractors are employed, they must be supervised by the contractor's Environmental Manager and necessary measures included in contracts and authorizations.</p> <p>The Environmental Management Plan should include definite details of environmental monitoring (dust, noise, vibration, water quality, etc.). Measuring equipments, methods and frequency of measurement must be selected in accordance with the legislation and</p>

Ref	Organisation/ Individual	Type (1)	Date	Details of contacts made	Names and contact details (names have been removed for reasons of personal confidentiality)	Summary of comments received on Project and scope of ESIA
						<p>approved by the authority.</p> <p>Decisions to speed up construction works that will pollute the environment and are contrary the legislation must not be approved.</p> <p>Appropriate areas and faculties for temporary storage of construction waste are required on both Asian and European sides. A plan must be prepared for domestic, industrial, hazardous, chemical, medical, construction and demolition, excavation and other wastes.</p> <p>A "work schedule for environmental works" shall be prepared in parallel with the construction programme.</p> <p>Environmental works should be audited by an independent firm.</p> <p>Regular public meetings should be held before and throughout construction works and throughout the construction works the grievances must be assessed.</p> <p>Construction workers and technical personnel must be trained in "Environmental and Occupational Safety" (ISO 14001 and OHSAS 18001). A training program must be prepared annually.</p> <p>Permits must be obtained before the discharge of wastewater from tunnel</p>

Ref	Organisation/ Individual	Type (1)	Date	Details of contacts made	Names and contact details (names have been removed for reasons of personal confidentiality)	Summary of comments received on Project and scope of ESIA
						works. Well-designed sedimentation tanks must be built at the tunnel exit. Chemicals use in grouting should be considered if necessary. Air quality (such as O ₂ , CO ₂ , CO, NO, NO ₂ , CH ₄ , H ₂ S) should be measured inside the tunnel.
						Advised that the requested documents might be requested at a later stage of the project, if needed and the opinion letter sent was valid.
0028	UNESCO Turkey National Commission	N	19/10/2009 – 03/11/2009	Telephone conversations with Secretary to Commission Chair re invitation to meet with ESIA Team and IFC	Secretary to Chair	ESIA Team was advised that UNESCO would not wish to meet or to comment directly to the ESIA Team or TKJV but would make any comments via the Ministry of Culture
			13/11/2009	Sent PID with cover letter inviting comment on issues of concern, together with the authorization letter from DLH. Erratum re EIA Regulations issued 22/12/2009	Chair UNESCO Türkiye Göreme Sokak 7/9 06680 Kavaklıdere-Ankara	
0029	International	N	05/10/2009	Introductory presentation about	Principal Investment Officer	IFC participants raised the following

Ref	Organisation/ Individual	Type (1)	Date	Details of contacts made	Names and contact details (names have been removed for reasons of personal confidentiality)	Summary of comments received on Project and scope of ESIA
	Finance Corporation			project including description of proposed ESIA approach made to Lenders by TKJV and project advisers	Investment officer Associate Investment officer Environmental Specialist Senior Environmental Specialist Chief Engineer	issues as matters which they wish to see addressed in the ESIA: the World Heritage Site and views of UNESCO; air pollution; fire safety; displacement of recreation areas; impact on small businesses along the route; labour management during construction.
			27/10/2009	Scoping Report was made available for comment to potential Lenders via the intranet	All Lenders	Initial comments on scope of ESIA received by email from Robert Gerrits (see Doc Ref 0029/1) Highlighted need to consider: Impacts on existing roads/traffic Safety design of tunnel Impacts on access to businesses, ferries etc Response sent 06/11/2009 (K Raymond) confirming that these issues would be addressed

Ref	Organisation/ Individual	Type (1)	Date	Details of contacts made	Names and contact details (names have been removed for reasons of personal confidentiality)	Summary of comments received on Project and scope of ESIA
			03/11/2009	Telephone conference call to discuss future consultation programme	IFC	IFC commented on expectations re stakeholder engagement and ESIA Team/TKJV agreed to provide proposed programme
			07/11/2009	Proposed consultation programme sent to IFC for information and comment	IFC Staff	
0030	European Investment Bank	N	05/10/2009	Introductory presentation about project including description of proposed ESIA approach made to Lenders by TKJV and project advisers	Deputy Head of Division, Projects Directorate Structured Finance Coordinator South East Europe EIB Representative in Turkey	Comments made re need to address alternatives in the ESIA. ESIA Team advised that the ESIA would address alternatives insofar as is practicable.
			27/10/2009	Scoping Report was made available for comment to potential Lenders via the intranet		
0031	Black Sea Trade and Development Bank	N	05/10/2009	Introductory presentation about project including description of proposed ESIA approach made to Lenders by TKJV and project advisers	Director, General Industries, Transport and Tourism Principal Banker, General Industries, Transport and Tourism	
			27/10/2009	Scoping Report was made available for comment to		

Ref	Organisation/ Individual	Type (1)	Date	Details of contacts made	Names and contact details (names have been removed for reasons of personal confidentiality)	Summary of comments received on Project and scope of ESIA
				potential Lenders via the intranet		
0032	Ministry of Transportation	G	11/12/2009	Sent PID with cover letter inviting comment on issues of concern, together with the authorization letter from DLH. Erratum re EIA Regulations issued 22/12/2009	Ministry of Transportation Hakkı Turaylıç Cad. No:5 Emek/ Ankara	
0033	Istanbul Metropolitan Municipality Department of Science Affairs, Directorate of Infrastructure Services	CG	04/01/2010	IMM requested their opinion (see document 0001.1).	Department Chair of Science Affairs	19/01/2010-Opinion letter has been received. The letter states that the directorate has no opinion regarding the ESIA study.
0034	Istanbul Metropolitan Municipality Department of Environmental Protection	CG	04/01/2010	IMM requested their opinion (see document 0001.1).	Waste Management Head	22/01/2010- Opinion letter has been received (0034.1). It recommends that excavations during the construction phase needs to be disposed of in accordance with the "Regulation on the Control of Excavated Soil, Construction and Debris Wastes" and necessary measures need to taken to

Ref	Organisation/ Individual	Type (1)	Date	Details of contacts made	Names and contact details (names have been removed for reasons of personal confidentiality)	Summary of comments received on Project and scope of ESIA
	and Control, Directorate of Waste Management					minimize the adverse impacts.
0035	Istanbul Metropolitan Municipality Department of Health and Social Services, Directorate of Seafood Wholesale Market	CG	04/01/2010	IMM requested their opinion (see document 0001.1).	Head of Seafood Wholesale Market	22/01/2010- Opinion letter has been received (0035.1). It states that the directorate has requested for transferring the activities of the Seafood Market outside the city and a new location has been approved by IMM.
0036	Istanbul Metropolitan Municipality Department of Environmenta l Protection and Control, Directorate of Sea Services	CG	04/01/2010	IMM requested their opinion (see document 0001.1).	Head of Sea Services	17/02/2010- Opinion letter has been received. (0036.1). It states that the directorate does not have any objection to the realization of the project.

Ref	Organisation/ Individual	Type (1)	Date	Details of contacts made	Names and contact details (names have been removed for reasons of personal confidentiality)	Summary of comments received on Project and scope of ESIA
0037	Istanbul Metropolitan Municipality Directorate of Bosphorus Physical Development Planning	CG	04/01/2010	IMM requested their opinion (see document 0001.1).	Head of Bosphorus Physical Development Planning	22/03/2010 - Opinion letter has been received. (0037.1). It states that the project is out of the scope of the boundaries of the Bosphorus Coast Line and Forefront-View Area that are under the jurisdiction of the Directorate. The Directorate requests information on as to whether the Eurasia Tunnel Project has an impact in the transportation circulation in the Forefront-View Area. The letter states that only after receiving this information, the directorate could evaluate the project.
0038	Istanbul Metropolitan Municipality, Directorate of Directorate of Environmental Protection, Department of Environmental Protection and Control	CG	04/01/2010	IMM requested their opinion (see document 0001.1).	Assistant General Secretary	22/03/2010- Opinion letter has been received (0038.1). Please see section 0001.
0039	Istanbul	CG	04/01/2010	IMM requested their opinion	Head of Urban Design	15.04.2010-Opinion letter has been

Ref	Organisation/ Individual	Type (1)	Date	Details of contacts made	Names and contact details (names have been removed for reasons of personal confidentiality)	Summary of comments received on Project and scope of ESIA
	Metropolitan Municipality, Department of Survey and Projects, Directorate of Urban Design			(see document 0001.1).		received (0039.1). It states that it will be possible to provide an opinion about the impacts of the ventilation shafts after the the design and the location of the ventilation shafts are clear. The letter mentions that there are concerns about the impact of the junction system on the Asian Side, on the silhouette of the historical peninsula. It is recommended that measures need to be taken to minimize the impacts at the load carrying system of the historical structures that are close the joining point of the road at the European side. It is further recommended that measures need to be taken to prevent adverse effects on the tourism areas where tourists visit mainly by foot, and necessary width need to be left in the whole coastal line at the European Side without damaging the continuity of the pedestrian promenades and the characteristics of the recreation areas.
0040	Istanbul Metropolitan	CG	04/01/2010	IMM requested their opinion	Head of Transportation Department	02.09.2010-Opinion letter has been received (0040.1). It states that the

Ref	Organisation/ Individual	Type (1)	Date	Details of contacts made	Names and contact details (names have been removed for reasons of personal confidentiality)	Summary of comments received on Project and scope of ESIA
	Municipality, Department of Transportatio n, Directorate of Transportatio n Planning			(see document 0001.1).		tunnel project is assessed within the scope of Istanbul Metropolitan Municipality-Transportation Master Plan works and the impact of the project for the year 2023 is examined. A map showing the traffic volume that is expected for the year 2023 is also provided in the annex.
0041	Istanbul Metropolitan Municipality, Department of Survey and Projects, Directorate of Historical Environment Protection	CG	04/01/2010	IMM requested their opinion (see document 0001.1).	Historical Environment Protection Director	03.09.2010-Opinion letter has been received (0041.1). It states that no work has been performed to date by the directorate related to the motorway tunnel project. The letter lists several issues to be taken into account during works that are carried out at urban areas and close protection areas. It is mentioned that Law No:2863 and relevant principle decisions are taken into account, and cultural asset inventory related to the existing and lost assets at the plan area is completed. The letter recommends measures such as protection of the originality of the cultural assets during restoration, restriction of trade and industry in the surrounding of cultural assets.

Ref	Organisation/ Individual	Type (1)	Date	Details of contacts made	Names and contact details (names have been removed for reasons of personal confidentiality)	Summary of comments received on Project and scope of ESIA
042	Muhtars along the Project route (25 in total)	C	27/12/2010 - 06/01/2011	Meetings included a presentation providing information on the Project, its background, key ESIA findings and the forthcoming public consultation process. Muhtars were invited to offer their initial opinion of the Project and key issues expected to be of importance in their community, to comment on the ESIA public consultation programme and to comment on any particular vulnerable groups within their local community.	All 25 Muhtars along the Project alignment. Details of the 25 neighbourhoods can be found in the SEP.	<p>Key points to emerge from the consultation programme with the Muhtars was:</p> <ul style="list-style-type: none"> • The Muhtars are generally supportive of the Project and can see benefits for their locality and for Istanbul due to shorter journeys across the Bosphorus; • They are satisfied with the proposed public consultation programme and also proposed various locations within their neighbourhoods for making public consultation information available (e.g. posters and leaflets). They are also willing to assist the consultation through their offices. • After receiving a briefing of the main findings of the draft ESIA Report, they noted that they had no further issues to be included in the Draft ESIA Report. However some did request that follow-up meetings be provided to Muhtars as the Project progresses. • They noted specific vulnerable

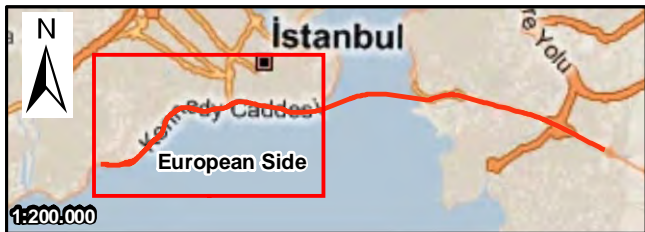
Ref	Organisation/ Individual	Type (1)	Date	Details of contacts made	Names and contact details (names have been removed for reasons of personal confidentiality)	Summary of comments received on Project and scope of ESIA
						<p>populations (some homeless people) within their neighbourhoods and these were all in the Fatih district on the European Side.</p> <ul style="list-style-type: none"> • They recommended changing one of the locations for the public reading rooms and recommended another location with better accessibility for the local population on the European side. • Muhtars suggested various locations where public consultation posters and leaflets can be placed in order to increase awareness of the Project and the public consultation programme, such as coffee houses and post offices. they also proposed specific locations also mentioned by the Muhtars for placing posters and leaflets (such as Paşa Konağı recreation centre and the Cagaloglu Culture Centre) • They noted that the internet would be a useful medium for consultation but that paper copies of material was also important (especially on the

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						<p>European Side).</p> <ul style="list-style-type: none"> • The neighbourhood populations do talk to Muhtars if they have a problem or concern but many also go to the municipality. Use of Muhtars for obtaining information of raising a local issue is more common on the less affluent European Side.

CONTENTS

Annex H

H	Structural Maps
H-1.1	Project Overview European Side
H-1.2	Project Overview Asian Side
H-2.1 to H-2.8	Detailed Project Design



Legend

- Outlines of the Project Alignment
- Footbridge



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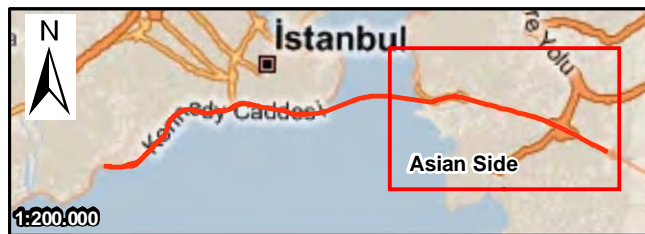
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**Istanbul Eurasia Road Tunnel
Project Overview
EUROPEAN SIDE**

Project No.: P0106067
Scale: 1:15.000
Status: DRAFT
Annex H-1.1



Legend

- Outlines of the Project Alignment
- Footbridge



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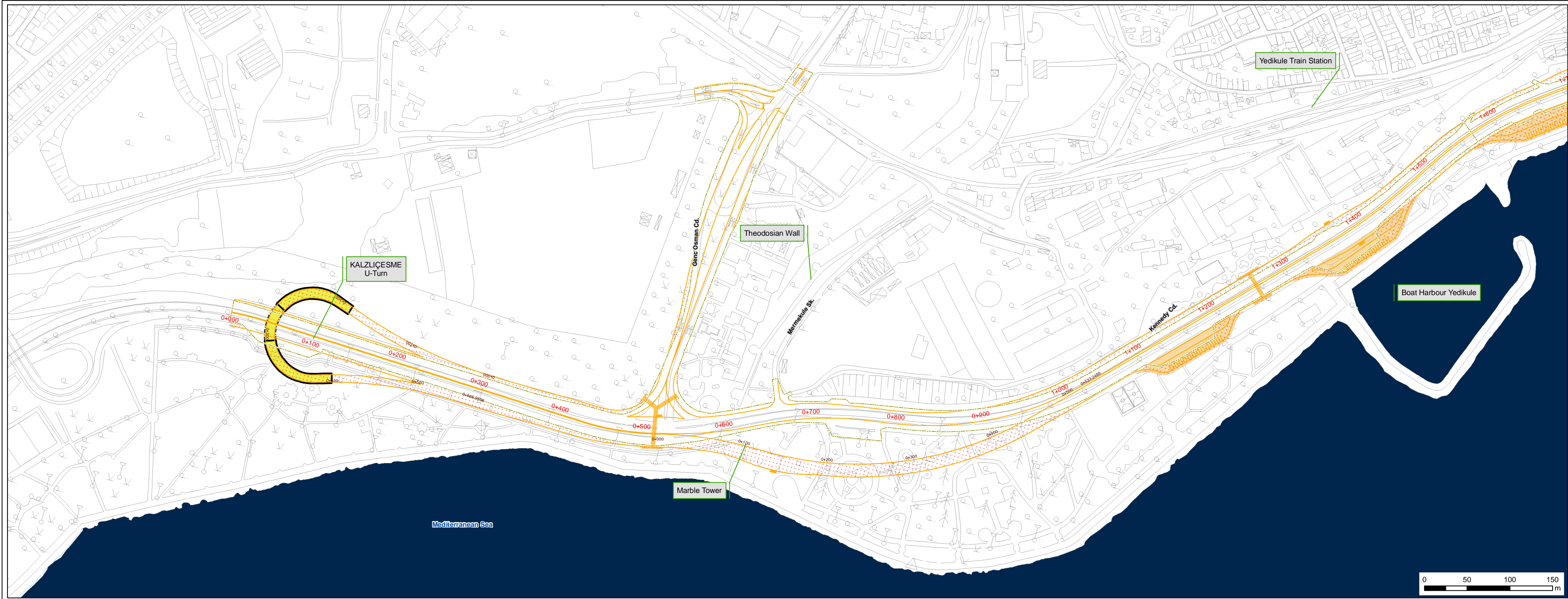
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**Istanbul Eurasia Road Tunnel
Project Overview
ASIAN SIDE**

Project No.: P0106067
Scale: 1:15.000
Status: DRAFT
Annex H-1.2



Legend

- General Parcelling Map
- Boundary of existing road

Project Overview

- Outlines of the Project Alignment
- Additional Area for new road

Construction Types

- Cut and Cover
- NATM
- TBM
- Footbridge
- New Pedestrian Overpass
- Operational Facilities
- Bus Stop
- Car Parking
- No specified construction type

Cut and Cover

- Double Deck Box
- Twin Box
- Box
- U-Type
- Ventilation Shaft

NATM

- Pattern PA (Double Deck)
- Pattern PB (Double Deck)
- Pattern PC-1 (Twin)
- Pattern PC-2 (Twin)

TBM

- Double Deck Tunnel



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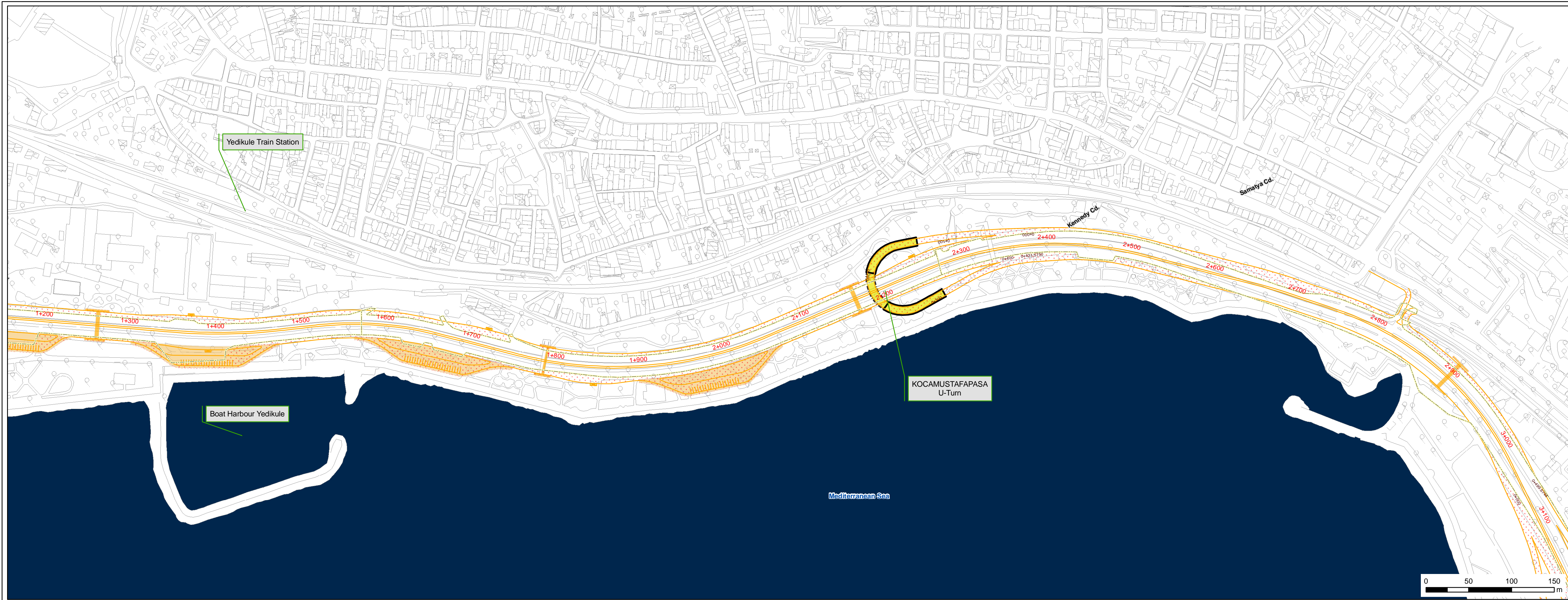
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Istanbul

Eurasia Road Tunnel

Detailed Project Design



Legend

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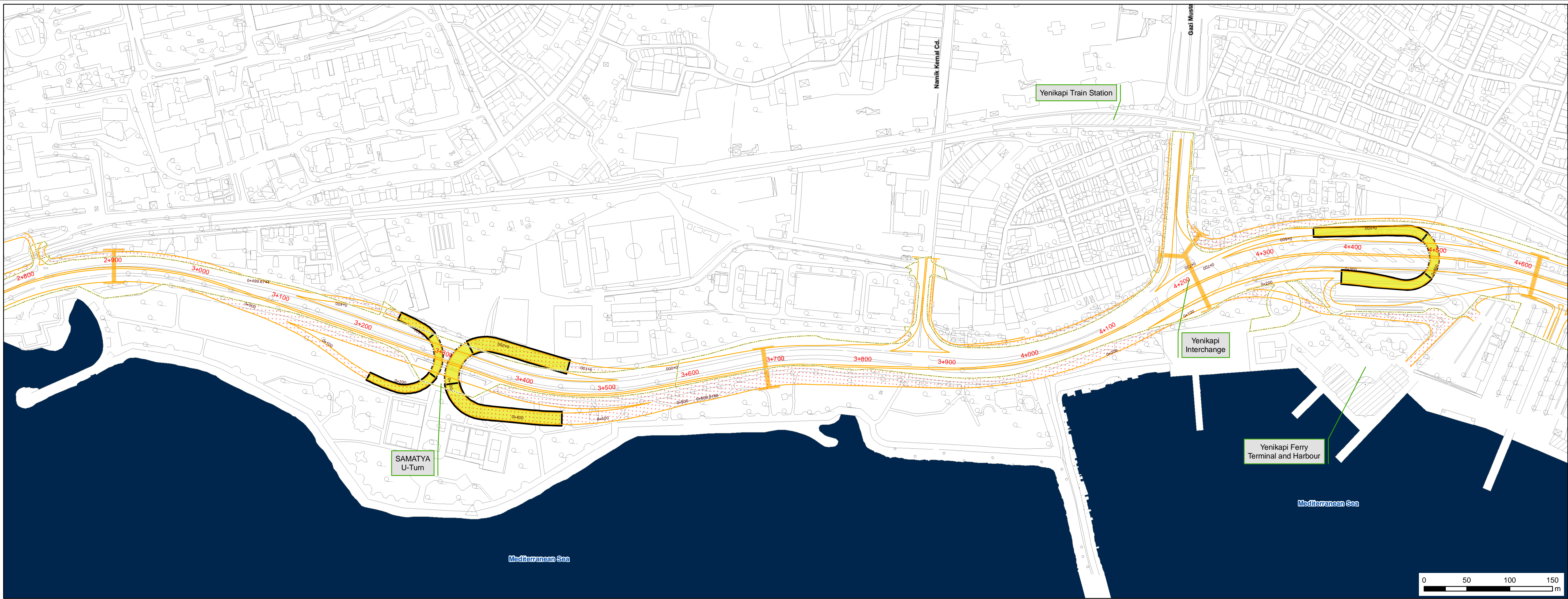
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Istanbul
Eurasia Road Tunnel
Detailed Project Design



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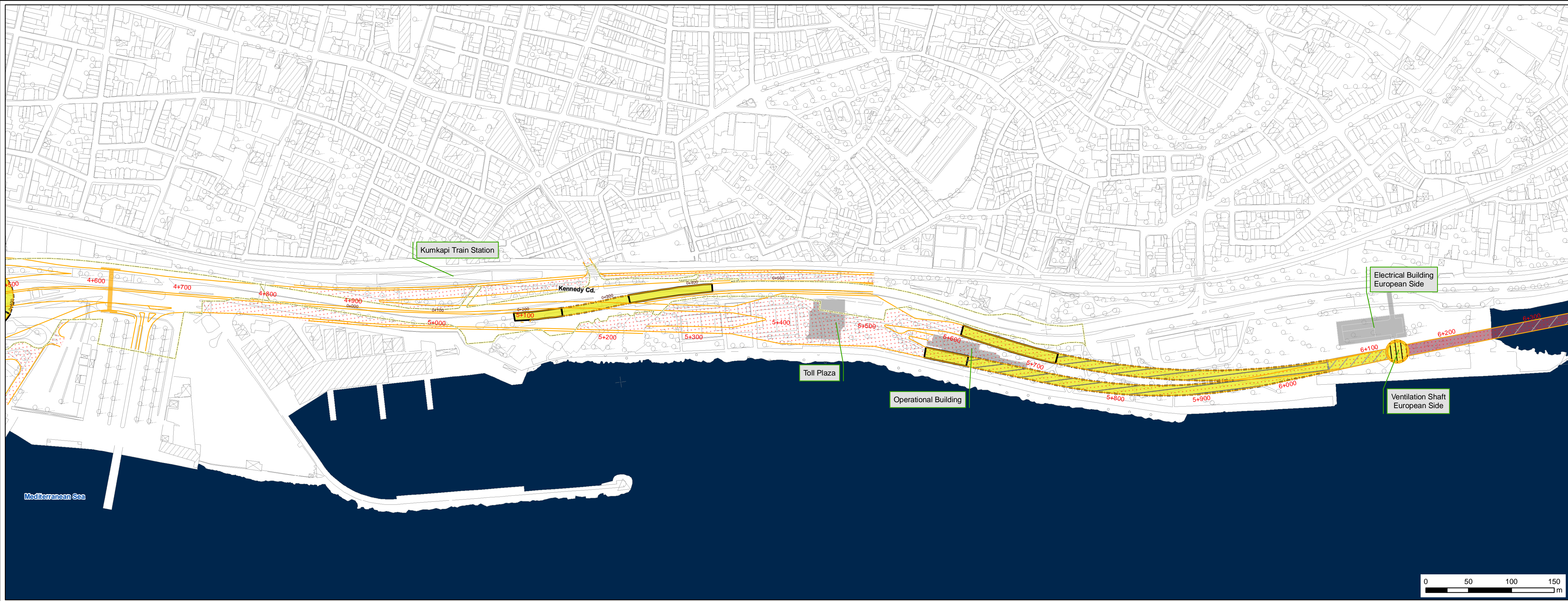
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Legend

- General Parcelling Map
- Boundary of existing road

Project Overview

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TBM

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Eurasia Road Tunnel

Detailed Project Design

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Legend

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- Boundary of existing road

Project Overview

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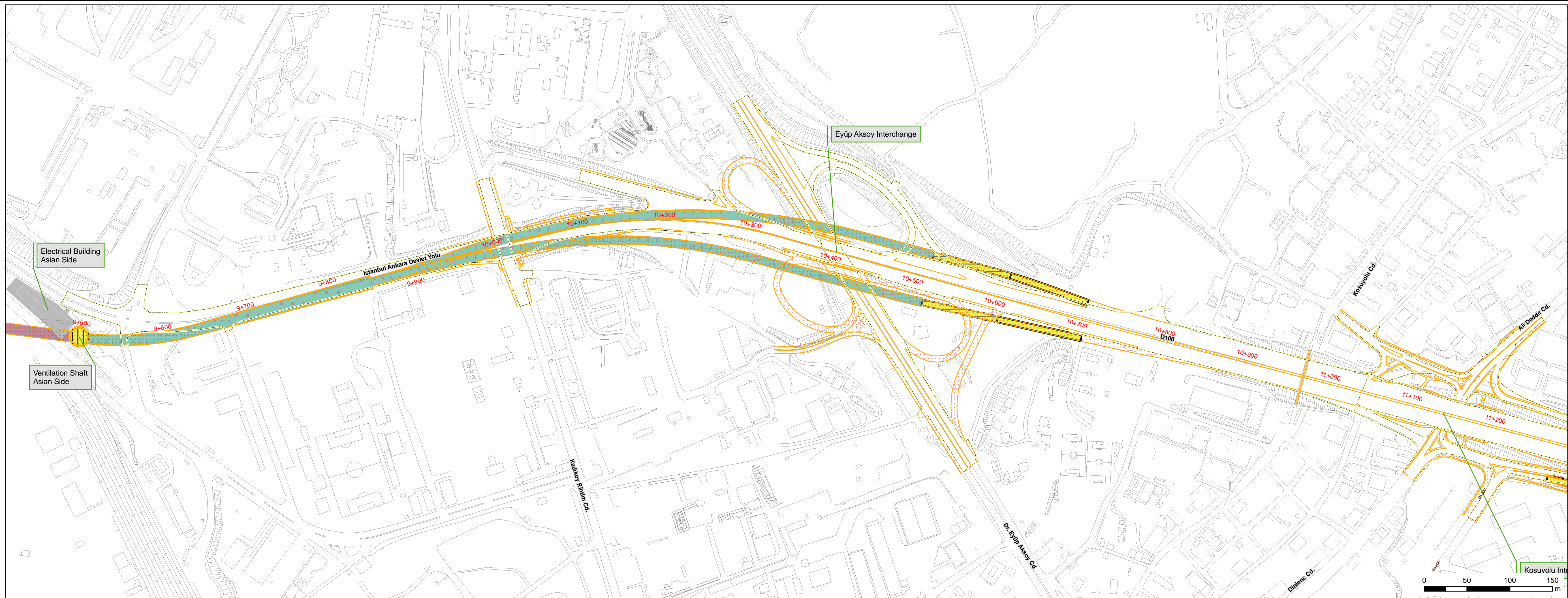
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Legend

- General Parcelling Map
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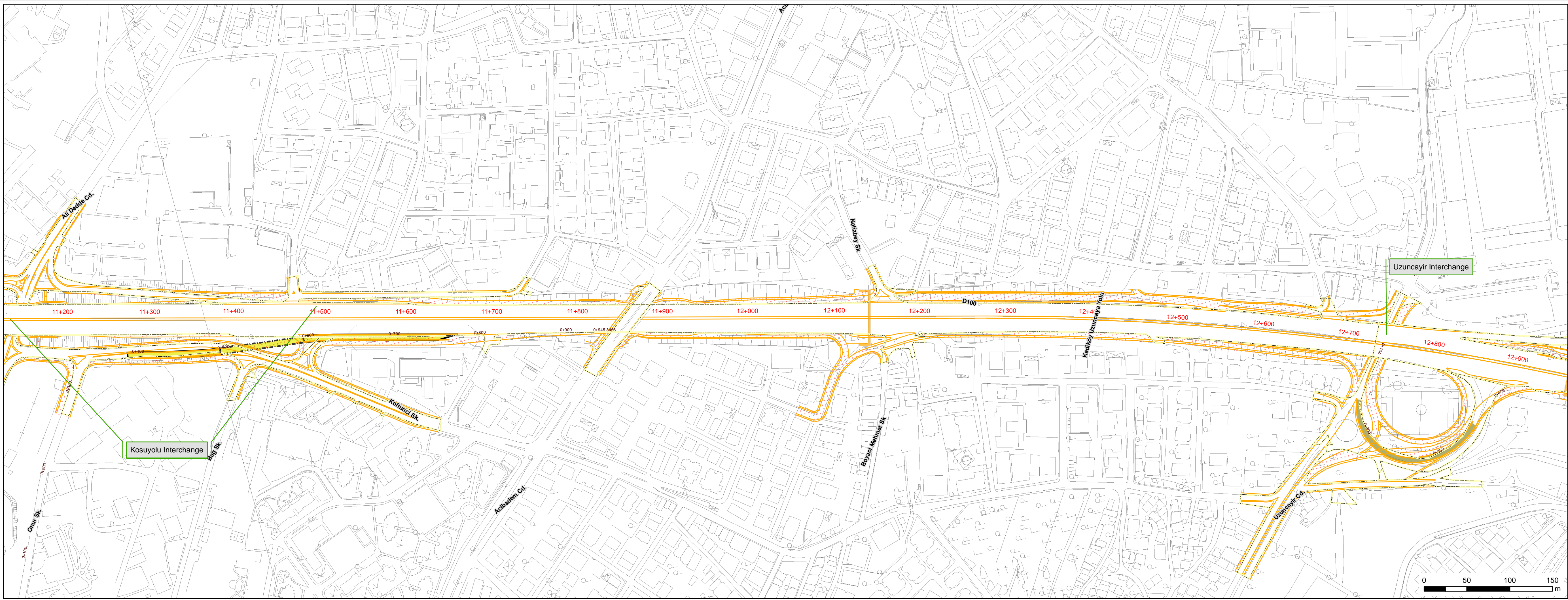
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Legend

- General Parcelling Map
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Project Overview

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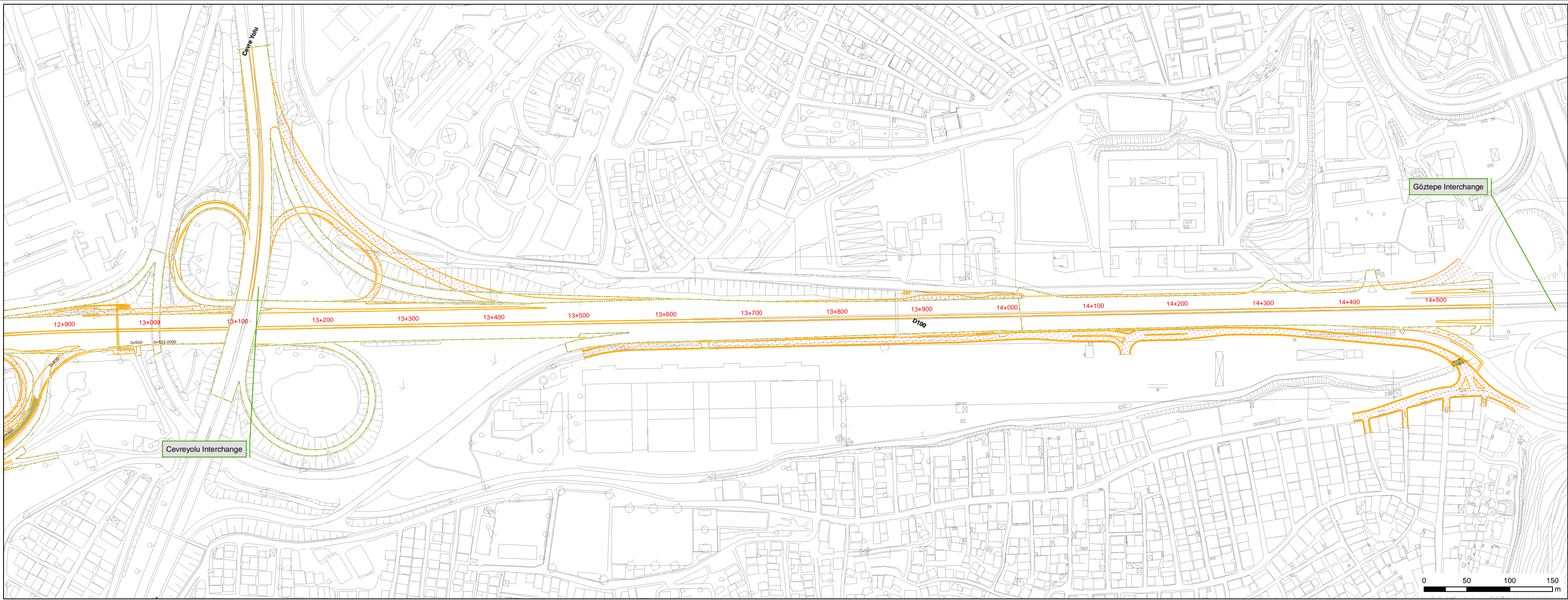
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Detailed Project Design

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Status: Draft	Annex: H-2.7



Legend

- General Parcelling Map
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Project Overview

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Istanbul

Eurasia Road Tunnel
Detailed Project Design

CONTENTS

Annex I

Land Use Maps



- Legend**
- Outline of the existing road
 - Project Alignment
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 - Subsurface Sections
 - Building to be expropriated
 - Building to be retained (pending mitigation approval)
 - Permanent change in land use
 - Land possibly to be expropriated
- Present Landuse**
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 - Commercial area
 - Mix Residential-Commercial area
 - Petrol station
 - Harbour, port, marina
 - Hospital
 - Industrial and manufacturing area
 - Market area
 - Monument
 - Public open space, park, garden
 - Parking
 - Public buildings and facilities
 - Sport facility
 - Existing pedestrian crossing
 - Cemetery
 - Warehouse and storage
 - Public transport facility
 - School, University, Kindergarten
 - Places of worship (Mosque/Church)
 - Wasteland
 - Unknown, vacant
 - Area under construction
- Important Points**
- Mosque
 - Church
 - Fishmarket
 - Historic Monument
 - Modern Monument
 - Playground
 - Petrol Station



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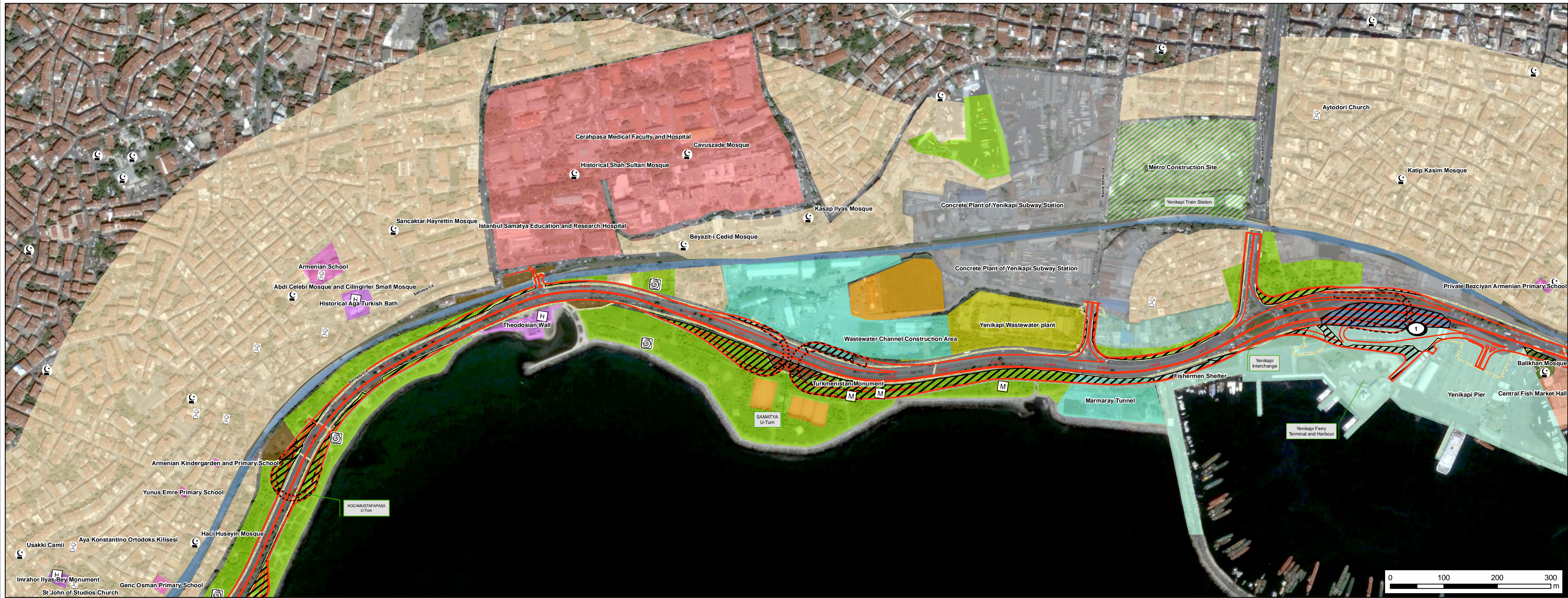
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Land Use

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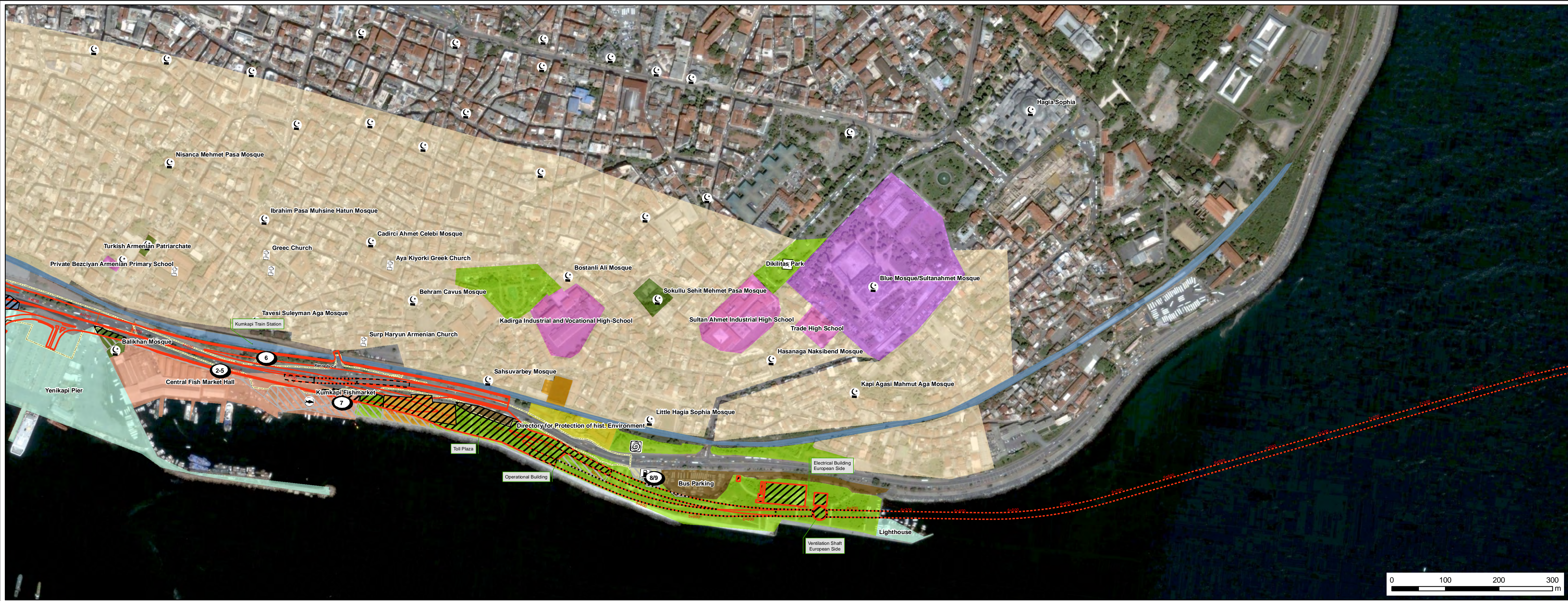


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Land Use			
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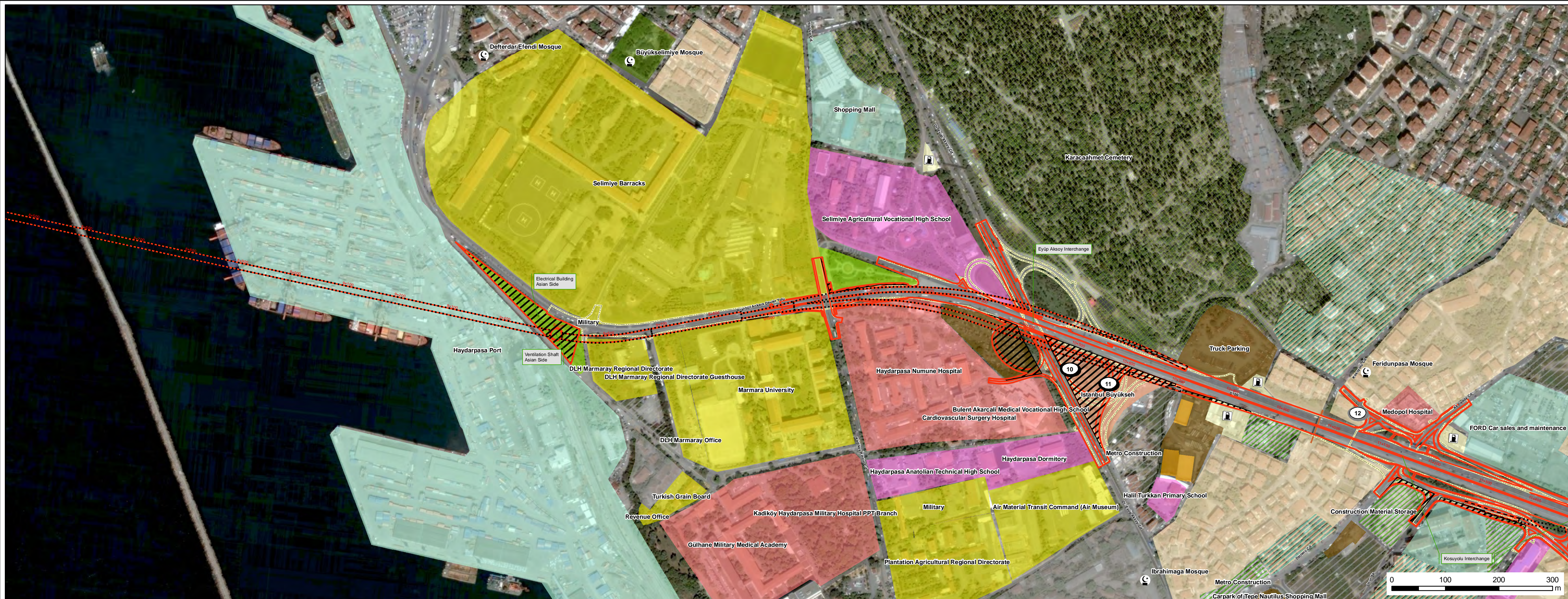
Istanbul
Eurasia Road Tunnel

Land Use

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appr. ML	10/03

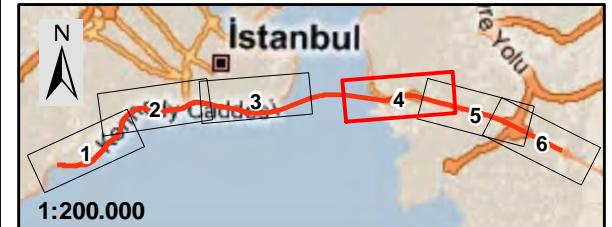
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- Legend**
- Outline of the existing road
 - Project Alignment
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 - Subsurface Sections
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 - Building to be retained (pending mitigation approval)
 - Permanent change in land use
 - Land possibly to be expropriated
- Important Points**
- Mosque
 - Church
 - Fishmarket
 - Historic Monument
 - Modern Monument
 - Playground
 - Petrol Station

- Present Landuse**
- Residential area
 - Commercial area
 - Mix Residential-Commercial area
 - Petrol station
 - Harbour, port, marina
 - Hospital
 - Industrial and manufacturing area
 - Market area
 - Monument
 - Public open space, park, garden
 - Parking
 - Public buildings and facilities
 - Sport facility
 - Existing pedestrian crossing
 - Cemetery
 - Warehouse and storage
 - Public transport facility
 - School, University, Kindergarten
 - Places of worship (Mosque/Church)
 - Wasteland
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 - Area under construction



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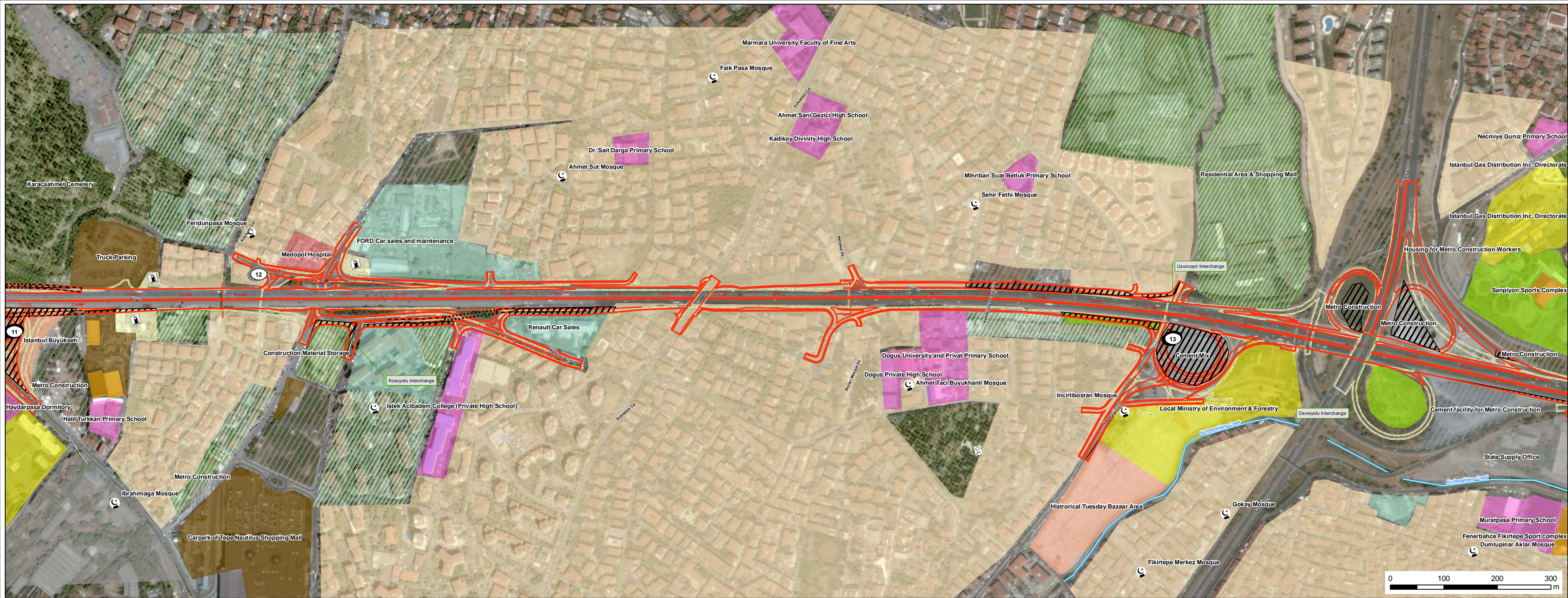
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Istanbul
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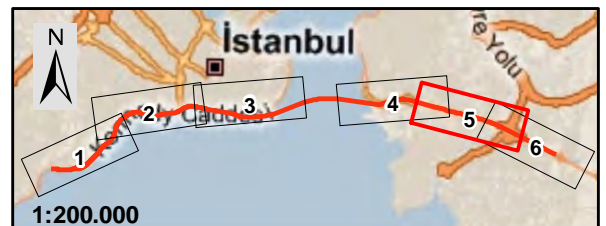
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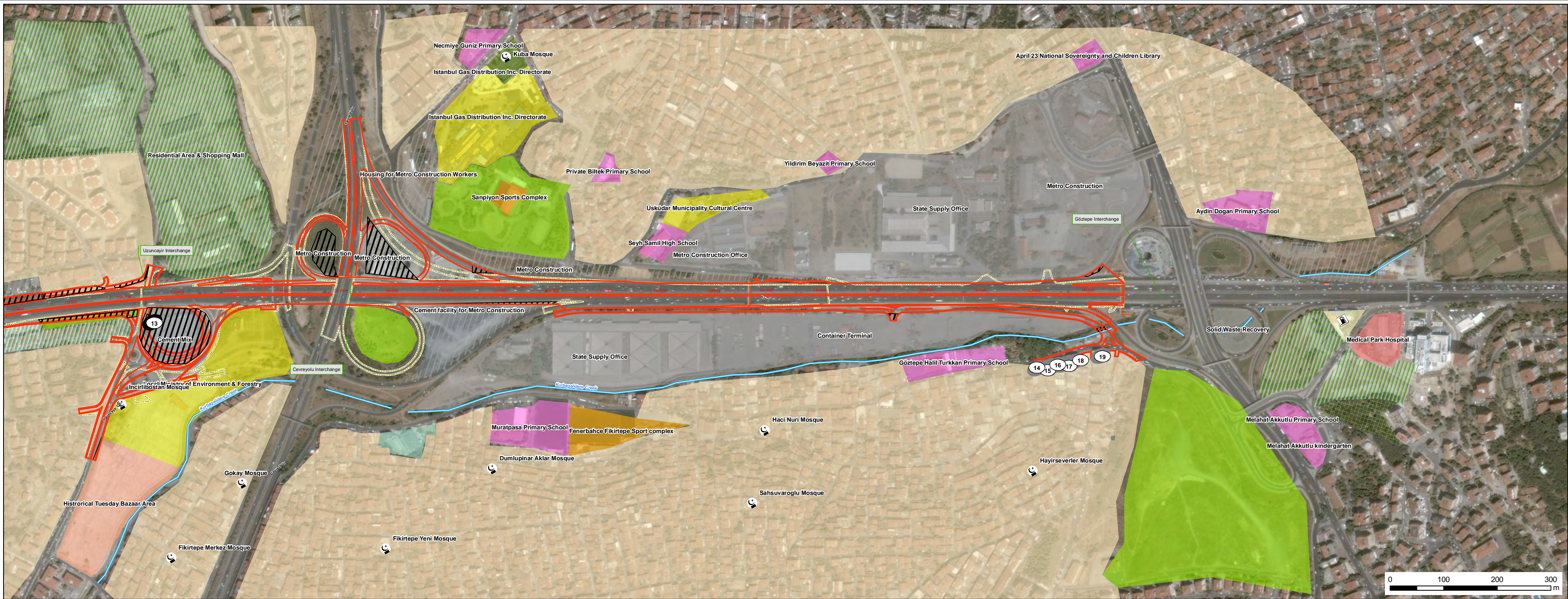
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Land Use

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Annex J

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J-1	Geology
J-2	Possible contaminated land
J-3.1 to J-3.8	Soil Boring Locations
J-4.1	Istanbul Surface Water Resources Map
J-4.2	Istanbul Lakes and Ponds Map

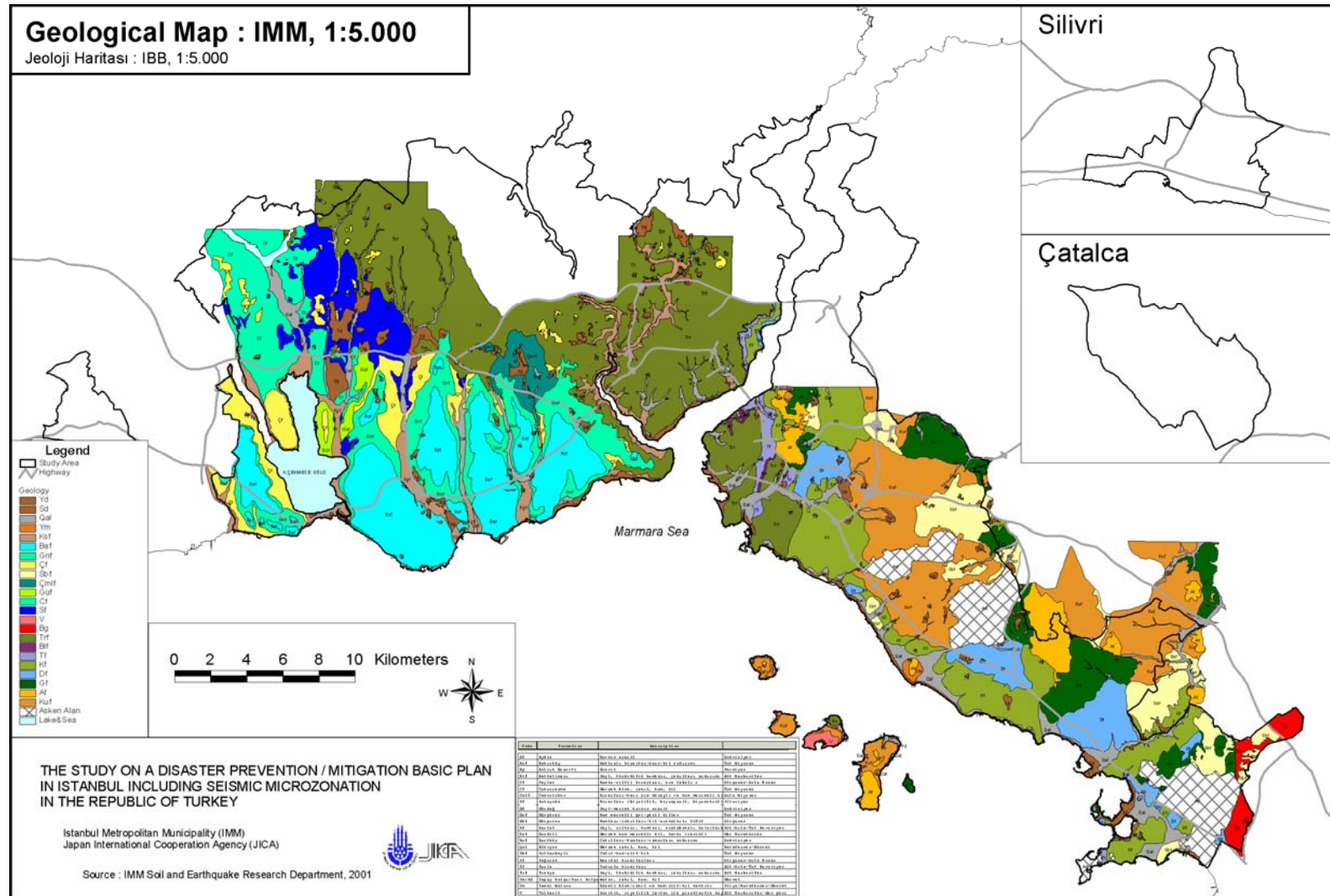
Stratigraphical Classification in Istanbul

AGE	GROUP	FORMATION	THICKNESS (m)	SYMBOL	DESCRIPTION
Current Quaternary - Current Late Quaternary (Holosen) Quaternary		Dolgu	30	Yd	Waste, Antique rubble and made grounds
		Alüvyon	15	Qa	Loose pebbles-sand- clays
		Kuşdili	70	Kşf	Clay with sand and pebble lenses
		Alüvyon Yelpazeleri	30	Q (Suf)	Loose boulders- pebbles-sands-clays
Upper Miocene	Halkalı	Bakırköy	40	Baf	Mactra -bearing limestone-marl-clay intercalation
Upper Miocene		Güngören	175	Gnf	Grey coloured clays with sand lenses
Upper Miocene		Çukurçeşme	50	Çf	Loose boulders- pebbles-sands-clays
Oligocene	Terkos	Karaburun / Gürpınar	900	Kbf / Güf	Conglomerates- limestones, marls, coal seams, tuffs/Tuffites sandstones, clays
Middle Eocene- Oligocene	Çatalca	Ceylan	50	Cef	Mudstone with marl and clastic limestone intercalations
		Soğucak	200	Sf	Reefal and fore-reef carbonates
		Hamamdere	600	Haf	Limestones-marl alternation
Upper Cretase- Lower Eocene	Darıca	Şemsettin/Sarı yer	300	Şf/Saf	Micrite-marl- mudstone-tuffie alternation - Andesite, basalts and agglomerate intercalation

AGE	GROUP	FORMATION	THICKNESS (m)	SYMBOL	DESCRIPTION
		Kutluca	56	Ktf	Limestones with Rudists
		Hereke Pudingi	75	Hpf	Micrites-Dolomitic limestones with dolomite intercalations
Triassic	Gebze	Tepecik	140	Tef	Halobian shales
		Hereke	800	Hf	Dolomitic limestones, limestones
		Erikli	40	Ef	Yellowish coloured sandy limestones and sandstones
		Kapaklı	1000	Kaf	Red continental clastics
		Kocatarla		Kof	Basalts
Lower Carboniferous	İstanbul	Trakya	1500	Trf	Grey shales with turbidite sandstone and conglomerates
Lower Carboniferous		Baltalimanı	30	Blf	Radiolarian black cherts
Middle-Upper Devonian		Tuzla	100	Tf	Nodular limestones
Lower-Middle Devonian		Kartal	750	Kf	Shales with calciturbidite intercalations
Silürian-Lower Devonian		Dolayoba	500	Df	Limestones (biyolitite, biosparite, biomicrite)
Middle Ordovisiyen		Gözdağ	700	Gf	Laminated grey shales with quartz arenite lenses
Middle Ordovisiyen		Aydos	310	Af	Quartz arenites with quartz conglomerate lenses
Lower Ordovisian		Kurtköy	150	Kuf	Lensoidal conglomerates-sanstones-shlaes

Source: Oktay F. Y., Eren R. H., 1994, Geology of Istanbul Megapolitan Area, Istanbul Greater City Municipality, Directorate of Reconstruction, Department of City Planning.

Figure F6. Geological Map (IMM, 1/5.000)



J-2

Possible contaminated land

EUROPEAN SIDE:

1: Kazlıçeşme tannery facilities:



2: Görürsan Makine Sanayi:



View from the side road:



View from the side road:



Main gate:




3: Old Gas Works



View from the seaside:





Part of the
Theodosian wall
the seaside.

4: Railway Maintenance Area (adjacent to the old gas works area):



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EURASIA TUNNEL, ISTANBUL, TURKEY	J-8
	FINAL REPORT



View from the seaside:



View from the seaside:



5: Petrol Ofisi (PO) fuel tank(s):

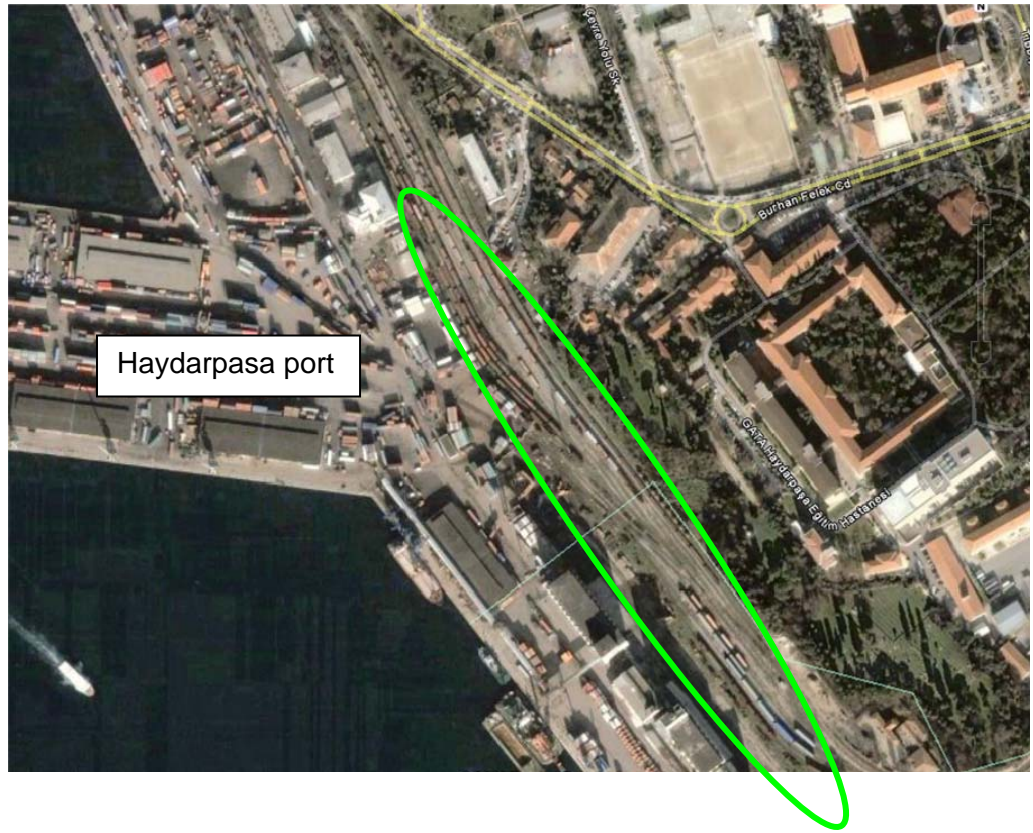


6: Petrol Ofisi (PO) Gasoline station:



ASIAN SIDE:

7: Haydarpasa port



8: Gasoline stations

Direction: to Harem, on the right side of the road:



Direction: to Göztepe, two adjacent gasoline stations opposite the above station:



9: Cement mix

Lafarge cement facility (adjacent to the road):



The second facility is the Nuh Cimento (adjacent to the road) after passing the Lafarge facility:



10: Automotive industry area:





- Legend**
- Project alignment
 - ⊕ Soil boring location



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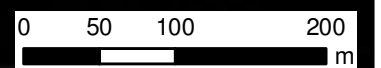
Soil Boring Locations

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Scale: 1:5.000

Status: Draft

Map: J-3.1



- Legend**
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 - Soil boring location



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Istanbul Eurasia Road Tunnel

Soil Boring Locations

Project No.: P0106067

Scale: 1:5.000

Status: Draft

Map: J-3.2



Legend

	Project alignment
	Soil boring location

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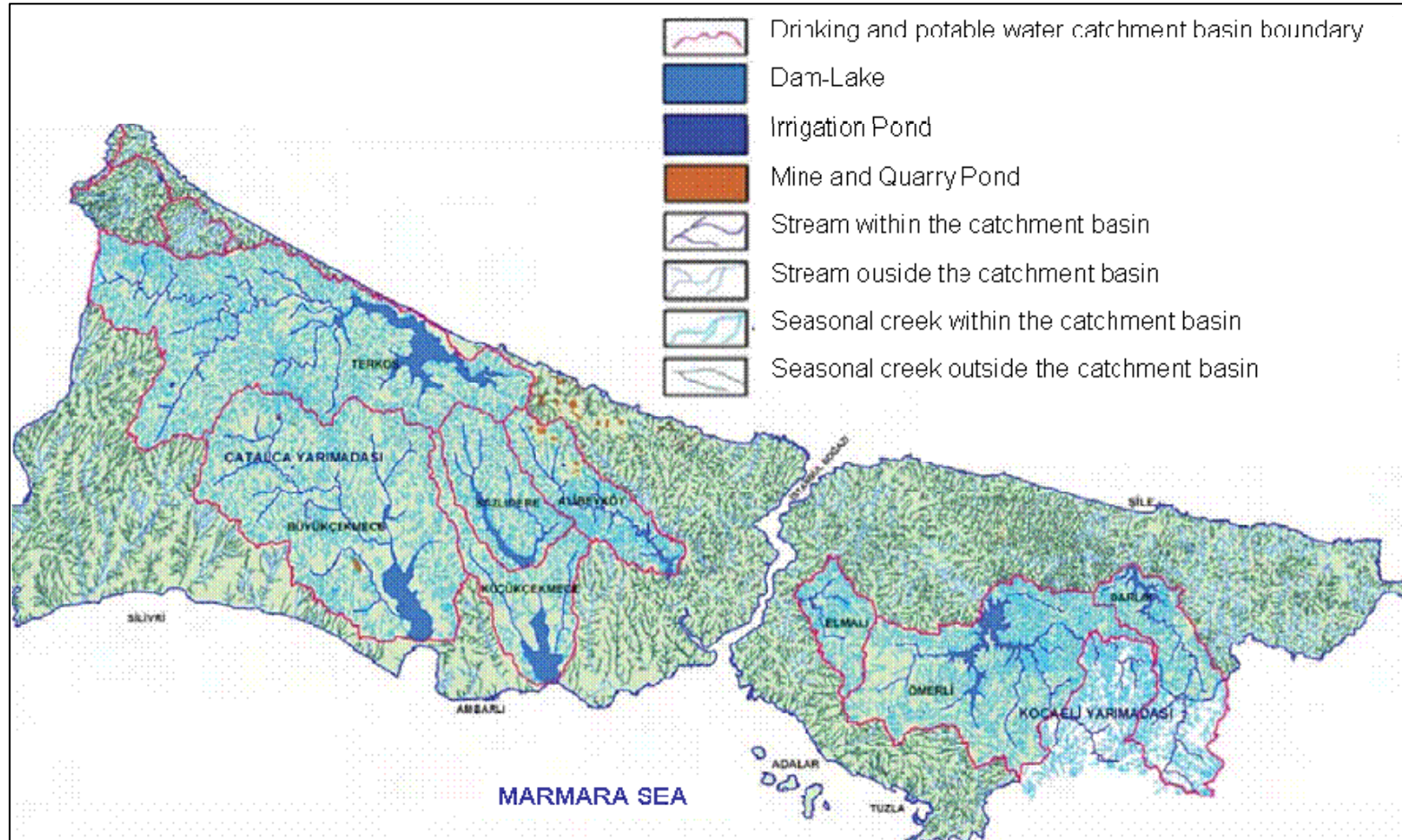
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Istanbul Eurasia Road Tunnel
Soil Boring Locations

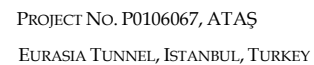
Project No.: P0106067
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Status: Draft
Map: J-3.3

Figure J-4.1. Istanbul Surface Water Resources Map

Source: İstanbul Province Environmental Status Report, 2007.



Source: İstanbul Province Environmental Status Report, 2007.



Annex K

Ambient Air Quality Measurements and Air Pollutant Dispersion Modelling including Climatic Factors

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K1 CLIMATIC FACTORS

1.1 GENERAL CLIMATIC CONDITIONS

In terms of climatic characterisation, Istanbul is located at the transition zone of the Oceanic and Mediterranean climates. Istanbul has many topographic diversities and experiences a variety of sub-climates. While the Bosphorus Strait and surroundings are dominated by the Mediterranean climate (dry summers, mild and rainy winters), the Black Sea climate prevails to the north (mostly rainy), the Balkan climate to the west (cold winters and snow) and the Anatolian Continental climate to the east (hot summers and cold winters). Summers are generally hot and humid; winters are cold, wet and often snowy. Spring and autumn are usually mild and wet but erratic, and the weather can range from chilly to warm, though the nights are normally chilly.

There are several meteorological stations located in the vicinity of the project site:

- Atatürk Airport Meteorological Station is located at 40°58'N and 28°49'E, 33 m above sea level (asl); about 22 km southwest of the centre of the European part of the scheme;
- Florya Station is located at 40°59'N and 28°47'E, 37 m asl; about 28 km west of the centre of the European part of the scheme;
- Göztepe Station is located at 40°58'N and 29°05'E, 33 m asl; about 10 km southeast of the centre of the Asian part of the scheme;
- Kartal Station (now closed) was located at 40°58'N and 29°03'E, 18 m asl; about 7 km south from the centre of the Asian part of the scheme.

Meteorological data on rainfall, temperature, relative humidity, and wind flow are described in following sections. Data from the Istanbul meteorological stations has been averaged over periods between 3 and 10 years depending on the available time frame. Due to a system change only limited past data from the relevant meteorological stations were suitable.

1.2 TEMPERATURE AND SUNSHINE

The average annual temperature is +15.7°C at Göztepe Station. At Florya Station it was +14.7°C, with, on average, a monthly minimum of +6.5°C / +5.7°C in January and a maximum of +25.9°C / +25.2°C in July (cf. Figure 1-1).

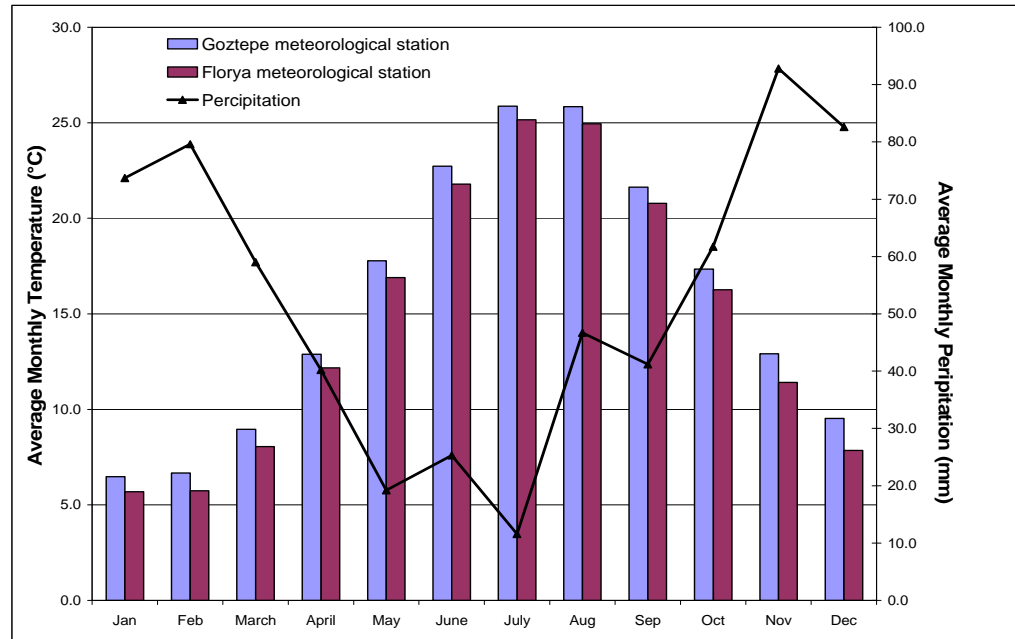
At Kartal Station a monthly minimum of +5.9°C in February, and a maximum of +23.8°C in July was recorded (cf. Table 1-1).

Table 1-1 *Average temperature and sunshine data for a period of 33 years at Kartal Station between 1975 and 2008*

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Average Temp (°C)	6.1	5.9	7.7	12.1	16.7	21.5	23.8	23.5	20.0	15.6	11.2	8.0
Average Maximum Temp (°C)	9.0	9.2	11.6	16.6	21.3	26.2	28.5	28.3	24.9	19.9	14.8	10.7
Average Minimum Temp (°C)	3.6	3.2	4.6	8.3	12.4	16.8	19.4	19.5	16.0	12.3	8.3	5.4
Average sunshine (hour)	2.3	3.1	4.6	6.0	8.0	9.8	10.5	9.4	7.9	5.2	3.3	2.2

Between 1999 and 2007, the average minimum and maximum temperatures recorded at Göztepe Station are -2.2°C in January and +35.3°C in August, respectively, with a minimum temperature of -6.4°C in January and a maximum temperature of 40.2°C in June. At Kartal Station, the average minimum and maximum temperatures between 1975 and 2008 were 3.6°C in January and 3.2°C in February and +28.5°C in July.

January is the coldest month at Göztepe and Florya and February in Kartal. Although the highest temperatures at Göztepe were measured in June, the hottest month of the 10 years average is August. The maximum temperature in the region can go up to 40°C.



Source: DEVLET METEOROLOJİ İŞLERİ GENEL MÜDÜRLÜĞÜ, Göztepe and Florya Meteorological Stations; 1999 – 2007

Figure 1-1 Monthly Average Temperature and Precipitation

With respect to the temperature data, the climate is classified as a hot climate, given an average annual temperature above 15°C. Temperatures below 0°C were reported for November and March.

The average monthly hours of sunshine range between 2.2 (Kartal) or 2.3 (Göztepe) hours in December and 10.5 (Kartal) and 11.7 (Göztepe) hours in July (cf. Table 1-1). The average annual sunshine duration is 6.8 hours. The monthly mean daily total global sun radiation can reach 430 kW/m².

1.3 PRECIPITATION AND SNOWFALL

The average annual precipitation in the region is 692 mm with average monthly precipitations ranging from 12 mm in July to 93 mm in November (cf. Table 1-2). As can be seen from Figure 1-1, there is a dry season between May and July, and a rainy season between October and February. During a 10 years observation, a maximum monthly precipitation of 250 mm was recorded in December at Göztepe Station and a monthly minimum of 0.1 mm in August. Istanbul on average experiences 152 days with precipitation per year. Summer is the driest season with July as the driest month (10 years average is 12 mm). Precipitation during summer is irregular and often torrential.

Table 1-2 summarizes the number of rainy days and precipitation at Kartal Station. Within this period, 38% of rainfall occurred in winter, 25% in spring, 12% in summer, and 25% in autumn.

Table 1-2 *Number of rainy days and amount of precipitation over a period of 33 years at Kartal Station (1975 – 2008)*

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Average number of rainy days	17.3	14.9	13.0	11.3	7.6	6.4	3.9	5.6	7.0	11.3	13.7	16.9
Average precipitation amount (mm)	83.9	64.9	58.8	45.3	30.2	25.7	24.7	31.8	35.9	72.4	89.6	101.3

Snowfall is observed in the region between November and March. A snow cover irregularly occurs and snow cover of more than 10 cm was registered for December, January and February. Maximum snow depth was measured as 40 cm in December 2001.

1.4 *PRESSURE, HUMIDITY AND EVAPORATION*

Maximum average pressure is observed in autumn and winter months in Istanbul. Table 1-3 shows the data of average vapour pressure and average relative humidity recorded at Göztepe Station over the period 1999 - 2006. The long-term average humidity is ranging between 69% in summer (June) and 80% in October.

Evaporation in the region of Istanbul is affected by the geographical situation comprising the Bosphorus Strait, the Marmara Sea, the Aegean Sea and the Black Sea. Average monthly evaporation observed in 2006 at Göztepe Station was 80 mm (April), 115 mm (May), 156 mm (June), 202 mm (July), 199 mm (August), 102 mm (September), 66 mm (October), and 3.4 mm (November).

Table 1-3 *Average vapour pressure and relative humidity observed 1999 - 2006 at Göztepe Station*

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Average Pressure (hPa)	1015	1013	10138	1010	1011	1010	1007	1008	1011	1015	1016	1016
Average Relative Humidity (%)	77.7	75.4	72.0	70.5	70.2	69.0	70.0	73.0	76.4	79.6	78.4	76.5

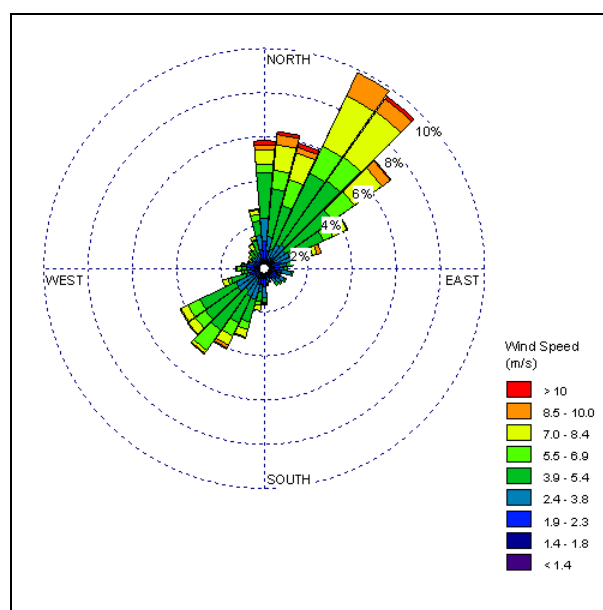
1.5

WIND CHARACTERISTICS

Wind flow in the Istanbul region is strongly affected by the location between the Aegean Sea to the southwest and the Black Sea to the northeast. In summertime, strong, dry north winds of the Aegean Sea, the so-called meltemi (Greek) or meltem (Turkish) are present at the region. The meltem is generally caused by deep continental depression centred over southwest Asia and blow from a direction between north-east and north-west depending on local topography. In addition, a Mediterranean wind from the Sahara, the so-called sirocco, blows as a strong southern wind over the Istanbul region. Furthermore, the wind directions recorded at the meteorological stations is influenced by the local topography.

For the Asian side, the prevailing wind direction at Göztepe Station is southwest (SW) with a north-easterly direction during four months of the year. Over a 10 years recording period, the average wind speed is in the range of 2.7 m/s (9.6 km/h) with a maximum wind speed of 25 m/s with north-north-eastern (NNE) direction recorded in December 2003.

On the European side, at Florya Station the prevailing wind direction is north-northwest or north-northeast throughout the year. The dominant wind direction at the Ataturk Airport station is northeast and north-northeast with abundance above 30% and wind speeds can be above 10 m/s (cf. Figure 1-2). A secondary maximum is the opposite wind coming from the southwest having an abundance of about 16%. Wind speed of the south-western winds occasionally reaches 8.5 m/s to 10 m/s. In 2009 the average wind speed was 4.5 m/s.



Data Source: DEVLET METEOROLOJİ İŞLERİ GENEL MÜDÜRLÜĞÜ, Atatürk Airport Meteorological Station 2009

Figure 1-2

Annual Average of Wind Direction and Wind Speed - Wind rose of Istanbul-Atatürk meteorological station (2001 - 2009 long-term average)

K2 *AMBIENT AIR QUALITY MEASUREMENTS AND AIR POLLUTANT DISPERSION MODELLING*

2.1 *INTRODUCTION*

This Annex provides results of the ambient air quality measurements and the dispersion modelling performed for the Eurasia Tunnel ESIA.

The Annexes structure is as follows:

1. Overview of national and international ambient air quality standards
2. Description and documentation of ambient air quality measurements
3. Air dispersion modelling – methodology and used data
4. Results of the air dispersion modelling

2.2 *NATIONAL AND INTERNATIONAL AMBIENT AIR QUALITY STANDARDS*

This section provides an overview of Turkish and international ambient air quality standards (cf. Table 2-1 and Table 2-2). Different standards and reference values are established for annual average and short-term ambient air concentrations. Annual (long-term) standards are specified to avoid cumulative effects on human health and/or the environment during long-term exposure. Short-term standards based on 1-hour, 8-hour, or 24-hour average concentrations are designed to avoid acute effects on human health caused by short exposures to high levels of a pollutant.

2.2.1 *Turkish Ambient Air Quality Standards*

Ambient air quality is regulated under the Air Quality Assessment and Management Regulation - AQEMR (Official Gazette Date/Number: 06.06.2008/26898). Annexes I and IA of the regulation specify air quality targets which are summarized in Table 2-1 below.

Table 2-1 Turkish Ambient Air Quality Standards (from 2014 on)

Substance	Concentration in $\mu\text{g}/\text{m}^3$		
	Hourly Average	Daily Average	Annual Average
Carbon monoxide (CO)	-	10 000 (daily and also for 8 hours periods)	10 000
Nitrogen dioxide (NO ₂) ⁽¹⁾	300 (200 from 2024 on)	-	60 (40 from 2024 on)
Sulphur dioxide (SO ₂) ⁽²⁾	500 (350 from 2019 on)	250 (125 from 2019 on)	150 (no long-term standard from 2019 on)
PM10 (airborne particles with aerodynamic diameter of 10 μm or less)	-	100 (50 from 2019 on)	60 (40 from 2019 on)

Source: Turkish Requirements as per AQEMR (Annexes I and IA)

2.2.2 International Ambient Air Quality Standards

References for international standards are the standards on ambient air quality published in the IFC General EHS Guidelines and in European Union Directives.⁽³⁾ The applicable standards are provided in Table 2-2.

Comparison of the Turkish air quality standards with those of the European Union shows that for CO, NO₂, and SO₂ the standards will be the same from 2014 on. The standard for PM10 will be the same from 2019 on.

¹ There is also a standard of 30 $\mu\text{g}/\text{m}^3$ for nitrogen oxides (NO_x) which applies to the protection of sensitive vegetation. This does not apply for city areas.

² For SO₂ a standard for the protection of ecosystems is specified. As for NO_x this standard is not applicable for the city area.

³ For the application of ambient air quality standards, it is important to note that assessing compliance with some ambient air quality standards requires use of a specific modelling approach. The European standards, for example, require modelling which predicts the number of exceedances of standards in a given time period as a statistical parameter.

Table 2-2 IFC and EU Ambient Air Quality Standards

Substance	Concentration in $\mu\text{g}/\text{m}^3$		
	Hourly Average	Daily Average	Annual Average
Carbon monoxide (CO)	-	10,000 ** (8 hour period)	-
Nitrogen dioxide (NO ₂) ⁽⁴⁾	200 (G)* 200** ⁽⁵⁾	-	40 (G)* 40 **
Sulphur dioxide (SO ₂) ⁽⁶⁾	500 (10 min)* 350** ⁽⁷⁾	125 / 50 / 20 (T1/T2/G)* 125**	-
PM10 (airborne particles with aerodynamic diameter of 10 μm or less)	-	150 / 100 / 75 / 50 (T1/T2/T3/G) * 50** ⁽⁸⁾	70 / 50 / 30 / 20 (T1/T2/T3/G) * 40**
Hydrocarbons (HC) Benzene	-	-	5 **

** IFC General EHS Guidelines, (IFC 2007): T1= IFC interim target-1; T2 = interim target-2; T3= interim target-3; G= Guideline value: The guideline values provided in the IFC General EHS Guidelines are adapted from the WHO Ambient Air Quality Guideline 2005. The guideline values cascade down from higher to lower levels indicated as 'interim-target 1' through 'interim-target 3', to end up at the 'guideline value' with the lowest concentration and highest ambient air quality. Interim-targets take into consideration that achievement of the guideline value in less developed countries requires long-term development and improvement effort.

** EU Council Directive 2008/50/EC on ambient air quality

⁴ There is also a standard of 30 $\mu\text{g}/\text{m}^3$ for nitrogen oxides (NO_x) which is applicable only for remote areas and ecosystems with no industries within about 30 km distance. Thus it is not applicable to the Project.

⁵ The NO₂ standard for 1-hour average may be exceeded up to 18 times per year.

⁶ For SO₂ a standard for the protection of ecosystems is specified. As for NO_x this standard is not applicable for the city area.

⁷ The SO₂ standard for 1-hour average may be exceeded up to 24 times per year.

⁸ The PM10 standard for daily average may be exceeded up to 35 times per year.

2.3 DESCRIPTION AND DOCUMENTATION OF AMBIENT AIR QUALITY MEASUREMENTS

2.3.1 Data from Existing Air Quality Monitoring Stations

For characterization of the current ambient air quality in the project area, monitoring data obtained at municipal ambient air quality measuring stations in 2009 are summarized in Table 2-3. The considered stations are:

- Istanbul-Aksaray: Situated at the European side on the historic peninsula at Ataturk Bulvari; substances monitored: CO, NO_x, PM10, SO₂
- Istanbul-Kadikoy: Situated on the Asian side south of D100 in residential area with major roads; substances monitored: CO, NO_x, PM10, SO₂, O₃
- Istanbul-Uskudar: Situated on the Asian side in a mixed city area north of the project area; substances monitored: CO, PM10, SO₂

Their locations are shown in Figure 2-1 and Figure 2-2. These stations are all in locations where evidence of air pollution is expected; there is no monitoring station operated in the Istanbul region for the determination of underlying background concentrations.

The air quality at the sampling locations is affected from all kind of emission sources: traffic, households, commercial enterprises, parking areas, and also background pollution from distant regional sources in and outside of Istanbul.

Table 2-3 *Ambient Air Quality Monitoring Data recorded in 2009 by Istanbul Municipality Operated Stations*

Substance	Station	Concentration		
		Hourly Average, maximum	Daily Average, maximum	Annual Average
Carbon monoxide (CO) in mg/m ³	Aksaray	16.8	2.9	0.83
	Kadikoy	40.5	3.4	0.62
	Uskudar	10.2	2.5	0.63
Nitrogen dioxide (NO ₂) in µg/m ³	Aksaray	1060	590	106
	Kadikoy	446	129	54
Nitrogen oxides (NO _x as NO ₂ equivalent) in µg/m ³	Aksaray	2170	1070	181
	Kadikoy	1490	523	104
Sulphur dioxide (SO ₂) in µg/m ³	Aksaray	210	116	11
	Kadikoy	150	22	5
	Uskudar	228	25	7
PM10 in µg/m ³ (airborne particles with aerodynamic diameter of 10 µm or less)	Aksaray	802	204	45
	Kadikoy	887	299	42
	Uskudar	521	150	37

Source: <http://www.havaizleme.gov.tr>

The monitoring data show some elevated levels and exceedances of the standards for 2014 ⁽⁹⁾. In summary:

- Standards for carbon monoxide are met at all locations.
- The measured hourly maximum for nitrogen dioxide (NO₂) exceeds the 2014 Turkish and the IFC/EU standards at Aksaray and Kadikoy; The current Turkish standard for NO₂ was also exceeded at Aksaray as were the 2014 Turkish standards for the maximum of the daily average and the annual average. At both stations the IFC and EU standards for annual average NO₂ were exceeded.
- Nitrogen oxides: NO_x standards refer to ecosystems and therefore are not applicable at the inner city locations of the above stations.

⁹ Reference is made to the standards for 2014 as the Project will start operation after this date.

- Sulphur dioxide: All Turkish and EU standards are met for SO₂. With reference to the IFC standards, the interim target T1 is met at Aksaray and T2 at the other two stations.
- Particulate matter: The monitored maximum daily average exceeded the 2014 Turkish standard as well as the IFC and EU standards at all stations. The 2014 Turkish standard for the annual average was slightly exceeded at Aksaray and Kadikoy. The IFC interim target T2 was met at all stations.

It has to be stressed that the maximum hourly and the maximum daily levels provided in the table are the single highest values of the year. However, such high levels may indicate local and short-term pollution episodes.

Comparison of the data with the IFC interim target values shows that achievement of the IFC guideline values in Turkey will require long-term development and improvement effort.

In general, an improvement in air quality can be expected to occur with steadily improving of vehicle engine technology and operation of exhaust emission control equipment. Emissions from domestic heating and cooking and industry should be reduced with replacement of old inefficient equipment and use of new emission control technology. Alongside these improvements, however, the predicted growth of Istanbul's population, households, traffic, and enterprises may work in the opposite direction.

2.3.2 *Passive Sampling of Nitrogen Dioxide (NO₂) and Sulphur Dioxide (SO₂)*

In order to obtain local data on ambient air quality a baseline monitoring survey was undertaken as part of the ESIA. The purpose of this sampling was to obtain indicative data regarding pollution levels at various locations along the scheme

Passive sampling was employed for the measurement of nitrogen dioxide (NO₂) and sulphur dioxide (SO₂). Sampling locations were selected along the project scheme and at offset locations in the build-up areas of Istanbul. The locations are shown in Figure 2-1 and Figure 2-2.

Passive air sampling of NO₂ and SO₂ was performed by means of diffusion samplers to receive information on long-term concentration along the alignment and in its vicinity.

The sampling tubes, which are specific to the compound being sampled, are designed to allow air to circulate by passive diffusion during long-term sampling (produced and analysed by Passam AG, Switzerland). Each tube contains a small quantity of a chemical that reacts with the subject substance in the air. The tubes are exposed to the ambient air for a certain period of time,

resealed and returned to the laboratory for determination of the average concentration during the sampling period.

For identification, each sampler was labelled with an individual sampler ID. The samplers were mounted outdoors on trees to provide a free exposure to the air stream. After exposure, the samples were sent to the laboratory and analysed for the content. From the content and knowledge of exposure duration, the concentration was determined by the laboratory. The results are provided below which shows the laboratory's documentation (cf. Figure 2-3). Table 2-4 summarizes the results with reference to the sampling location IDs.



Figure 2-1 Map of the sampling locations - European side



Figure 2-2 Map of the sampling locations - Asian side

Following - Data sheets of passive air sampling analyses:

passam ltd, CH-8708 Männedorf
www.passam.ch

STS Nr. 149

Nitrogen dioxide (NO₂) - Measurement by Diffusive Samplers

sampling method: diffusive sampler

analytical method: Saltzman SP01

ERM GmbH		period		25.11.2009	til	24.12.2009												
D- Neu-Isenburg		Date of analysis: 7.01.2010		blanc		0.008	color reagent: 16.12.2009		SR 9°C		ml/min		0.8536					
Site Code DERM	start date	time	end date	time	exposure time	code	value 1	absorption brutto code	value 2	code	value 3	concentration ug/m ³ value 1	value 2	value 3	mean ug/m ³	rel. SD %		
	25.11.2009	15:30	24.12.2009	16:30	697.00	1	0.465		2 x color reagent			55.4			55.4			
	25.11.2009	13:30	24.12.2009	15:00	697.50	2	0.437			2 x cr		53.2			53.2			
	25.11.2009	10:00	24.12.2009	11:40	697.67	3	0.553			2 x cr		67.6			67.6			
	25.11.2009	12:30	23.12.2009	13:30	673.00	4	0.375			2 x cr		47.1			47.1			
	25.11.2009	16:45	23.12.2009	12:45	668.00	5		sampler dirty, unmeasurable										
	24.11.2009	16:00	24.12.2009	11:00	715.00	6	0.533			2 x cr		63.5			63.5			
	25.11.2009	09:00	24.12.2009	17:30	704.50	7	0.012			2 x cr		0.3			0.3			
	25.11.2009	15:30	23.12.2009	11:15	667.75	8	0.790			2 x cr		101.4			101.4			
	25.11.2009	13:45	23.12.2009	10:00	668.25	10	0.406			2 x cr		51.5			51.5			
	25.11.2009	18:00	23.12.2009	10:30	664.50	11	0.800	cobweb		2 x cr		103.2			103.2			
	25.11.2009	13:00	24.12.2009	14:00	697.00	12	0.378			2 x cr		45.9			45.9			
	25.11.2009	16:00	23.12.2009	11:30	667.50	13	0.828			2 x cr		106.4			106.4			
	25.11.2009	14:30	23.12.2009	09:45	667.25	14	0.620			2 x cr		79.4			79.4			
	24.11.2009	16:30	24.12.2009	11:20	714.83	15	0.534			2 x cr		63.6			63.6			
	25.11.2009	12:00	24.12.2009	13:00	697.00	16	0.353			2 x cr		42.7			42.7			
	24.11.2009	16:35	24.12.2009	11:25	714.83	17	0.487			2 x cr		57.9			57.9			
	25.11.2009	15:00	24.12.2009	16:00	697.00	18	0.541			2 x cr		66.1			66.1			
	25.11.2009	13:30	23.12.2009	14:30	673.00	19	0.654			2 x cr		83.1			83.1			
	25.11.2009	15:00	23.12.2009	11:00	668.00	20	0.676			2 x cr		86.6			86.6			
	25.11.2009	10:25	24.12.2009	12:05	697.67	21	0.475			2 x cr		57.9			57.9			
	25.11.2009	14:45	23.12.2009	09:30	666.75	22	0.017	sampler wet inside		2 x cr		1.0			1.0			
	25.11.2009	12:45	23.12.2009	12:15	671.50	23	0.486			2 x cr		61.6			61.6			
	25.11.2009	10:20	24.12.2009	12:00	697.67	24	0.522			2 x cr		63.7			63.7			
	25.11.2009	17:15	23.12.2009	13:00	667.75	25	0.493			2 x cr		62.8			62.8			
	24.11.2009	15:30	24.12.2009	10:30	715.00	26	0.550			2 x cr		65.6			65.6			
	25.11.2009	12:00	23.12.2009	12:00	672.00	27	0.429			2 x cr		54.1			54.1			
	25.11.2009	11:00	24.12.2009	12:20	697.33	28	0.473			2 x cr		57.7			57.7			
	25.11.2009	12:30	23.12.2009	13:45	673.25	30	0.476			2 x cr		60.1			60.1			
	25.11.2009	14:00	24.12.2009	15:30	697.50	60	0.465			2 x cr		55.4			55.4			

Date of arrival: 29.12.2009

The values are representative for the immediate measuring site only. Conclusions to remote points with reservation.
These data are part of a long-term measuring serie and it is not allowed to publish partly without permission of passam ltd.

Detection limit 0.4 ug/m³ 14 days

Estimate of uncertainty: www.passam.ch/products.htm

DERM010901.xls
approved 31.01.2005

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Exit 18.03.2010

QC-coordinator
Dr. M. Hangartner

Nitrogen dioxide (NO₂) - Measurement by Diffusive Samplers

sampling method: diffusive sampler

analytical method: Saltzman SP01

ERM GmbH

period

23.12.2009

ti

20.01.2010

D- Neu-Isenburg

Date of analysis: 26.01.2010

blanc

0.008

color reagent: 15.01.2010

SR 9°C

ml/min

0.8536

[illegible]

Date of arrival: 25.01.2010

Detection limit	0.4	ug/m ³	14 days
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The values are representative for the immediate measuring site only. Conclusions to remote points with reservation.
These data are part of a long-term measuring serie and it is not allowed to publish partly without permission of passam ltd.

Estimate of uncertainty www.passam.ch/products.htm

DERM011001.xls
approved 31.01.2005

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Exit 18.03.2010

QC-coordinator
Dr. M. Hangartner

Nitrogen dioxide (NO₂) - Measurement by Diffusive Samplers

sampling method: diffusive sampler

analytical method: Saltzman SP01

ERM GmbH

period

21.01.2010

til

17.02.2010

D- Neu-Isenburg

Date of analysis: 22.02.2010

blanc

0.008

color reagent: 2.02.2010

SR 9°C

ml/min

0.8536

[illegible]

Date of arrival: 22.02.2010

Detection limit

0.4 $\mu\text{g}/\text{m}^3$ 14 days

The values are representative for the immediate measuring site only.

Conclusions to remote points with reservation.

Estimate of uncertainty www.passam.ch/products.htm

These data are part of a long-term measuring serie and it is not allowed to publish partly without permission of passam ltd.

DERM011002.xls
approved 31.01.2005

page 1 of 1

Exit 18.03.2010

QC-coordinator
Dr. M. Hangartner

Sulfure dioxide (SO₂) - Measurement by Diffusive Samplers

sampling method: diffusive sampler

analytical method: ion chromatography SP10

ERM GmbH

Period

25.11.2009 ti

til 23.12.2009

20°C

D. Neukirchen

Date of analysis: 05.01.2010

blank (ppm)

0.05

volume [ml]

4

sampling rate

11.9 mL/min

20°C

Site Code	DERM	start date	time	end date	time	exposure time	code	value 1	quantity SO _x	[ppm]	volume	4	sampling rate	concentration SO ₂	[µg/m³]	mean ug/m³	rel. SD %
		25.11.2009	12:00	23.12.2009	12:00	672.0	31	1.238						6.6		6.6	
		25.11.2009	15:00	24.12.2009	16:00	697.0	32	1.075						5.5		5.5	
		25.11.2009	15:30	24.12.2009	16:30	697.0	33	1.405						7.3		7.3	
		25.11.2009	17:15	23.12.2009	13:00	667.8	34	0.771						4.0		4.0	
		24.11.2009	16:35	24.12.2009	11:25	714.8	35	1.546						7.8		7.8	
		25.11.2009	13:30	24.12.2009	15:00	697.5	36	1.279						6.6		6.6	
		25.11.2009	10:25	24.12.2009	12:05	697.7	37	1.501						7.8		7.8	
		25.11.2009	13:45	23.12.2009	10:00	668.3	38	1.482						8.0		8.0	
		25.11.2009	12:45	23.12.2009	12:15	671.5	39	1.756						9.5		9.5	
		25.11.2009	11:00	24.12.2009	12:20	697.3	40	2.025						10.6		10.6	
		25.11.2009	12:30	23.12.2009	13:30	673.0	41	1.691						9.1		9.1	
		25.11.2009	13:00	24.12.2009	14:00	697.0	42	1.179						6.1		6.1	
		24.11.2009	15:30	24.12.2009	10:30	715.0	43	0.849						4.2		4.2	
		25.11.2009	13:30	23.12.2009	14:30	673.0	44	2.321						12.6		12.6	
		25.11.2009	16:00	23.12.2009	11:30	667.5	45	2.575						14.1		14.1	
		25.11.2009	15:00	23.12.2009	11:00	668.0	46	1.464						7.9		7.9	
		25.11.2009	14:00	24.12.2009	15:30	697.5	48	1.680						8.7		8.7	
		25.11.2009	12:00	24.12.2009	13:00	697.0	49	0.938						4.8		4.8	
		25.11.2009	10:00	24.12.2009	11:40	697.7	50	2.255						11.8		11.8	
		25.11.2009	15:30	23.12.2009	11:15	667.8	51	5.086						28.2		28.2	
		24.11.2009	16:00	24.12.2009	11:00	715.0	52	1.467						7.4		7.4	
		25.11.2009	18:00	23.12.2009	10:30	664.5	53	2.242						12.3		12.3	
		25.11.2009	16:45	23.12.2009	12:45	668.0	54	samplers were found on the ground, unmeasurable									
		25.11.2009	09:00	24.12.2009	17:30	704.5	55	1.587		Filter was wet			8.2			8.2	
		25.11.2009	14:45	23.12.2009	09:30	666.8	56	0.874		samplers were found on the ground			4.6			4.6	
		25.11.2009	10:20	24.12.2009	12:00	697.7	57	1.871					9.8			9.8	
		24.11.2009	16:30	24.12.2009	11:20	714.8	58	2.378					12.2			12.2	
		25.11.2009	12:30	23.12.2009	13:45	673.3	59	1.465					7.9			7.9	
		25.11.2009	14:30	23.12.2009	09:45	667.3	60	2.920					16.1			16.1	

Arrival date: 29.12.2009

detection limit	0.3 $\mu\text{g}/\text{m}^3$	14 days
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The values are representative for the immediate measuring site only. Conclusions to remote points with reservation.

uncertainty www.passam.ch/products.htm

These data are part of a long-term measuring serie and it is not allowed to publish partly without permission of passam Ltd

DERM100901.xls
approved 21.01.2009

page 1 of 1

Exit 18.03.2010
QA coordinator
Dr. M. Hangartner

Sulfure dioxide (SO₂) - Measurement by Diffusive Samplers

sampling method: diffusive sampler

analytical method: ion chromatography SP10

ERM GmbH

Period 24.12.2009 til 21.01.2010

D. Neu-Isenburg

Date of analysis: 26.01.2010

blank (ppm)

0.05

volume [ml]

4

sampling rate

11.9 ml/min

20°C

[illegible]

Arrival date: 25.01.2010

detection limit	0.3 $\mu\text{g}/\text{m}^3$	14 days
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The values are representative for the immediate measuring site only. Conclusions to remote points with reservation.

uncertainty www.passam.ch/products.htm

These data are part of a long-term measuring serie and it is not allowed to publish partly without permission of passan Ltd

DERM101001.xls
approved 21.01.2008

page 1 of 1

Exit 18.03.2010
QA coordinator
Dr. M. Hangartner

Table 2-4 Summary of Passive Sampling Results

	Nitrogen dioxide (NO ₂) (µg/m ³) and sampler ID for the Laboratory in ()					Sulphur dioxide (NO ₂) (µg/m ³) and sampler ID for the Laboratory in ()				
	November 24 – December 24, 2009	December 24, 2009 - January 20, 2010	January 20 – February 19, 2010	Average concentration in µg/m ³ for the measuring period*		November 24 – December 24, 2009	December 24, 2009 - January 20, 2010	January 20 – February 19, 2010	Average concentration in µg/m ³ for the measuring period*	
European Side										
Along the scheme/existing road										
Location 1	64 (6)	63 (49)	n.a.		63	7 (52)	9 (23)	n.a.		8
Location 2	64 (15)	n.a.	72 (62)		68	12 (58)	n.a.	8 (65)		10
Location 2b	58 (17)	n.a.	n.a.		58	8 (35)	n.a.	n.a.		8
Location 3	68 (3)	n.a.	n.a. (87)		68	12 (50)	n.a.	n.a. (64)		12
Location 4	64 (24)	59 (42)	68 (78)		64	10 (57)	15 (1)	13 (85)		13
Location 4b	58 (21)	n.a.	67 (72)		62	8 (37)	n.a.	15 (77)		11
Location 5	58 (28)	51 (63)	71 (69)		60	11 (40)	9 (11)	9 (81)		10
Location 6	n.a.	67 (35)	88 (65)		78	n.a.	14 (3)	26 (80)		20
North of the scheme, city area										
Location 7	66 (26)	61 (54)	68 (61)		65	4 (43)	7 (17)	n.a. (78)		6
Location 8	55 (1)	70 (34)	76 (80)		67	7 (33)	9 (14)	8 (72)		8
Location 9	66 (18)	91 (40)	97 (71)		85	6 (32)	11 (25)	12 (70)		10
Location 10	55 (60)	72 (33)	n.a.		64	9 (48)	10 (28)	13 (67)		11
Location 11	53 (2)	n.a.	85 (90)		69	7 (36)	n.a.	15 (83)		11
Location 12	43 (16)	59 (32)	67 (73)		56	5 (49)	10 (2)	13 (73)		9
Location 13	46 (12)	62 (38)	n.a.		54	6 (42)	13 (12)	n.a. (69)		10
Location 14	47 (4)	61 (46)	53 (76)		54	9 (41)	13 (22)	13 (76)		12
Asian side										
Along the scheme/existing road										
Location 21	79 (14)	50 (41)	83 (64)		71	16 (60)	16 (6)	n.a. (62)		16
Location 22	83 (19)	75 (39)	78 (70)		79	13 (44)	17 (30)	13 (61)		14
Location 23	87 (20)	89 (37)	81 (67)		85	8 (46)	12 (26)	10 (82)		10
Location 24	101 (8)	87 (59)	98 (82)		95	28 (51)	18 (15)	9 (66)		18
Location 25	106 (13)	95 (31)	100 (74)		100	14 (45)	11 (10)	64 (89)		30
Location 26	n.a.	103 (57)	n.a. (88)		103	n.a.	18 (29)	n.a. (88)		18

	Nitrogen dioxide (NO ₂) (µg/m ³) and sampler ID for the Laboratory in ()					Sulphur dioxide (NO ₂) (µg/m ³) and sampler ID for the Laboratory in ()				
	November 24 – December 24, 2009	December 24, 2009 - January 20, 2010	January 20 – February 19, 2010	Average concentration in µg/m ³ for the measuring period*		November 24 – December 24, 2009	December 24, 2009 - January 20, 2010	January 20 – February 19, 2010	Average concentration in µg/m ³ for the measuring period*	
North of the scheme, city area										
Location 27	n.a.	69 (50)	72 (79)	71		5 (56)	6 (8)	9 (79)	6	
Location 28	60 (30)	53 (58)	62 (84)	58		8 (59)	6 (16)	7 (86)	7	
Location 28b	n.a.	52 (47)	n.a.	52		n.a.	5 (18)	n.a.	5	
Location 29	63 (25)	65 (43)	79 (89)	69		4 (34)	4 (20)	7 (87)	5	
South of the scheme, city area										
Location 30	52 (10)	56 (55)	65 (86)	58		8 (38)	10 (7)	14 (74)	11	
Location 31	103 (11)	93 (45)	103 (77)	100		12 (53)	11 (24)	71 (84)	31	
Location 32	62 (23)	73 (48)	n.a. (75)	67		10 (39)	10 (19)	n.a. (63)	10	
Location 33	54 (27)	65 (36)	56 (68)	58		7 (31)	8 (21)	13 (71)	9	
Monthly range (min – max)	43 – 106	50 – 103	53 – 103	52 - 103		4 – 28	4 – 18	7 – 71	5 – 31	
Monthly average	64	70	78	70		9.3	10.7	17.1	12	

n.a. – no analysis; e.g. sample lost, dirty

* Some samples were not analyzed since lost or found dirty. In these cases the average is based on less than three months.

Some of the samplers got lost (taken off by animals or children) or were dirty when they fell on the ground.

At three sample locations, a second sampler was mounted in order to obtain a figure for the variance and reliability of the measurements. From these results, the uncertainty for NO₂ measurements can be estimated to be about 3 µg/m³ and 2 µg/m³ for SO₂.

The results of the passive sampling for NO₂ show concentrations along Kennedy Caddesi of between 50 and 70 µg/m³. Away from the main road the values vary from 40 up to 100 µg/m³. The overall average of the European measurements is about 65 µg/m³. The lowest concentrations were obtained at sampling locations 12 to 14. Since these locations were least affected by traffic, the respective average of 54 µg/m³ is taken as a conservative background value for areas unaffected by local traffic along the European part of the scheme.

For the Asian side, the measurements at the existing highway are more elevated, ranging between 50 and 106 µg/m³, and with an average of about 87 µg/m³. The offset measurements revealed results comparable to the European side except at Location 31 which was situated near the railway terminal. This appears to have been a local hotspot, maybe due to railway engine operation or other sources. For the Asian side, the lowest concentrations were obtained at sampling locations 28, 30 and 33. The respective average of 58 µg/m³ is therefore taken as the background value for the Asian part of the scheme.

The single SO₂ measurements show a wide range between 5 and 70 µg/m³. For the European side, the average is about 10 µg/m³ for both the Kennedy Caddesi and the offset locations.

On the Asian side, again, the concentrations along the highway were higher with an average of 16 µg/m³. For sampling locations offset to the North the average is 6 µg/m³ and about 10 µg/m³ to the South, indicating a background value of approximately 8 µg/m³. Again, Location 31 shows a relatively high concentration in one measurement.

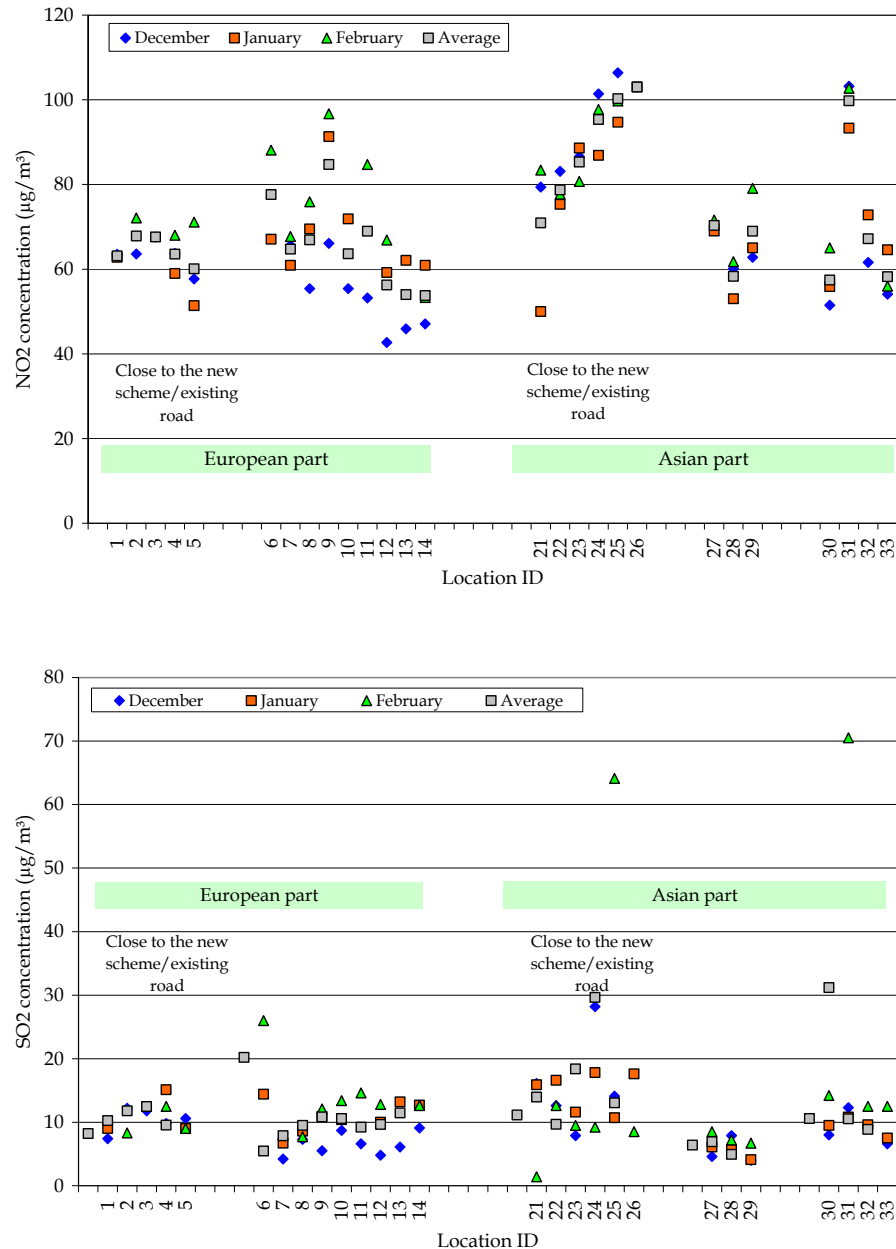


Figure 2-4 Results of NO₂ and SO₂ passive sampling (NO₂ above, SO₂ below)

2.3.3 Active Sampling of PM₁₀, Nitrogen Dioxide (NO₂), and Sulphur Dioxide (SO₂)

In addition to the passive sampling, spot samples for particulate matter (PM₁₀), NO₂ and SO₂ were taken by means of an active sampling device at four locations in the general vicinity of the proposed tunnel portals. For active sampling, air is actively pumped through the equipment and analysed for the pollutants of interest by specific methods; e.g. fluorescence spectrometry. The pumping allows for higher volume flows and thus higher quantities of pollutants for analysis which is required for short-term measurements.

The four locations selected for the sampling are shown in Figure 2-1 and Figure 2-2. The locations were

- at the European part of the scheme (major types of sources):
 - #101 - Kumkapi fish market, 60 m south of Kennedy Cd (traffic, market, parking)
 - #102 - Kumkapi coastline, 100 m south of Kennedy Cd (traffic, parking, gas station)
- at the Asian part of the scheme:
 - #103 - Kirmizi Beyaz parking, intersection with Dr. EyüpAksoy; 120m south of D100 (high traffic)
 - #104 - BP gas station 2.5 km north of D100 (traffic, gas station, residential)

The measurements were performed 12 times at each location during the period March 17 to June 22, 2010 for 24 consecutive hours each recorded as one hour levels. Given the sampling in the city area, the locations are affected not only from traffic but also from other nearby sources. Furthermore, background pollution from distant sources in and outside of Istanbul might influence the measurements.

The measurements were performed by the accredited laboratory Ekotest and documented in reports dated June 4 and August 9, 2010. The results are summarized in Table 2-5.

Table 2-5 **Summary of Active Sampling Results**

Substance	Period	Concentration in $\mu\text{g}/\text{m}^3$ at Location				Applicable** Turkish limit (2010)
		# 101	# 102	# 103	# 104	
PM ₁₀	Average*	74	63	65	65	114
	24 hrs max.	118	110	109	99	220
SO ₂	Average*	7.2	7.0	7.1	7.8	150
	95-percentile +	11	11	14	18	340
	Max. hour	17	19	32	63	-
NO ₂	Average*	33	33	39	45	84
	95-percentile +	88	98	87	108	300
	Max. hour	161	165	140	197	-

* Average over 24-hours sampling periods on 12 days in three months

** Current legislation stipulates a transition of limit values which are continuously reduced over a couple of years to adapt with new regulations. The average over the measurement period is compared to the annual average limit.

+ The 95-percentile is the value which is met by 95% of all measurements which is used as standard to evaluate short-term levels.

With reference to the future short-term standards the following can be concluded.

- The measurement results for PM₁₀ indicate that exceedance of the future standard is likely if emissions from general sources of dust are not reduced in the future. The Turkish standard of 50 $\mu\text{g}/\text{m}^3$ for the daily average is valid from 2019 on.
- The results for SO₂ meet the future short-term standards (350 $\mu\text{g}/\text{m}^3$ for the 1-hour maximum and 125 $\mu\text{g}/\text{m}^3$ for the daily average; valid from 2019 on).
- For NO₂, the future short-term standard is also met (200 $\mu\text{g}/\text{m}^3$ for the 1-hour maximum; valid from 2024 on).

The table shows that all Turkish limit values applicable in 2010 were met within the measuring period. Comparison of the average concentrations of the active sampling during the Spring with the annual average limits has to be prefaced as being indicative as the active sampling was discontinuous and only for a limited period. The main purpose of the active sampling was to obtain short-term results at locations close to the scheme to supplement the other baseline monitoring information.

2.3.4

Summary of Air Quality Monitoring Results

With regard to the Turkish and international standards, the following can be concluded from the passive and active baseline sampling.

- The existing situation reveals high levels for NO₂ at all sampling locations which suggests that the 2024 annual average limit in Turkey may be exceeded when it enters into force. Exceedance of the IFC/EU standards indicates the need for regional air quality improvement. As demonstrated by the results at the Metropolitan monitoring stations, elevated concentrations are a regional rather than a local characteristic of the current ambient air quality in Istanbul.
- The PM₁₀ future standards will not be met if the current situation remains unchanged. Measures to reduce PM₁₀ emissions from all types of source need to be implemented at a regional and national level.
- All the SO₂ levels reported here complied with Turkish and international standards.

Overall, the Project area shows air quality typical of a large city with heavy traffic levels.

2.4

AIR DISPERSION MODELLING – METHODOLOGY AND USED DATA

Substances of Interest

The following air pollutants were considered in the modelling:

- NO_x – Nitrogen oxides: NO₂ - nitrogen dioxide and NO – nitric oxide
- CO – Carbon monoxide
- PM₁₀ – Particulate matter (includes soot/black carbon and abrasion of wheel rubber and re-suspension of particles from the road surface); PM₁₀ indicates that the particle size is below 10 µm
- SO₂ – Sulphur dioxide
- HC – unburned hydrocarbons (unspecific assortment of organic molecules, generated through combustion processes and fugitive fuel evaporation; a component of particular interest is benzene)
- CO₂ – Carbon dioxide (considered for emissions but not for dispersion modelling).

Type of Model

AUSTAL2000¹⁰ was used as dispersion model that was developed on behalf of the German Environmental Agency. The model is a Lagrangian particle model and the official reference model for the German Instruction on Air Quality Control (TA Luft) and hence mandatory for air emissions of industrial point sources. Besides modelling of point source emissions, like dispersing from the ventilation shaft, line sources like roads can be included. The calculation model is set up, verified, and validated in conformance with the German guideline on atmospheric particle models - VDI 3945/3¹¹.

Lagrangian particle models are advanced models which consider local topography and meteorological conditions in more detail than the older Gaussian models. Comprehensive meteorological parameters are used in form of a dispersion class statistics utilizing the parameters wind direction, wind speed, and atmospheric stability. The model calculates a local three-dimensional wind field. Thus, the dispersion of substances follows the wind streams modulated by topography. This might be relevant in a complex terrain like it is found along the project scheme. In addition, the model allows accounting for high abundance of calm wind situations.

Emission sources can be defined as point, line, area, or volume source. The results of the dispersion calculation are substance-specific ground level concentrations in accordance with the EU air quality directive 2008/50/EC.

The modelling was performed by means of the software AUSTALView (Version 6.3, February 2010).

Traffic Data

The traffic figures for the modelling are based upon the Traffic and Revenue Analysis report (Jacobs 2010) and supplementary detailed data provided by Jacobs. Three scenarios were modelled:

- "2009": Current situation
- "2023 with-Project": Year 2023 with implementation of the Project
- "2023 without-Project": Year 2023 without the Project being implemented (but including other committed changes in the transport system).

(1) ¹⁰ <http://www.austal2000.de/en/home.html>

(1) ¹¹ VDI – Society of German Engineers; the VDI publishes technical guidelines and norms comparable to ISO standards

The project scheme was separated into sections on which the predicted traffic flow is in the same order of magnitude. Consecutive parts of the scheme between connecting roads were taken as one section as long the traffic flow varies less than 10%, which variation does not significantly affect the location of modelled contours. The entire scheme and connecting roads were separated into 74 sections.

The traffic flow was provided by Jacobs as average annual daily traffic (AADT). These data were used for modelling of the average situation throughout the year in order to determine annual average concentrations. For short-term concentrations it had to be considered that the traffic flow is not constant but also shows peak traffic times. For the main road sections, the traffic load during these times is about 1.6-fold of the AADT (Jacobs).

For the future composition of the vehicle fleet, no significant change was presumed. Potential changes may result from gas fuelled or electrically driven vehicles which both would decrease emissions of pollutants. Such changes in the vehicle fleet, however, can not be predicted at present. Therefore, no such change was considered for the modelling which approach provides conservative results.

Air Emissions

The quantity of pollutant emission by vehicle engines depends on a variety of factors, which are:

- Type and power of engine
- Date of construction
- Type and composition of fuel
- Efficiency of combustion (e.g. age, wear)
- Presence of emission control equipment (i.e. catalyser)
- Actual speed of the vehicle
- Traffic flow
- Composition of traffic regarding vehicle types (e.g. abundance of trucks, average age and actual performance of engine types)
- Traffic flow characteristics on a specific road section (average speed, free flow, or traffic jam)
- Road gradient.

Traffic flow, speed, and road gradient can be specified for the road sections. The others of the above factors can be accounted for only in terms of averages and assumptions. This, however, is feasible since the actual engine types using the road today and in the future are not known. A standard engine mix was

therefore assumed (cf. below). The mix was used for all three scenarios. The dominant factor affecting the emission of pollutants is the year of construction of the engine. Due to improving requirements on emission control of vehicle exhaust, the relevant emissions will be reduced as already was in the past.

Based on the data of Jacobs about 10% of the vehicles are heavy duty trucks of more than 3.5 tons or busses. For the future scenario no change in this figure was anticipated. A variation of the heavy vehicle share by few percent would not have a significant effect on the dispersion modelling results.

For the engines it was assumed that about 40% of the passenger cars have diesel engines.

For the age composition of the vehicle fleet, it was presumed that the vehicles operated in Turkey in 2009 were on average 5 years older than in Western European countries. For 2023 there is no difference anticipated due to the expected growth of the Turkish economies and associated modernisation of the vehicle fleet.

Driving speed on the major roads was set to 80 km/h for passenger cars and trucks. This is a conservative approach for trucks which at some sections might drive 10-20 km/h slower.

Most of the roads of the scheme have a minor gradient. Only the tunnel has a 5% gradient which is relevant in regard of vehicle engine emissions.

Based on the traffic flow figures, the air emissions were calculated from specific emissions (grams per km and vehicle) provided in the EMEP/EEA Air Pollutant Emission Inventory Guidebook¹², Part B: Sectoral Guidance, Chapter 1.A.3.b on Road Transport published by the European Environment Agency (EMEP/EEA 2009).

In Table 2-6 the emission factors are summarized that were used for the modelling. These emissions are given as mass per vehicle and kilometre.

For the tunnel section, higher emission factors were taken since slope and decline change the emissions. PM10 emissions from vehicle traffic originate from various sources. In addition to the combustion products from the engine, particulates are generated from tyre wear, braking, and road wear. While the emissions from engines will change due to improvement of techniques, the emissions from wear will not change significantly according to the current knowledge. Therefore, the both types of emission generation were considered. PM10 particles are dispersed almost like gaseous substances. For the tunnel it

(1) ¹² <http://www.eea.europa.eu/publications/emep-eea-emission-inventory-guidebook-2009>

was assumed that no deposition occurs, which is a conservative estimate in regard of PM10 dispersion.

Nitrogen oxides (NO_x) in the combustion process are mostly generated as nitric oxide (NO). For past years, the initial fraction of NO₂ from combustion processes was about 5%. In recent years, however, this fraction was observed to increase up to around 10%, due to after-treatment systems on diesel exhausts. In order to avoid underestimation, a fraction of 15% was applied for the modelling. NO is oxidized to nitrogen dioxide in the atmosphere driven by the presence of ozone. On the other side, NO₂ is reduced to NO in the presence of sunlight. With growing distance to the road, the share increases depending on the above factors. In areas with high NO_x concentration, the oxidization process is less efficient than under low NO_x conditions. The average lifetime for NO oxidization ranges between about 0.3 and 3 hours. For the near road situation the conversion is of minor relevance. The model, however, considers NO conversion. Inside the tunnel, the distance to the shaft provides time for this conversion. But the required presence of ozone is limited, since it will be used-up after a short distance from the tunnel portal. However, as conservative approach, a NO-to-NO₂ conversion of 50% was taken for the modelling of tunnel shaft emissions.

Benzene as the most relevant hydrocarbon can be calculated with 4.5% of the hydrocarbons (EMEP/EEA 2009).

In the past, sulphur dioxide (SO₂) was a relevant pollutant from vehicle engines. After reduction of the sulphur content in fuel, the SO₂ emissions today are very low (cf. Table 2-6).

Table 2-6 *Emission factors*

Substance	Emission factor in g/(km*vehicle)		
	2005	2023	2023 for tunnel (5% gradient)
CO	1.9	0.88	1.9
Nitrogen oxides (NO _x ; as NO ₂ equivalent)	1.51	0.63	0.7
Nitrogen dioxide	0.23	0.10	0.35
PM10 (engine)	0.042	0.015	0.017
PM10 (tyre, brake, road wear)	0.017	0.017	0.019
Hydrocarbons (HC)	0.20	0.12	0.17
Benzene	0.009	0.006	0.008
Sulphur dioxide (SO ₂)	0.006	0.005	0.006
Carbon dioxide (CO ₂)	268	248	220

With regard to future air emissions from vehicle engines, further development in emissions control can be expected. A significant modernisation of the vehicle fleet in Turkey is assumed until 2023 by continuous substitution of older vehicles. Due to technological improvements in engine technology to being introduced by the manufacturers in order to comply with emission control requirements set forth in the European Union, vehicle emissions will be reduced. According to the European Directive 89/69/EC the Euro 3 specifications were implemented for new vehicles in 2000. More stringent requirements of Euro 4 were valid from 2005 on. Specified by the European Regulation No 715/2007, Euro 5 becomes effective in January 2010 for new passenger cars and in 2012 for heavy duty vehicles. Euro 6 will follow 5 years later. For the modelling of the future ambient air increment from traffic it is assumed that most of the vehicles in 2023 will meet the Euro 5 and Euro 6 requirements.

In general, the assumptions used in the assessment are considered to lead to over-prediction of traffic emissions and therefore to provide a conservative assessment of the impact of the Project.

Emissions of the Ventilation Shaft

The ventilation shafts are included in the modelling as point sources. There are two shafts one for each tube, meaning that for example the shaft at the Asian side is venting the air of the eastbound traffic. Design of the shafts and integral vehicle engine emissions are summarized in Table 2-7. Since the air is

vented in direction to the shafts, no significant quantity of air will be leaving the tunnel through the portals. For the pollutants emitted inside the tunnel, it has to be considered that the engines' specific emissions will be elevated compared to a no-gradient section due to the tunnel's continuous gradient of $\pm 5\%$. Truck traffic through the tunnel will be prohibited in general and has not to be considered as tunnel related emission source.

In order to account for potential NO-to-NO₂ conversion inside the tunnel, conversion was conservatively assumed to 50% of the emitted NO. The actual rate might be less since the process depends on the presence of ozone which is limited inside the tunnel.

Although the ventilation shafts are not industrial plants or industrial emissions, emission limits for industrial point sources are the most useful standards to use for reference purposes. All emission concentrations are below the limits applicable to emissions from industrial plants.

Table 2-7 *Shaft design and emission data for an AADT of 65,000 vehicles/day in each direction*

Shaft height	5 m		
Diameter of shaft outlet	5 m		
Ventilated air	160 m ³ /s (European side) 180 m ³ /s (Asian side)		
Emissions	Emissions in kg/h (per each shaft)	Concentration in mg/m ³ (for European side)	For comparison *: Turkish emission limits for industrial plants (mg/m ³)
CO	26	45	50
NO _x	9.2	16	50
NO ₂	4.6	8	-
PM10	0.33	0.6	5
HC	2.2	3.8	-
Benzene	0.11	0.19	-
SO ₂	0.07	0.12	5
CO ₂	3 600	6 300	-

* Note: Ventilation shafts do not present an industrial plant. The limit values can, however, be adopted as reference value.

Geographical Data

Air dispersion is affected by the topography that is present in the calculation area. For the modelling, cadastral data made available from the Istanbul municipality were used. The data included three-dimensional information on ground levels in the project area. Additional information was contained on building heights. From these data, a digital terrain model was generated by the software.

Calculation Mesh

Modelling was performed for a mesh size of 50 m. In order to estimate the reliability of the resulting contours, one section of the scheme was additionally calculated with a 25 m mesh. The comparison revealed that the contours showed only minor variations below 10 m, if noticeable at all.

Meteorological Data

Meteorological data representative for the project area are fed into the dispersion model by means of a three-dimensional statistics in the special format required by the software.¹³

Istanbul-Atatürk meteorological station was used as reference due to the availability of the various meteorological parameters required from the dispersion model. Details are provided in Annex K1. For the modelling, meteorological data of the years 2001 to 2009 were taken. The wind rose is shown in Figure 1-2.

The statistics of the Atatürk station were transposed within AUSTAL to the area of interest by wind field simulation. This means that the statistical data of the station were modulated via the regional topography. By this approach, the station's statistics can be adapted to the area of the scheme. Figure 2-5 illustrates examples of wind stream pattern for a wind blowing from the South.

(2)¹³ This data format represents the relative probability of all possible combinations of wind direction (36 wind direction classes), wind speed (9 classes) and stability of the atmosphere (six stability classes ranging from very stable to very unstable). In optimum data availability situation the statistics comprises these data for each hour of a year.

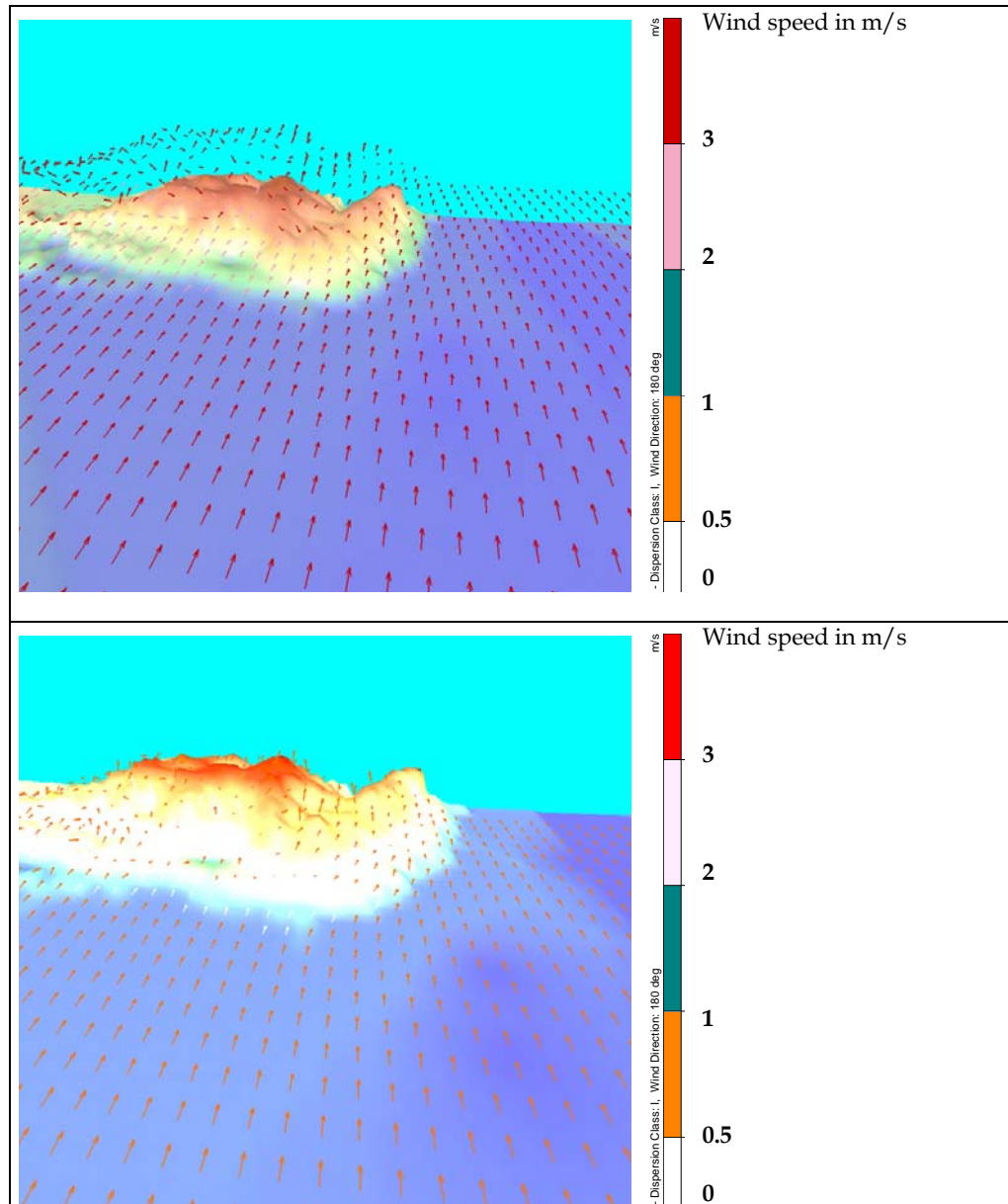


Figure 2-5 *Illustrative wind stream pattern of the wind field simulation in the AUSTAL model*

2.5 RESULTS OF THE AIR DISPERSION MODELLING

Atmospheric dispersion modelling of current road traffic emissions has been carried out in order to estimate the contribution traffic makes to existing ambient air quality (ground level concentrations) and to verify the estimates of underlying background concentrations made from measurement data.

The figures at the end of this section (Annex K-1 through Annex K-14) show the modelling results for:

1. Annual average for NO₂ concentration
 - (a) 2009 scenario

- (b) 2023 with-Project scenario
 - (c) 2023 without-Project scenario
 - (d) Difference between the 2023-without and the 2023-with Project scenario in order to illustrate the Project's effect for the year 2023
2. Maximum 1-hour concentration which is exceeded in 18 hours of the year for NO₂
 - (a) through (c) as before for the average traffic flow.

In Annex K-1 through Annex K-7 the results for the European side of the Project are shown. Annex K-8 through Annex K-14 present the Asian side.

For the short-term concentrations (1-hour maximum) higher values may be possible in case that a peak traffic hour coincides with meteorological conditions which are most adverse for dispersion (e.g. inversions). This worst case will be a rare situation since such meteorological conditions occur mostly during the second half of the night when maximum traffic flow is unlikely. The worst case therefore is not very likely to occur.

Table 2-8 to Table 2-10 below list results of the dispersion modelling for ground level concentrations at selected reference points which are near the two shafts and two cross sections located at Kennedy Caddesi (scheme-km 2+100) and near Dogus University (scheme-km 12+400). For Kennedy Cd. the distances increase to the West of the scheme and at Dogus University they increase to the South. The distance of 25 m from the centreline represents the boardwalk at 4 lane sections or the outer lane at 6 lane sections. Maximum concentrations directly at the road (centreline) can not be predicted with the model. For the shafts, the maximum concentrations are found less than 25 m distant to the shafts.

The data presented in the tables take into account both the expected development of vehicle emissions and the change in traffic for the year 2023.

For the short-term concentrations the tables provide the 19th highest 1-hour concentrations which indicate the allowed number of 18 exceedings (2008/50/EC). Daily averages were calculated in the same way which is a very conservative over-estimate of the daily (24-hours) average, since the 18 highest 1-hour values are discontinuously scattered over the year and not a continuous series of 18 hours. Furthermore, the allowed 35 exceedings were not taken into consideration.

Table 2-8 *Calculated contribution of traffic-related emissions to nitrogen dioxide (NO₂) ground level concentrations at selected reference locations*

Location /Scenario	Maximum Concentration (µg/m³)	Concentration at distance to scheme centreline (µg/m³)				
		25m	50m	100m	200m	400m
Annual Average		Air Quality Standards *: 60 / 40				
Km 2 +100						
2009	-	31.8	8.6	4.7	2.5	1.4
2023 without	-	21.3	5.8	3.2	1.8	1.0
2023 with	-	32.2	9.0	4.9	2.7	1.5
Shaft (Europe)						
2009	4.1	4.2	-	-	-	-
2023 without	4.6	4.7	-	-	-	-
2023 with	44.6	5.5	-	-	-	-
Dogus University						
2009	-	22.1	12.7	5.5	3.2	2.2
2023 without	-	18.9	10.7	4.8	2.7	1.8
2023 with	-	29.3	16.7	7.1	3.9	2.5
Shaft (Asia)						
2009	1.1	1.0	-	-	-	-
2023 without	1.5	1.1	-	-	-	-
2023 with	50.9	4.1	-	-	-	-
Maximum Hourly Concentration with 18 exceedings **		Air Quality Standards *: 200 / 200				
Km 2+100						
2009	-	215	101	79	61	52
2023 without	-	149	67	49	47	47
2023 with	-	214	110	82	76	63
Shaft (Europe)						
2009	59	87	-	-	-	-
2023 without	59	83	-	-	-	-
2023 with	120	98	-	-	-	-
Dogus University						
2009	-	159	131	83	73	67
2023 without	-	140	114	68	59	51
2023 with	-	196	159	94	69	58
Shaft (Asia)						
2009	53	62	-	-	-	-
2023 without	60	61	-	-	-	-
2023 with	155	70	-	-	-	-

* Turkish limit value (2014) / International standard (IFC)

Table 2-9 *Calculated contribution of traffic-related emissions to PM10 ground level concentrations at selected reference locations*

Location /Scenario	Maximum Concentration (µg/m³)	Concentration at distance to scheme centreline (µg/m³)				
		25m	50m	100m	200m	400m
Annual Average		Air Quality Standards *: 60 / 40				
Km 2 +100						
2009	-	7.8	1.9	0.9	0.5	0.2
2023 without	-	6.8	1.6	0.8	0.4	0.2
2023 with	-	10.4	2.5	1.3	0.6	0.3
Shaft (Europe)						
2009	0.8	0.9	-	-	-	-
2023 without	1.3	1.3	-	-	-	-
2023 with	4.6	1.5	-	-	-	-
Dogus University						
2009	-	5.2	2.8	1.1	0.6	0.4
2023 without	-	5.9	3.2	1.3	0.6	0.4
2023 with	-	9.2	5.0	1.9	0.9	0.5
Shaft (Asia)						
2009	0.2	0.1	-	-	-	-
2023 without	0.4	0.3	-	-	-	-
2023 with	4.7	0.5	-	-	-	-
Maximum Daily value based on the Maximum Hourly value which is 24 times over the Year (for comparison Air Quality Standards *: -50 / 50)						
Km 2+100						
2009	-	46	17	12	9	6
2023 without	-	38	15	10	7	6
2023 with	-	59	23	16	11	9
Shaft (Europe)						
2009	9	13	-	-	-	-
2023 without	11	17	-	-	-	-
2023 with	20	13	-	-	-	-
Dogus University						
2009	-	31	24	11	10	8
2023 without	-	25	26	12	9	8
2023 with	-	50	39	18	11	9
Shaft (Asia)						
2009	6	6	-	-	-	-
2023 without	10	10	-	-	-	-
2023 with	16	10	-	-	-	-
* Turkish limit value (2019) / International standard (IFC)						

Since PM10 is dispersed almost like a gas, the concentrations for the other pollutants decrease with distance similar to those for PM10. The contents of Table 2-10, therefore, has been limited to the maximum values as being the most relevant for evaluation.

Table 2-10 *Calculated contribution of traffic-related concentrations to ground level concentrations for carbon monoxide (CO), sulphur dioxide (SO₂), hydrocarbons (HC) and Benzene (Bz) at selected reference locations*

Location	Scenario	Maximum Concentration (µg/m³)			
		CO	SO ₂	HC	Benzene
Annual Average					
Km 2 +100	2009	254	1.0	26	1.2
	2023 without	181	1.3	24	1.1
	2023 with	275	1.6	37	1.7
Shaft (Europe)	2009	27	0.1	3	0.2
	2023 without	33	0.2	4	0.2
	2023 with	364	2.1	32	1.5
Dogus University	2009	171	0.5	17	0.8
	2023 without	158	0.9	21	0.9
	2023 with	245	1.4	33	1.5
Shaft (Asia)	2009	6	0.02	0.5	0.03
	2023 without	10	0.05	0.9	0.05
	2023 with	371	1.1	32	1.5
Air Quality Standards *		-	150 / -	-	- / 5
Maximum Hourly value with 18 exceedings, indicating also a maximum daily average					
Km 2 +100 (at 25m)	2009	1440	5	149	7
	2023 without	1060	5	145	7
	2023 with	1660	8	225	11
Shaft – Europe (maximum)	2009	286	1	30	1
	2023 without	330	2	45	2
	2023 with	1030	3	92	4
Dogus University (at 25m)	2009	990	3	102	5
	2023 without	970	5	132	6
	2023 with	1390	7	188	9
Shaft – Asia (maximum)	2009	190	1	20	1
	2023 without	290	1	40	2
	2023 with	840	2	74	4
Air Quality Standards *		10000 / 10000 (8h and 24h)	500 / 350	-	-

* Turkish limit value (2014) / International standard (IFC)

In general, the predicted average concentration decreases significantly with increasing distance. At 400 m distance the annual mean has dropped by more than 90%. For the 1-hour concentration of the most adverse hour of the year, the reduction effect is less; around 50%. When taking into account the European regulation where the 18 highest values of the year can be excluded, the concentration at 400 m is reduced by about 75%.

By comparing the contributions from the traffic to ambient air quality concentrations provided in the tables with the ambient air quality standards,

the following can be concluded for the selected sections of Kennedy Caddesi and D100.:

- **CO:** The 8-hour standard of $10,000 \mu\text{g}/\text{m}^3$ will not be exceeded in the future scenarios, since even the calculated 1-hour maximum for the with-Project scenario is $2,900 \mu\text{g}/\text{m}^3$. The maximum Project-related difference will be below $1,700 \mu\text{g}/\text{m}^3$. There will therefore be no significant impact on CO concentrations.
- **NO₂:** The air quality standard for NO₂ in Turkey will be $200 \mu\text{g}/\text{m}^3$ for the 1-hour and $40 \mu\text{g}/\text{m}^3$ for the annual standard from 2024 on, which equal the IFC and EU standard values. On the European side the maximum future contribution to the ambient annual average at 50 m from the road centreline will be $6 \mu\text{g}/\text{m}^3$ for 2023 without-Project and $9 \mu\text{g}/\text{m}^3$ with-Project. The increase due to the Project ($3.2 \mu\text{g}/\text{m}^3$) will not exceed 10% of the standard at this distance. This 10% threshold may, however, be exceeded at shorter distances up to about 45 m from the centreline. With a typical 4-lane design and a 13 m distance between centreline and roadside, the 10% threshold could therefore be exceeded at up to 32 m from the roadside.

At the Asian side the future contribution at 50 m will be about $11 \mu\text{g}/\text{m}^3$ for the 2023-without Project scenario and $17 \mu\text{g}/\text{m}^3$ with the Project. The increment of $6 \mu\text{g}/\text{m}^3$ exceeds 10% of the short-term standard at 50 m, it can be exceeded at distances up to 75 m. Since the Asian part of the scheme has 6 lanes, the distance from the roadside at which 10% of the standard could be exceeded in this case is 57 m.

- **PM₁₀:** From 2019 on the Turkish air quality standard for PM₁₀ will be $40 \mu\text{g}/\text{m}^3$ for the annual average and $50 \mu\text{g}/\text{m}^3$ for the daily average. The maximum future contribution of traffic to the annual average in the with-Project scenario is $11 \mu\text{g}/\text{m}^3$ at 25 m. The difference between the scenario with and without Project is $3.6 \mu\text{g}/\text{m}^3$, which is 9% of the standard.

For the daily average, the maximum at 25 m is calculated to be about $55 \mu\text{g}/\text{m}^3$. The maximum difference between the 2023 scenarios is $19 \mu\text{g}/\text{m}^3$. As mentioned above, the calculation of the daily average is based on exclusion of the 18 highest 1-hour values (99.8% of the hours are lower than this value) which is very conservative if taken for the daily average. Furthermore the daily average may be exceeded at 35 days of the year (90.5% of the hours are lower than this value).

- **Hydrocarbons - benzene:** Benzene is considered a key component of hydrocarbons generated from vehicle engine combustion. An air quality standard of $5 \mu\text{g}/\text{m}^3$ for the annual average is defined in the European Union. With the calculated maximum contribution of $1.7 \mu\text{g}/\text{m}^3$ at 25 m distance to the road centreline, this standard will be met.

The impact generated by the emissions from the **ventilation shaft** is limited. The maximum annual average for NO₂ is 51 µg/m³ at the centre point of the shaft. Therefore, the ambient air quality standard of 40 µg/m³ could be exceeded close to the shaft. However, the concentration reduces quickly to about 6 µg/m³ at about 25 m from the shaft centre point. Within this area, people are not expected to be continuously present and adverse impacts on health are not therefore predicted. The shaft's contribution to ambient PM₁₀ levels at 25 m distance is less than 1 µg/m³ for the annual average and below 5 µg/m³ for the maximum daily average. Therefore, no significant effect is anticipated from the ventilation shaft PM₁₀ emissions.

Various assumptions had to be made for the modelling which may cause uncertainty of the modelling results:

- traffic data: Data of the Jacobs traffic analysis report were used and are assumed to predict the future situation with sufficient accuracy
- emission factors: vehicle fleet composition affects the emission factor for the average vehicle; for the driving speed 80 km/h was taken which causes higher emissions compared to the actual speed which on average will be slower; the uncertainty of the emission factors approach is estimated to 20%;
- meteorological data: since the data were determined from a 9-year period, they reflect both the average situation and short-term unfavourable dispersion conditions providing for sufficient accuracy;
- calculation accuracy of the annual mean: the uncertainty of the modelled data was about 2% to 4%.

In total, the modelling results have an accuracy of 20-25% for the annual mean concentrations. For the 1-hour maximum of the year the variations can be some 50-60%. This is in conformance with the requirements of EU air quality directive 2008/50/EC.

In general, conservative figures were chosen which rather may lead to over than under-estimation.

Maps with the calculated predictions for the entire scheme are presented at the end of this Annex. The maps show the results for NO₂ since the impacts of the other substances are less extended and hence, covered by the maps for NO₂.

The above conclusions are drawn without consideration of an underlying background concentrations. Given the currently degraded ambient air quality

being detected at the IBB monitoring stations, efforts will be required to reduce all types of emission sources in Istanbul in order to meet future Turkish air quality standards. It is not possible to estimate the extent to which these might be successful up to the year 2023 and therefore whether air quality standards will be met. Given the unpredictable nature of these other background sources, no reliable estimates of the future background concentrations can be provided.

If, however, as a worst case assumption the underlying background concentration of NO₂ is taken to remain at the current level of about 54 to 58 µg/m³ in the future (as determined in Section 2.3.2), the future maximum concentration for the annual average at 25 m distance at the most affected location addressed in Table 2-8 results in a concentration of 86 µg/m³ with the Project and 76 µg/m³ without the Project (a difference of 10 µg/m³). At 50 m distance this reduces to about 63 and 60 µg/m³ respectively (a difference of 3 µg/m³). As mentioned before, the standard will be exceeded both with and without the Project unless NO₂ emissions reduction measures are implemented on the municipal and national level. At distances beyond 50 m, the effect of the Project will not significantly affect the exceeding of the standard.

For PM₁₀, the continuous monitoring by the Municipality reveals a current level of about 42 µg/m³ for the annual average concentration (cf. Table 2-9). Taking this level as the underlying background value and presuming that this remains unchanged until 2023, the annual average of 40 µg/m³ will be exceeded both with and without the Project. The sum of this background level and the contribution from traffic at 25 m distance at the most affected location in Table 2-9 is 52 µg/m³ with the Project and 49 µg/m³ without the Project (a difference of 3 µg/m³). After 50 m the respective levels reduce to 45 and 44 µg/m³ with only a minor difference. At distances beyond 25 m the Project will not significantly affect the exceeding of the standard.

In conclusion, based on a level of 10% threshold of the standard, it is evident that in some cases local impacts on air quality will occur, since emissions with the tunnel will be higher along the Project route. The significance of these will depend on whether sensitive receptors whose health could be adversely affected are present in these locations.

References:

Traffic and Revenue Analysis report by Jacobs (Jacobs)
(Jacobs) – Istanbul Strait Road Tunnel Crossing, Traffic and revenue analysis, Jacobs Consultancy, Final of February 2010; Original traffic load data for separated road sections that were provided to ERM by Jacobs in February and March 2010 as excerpt of the Jacobs model runs

IBB link <http://www.havaizleme.gov.tr>

EMEP/EEA 2009 - EMEP/EEA Air Pollutant Emission Inventory Guidebook, Part B: Sectoral Guidance, Chapter 1.A.3.b on Road Transport published by the European Environment Agency.

HBEFA – Handbook of Emission Factors, Version 2.1 (2004), prepared on behalf of the German Federal Environment Agency

Figures of Annex K:

Annex K-1

Annual average of NO₂ concentration – 2009 scenario; European side

Annex K-2

Annual average of NO₂ concentration – 2023-with Project scenario;
European side

Annex K-3

Annual average of NO₂ concentration – 2023-without Project scenario;
European side

Annex K-4

Annual average of NO₂ concentration –Tunnel effect; difference of 2023-with
minus 2023-without Project ; European side

Annex K-5

Maximum 1-hour concentration of the year with 18 exceedings for NO₂ –
2009 scenario; European side

Annex K-6

Maximum 1-hour concentration of the year with 18 exceedings for NO₂–
2023 with Project scenario; European side

Annex K-7

Maximum 1-hour concentration of the year with 18 exceedings for NO₂–
2023 without Project scenario; European side

Annex K-8

Annual average of NO₂ concentration – 2009 scenario; Asian side

Annex K-9

Annual average of NO₂ concentration – 2023-with Project scenario; Asian side

Annex K-10

Annual average of NO₂ concentration – 2023-without Project scenario;
Asian side

Annex K-11

Annual average of NO₂ concentration –Tunnel effect; difference of 2023-with minus 2023-without Project ; Asian side

Annex K-12

Maximum 1-hour concentration of the year with 18 exceedings for NO₂ – 2009 scenario; Asian side

Annex K-13

Maximum 1-hour concentration of the year with 18 exceedings for NO₂– 2023 with Project scenario; Asian side

Annex K-14

Maximum 1-hour concentration of the year with 18 exceedings for NO₂– 2023 without Project scenario; Asian side

Annex K-1 - Annual average of NO2 concentration - 2009 scenario; European side



Concentration in $\mu\text{g}/\text{m}^3$

00 < 05	10 < 15	20 < 25	30 < 35	40 < 45
05 < 10	15 < 20	25 < 30	35 < 40	45 < 50

0 0,25 0,5 km

1:10.000

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Annex K-2 - Annual average of NO2 concentration - 2023-with Project scenario; European side



Concentration in $\mu\text{g}/\text{m}^3$

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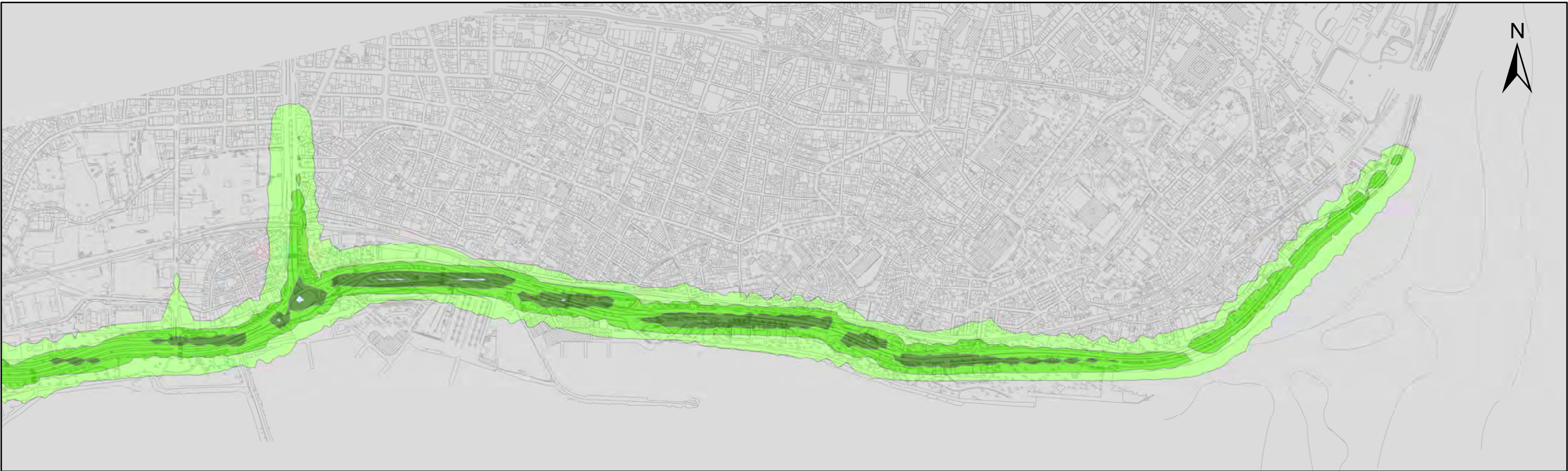
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Annex K-3 - Annual average of NO2 concentration - 2023-without Project scenario; European side



Concentration in $\mu\text{g}/\text{m}^3$

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05 < 10	15 < 20	25 < 30	35 < 40	45 < 50

0 0,25 0,5 km

1:10.000

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Annex K-4 - Annual average of NO2 concentration - Tunnel effect; difference of 2023-with minus 2023-without Project ; European side



Concentration in $\mu\text{g}/\text{m}^3$

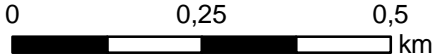
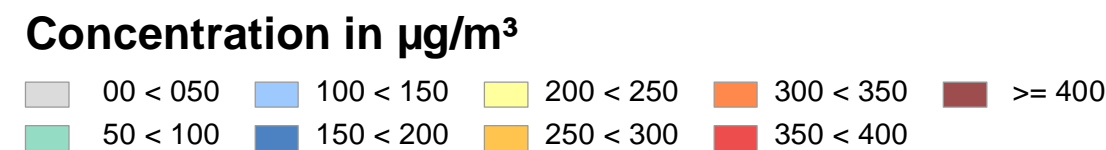
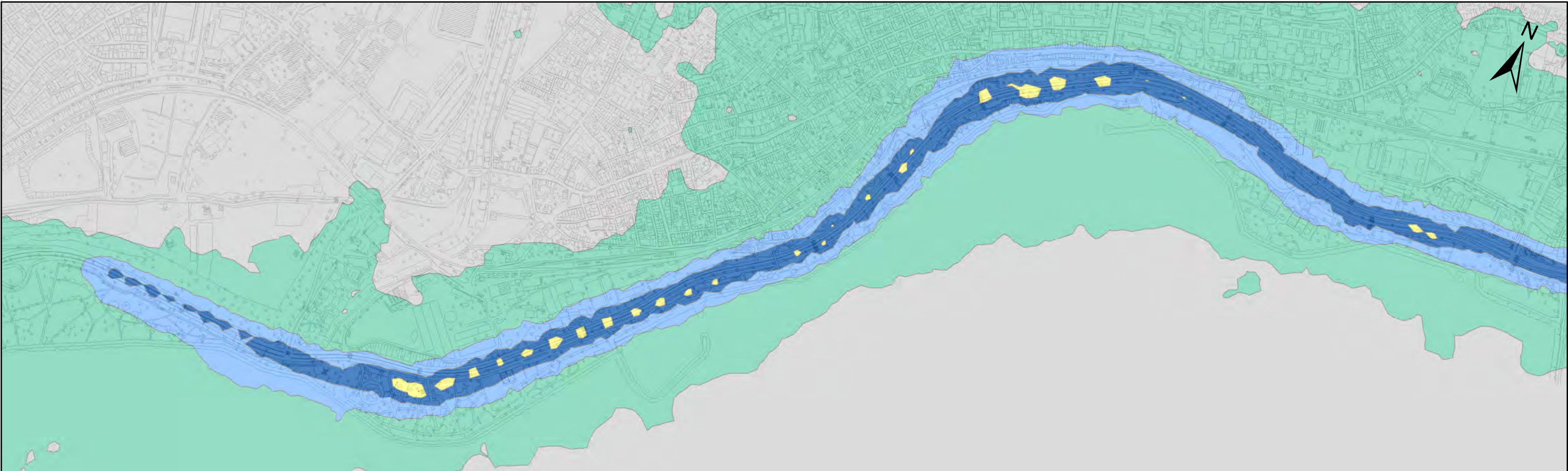
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Annex K-5 - NO2 1-hour concentration with 18 exceedings per year - 2009 scenario; European side



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Annex K-6 - NO2 1-hour concentration with 18 exceedings per year - 2023 with Project scenario; European side



Concentration in $\mu\text{g}/\text{m}^3$

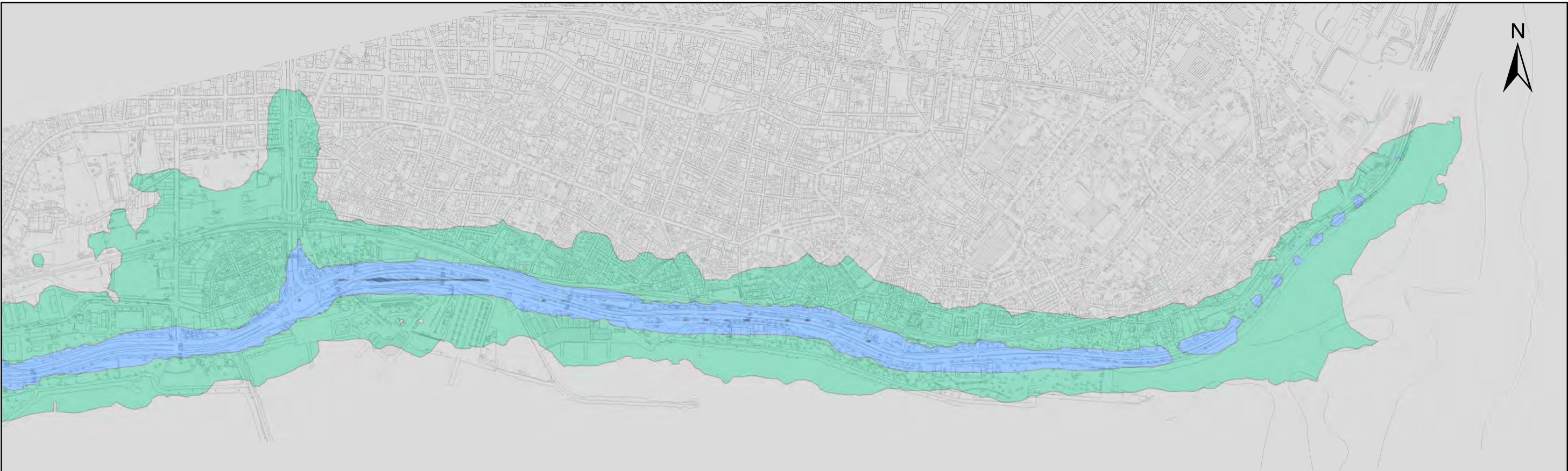
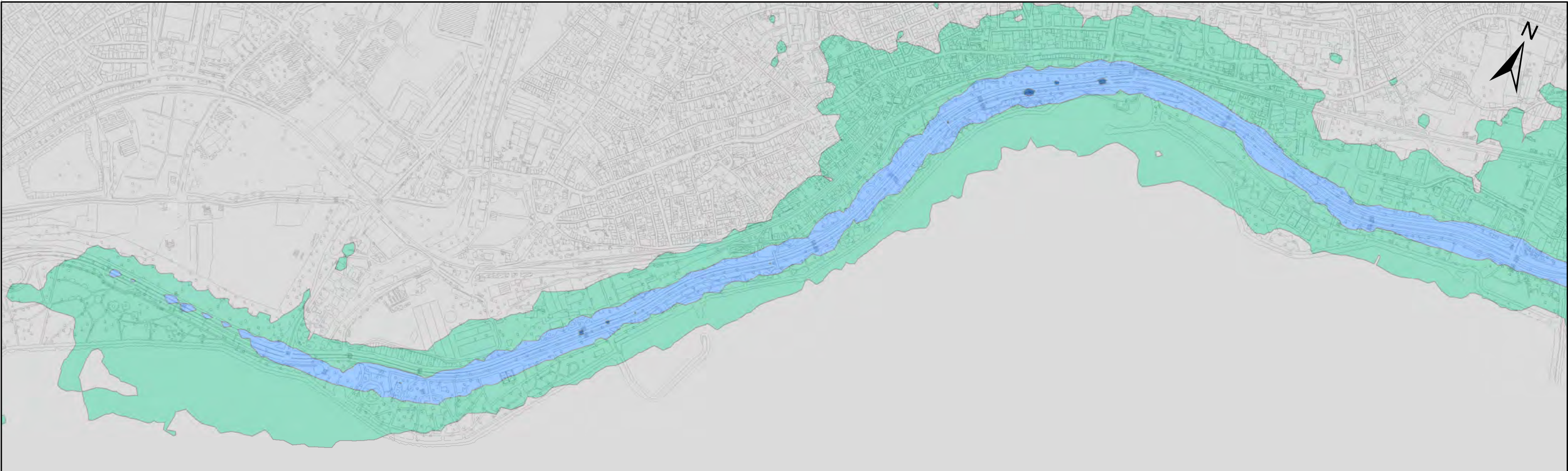
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50 < 100	150 < 200	250 < 300	350 < 400	

0 0,25 0,5 km

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Annex K- 7 - NO2 1-hour concentration with 18 exceedings per year - 2023 without Project scenario; European side



Concentration in $\mu\text{g}/\text{m}^3$

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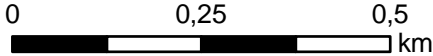
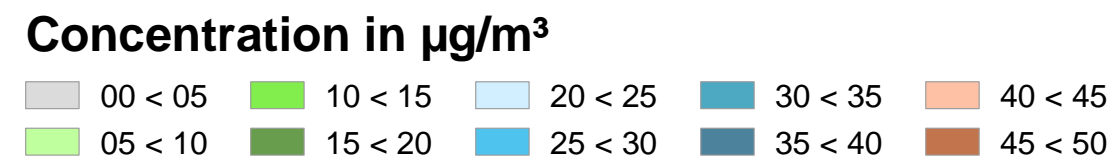
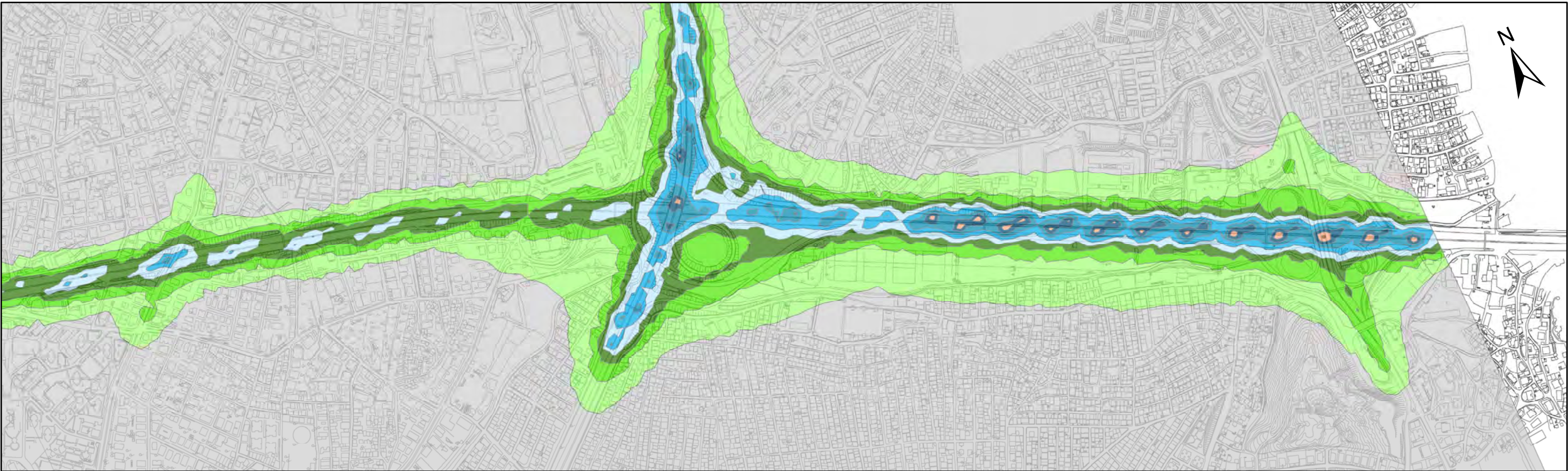
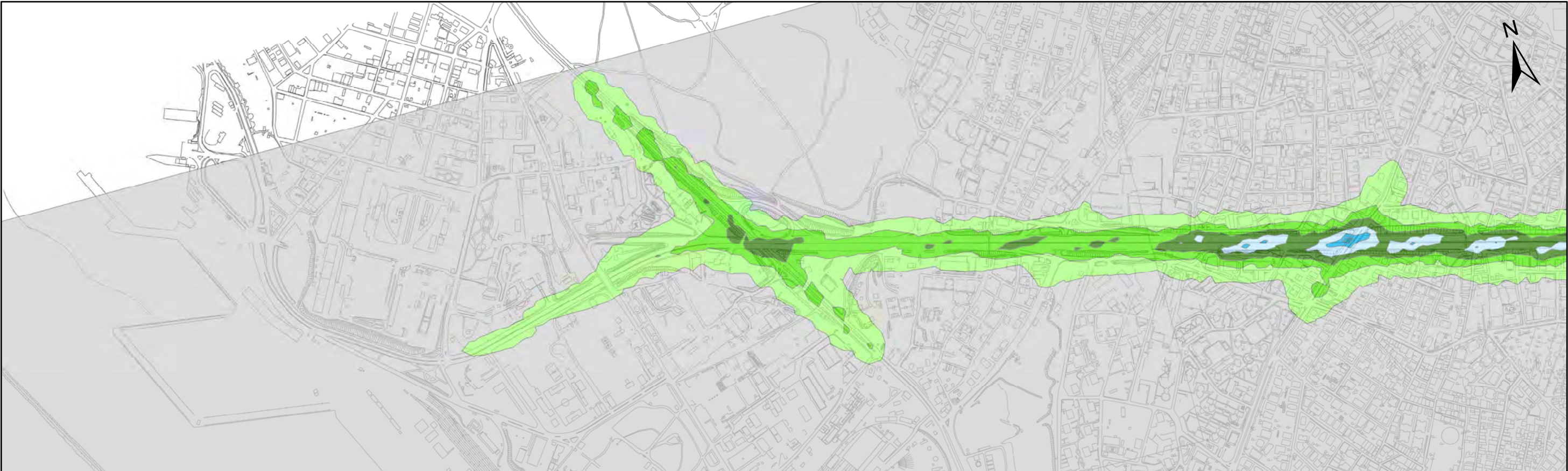
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Annex K- 8 - Annual average of NO2 concentration - 2009 scenario; Asian side

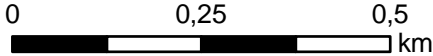
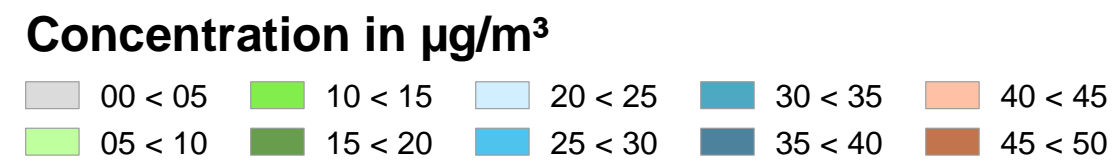
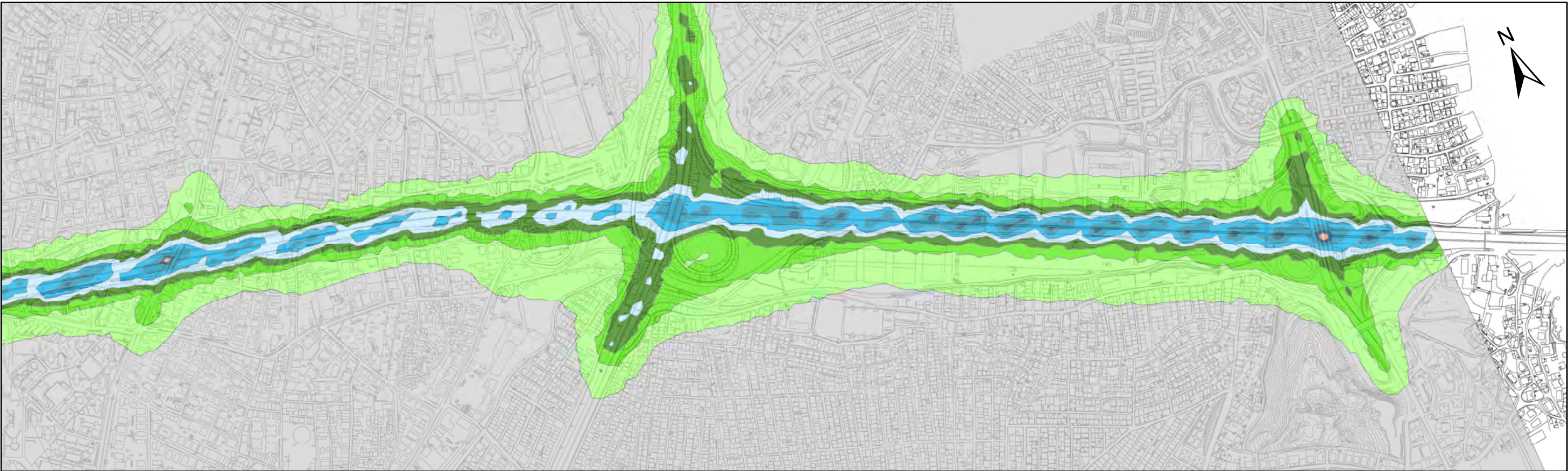
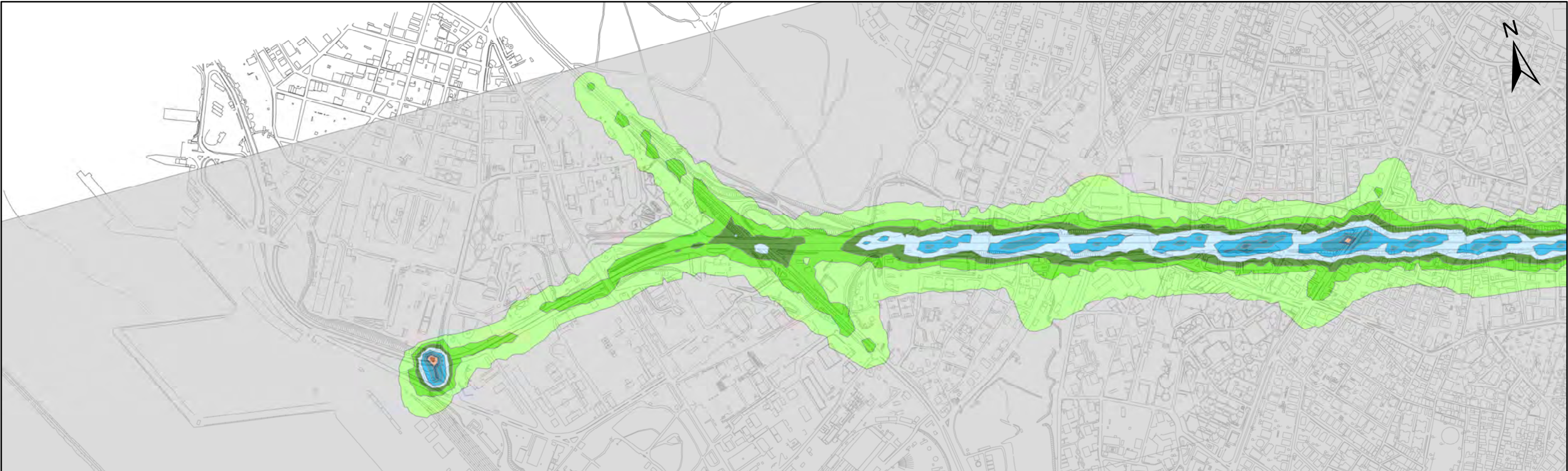


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Annex K- 9 - Annual average of NO2 concentration - 2023-with Project scenario; Asian side

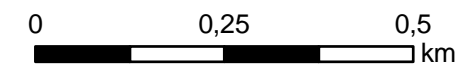
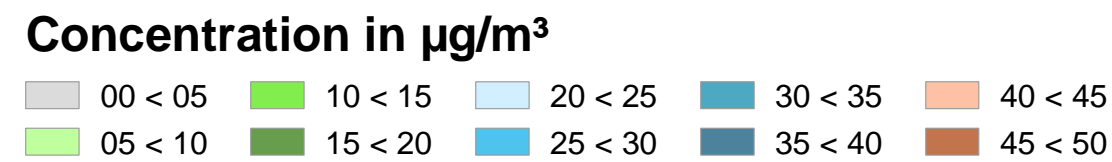
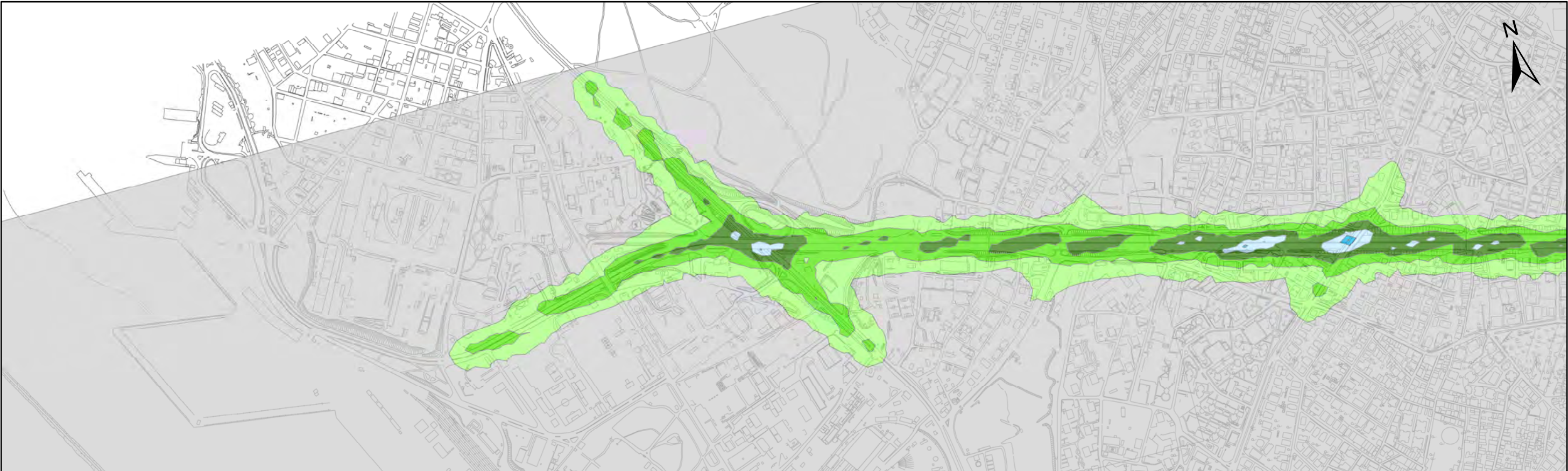


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Annex K- 10- Annual average of NO2 concentration - 2023-without Project scenario; Asian side

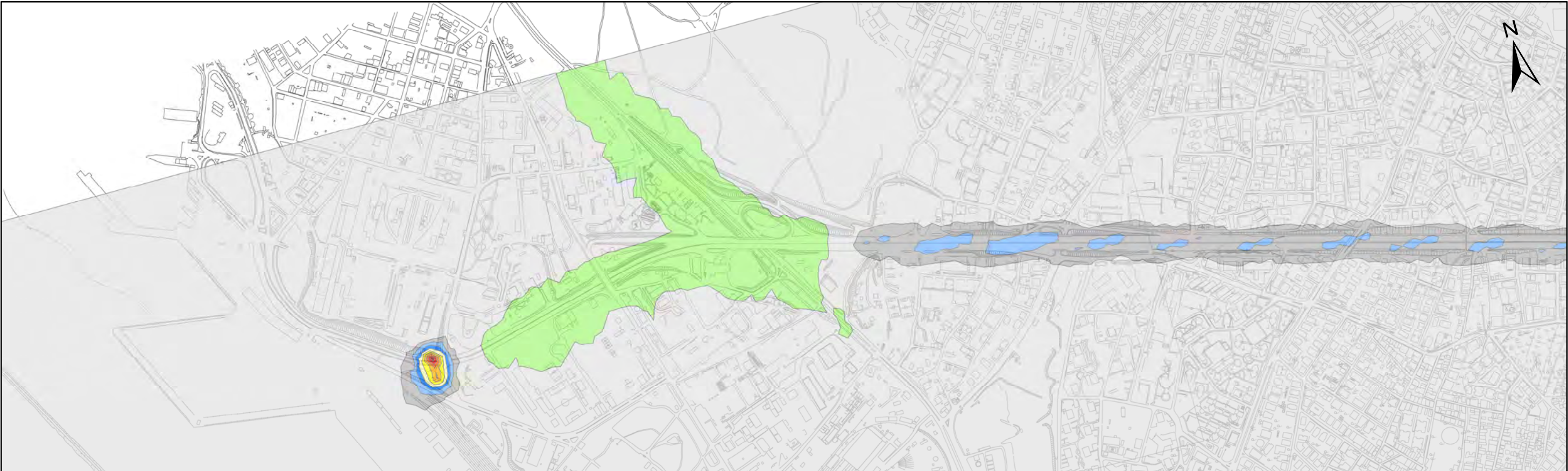


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Annex K- 11- Annual average of NO2 concentration - Tunnel effect; difference of 2023-with minus 2023-without Project ; Asian side



Concentration in $\mu\text{g}/\text{m}^3$

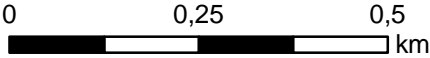
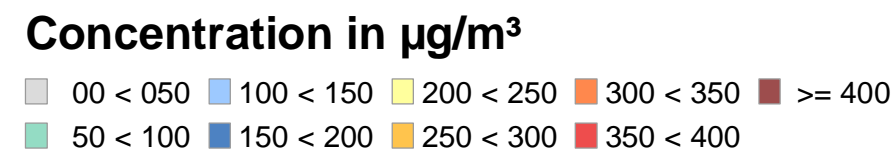
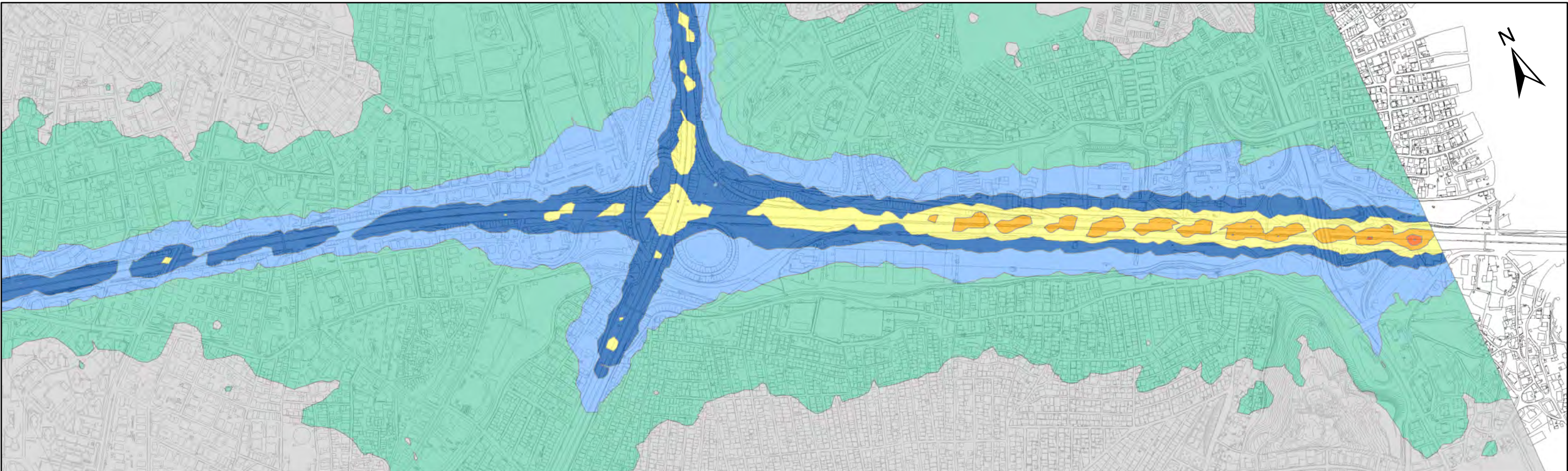
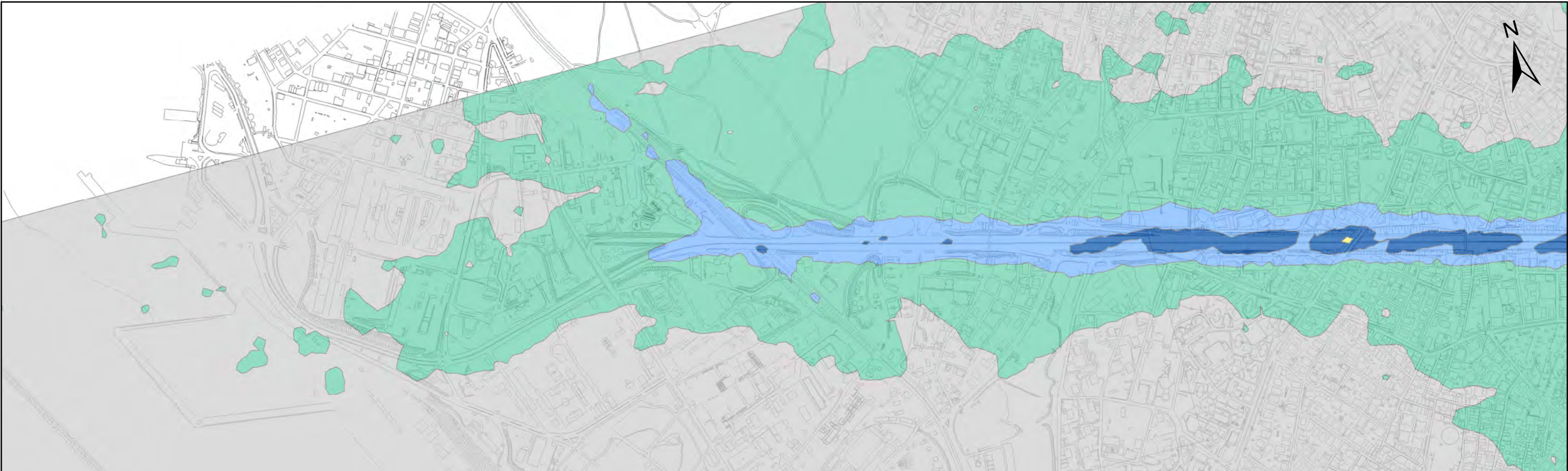
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Annex K-12 - NO2 1-hour concentration with 18 exceedings per year - 2009 scenario; Asian side

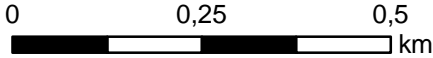
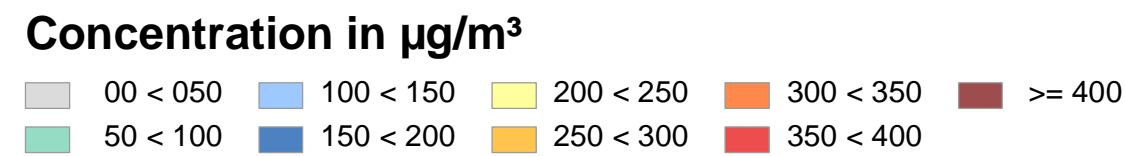
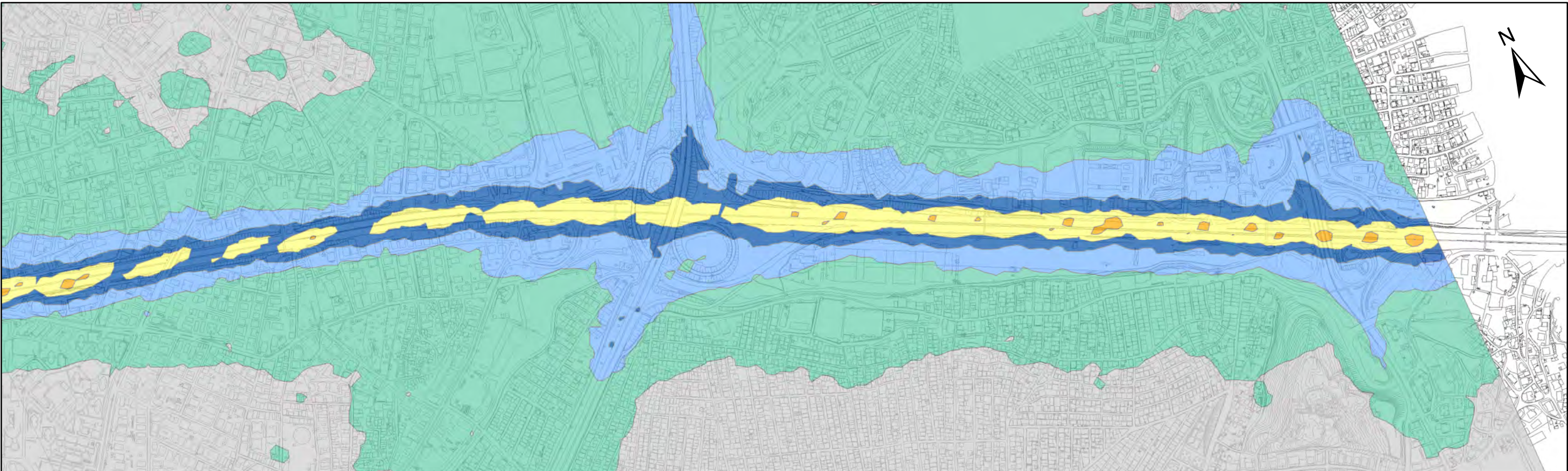
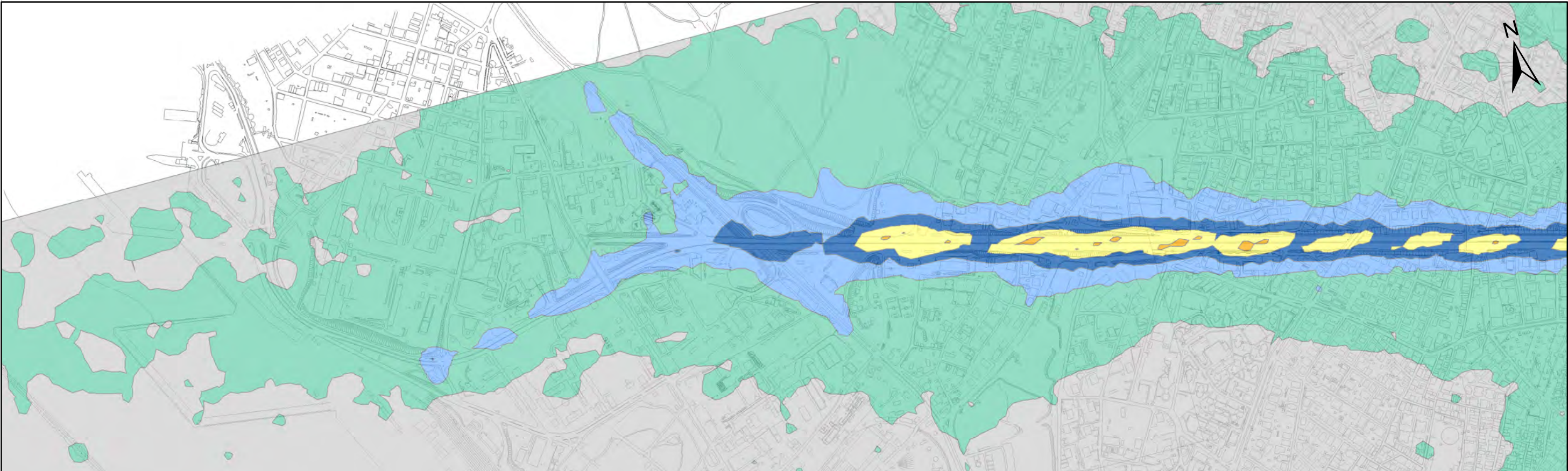


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Annex K-13 - NO2 1-hour concentration with 18 exceedings per year - 2023 with Project scenario; Asian side

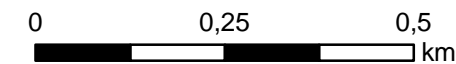
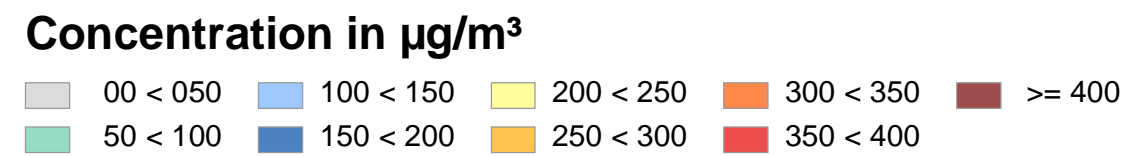
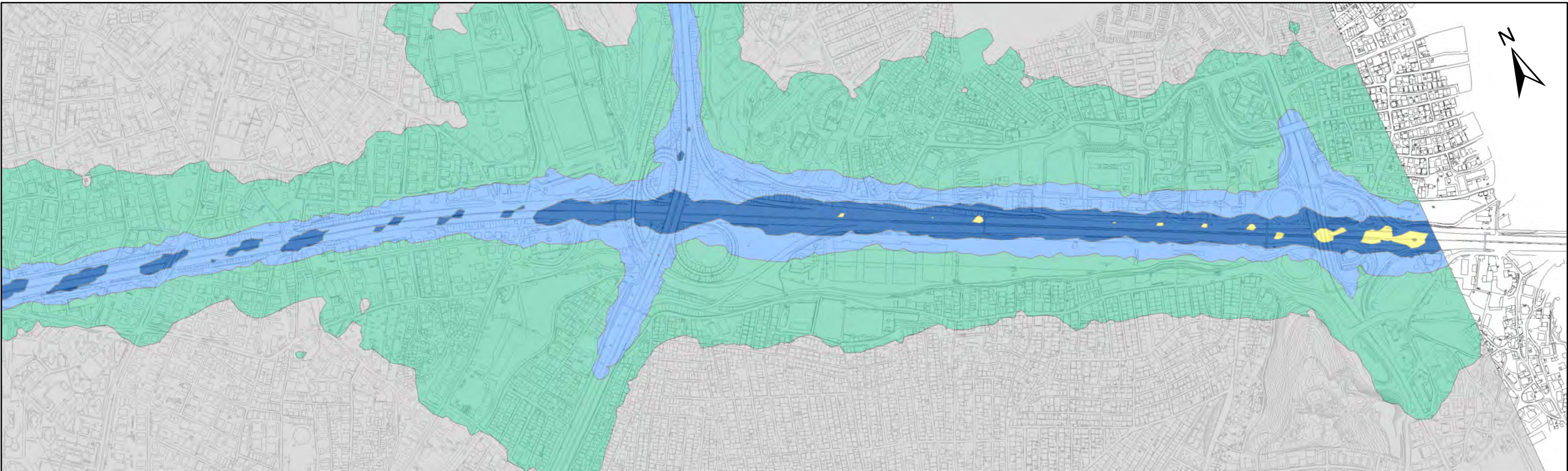
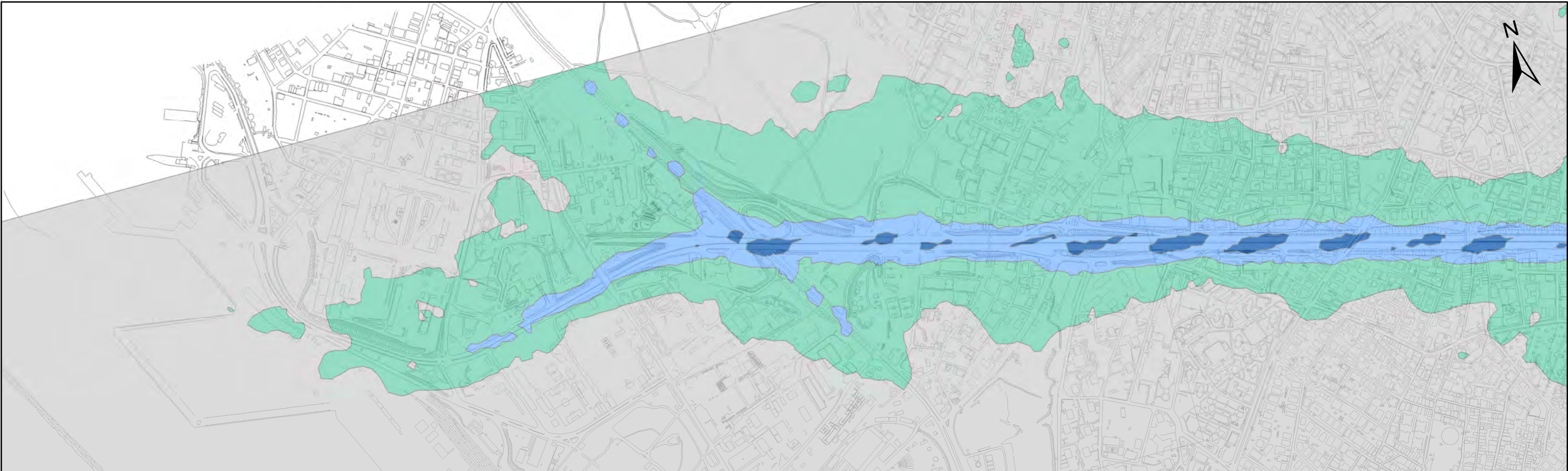


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Annex K- 14 - NO2 1-hour concentration with 18 exceedings per year - 2023 without Project scenario; Asian side



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Annex L

Sound Propagation Modelling

CONTENTS

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This Annex provides results of the environmental noise measurements and the sound propagation modelling performed for the Eurasia Tunnel ESIA.

The structure of the Annex is as follows:

1. Description and documentation of environmental noise measurements
2. Sound propagation modelling – methodology and used data
3. Results of sound propagation modelling

Sound is a change of air pressure affecting the ear. **Sound pressure levels** are measured in decibels (dB) which is the logarithm of the ratio of the actual air pressure over a reference air pressure. Human hearing perceives identical sound pressure levels of different frequencies with different strength. For the adaption to human hearing, it is therefore common to use a frequency weighted scale designed so that the level will match the subjectively perceived level. This is commonly done by implementing the so-called A-weighting scheme indicated by the unit **dB(A)**.

Due to the logarithmic nature of the scale the doubling of a source does not result in an impression of doubled loudness. This is reflected in findings of physiological studies where human perception was compared against decibel level increases:

≤ 3 dB(A)	imperceptible increase
3 – 5 dB(A)	threshold of perceptibility, minor increase
6 - 9 dB(A)	moderate increase
≥ 10 dB(A)	significant increase, representing a subjective doubling of loudness.

Since sound pressure levels often vary over time, they are commonly shown as the so-called **Equivalent Continuous Sound Pressure Level (L_{eq})** which is the energetic average over the observation time:

L_{eq} -parameter normally used for specification of noise standards

L_d -indicates L_{eq} for the related time period of the day time hours (e.g. 7:00 to 19:00)

L_e -indicates L_{eq} for the related time period of the evening hours (e.g. 19:00 to 21:00)

L_n -indicates L_{eq} for the related time period of the night time hours (e.g. 21:00 – 7:00)

In this assessment, all sound pressure levels L are provided as L_{eq} levels.

The strength of a source is given as **Sound Power Level L_w** .

L2

ENVIRONMENTAL NOISE MEASUREMENTS 2009

The Project corridor is situated in a densely urbanized area with many sources of noise, particularly traffic. At some places, noise will also be caused by activity in markets, playgrounds, sports areas and meeting places. In addition to, nature can contribute to the overall sounds and noise, for example through wind blowing or waves on the shore.

In order to obtain local data for the environmental noise situation, a baseline monitoring survey has been conducted. Spot sample measurements were taken at nine locations along the alignment and in its vicinity during November 2009. Nine single measurements on randomized dates and times were carried out at each location and included measurements during daytime, evening, and night time.

The sampling locations are shown in Figure 1 and Figure 2. Details of the measurements are provided on the following pages which comprise measurement protocols with photography and brief description of the locations.



Figure 1 Noise Spot-Sampling Locations European side with Measured Noise Levels for Daytime (L_d) and Night time (L_n)



Figure 2 Noise Spot-Sampling Locations Asian side with Measured Noise Levels for Daytime (L_d) and Night time (L_n)

NOISE MEASUREMENT PROTOCOL

Project : EURASIA TUNNEL

Measurement Height : 1,5 mt. above ground with tripod
 Manufacturer of sound meter : CASELLA
 Type of sound meter : Type I
 Serial Number of sound meter : 308197
 Measuring Team : Ayse BERKAY
 Murat UZUN
 Hasan ACAR


General settings of the Sound Level Meter: : Wind shield was always used :


: A-weighted (device has also Z and C weighted measuring automatically)

Sound pressure level :

Microphone Locations :

Pointing Direction :

	Measurement Run	Measurement Date	Measurement Time	Duration, minutes	Calibration Date	LAeq, dB(A)	LApk, dB(A)	Ambient Temperature, °C	Relative Humidity, %	Wind speed	Wind direction	Other meteorological information	Comments		
<i>Measuring Point#1 : Kumkapı Fish Market Corner</i>															
low traffic	1	03.11.2009	14:11	10:05	03.11.2009	75.6	107.8	10.9	59	3		E very light rain showers	Noise near traffic light and a fish market place		
	2	18.11.2009	20:56	11:29	17.11.2009	76.5	98	11.9	72	2	NW	Mist			
	3	24.11.2009	22:43	10:28	20.11.2009	75.2	100.2	12.1	97	1	W	Mist			
high traffic	1	06.11.2009	10:05	10:06	06.11.2009	73	102.4	16.5	70	3	E				
	2	17.11.2009	10:04	11:48	17.11.2009	77.1	101.7	13	77	3	S	Mist			
	3	23.11.2009	09:31	10:17	20.11.2009	73.2	104.5	11.1	100	3	W	Mist			
night time	1	06.11.2009	00:21	06:06	06.11.2009	72.2	97.2	15.7	69	3	SW				
	2	20.11.2009	23:58	06:04	20.11.2009	75.4	98	12.8	98	3	W	Mist			
	3	26.11.2009	00:05	10:43	26.11.2009	74	103	7.8	100	2	N	Mist			
Nearby Noise Sources: Automobiles, train road, heavy populated birds (because of fish market) Reasons for noise peaks during recording: Main reason for the peaks are automobiles. Microphone Locations: See photo point#6 Pointing Direction: See photo point#6															
<i>Measuring Point#2 : Kennedy Avenue-Proposed Project Toll Collection (before entrance to underground)</i>															
low traffic	1	03.11.2009	15:29	10:04	03.11.2009	64.9	96.5	10.9	59	3	E		Noise near playground and public park		
	2	18.11.2009	21:12	10:54	17.11.2009	67.8	97.4	11.9	72	2	NW	Mist			
	3	24.11.2009	22:57	10:10	20.11.2009	66.5	99.5	12.1	97	1	W	Mist			
high traffic	1	06.11.2009	10:19	10:11	06.11.2009	73.6	99.7	16.5	70	3	E				
	2	17.11.2009	10:22	11:02	17.11.2009	69.5	90.6	13	77	3	S	Mist			
	3	23.11.2009	09:47	11:36	20.11.2009	70.9	92.2	11.1	100	3	W	Mist			
night time	1	06.11.2009	00:31	05:33	06.11.2009	69.7	95.8	15.7	69	3	SW				
	2	21.11.2009	00:07	08:07	20.11.2009	67.7	89.4	10.5	95	2	W	Mist			
	3	26.11.2009	00:18	11:34	26.11.2009	66.9	97.7	7.8	100	2	N	Mist			
Nearby Noise Sources: Automobiles Reasons for noise peaks during recording: Main reason for the peaks are automobiles. Microphone Locations: See photo point#8 Pointing Direction: See photo point#8															

	Measurement Run	Measurement Date	Measurement Time	Duration, minutes	Calibration Date	L _{Aeq} , dBA	L _{Apk} , dBA	Ambient Temperature, °C	Relative Humidity, %	Wind speed	Wind direction	Other meteorological information	Comments		
Measuring Point#3: Kennedy Avenue-Public park near the ventilation shaft															
low traffic	1	03.11.2009	15:52	10:06	03.11.2009	64.6	89.8	10.9	59	3	E		Noise in public park		
	2	18.11.2009	21:26	10:12	17.11.2009	59.2	102.2	11.9	72	2	NW Mist				
	3	24.11.2009	23:11	13:12	20.11.2009	66.5	90.9	12.1	97	1	W Mist				
high traffic	1	06.11.2009	10:32	10:18	06.11.2009	66.8	94.1	16.5	70	3	E				
	2	17.11.2009	10:37	10:13	17.11.2009	60	81.3	13	77	3	S Mist				
	3	23.11.2009	10:08	11:49	20.11.2009	62.1	85.2	11.1	100	3	W Mist				
night time	1	06.11.2009	00:40	05:27	06.11.2009	66.2	117.1	15.7	69	3	SW				
	2	21.11.2009	00:19	07:07	20.11.2009	65.2	90.7	10.5	95	2	W Mist				
	3	26.11.2009	00:33	10:27	26.11.2009	62.6	87.2	7.8	100	2	N Mist				
Nearby Noise Sources: Automobiles. Reasons for noise peaks during recording: Main reason for the peaks are automobiles. Microphone Locations: See photo point# 10 Pointing Direction: See photo point#10															
Measuring Point#6: Topkapı Palace Entrance Square															
low traffic	1	03.11.2009	16:46	10:04	03.11.2009	58.3	95.2	10.9	59	3	E		Noise from Touristic area		
	2	18.11.2009	21:44	11:00	17.11.2009	47.1	84.7	11.9	72	2	NW Mist				
	3	24.11.2009	22:00	10:32	20.11.2009	49.3	89	12.1	97	1	W Mist				
high traffic	1	06.11.2009	10:49	11:44	06.11.2009	56.8	89.7	16.5	70	3	E				
	2	17.11.2009	10:54	11:48	17.11.2009	53.9	102.7	13	77	3	S Mist				
	3	23.11.2009	10:26	10:31	20.11.2009	55.2	88.5	11.1	100	3	W Mist				
night time	1	05.11.2009	23:22	06:06	05.11.2009	53.5	98.8	14.7	79	4	S				
	2	21.11.2009	00:32	06:46	20.11.2009	48.1	77.4	10.5	95	2	W Mist				
	3	26.11.2009	00:49	10:03	26.11.2009	55	102.4	7.8	100	2	N Mist				
Nearby Noise Sources: Touris groups and automobiles. Reasons for noise peaks during recording: Main reason for the peaks are automobiles. Microphone Locations: See photo point# 24 Pointing Direction: See photo point#24															
Measuring Point#5: Park close to Sultan Ahmet Mosque															
low traffic	1	03.11.2009	16:17	10:14	03.11.2009	60.5	92.8	10.9	59	3	E		Noise from Touristic area		
	2	18.11.2009	22:01	10:28	17.11.2009	55	84.4	11.9	72	2	NW Mist				
	3	24.11.2009	21:40	11:08	20.11.2009	63.9	99.9	12.1	97	1	W Mist				
high traffic	1	06.11.2009	11:13	10:03	06.11.2009	62.2	104	16.5	70	3	E				
	2	17.11.2009	11:14	10:51	17.11.2009	60.7	88.3	13	77	3	S Mist				
	3	23.11.2009	10:48	10:22	20.11.2009	61.2	94.5	11.1	100	3	W Mist				
night time	1	05.11.2009	23:38	07:28	05.11.2009	56.5	84.7	14.7	79	4	S				
	2	21.11.2009	00:46	09:01	20.11.2009	50.5	77.7	10.5	95	2	W Mist				
	3	26.11.2009	01:04	10:03	26.11.2009	57.9	94.7	7.8	100	2	N Mist				
Nearby Noise Sources: Touris groups and automobiles. Reasons for noise peaks during recording: Main reason for the peaks are automobiles. Microphone Locations: See photo point# 9 Pointing Direction: See photo point#9															
Measuring Point#4: Tiyatro Street-Princess Hotel and Mosque Corner															
low traffic	1	03.11.2009	14:43	10:03	03.11.2009	72.6	97.2	10.8	59	3	E		Heavy activity at every hour a day about traffic		
	2	18.11.2009	22:23	10:43	17.11.2009	63.5	117.2	11.9	72	2	NW Mist				
	3	24.11.2009	22:23	10:16	20.11.2009	60.3	90.5	12.1	97	1	W Mist				
high traffic	1	06.11.2009	11:31	10:18	06.11.2009	77.2	107.7	16.5	70	3	E				
	2	17.11.2009	11:46	10:09	17.11.2009	67.2	102.3	13	77	3	S Mist				
	3	23.11.2009	11:20	10:06	20.11.2009	65	99.1	11.1	100	3	W Mist				
night time	1	05.11.2009	23:54	06:00	05.11.2009	67.4	100.8	14.7	79	4	S				
	2	21.11.2009	01:04	06:10	20.11.2009	57.2	87.2	10.5	95	2	W Mist				
	3	26.11.2009	23:46	10:19	20.11.2009	63.1	90.4	7.8	100	2	N Mist				
Nearby Noise Sources: Touris groups and automobiles. Reasons for noise peaks during recording: Main reason for the peaks are automobiles and Hotel quest transfers. Microphone Locations: See photo point# 7 Pointing Direction: See photo point#7															

	Measurement Run	Measurement Date	Measurement Time	Duration, minutes	Calibration Date	LAeq, dB(A)	LApk, dB(A)	Ambient Temperature, °C	Relative Humidity, %	Wind speed	Wind direction	Other meteorological information	Comments	ELC GROUP
Measuring Point#1 2: E5 Motorway near Haydarpaşa Numune Hospital														
low traffic	1	05.11.2009	12:05	10:04	05.11.2009	77.9	102.4	17.3	62	4	S		Active in every hour a day about traffic	
	2	19.11.2009	20:48	11:29	17.11.2009	77.4	101.6	13.3	84	2	NW Mist			
	3	24.11.2009	20:16	10:14	20.11.2009	78.9	109.2	12.1	97	1	W Mist			
high traffic	1	05.11.2009	17:56	10:59	05.11.2009	78.3	106.2	17.3	62	4	S			
	2	20.11.2009	09:28	12:16	20.11.2009	79.7	102.9	12.2	98	4	W Mist			
	3	24.11.2009	09:38	10:48	20.11.2009	79.6	102.5	10.2	92	1	W Mist			
night time	1	06.11.2009	01:25	05:06	06.11.2009	70.4	102.6	15.7	69	3	SW			
	2	21.11.2009	01:38	06:17	20.11.2009	69.4	96.7	10.5	95	2	W Mist			
	3	26.11.2009	01:36	10:02	26.11.2009	73.2	106.7	7.8	100	2	N Mist			
Nearby Noise Sources: Automobiles Reasons for noise peaks during recording: Main reason for the peaks are automobiles. Microphone Locations: See photo point# 13 Pointing Direction: See photo point# 13														
Measuring Point#1 1: Selimiye Military Base opposite corner														
low traffic	1	05.11.2009	12:29	10:02	05.11.2009	73.7	100.7	17.3	62	4	S		Active in every hour a day about traffic	
	2	19.11.2009	21:06	11:15	17.11.2009	74.7	108.5	13.3	84	2	NW Mist			
	3	24.11.2009	20:32	10:25	20.11.2009	75.6	104.9	12.1	97	1	W Mist			
high traffic	1	05.11.2009	18:13	10:03	05.11.2009	72.8	107.8	17.3	62	4	S			
	2	20.11.2009	09:47	10:26	20.11.2009	76.1	108.8	12.2	98	3	W Mist			
	3	24.11.2009	09:57	10:35	20.11.2009	78.3	118	10.2	92	1	W Mist			
night time	1	06.11.2009	01:35	05:05	06.11.2009	58.9	101.8	15.7	69	3	SW			
	2	21.11.2009	01:50	08:45	20.11.2009	65.9	106.2	10.5	95	2	W Mist			
	3	26.11.2009	01:51	10:02	26.11.2009	67.5	104.3	7.8	100	2	N Mist			
Nearby Noise Sources: Automobiles Reasons for noise peaks during recording: Main reason for the peaks are automobiles. Microphone Locations: See photo point# 11 Pointing Direction: See photo point# 11														
Measuring Point#1 3: E5 Motorway - Opposite Medipol Hospital														
low traffic	1	05.11.2009	12:46	10:10	05.11.2009	77.9	104.5	17.3	62	4	S		Heavy activity in every hour a day about traffic	
	2	19.11.2009	21:28	10:05	17.11.2009	79.7	107.6	13.3	84	2	NW Mist			
	3	24.11.2009	20:48	10:11	20.11.2009	80.5	110.1	12.1	97	1	W Mist			
high traffic	1	05.11.2009	17:36	10:08	05.11.2009	76.8	103.9	17.3	62	4	S			
	2	20.11.2009	10:03	10:12	20.11.2009	80.3	101.4	12.2	98	3	W Mist			
	3	24.11.2009	10:12	12:06	20.11.2009	81.5	105.5	10.2	92	1	W Mist			
night time	1	06.11.2009	01:44	05:14	06.11.2009	73	115	15.7	69	3	SW			
	2	21.11.2009	02:03	06:09	20.11.2009	74	99.2	10.5	95	2	W Mist			
	3	26.11.2009	02:04	10:03	26.11.2009	73.5	99.3	7.8	100	2	N Mist			
Nearby Noise Sources: Automobiles Reasons for noise peaks during recording: Main reason for the peaks are automobiles. Microphone Locations: See photo point# 15 Pointing Direction: See photo point# 15														

Measuring Point #1: Kumkapı Fish Market Corner



Distance between the microphone location and the Highway= 2 meters.

The point is at the west corner of Kumkapı Fish Market.

There is an entrance for cars to the market place with a subordinate road in order to make U-turn from the traffic lights.

**Measuring Point #2: Kennedy Avenue-Proposed Project Toll Collection
(before entrance to underground)**



Distance between the microphone location and the Highway= 30 meters

The point is at the park site just close to the main project road.

ELC; 10-12-2009



Measuring Point #3: Kennedy Avenue-Public park near the ventilation shaft



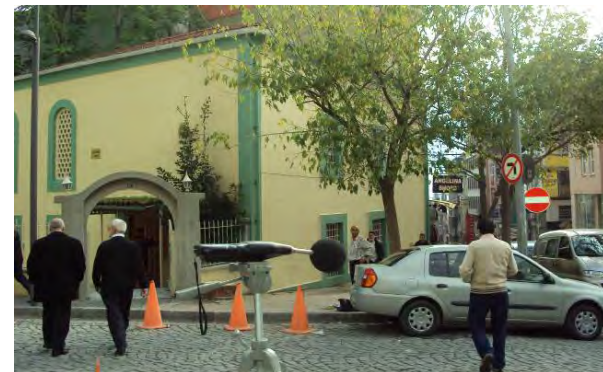
Distance between the microphone location and the Highway= 20 meters.

The point is at the park site just close to the main project road.

Measuring Point #4: Tiyatro Street-Princess Hotel and Mosque Corner



Distance between the microphone location and the local street = 0 meter (microphone is on the street). The point is approximately 500 meters far away from the main project road. Location has a Hotel, a Mosque and so many shops and heavy activity due to that details all the time. Distance between the microphone location and the Highway= 540 meters.



ELC; 10-12-2009



Measuring Point #5: Park close to Sultan Ahmet Mosque



*Distance between the microphone location and the Highway= 370 meters.
Distance between the microphone location and the local street = 20 meters (microphone is in the park), The point is inside a park close to the Sultanahmet Mosque. People use this park to cross the area.'*



Measuring Point #6: Topkapı Palace Entrance Square)



Distance between the microphone location and the Highway= 310 meters
Distance between the microphone location and the local street = 34 meters
The point is at the entrance of Topkapı Palace. Relatively, the location is a quiet area but touris groups are active in that place.

ELC; 10-12-2009

Measuring Point #11: Selimiye Military Base opposite corner



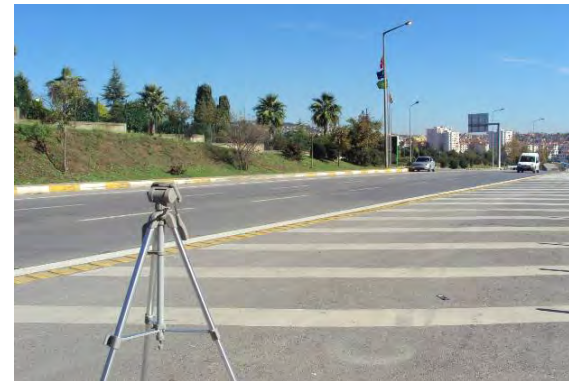
Distance between the microphone location and the Highway= 2 meters.
The point is just beside of the main D-100 highway. There are heavy traffic due to customs house, harbour and a main intercity bus station. Opposite side of the point is an army base. There are minibus station at the back side of the point and the connection road with the station. Location is active almost all the time.



Measuring Point #12: E5 Motor way near Haydarpaşa Numune Hospital



Distance between the microphone location and the Highway= 30 meters
The point is at the park site just close to the main project road.



ELC; 10-12-2009

Measuring Point #13: E5 Motor way - Opposite Medipol Hospital



Distance between the microphone location and the Highway= 0 meter (microphone is on the highway) The point is on the D-100 highway. Location has heavy traffic due to the connection to customs house, harbour and main intercity bus station.



ELC; 10-12-2009



The noise modelling is based on the following approach:

- information on traffic flows with and without the Project has been obtained from the transport studies undertaken by Jacobs and these have been used to estimate the level of sound emissions;
- computer models have been used to calculate the noise exposure in the vicinity of the Project scheme.

Three scenarios have been modelled:

- "2009": Current situation
- "2023 with-Project": Year 2023 with implementation of the Project
- "2023 without-Project": Year 2023 without the Project being implemented (but including other committed changes in the transport system).

3.1

COMPUTATION METHOD

The noise modelling has been carried out using standard software SoundPLAN (Version 7). The calculations were carried out using the French national "NMPB-Routes-96" computation method which is recommended by the European Commission for the assessment of environmental noise as stipulated in Directive 2000/49/EC (relating to the assessment and management of environmental noise). On August 6, 2003 as additional guidance the European Commission has published a Recommendation for the computation of noise (2003/613/EC).

Noise emissions used for the NMPB-model are based on the 'Guide du bruit des transports terrestres, fascicule prévision des niveaux sonores, CETUR 1980'.

Directive 2002/49/EC requires calculation of equivalent noise levels L for day time, evening and night time as long-term noise levels according to ISO 1996-2:1987. They are determined over all day, evening and night periods of a year. The method considers the following parameters:

- Vehicle types: "light vehicles" and "heavy vehicles"
- Average vehicle speed

- Number of vehicles as Annual Average Daily Traffic (AADT) for the three reference periods: day time, evening ours, night time
- Traffic flow type in order to account for pulsated or continuous traffic motion
- Gradient of the road
- Road surface where "smooth asphalt, concrete or mastic" is the reference surface
- Ground effect in order to consider reflecting ground (e.g. paved area, densely built-up areas) or absorbent ground (e.g. grassland, park, garden, woodland)
- Reflections on vertical obstacles

The noise contours obtained with the modelling and presented in the ESIA refer to a receptor height of 2 m unless otherwise stated. The noise modelling area covered a strip of about 400 m to both sides of the scheme.

3.2

TRAFFIC DATA

The sound emission of vehicles depends on a variety of factors. Sound emissions of a single vehicle may depend on but are not limited to:

- Type of vehicle
- Number and type of tyres
- Actual speed of the vehicle
- Air drag of the vehicle

Sound emissions of the total traffic flow depend on e.g.:

- Traffic flow (number of vehicles per hour or day)
- Traffic flow characteristics on a specific road section (average speed, free flow, or traffic jam)
- Composition of vehicle types (abundance of trucks)
- Road characteristics (e.g. type of surface, gradient)

For the modelling, the project scheme was separated into sections between connecting roads where the traffic flow figures change. Joining sections of connecting roads have been included in order to provide an impression of the situation on these roads.

Traffic flow for the three averaging periods (day, evening, night) was calculated from the figures provided by Jacobs. The parameters provided for each traffic flow direction were as follows:

- traffic flow of the average weekday inter-peak hour (IP-hour)
- traffic flow of the average weekday A.M. peak hour (AMP-hour, morning peak)
- average annual daily traffic (AADT)

According to Jacobs the AADT forecasts were calculated from the IP- and AMP-hours with the following factors:

$$\text{AADT} = 0.971 \times (8 \times \text{IP-hour} + 5.22 \times \text{IP-hour} + 5.062 \times \text{AMP-hour})$$

- with 0.971 as the ratio of the annual average day traffic (AADT) over the annual average weekday traffic (AAWT)
- with 8 to include the IP-hours between 9:30 and 17:30
- with 5.22 for the night-time off-peak period from 20:00 to 07:00 (meaning 0.4745 per night-time off-peak hour)
- with 5.062 for the 2.5 AMP-hours in the morning (7:00 - 9:30) and for 2.5 afternoon peak hours (PMP; 17:30 - 20:00)

Based on the data sets for each section and the three noise modelling scenarios as provided by Jacobs, the average day time, evening hours, and night time traffic flows for the modelling were calculated as follows:

- Day time hours from 7:00 to 19:00:

$$\text{Average day time hour traffic flow} = (2.5 \times \text{AMP} + 8 \times \text{IP} + 1.5 \times \text{PMP}) / 12$$

- Evening hours from 19:00 to 23:00:

$$\text{Average evening hour traffic flow} = (1 \times \text{PMP} + 3 \times 0.4745 \times \text{IP}) / 4$$

- Night time hours from 23:00 to 7:00:

$$\text{Average night time hour traffic flow} = 8 \times 0.4745 \times \text{IP} / 8$$

When looking at the directional traffic flow, the morning peak traffic (AMP) in downtown direction (inbound) is higher than for the outbound direction, whereas during the afternoon peak traffic the outbound traffic is higher. In order to account for this, the inbound afternoon peak (PMP; which was not

determined by Jacobs as absolute figures) was assumed to equal the morning outbound (AMP) traffic flow. This approach is considered reasonable since the majority of morning traffic will return in the afternoon.

According to the NMPB computation method, for each road section and traffic flow direction, the number of vehicles was considered separated for "light vehicles" (passenger cars, mini busses, mini trucks) and "heavy vehicles" (heavy duty vehicles, busses, big trucks). The driving speed on the major roads was set to 80 km/h for passenger cars and trucks; for slip lanes, U-turns, and secondary roads the speed was set to 50 km/h. Traffic flow type was considered continuous at the main lanes, whereas traffic on slip lanes, U-turns, and secondary roads were considered to be pulsated due to acceleration and deceleration. The gradient of the road is considered automatically by the model based on the terrain. Terrain data were obtained from the Istanbul Municipality which also included the buildings located along the scheme and within distances of about 400 m to 800 m.

The modelling has been based on a number of assumptions:

- Actual traffic flows in the future may differ from the predicted, but the figures used are the best available.
- Changes in the road network elsewhere in the city and traffic management measures may lead to a different pattern of traffic movements than that assumed for the study. The traffic forecasts do take into account changes in the transport system which are already planned, for example the effects of the Metro tunnel and privatisation of the bridges.
- Noise emission levels from vehicles and tyres are assumed to remain the same as today.
- The road surfaces described for the Project are assumed to correspond with the NMPB standard road surface ('smooth asphalt, concrete or mastic').

The assumption relating to vehicle and road surface characteristics is considered to provide a conservative assessment of the impact from individual vehicles.

For the future composition of the vehicle fleet no significant changes of sound emission characteristics was assumed. Future design of vehicles and tyres are likely to reduce sound emissions from individual vehicles but these effects have not been taken into account as their effects on sound generation can not

be predicted at present. The forecasts of future vehicle noise pressure levels are therefore likely to be conservative.

3.3

SOUND EMISSIONS OF THE TUNNEL SECTION INCLUDING THE VENTILATION SHAFTS

The tunnel itself is no source of sound emissions since the sound generated inside a tunnel is absorbed by the tunnel walls and air turbulences inside the tunnel. Furthermore, the tunnel walls enclose the noise source completely so that no sound will be perceivable outside the tunnel walls. However, sound will be emitted from the tunnel portals where these damping effects cease. Therefore, the emissions from the portals are considered in the model. The emissions, however, have no strong contribution to the noise of the road traffic itself due to the location of the portals below ground and the shielding effect of the road cut walls.

The ventilation shafts are included in the modelling as point sources. They are equipped with a ventilation system comprising three exhaust fans with a combined sound power level of about 131 dB(A) ¹. In order to abate sound pressure levels from these outside the vent shaft structure, sound attenuation equipment will be installed inside the shaft providing a reduction by 42 dB(A). Due to this sound attenuation, the noise pressure level at a distance of 10 m from the shaft at ground level will be below 53 dB(A).

(1) ¹ Sound power level is the parameter to describe the strength of a sound source, whereas a sound pressure level describes the impact on a receptor. Environmental noise is expressed as sound pressure level.

4.1

RESULTS

Based on the traffic flow figures for the three scenarios, noise levels along the alignment were predicted for the daytime, evening, and night time. The adjacent sections of major connecting roads are also included to allow assessment of future potential changes on the wider network in consequence of the Project.

For the operation of the tunnel an average daily traffic flow of 130,000 vehicles was taken which represents the maximum design flow in the tunnel. Heavy vehicle traffic through the tunnel will not be permitted.

The results of the modelling are provided in the figures attached to this Annex. Figures 1 through 8 show the noise contour plots for the European side and figures 9 through 16 for the Asian side:

Figure No		Scenario	Content
Europe	Asia		
1	9	2009 - current scenario	Noise contours - daytime
2	10	ditto	Noise contours - night time
3	11	2023 with Project	Noise contours - daytime
4	12	ditto	Noise contours - night time
5	13	2023 without Project	Noise contours - daytime
6	14	ditto	Noise contours - night time
7	15	Difference plot 2023	Noise contours - daytime
8	16	ditto	Noise contours - night time

Since traffic flows will increase not only through operation of the tunnel but also due to general increase of traffic over time, the ESIA refers to the future situation without tunnel as the baseline for defining the impacts of the Project. In order to show this effect, Figures 8, 9, and 15, 16 show dB(A) difference plots calculated from the dB(A) levels of the 2023 scenario "with Project" minus the scenario "without Project". In this context it has to be stressed that differences in the dB-scale require special interpretation since a dezibel difference is independent from the absolute level and thus does not stand for

an impact. Dezibel differences need always to be discussed with reference to the absolute level at the respective location.

As a general guidance regarding the scaling and colours used in the noise contour plots the following is stated:

- Noise contour scales are provided in steps of 3dB(A)
 - Green colour indicates that none of the Turkish noise limits is exceeded
 - Light yellow colour indicates that the Turkish noise limit for sensitive receptors (e.g. school, hospital) is exceeded (65 dB(A) at daytime and 55 dB(A) at night time²)
 - Yellow colour indicates that the Turkish noise limit for areas of mostly residential use is exceeded (68 dB(A) at daytime and 58 dB(A) at night time)
 - Reddish colours indicate exceedance of Turkish noise limits for commercial areas
- Difference plots show scales in steps of 1 dB(A)
 - Green colour indicates an unchanged or reduced noise level
 - Blue colours indicate an increase between 0 dB(A) and 3 dB(A), the latter being the threshold of perceptibility
 - White-yellow-red colours indicate higher increments

In general the contour plots show that the standards are only exceeded close to the Project scheme. The propagation of sound into the built-up areas is limited by sound shielding effects from buildings in the first rows. For the first row of buildings the noise standard can be exceeded if situated close to the scheme, whereas the level at the second row of buildings meets the standard unless there is open space between the first row buildings enabling the sound wave to propagate through.

The effect of the ventilation shafts is only minor due to the installed sound attenuation for the fans. At a distance of 10 m from the shaft at the ground level of noise pressure will be below 53 dB(A). This will be a minor contribution to environmental noise since it will be masked by the traffic noise of the roads which ranges between 56 and 62 dB(A).

(2) ² According to the type of project, the Turkish noise limits for upgrading of existing roads apply.

The calculated modelling results directly depend on the input data. The actual traffic forecast figures in the future may differ from the predicted, but the figures used for the modelling are the best available. The transformation from IP and AMP data sets into day, evening and night time periods made some assumptions necessary. This resulted in uncertainties for the directional traffic flow figures in the range of 10% to 15%. The bidirectional figures, however, showed deviations below 0.5%. Also for connecting roads with low traffic flow, the uncertainty was about 10%. Such uncertainties could cause deviations below 0.5 dB(A) which only would have minor effect on the results.

Other reasons for potential uncertainties that can not be quantified are:

- Actual topography and existing buildings may differ from the available terrain and building data which could cause inaccurate noise levels on the local scale. Future buildings could not be considered.
- The actual levels of the final road may differ from the current design which can cause higher noise levels in case of elevated alignment, or lower levels in case of a cut.

In conclusion, the uncertainties can be considered to being limited to a level not being relevant for the interpretation of the modelling results.

Annex M

Biodiversity and Nature Conservation Supporting Information

Table M-1: Fauna Species observed during Field Visit on the European Side

Scientific Name	English Name	Status	IUCN	Bern
GASTROPODA				
Order: NEOTAENIOGLASSA				
Familia: Pomatiidae				
<i>Pomatias elegans</i>	Round-mouthed snail	Native	-	-
Order: STYLOMMATOPHORA				
Familia: Pleurodiscidae				
<i>Pleurodiscus balmei</i>	-	Native	-	-
Familia: Helicidae				
<i>Cornu aspersum</i>	Garden snail	Native	-	-
INSECTA				
Order: LEPIDOPTERA				
Familia: Pieridae				
<i>Colias crocea</i>	Dark Clouded Yellow	Native	-	-
<i>Pieris brassicae</i>	Large White	Native	-	-
<i>Pieris rapae</i>	Small White	Native	-	-
Familia: Lycaenidae				
<i>Lycaena phlaeas</i>	Small Copper	Native	-	-
Familia: Nymphalidae				
<i>Vanessa atalanta</i>	Red Admiral	Native	-	-
Familia: Sphingidae				
<i>Macroglossum stellatarum</i>	Hummingbird Hawk-moth	Native	-	-
Order: HYMENOPTERA				
Familia: Apidae				
<i>Apis mellifera</i>	European honey bee	Native	-	-
Familia: Formicidae				
<i>Tetramorium caespitum</i>	Pavement ant	Native	-	-
<i>Pheidole pallidula</i>	-	Native	-	-

Scientific Name	English Name	Status	IUCN	Bern
REPTILA				
Order: TESTUDINATA				
Familia: Lacertidae				
<i>Lacerta viridis</i>	European green lizard	Native	LC	Appx II
<i>Podarcis muralis</i>	Wall Lizard	Native	LC	Appx II
AVES				
Order: PODICIPEDIFORMES				
Familia: Podicipedidae				
<i>Tachybaptus ruficollis</i>	Little Grebe	Resident	LC	Appx II
Order: PELECANIFORMES				
Familia: Phalacrocoracidae				
<i>Phalacrocorax carbo</i>	Great Cormorant	Resident	LC	Appx II
Order: ANSERIFORMES				
Familia: Anatidae				
<i>Anas platyrhynchos</i>	Mallard	Winter visitor, Resident	LC	-
Order: FALCONIFORMES				
Familia: Falconidae				
<i>Falco tinnunculus</i>	Common Kestrel	Resident	LC	Appx II
Order: GRUIFORMES				
Familia: Rallidae				
<i>Fulica atra</i>	Common Coot	Resident	LC	-
Order: CHARADRIIFORMES				
Familia: Laridae				
<i>Larus melanocephalus</i>	Mediterranean Gull	Winter Visitor	LC	Appx II
<i>Larus ridibundus</i>	Common Black-headed Gull	Resident	LC	Appx II
<i>Larus cachinnans</i>	Yellow-legged Gull	Resident	LC	Appx III
Order: COLUMBIFORMES				
Familia: Columbidae				
<i>Columba livia</i>	Rock Pigeon (Dove)	Resident	LC	-

Scientific Name	English Name	Status	IUCN	Bern
<i>Streptopelia decaocto</i>	Eurasian Collared Dove	Resident	LC	-
<i>Streptopelia turtur</i>	Turtle Dove	Sommer Migrant	LC	-
<i>Streptopelia senegalensis</i>	Laughing Dove	Resident	LC	Appx II
Order: PASSERIFORMES				
Familia: Motacillidae				
<i>Motacilla cinerea</i>	Grey Wagtail	Passage Migrant	LC	
<i>Motacilla alba</i>	White (Pied) Wagtail	Passage Migrant	LC	Appx II
Familia: Troglodytidae				
<i>Troglodytes troglodytes</i>	Winter Wren	Resident	LC	-
Familia: Turdidae				
<i>Erithacus rubecula</i>	European Robin	Resident	LC	-
<i>Phoenicurus ochruros</i>	Black Redstart	Sommer Migrant	LC	-
<i>Phoenicurus phoenicurus</i>	Common Redstart	Sommer Migrant	LC	-
Familia: Sylviidae				
<i>Phylloscopus collybita</i>	Common Chiffchaff	Passage Migrant, Sommer Migrant	LC	Appx II
<i>Phylloscopus trochilus</i>	Willow Warbler	Passage Migrant	LC	Appx II
Familia: Paridae				
<i>Parus lugubris</i>	Sombre Tit	Vagrant	LC	
<i>Parus caeruleus</i>	Blue Tit	Resident	LC	Appx II
<i>Parus major</i>	Great Tit	Resident	LC	Appx II
Familia: Corvidae				
<i>Corvus monedula</i>	Eurasian Jackdaw	Resident	LC	Appx III
<i>Corvus frugilegus</i>	Rook	Winter Visitor	LC	Appx III
<i>Corvus corone</i>	Hooded Crow	Resident	LC	Appx III
Familia: Sturnidae				
<i>Sturnus vulgaris</i>	Common Starling	Resident	LC	Appx III

Scientific Name	English Name	Status	IUCN	Bern
Familia: Passeridae				
<i>Passer domesticus</i>	House Sparrow	Resident	LC	Appx III
Familia: Fringillidae				
<i>Fringilla coelebs</i>	Chaffinch	Resident	LC	Appx III
<i>Carduelis chloris</i>	European Greenfinch	Resident	LC	Appx II
<i>Carduelis carduelis</i>	European Goldfinch	Resident	LC	Appx II
<i>Carduelis spinus</i>	Eurasian Siskin	Resident	LC	Appx II
MAMMALIA				
Order: CHIROPTERA				
Familia: Rhinolophidae				
<i>Rhinolophus hipposideros</i>	Lesser horseshoe bat	Native	LC	-
Familia: Vespertilionidae				
<i>Pipistrellus pipistrellus</i>	Common Pipistrelle	Native	LC	-
Order: RODENTIA				
Familia: Muridae				
<i>Rattus rattus</i>	House Rat	Introduced	LC	-
<i>Mus musculus</i>	House Mouse	Native	LC	-
Order: CARNIVORA				
Familia: Mustelidae				
<i>Martes martes</i>	European Pine Marten	Native	LC	Appx III
Familia: Canidea				
<i>Canis familiaris</i>	Domestic Dog	Native	-	-
Familia: Felidae				
<i>Felis catus</i>	Domestic Cat	Native	-	-

Table ML-2: Fauna Species observed during Field Visit on the Asian Side

Scientific Name	English Name	Status	IUCN	Bern	Habitat Type
GASTROPODA					
Order: STYLOMMATOPHORA					
Familia: Hygromiidae					
<i>Helicella itala</i>	Western Health Snail	Native	-	-	• Amenity grassland and ornamental planting
Order: SIGMURETHRA					
Familia: Helicidae					
<i>Helix pomatia</i>	Roman Snail,	Native	-	-	• Amenity grassland and ornamental planting
INSECTA					
Order: LEPIDOPTERA					
Familia: Pieridae					
<i>Colias crocea</i>	Dark Clouded Yellow	Native	-	-	• Other grassland and scrub
<i>Pieris brassicae</i>	Large White	Native	-	-	• Other grassland and scrub
Familia: Nymphalidae					
<i>Vanessa atalanta</i>	Red Admiral	Native	-	-	• Other grassland and scrub
Familia: Sphingidae					
<i>Macroglossum stellatarum</i>	Hummingbird Hawk-moth	Native	-	-	
Order: HYMENOPTERA					
Familia: Apidae					
<i>Apis mellifera</i>	European honey bee	Native	-	-	• Amenity grassland and ornamental planting; • other planted grassland and landscaped planting; • other grassland and scrub; • other

Scientific Name	English Name	Status	IUCN	Bern	Habitat Type
Familia: Vespidae					
<i>Vespa crabro</i>	European hornet	Native	-	-	<ul style="list-style-type: none"> • Amenity grassland and ornamental planting; • other planted grassland and landscaped planting; • other grassland and scrub; • other
Familia: Formicidae					
<i>Iridomyrmex purpureus</i>	Meat ant	Native	-	-	<ul style="list-style-type: none"> • Amenity grassland and ornamental planting; • other planted grassland and landscaped planting; • other grassland and scrub; • other
REPTILA					
Order: TESTUDINATA					
Familia: Lacertidae					
<i>Lacerta viridis</i>	European green lizard	Native	LC	Appx II	<ul style="list-style-type: none"> • Amenity grassland and ornamental planting; • other planted grassland and landscaped planting; • other
AVES					
Order: PELECANIFORMES					
Familia: Phalacrocoracidae					
<i>Phalacrocorax carbo</i>	Great Cormorant	Resident	LC	-	
Order: ACCIPITRIFORMES					
Familia: Accipitridae					
<i>Accipiter nisus</i>	Eurasian Sparrowhawk	Passage Migrant, Resident	LC	Appx II	
Order: GRUIFORMES					
Familia: Rallidae					
<i>Fulica atra</i>	Common Coot	Resident	LC	-	

Scientific Name	English Name	Status	IUCN	Bern	Habitat Type
Order: CHARADRIIFORMES					
Familia: Laridae					
<i>Larus melanocephalus</i>	Mediterranean Gull	Winter Visitor	LC	Appx II	
<i>Larus minutus</i>	Little Gull	Winter Visitor	LC	Appx II	
<i>Larus ridibundus</i>	Common Black-headed Gull	Resident	LC	Appx II	
<i>Larus cachinnans</i>	Yellow-legged Gull	Resident	LC	Appx III	
Order: COLUMBIFORMES					
Familia: Columbidae					
<i>Columba livia</i>	Rock Pigeon (Dove)	Resident	LC	-	<ul style="list-style-type: none"> • Amenity grassland and ornamental planting; • other planted grassland and landscaped planting; • other grassland and scrub; • other
<i>Streptopelia senegalensis</i>	Laughing Dove	Resident	LC	Appx II	<ul style="list-style-type: none"> • Amenity grassland and ornamental planting; • other planted grassland and landscaped planting; • other grassland and scrub; • other
Order: PICIFORMES					
Familia: Picidae					
<i>Dendrocopos syriacus</i>	Syrian Woodpecker	Resident	LC	Appx II	<ul style="list-style-type: none"> • other
Order: PASSERIFORMES					
Familia: Motacillidae					
<i>Motacilla alba</i>	White (Pied) Wagtail	Passage Migrant	LC	Appx II	<ul style="list-style-type: none"> • Amenity grassland and ornamental planting; • other planted grassland and landscaped planting

Scientific Name	English Name	Status	IUCN	Bern	Habitat Type
Familia: Sylviidae					
<i>Phylloscopus collybita</i>	Common Chiffchaff	Passage Migrant, Sommer Migrant	LC	Appx II	• Amenity grassland and ornamental planting
Familia: Paridae					
<i>Parus caeruleus</i>	Blue Tit	Resident	LC	Appx II	• Amenity grassland and ornamental planting
<i>Parus major</i>	Great Tit	Resident	LC	Appx II	• Amenity grassland and ornamental planting
Familia: Corvidae					
<i>Corvus monedula</i>	Eurasian Jackdaw	Resident	LC	Appx III	• Amenity grassland and ornamental planting; • other
<i>Corvus frugilegus</i>	Rook	Winter Visitor	LC	Appx III	• Amenity grassland and ornamental planting; • other
<i>Corvus corone</i>	Hooded Crow	Resident	LC	Appx III	• Amenity grassland and ornamental planting; • other
Familia: Sturnidae					
<i>Sturnus vulgaris</i>	Common Starling	Resident	LC	Appx III	• Amenity grassland and ornamental planting; • other planted grassland and landscaped planting; • other grassland and scrub; • other
Familia: Passeridae					
<i>Passer domesticus</i>	House Sparrow	Resident	LC	Appx III	• Amenity grassland and ornamental planting; • other planted grassland and landscaped planting; • other grassland and scrub; • other
Familia: Fringillidae					
<i>Fringilla coelebs</i>	Chaffinch	Resident	LC	Appx III	• other

Scientific Name	English Name	Status	IUCN	Bern	Habitat Type
MAMMALIA					
Order: CHIROPTERA					
Familia: Vespertilionidae					
<i>Pipistrellus pipistrellus</i>	Common Pipistrelle	Native	LC	-	<ul style="list-style-type: none"> • Amenity grassland and ornamental planting; • other
Order: RODENTIA					
Familia: Sciuridae					
<i>Sciurus anomalus</i>	Caucasian Squirrel	Native	LC	Appx II	<ul style="list-style-type: none"> • other
Familia: Muridae					
<i>Rattus rattus</i>	House Rat	Introduced	LC	-	<ul style="list-style-type: none"> • Running water; • other
<i>Mus musculus</i>	House Mouse	Native	LC	-	<ul style="list-style-type: none"> • Running water
Order: CARNIVORA					
Familia: Canidea					
<i>Canis familiaris</i>	Domestic Dog	Native	-	-	<ul style="list-style-type: none"> • Amenity grassland and ornamental planting; • other planted grassland and landscaped planting; • other
Familia: Felidae					
<i>Felis catus</i>	Domestic Cat	Native	-	-	<ul style="list-style-type: none"> • Amenity grassland and ornamental planting; • other grassland and scrub; • other

Table M-3: Fauna Species according to literature review on the Asian Side

Scientific Name	English Name	Status	IUCN	Bern
INSECT				
Order: ORHOPTERA				
Familya: Gryllotalpidae				
<i>Gryllotalpa gryllotalpa</i>	European mole cricket	Native	-	-
Order: COLEOPTERA				
Familya: Chrysomelidae				
<i>Agelastica alni</i>	Alder leaf beetle	Native	-	-
<i>Chrysomela populi</i>	Red Poplar Leaf Beetle	Native	-	-
<i>Crepidodera aurata</i>	Willow Flea Beetle	Native	-	-
Familya: Cerambycidae				
<i>Cerambyx cerdo</i>	Great Capricorn Beetle	Native	VU	-
Familya: Lucanidae				
<i>Dorcus parallelipedus</i>	Lesser stag beetle	Native	-	-
Familya: Scarabaeidae				
<i>Melolontha melolontha</i>	Cockchafer	Native	-	-
<i>Polyphylla fullo</i>	June beetle	Native	-	-
Order: LEPIDOPTERA				
Familya: Tortricidae				
<i>Archips xylosteana</i>	Variegated Golden Tortrix	Native	-	-
<i>Tortrix viridana</i>	European oak leaf roller	Native	-	-
Familya: Geometridae				
<i>Deuteronomos quercaria</i>	-	Native	-	-
<i>Erannis defoliaria</i>	Mottled Umber	Native	-	-
Familya: Noctuidae				
<i>Agrotis ipsilon</i>	Dark Sword-grass	Native	-	-
<i>Autographa gamma</i>	Silver Y	Native	-	-
<i>Catocala conversa</i>	-	Native	-	-
<i>Catocala elocata</i>	French Red Underwing	Native	-	-
<i>Noctua comes</i>	Lesser Yellow Underwing	Native	-	-

Scientific Name	English Name	Status	IUCN	Bern
<i>Noctua pronuba</i>	Large Yellow Underwing	Native	-	-
Familya: Lymantridae				
<i>Euproctis chrysorrhoea</i>	Brown-tail	Native	-	-
<i>Lymantria dispar</i>	Gypsy moth	Native	-	-
Familia: Papilionidae				
<i>Ipheclides podalirius</i>	Scarce Swallowtail	Native	-	-
<i>Papilio machaon</i>	Old World Swallowtail	Native	-	-
Familya: Pieridae				
<i>Aporia crataegi</i>	Black-veined White	Native	-	-
<i>Pieris rapae</i>	Small White	Native	-	-
<i>Pontia edusa</i>	Eastern Bath White	Native	-	-
Familia: Lycaenidae				
<i>Lycaena phlaeas</i>	Small Copper	Native	-	-
<i>Lampides boeticus</i>	Peablu or Long-tailed Blue	Native	-	-
<i>Leptotes pirithous</i>	Lang's short tailed Blue	Native	-	-
<i>Celastrina argiolus</i>	Holly Blue	Native	-	-
<i>Plebeius argus</i>	Silver-studded Blue	Native	-	-
<i>Polyommatus icarus</i>	Common Blue	Native	-	-
Familya: Nymphalidae				
<i>Vanessa cardui</i>	Painted Lady	Native	-	-
<i>Vanessa polychloros</i>	Great tortoise-shell	Native	-	-
<i>Polygonia egea</i>	Southern Comma	Native	-	-
<i>Argynnis pandora</i>	Cardinal	Native	-	-
<i>Maniola jurtina</i>	Meadow Brown	Native	-	-
<i>Tyhmelicus sylvestris</i>	Small skipper	Native	-	-
Order: HYMENOPTERA				
Familya: Cynipidae				
<i>Andricus kollari</i>	Oak marble galls	Native	-	-
AMPHIBIANS				
Order: ANURA				
Familia: Bufonidae				

Scientific Name	English Name	Status	IUCN	Bern
<i>Bufo bufo</i>	Common Toad	Native	LC	-
<i>Bufo viridis</i>	European Green Toad	Native	LC	Appx II
Familia: Ranidae				
<i>Rana ridibunda</i>	Marsh Frog	Native	LC	-
REPTILIAN				
Order: TESTUDINATA				
Familia: Lacertidae				
<i>Lacerta trilineata</i>	Balkan Green Lizard	Native	LC	Appx II
<i>Podarcis muralis</i>	Wall Lizard	Native	LC	Appx II
<i>Podarcis sicula</i>	Istanbul Lizard	Native	LC	Appx II
BIRD SPECIES				
Order: PROCELLARIIFORMES				
Familia: Procellariidae				
<i>Puffinus yelkouan</i>	Yelkouan Shearwater	Resident	NT	Appx II
Order: PELECANIFORMES				
Familia: Phalacrocoracidae				
<i>Phalacrocorax aristotelis</i>	European Shag	Winter Visitor	LC	-
Familia: Pelecanidae				
<i>Pelecanus onocrotalus</i>	Great White Pelican	Passage Migrant	LC	Appx II
Order: CICONIIFORMES				
Familia: Ardeidae				
<i>Ardea cinerea</i>	Grey Heron	Resident	LC	-
Familia: Ciconiidae				
<i>Ciconia nigra</i>	Black Stork	Passage Migrant	LC	Appx II
<i>Ciconia ciconia</i>	White Stork	Passage Migrant	LC	Appx II
Order: ACCIPITRIFORMES				
Familia: Accipitridae				
<i>Pernis apivorus</i>	European Honey Buzzard	Passage Migrant	LC	-

Scientific Name	English Name	Status	IUCN	Bern
<i>Milvus migrans</i>	Black Kite	Passage Migrant	LC	-
<i>Circus gallicus</i>	Short-toed Snake-eagle	Passage Migrant	LC	-
<i>Accipiter brevipes</i>	Levant Sparrowhawk	Passage Migrant	LC	-
<i>Buteo buteo</i>	Common Buzzard	Passage Migrant	LC	-
<i>Aquila pomarina</i>	Lesser Spotted Eagle	Passage Migrant	LC	-
<i>Hieraaetus pennatus</i>	Booted Eagle	Passage Migrant	LC	-
Order: FALCONIFORMES				
Familia: Falconidae				
<i>Falco subbuteo</i>	Eurasian Hobby	Passage Migrant	LC	Appx II
<i>Falco peregrinus</i>	Peregrine Falcon	Passage Migrant	LC	Appx II
Order: CHARADRIIFORMES				
Familia: Laridae				
<i>Larus fuscus</i>	Lesser Black-backed Gull	Summer Migrant	LC	Appx III
<i>Larus marinus</i>	Great Black-backed Gull	Winter Visitor	LC	Appx III
Familia: Sternidae				
<i>Sterna sandvicensis</i>	Sandwich Tern	Winter Visitor	LC	Appx II
<i>Sterna hirundo</i>	Common Tern	Winter Visitor	LC	Appx II
Order: PSITTACIFORMES				
Familia: Psittacidae				
<i>Psittacula krameri</i>	Rose-ringed (Ring-necked) Parakeet	Resident	LC	-
Order: STRIGIFORMES				
Familia: Strigidae				
<i>Athene noctua</i>	Little Owl	Resident	LC	Appx II
Order: CAPRIMULGIFORMES				
Familia: Caprimulgidae				
<i>Caprimulgus europaeus</i>	Eurasian Nightjar	Passage Migrant	LC	Appx II
Order: APODIFORMES				
Familia: Apodidae				
<i>Apus apus</i>	Common Swift	Summer migrant	LC	-

Scientific Name	English Name	Status	IUCN	Bern
<i>Apus pallidus</i>	Pallid Swift	Summer migrant	LC	Appx II
<i>Apus melba</i>	Alpine Swift	Summer migrant	LC	Appx II
Order: CORACIIFORMES				
Familia: Meropidae				
<i>Merops apiaster</i>	European Bee-eater	Passage Migrant	LC	Appx II
Order: PICIFORMES				
Familia: Picidae				
<i>Dendrocopos minor</i>	Lesser Spotted Woodpecker	Resident	LC	Appx II
Order: PASSERIFORMES				
Familia: Hirundinidae				
<i>Hirundo rustica</i>	Barn Swallow	Summer migrant	LC	Appx II
<i>Delichon urbica</i>	Northern House-martin	Summer Migrant	LC	Appx II
Familia: Motacillidae				
<i>Motacilla flava</i>	Yellow Wagtail	Passage Migrant	LC	Appx II
<i>Motacilla cinerea</i>	Grey Wagtail	Passage Migrant	LC	Appx II
Familia: Turdidae				
<i>Phoenicurus ochruros</i>	Black Redstart	Passage Migrant	LC	Appx II
Familia: Sylviidae				
<i>Hippolais icterina</i>	Icterine Warbler	Passage Migrant	LC	-
<i>Phylloscopus trochilus</i>	Willow Warbler	Passage Migrant	LC	-
<i>Regulus regulus</i>	Goldcrest	Resident		Appx II
Familia: Oriolidae				
<i>Oriolus oriolus</i>	Eurasian Golden-oriole	Passage Migrant	LC	Appx II
Familia: Corvidae				
<i>Pica pica</i>	Black-billed Magpie	Resident	LC	Appx III
MAMMALS				
Order: INSECTIVORA				
Familia: Erianaceidae				

Scientific Name	English Name	Status	IUCN	Bern
<i>Erinaceus concolor</i>	Southern White-breasted Hedgehog	Native	LC	-
Order: CHIROPTERA				
Familia: Rhinolophidae				
<i>Rhinolophus hipposideros</i>	Lesser horseshoe bat	Native	LC	-
Familia: Vespertilionidae				
<i>Myotis blythii</i>	Lesser Mouse-eared Bat	Native	LC	-
Order: RODENTIA				
Familia: Muridae				
<i>Rattus norvegicus</i>	Brown Rat	Introduced	LC	-
Order: CARNIVORA				
Familia: Mustelidae				
<i>Martes martes</i>	European Pine Marten	Native	LC	Appx III

Annex N

Archaeology and Built Heritage

Most of the pre-historical settlements of Istanbul are concentrated on the Asian side of the city. Among these, the one known as “culture of Fikirtepe” is not only the oldest Neolithical (8,000-6,000 B.C.) ceramic producing one in Istanbul but in the entire region of Marmara.¹

The most important settlement on European side is the “cave of Yarımburgaz” which was inhabited as early as 600 B.C. and was one of the oldest settlements in the Near East.² This cave continued to be inhabited as late as the Byzantine period and fell into disuse during the Ottoman era.³

Last major changes in the geography of the area occurred after the Last Ice Age, around 8,000 B.C. During this period the coastlines of Istanbul close to today was shaped and the bays between Yenikapı and Yeşilköy were filled with alluvial soil.⁴

Excavations at Marmaray / Yenikapı uncovered a 6th millennium B.C. settlement which is very important for the history of the city and was unknown prior to the excavations. Houses of this settlement were made of mud and wooden beams.⁵

Rapid cultural development between 4,000 and 1,000 B.C. in the Near East, Aegean and Anatolia had impact on several sites of Istanbul such as Bakırköy (Ayamama), Sultanahmet (Hippodrome). It is also understood from the examples like Silivri (Sülüklü area) and Sultanahmet (annex building construction of Istanbul Archaeological Museums) that the wave of

¹ Mehmet Özdoğan, “ Tarih öncesi dönemde İstanbul”, Semavi Eyice armağanı – İstanbul yazıları, İstanbul 1992, s. 42

² Ufuk Esin, “ İstanbul’un en eski buluntu yerleri ve kültürleri”, Semavi Eyice armağanı – İstanbul yazıları, İstanbul 1992, s. 68

³ Mehmet Özdoğan, “ Tarih öncesi çağlarda İstanbul”, Dünya kenti İstanbul, yay. Afife Batur, İstanbul 1996, s. 95

⁴ Sırrı Erinç, “ İstanbul boğazı ve çevresi. Doğal ortam: Etkiler ve olanaklar”, İstanbul Üniversitesi Coğrafya Enstitüsü dergisi sayı 20-21 (1974-77), s. 10

⁵ Zeynep Kızıltan, “Marmaray projesi ve İstanbul’un gün ışığına çıkan 8000 yılı”, Gün ışığında İstanbul’un 8000 yılı: Marmaray, Metro, Sultanahmet kazıları, İstanbul 2007, s. 18

immigration which influenced Balkans around 1,000 B.C., had reached Istanbul as well.⁶

In the following period, the city of Byzantion was established. The city-state is thought to have been established on the location where Topkapı palace is today around 660 B.C. by a certain Byzas.⁷

The name of the founder is considered to be Thracian.⁸ Since Thracian tribes of Phrygians and Bithyans came and settled from the Balkans and Southeastern Europe around 1,200 and 700 B.C. respectively,⁹ it is also possible that Byzantion was established by Thracians as well.

According to ancient sources, Byzantion was established by Megarians seventeen years after Khalkedon (modern day Kadıköy).¹⁰ Since the date of establishment for Khalkedon is considered to be 685 B.C.¹¹ Byzantion is likely to have been established by around 658 B.C. Traditionally the establishment year for Byzantion is 660 B.C.¹²

The earliest scientific evidence for Byzantion came from the area of Sarayburnu under Topkapı Palace in the form of Proto-Korinthian pottery sherds dated to 7th century B.C.¹³

Byzantion was occupied by Persians under Darius I in 512 B.C.¹⁴

Fishing was the main source of income for Byzantion.¹⁵ Due to its big fishing industry and strategic location, Byzantion benefitted from large (fishing)

⁶ Mehmet Özdoğan, " Tarih öncesi çağlarda İstanbul", Dünya kenti İstanbul, yay. Afife Batur, İstanbul 1996, s. 100

⁷ Doğan Kuban, "Bizantion", Düünden bugüne İstanbul ansiklopedisi, c. II, İstanbul 1994, s. 258

⁸ Oğuz Tekin, Eskiçağda İstanbul, İstanbul 2005, 3. baskı, s. 5

⁹ Afif Erzen, İlkçağ tarihinde Trakya: Başlangıçtan Roma çağı'na kadar, İstanbul 1994, s. 75

¹⁰ Herodotus, Herodot Tarihi, çev. Müntekim Ökmen, 3. baskı, İstanbul 1993, IV. 144

¹¹ Plinius, Naturalis Historia, tr. H.R. Rackham, London 1958, V. 42.

¹² Doğan Kuban, "Bizantion", Düünden bugüne İstanbul ansiklopedisi, c. II, İstanbul 1994, s. 258

¹³ Aziz.Ogan, "1937 Yılında TTK tarafından yapılan Topkapı Sarayı hafriyatı" Belleten 4 (1940), s. 318-327

¹⁴ Wolfgang Müller-Wiener, İstanbul'un Tarihsel Topografyası: 17. yüzyılın başlarına kadar Byzantion-Konstantinopolis-İstanbul, çev. Ülker Sayın, İstanbul 2001, s. 16

¹⁵ Strabon, Geographika, çev. Horace L. Jones, London 1917, VII. 6.2.

related-incomes during the 5th and 4th centuries B.C. with which they were able to pay heavy taxes not to be overrun and avoid domestic politics of the mainland Greek city-states.¹⁶

Xenophon, an Athenian commander who participated in the civil war of Persia as a mercenary, explains that as they were returning home their soldiers were called to gather in the square called “ Thrakion” in the city of Byzantion in the year 400 B.C.¹⁷

After occupying Khalkedon and signing a political unity agreement with Selymbria, Byzantion reached the borders of the Kingdom of Macedonia.

The friendly relation at the beginning came to an end upon Philip II’s unsuccessful siege on the city in 340-339 B.C.¹⁸

Immigration from various Celtic tribes changed the population balance in the Greek world also they reached at Byzantion under the leadership of Leonnorias and Luturios in 278-277 B.C. In return for a promise of looting any city other than the Bithynian ones they were directed to Anatolia by the Bithynian king Nikomedes I.¹⁹

Byzantion became part of Roman state in 146 B.C. and was included in the province of Bithynia in 74 B.C.²⁰

Under Roman rule, public buildings such as temples, squares, cisterns and fountains were built. Byzantion surrendered to the Roman general Septimius Severus in 195 A.D. after a two year siege.²¹

¹⁶ Wolfgang Müller-Wiener, Bizans’tan Osmanlı’ya İstanbul limanı, çev. Erol Özek, İstanbul 1998, s. 3

¹⁷ Ksenophon, Anabasis-onbinlerin dönüşü , çev. Tanju Gökçöl, 2.baskı, İstanbul 1998, VI. 24.

¹⁸ Wolfgang Müller-Wiener, İstanbul’un Tarihsel Topografyası: 17. yüzyılın başlarına kadar Byzantion-Konstantinopolis-İstanbul, çev. Ülker Sayın, İstanbul 2001, s. 16-17

¹⁹ Stephen Mitchell, Anatolia: Land, men, and gods in Asia Minor. The Celts and the impact of Roman rule, vol. I, Oxford 1995, s. 15-16

²⁰ Wolfgang Müller-Wiener, İstanbul’un Tarihsel Topografyası: 17. yüzyılın başlarına kadar Byzantion-Konstantinopolis-İstanbul, çev. Ülker Sayın, İstanbul 2001, s. 18

²¹ Wolfgang Müller-Wiener, İstanbul’un Tarihsel Topografyası: 17. yüzyılın başlarına kadar Byzantion-Konstantinopolis-İstanbul, çev. Ülker Sayın, İstanbul 2001, s. 19

In the middle of 3rd century A.D. Byzantium was partially destroyed by the Goths. After their defeat by Claudius II in 269/270 they were never able to be a threat to the city.²²

Constantine I becoming the sole city ruler, following a long civil war, chose this city as the new capital on 4 November 326. The official inauguration of the city was on 11 May 330.²³

²² Oğuz Tekin, Eskiçağda İstanbul, İstanbul 2005, 3. baskı, s. 35

²³ Jacob Burckhardt, The age of Constantine the Great, tr. Moses Hadas, New York 1989, s. 347-348

Greatest part of the defence of the city was played by the city walls which have been perfected by time except for the sections by the sea. Development of the sea walls came at a later stage.

2.1

CITY WALL SECTIONS ON LAND

It is believed that the city-state of Byzantion had city walls from the beginning. It was reported by Xenophon in 400 B.C. that the Athenian mercenaries returning from Persia entered the city by going over its walls because of a misunderstanding.²⁴

Roman general Septimius Severus, upon capturing Byzantion in 195 A.D., punished the citizens who were supporting the losing party but he then restored the city walls.²⁵

City walls were partially damaged during the raids of Goths between 258-269 and were restored immediately. They were restored soon afterwards between 285-289 as well.²⁶

The city walls which were already in existence since the time of the legendary founder Byzaz were enlarged by Constantine I after having the city raised to the capital city in 328.²⁷

Although limits of the Constantinian walls are not known, it is believed that their westward limit was in the area of Isakapısı, around Cerrahpaşa hospital, which was in existence until 1509.²⁸

²⁴ Ksenophon, *Anabasis-onbinlerin dönüşü* , çev. Tanju Gökçöl, 2.baskı, İstanbul 1998, VII. 1.

²⁵ Doğan Kuban, “Bizantion”, *Dünden bugüne İstanbul ansiklopedisi*, c. 2, İstanbul 1994, s. 259

²⁶ Wolfgang Müller-Wiener, *İstanbul’un Tarihsel Topografyası: 17. yüzyılın başlarına kadar Byzantion-Konstantinopolis-İstanbul*, çev. Ülker Sayın, İstanbul 2001, s. 18

²⁷ *Chronicon Paschale 284-628 A.D.*, tr. Michael Whitby-Mary Whitby, Liverpool 2007, Olympiad 277

²⁸ Semavi Eyice, “ İlk kuruluştan Türk devrinin başlarına İstanbul”, *İstanbul Armağanı I Fetih ve Fatih*, yay. Mustafa Armağan, İstanbul 1995, s. 15

Other evidence suggests that part of the Constantinian city walls have been unearthed during the excavations of Marmaray / Yenikapı.²⁹

A large portion of the land walls were built during the reign of Theodosius II between 412-414.³⁰

2.1.1 *City Wall Sections by the Sea of Marmara*

The 8.5 kms long sea walls had 188 towers and 13 gates by the beginning of the 15th century.³¹

Although it was suggested by some scholars that the city had sea walls from its beginning³² it was not necessary to have them because of the strong currents and winds which prevent any landing. Danger was then expected from the land side of the city.

The oldest evidence for the sea walls being non-existent is from the year 400 B.C. Since Athenian mercenaries prevented the entry of the defending Spartan commander of Byzantium through the city walls, he had to enter the city from the sea by a short journey on a rowing-boat.³³

Despite being suggested that the sea walls were built by Constantine I³⁴ consensus is that they were built by 439.³⁵

²⁹ M. Metin Gökçay, “ Yenikapı kazılarında ortaya çıkarılan mimari buluntular”, Gün ışığında İstanbul’un 8000 yılı: Marmaray, Metro, Sultanahmet kazıları, İstanbul 2007, s. 172

³⁰ Clive Foss-David Winfield, Byzantine fortifications, Praetoria 1986, s. 42

³¹ Bryon Tsangadas, The fortifications and defense of Constantinople, New York 1980, s. 48

³² Feridun Dirimtekin, Fetihten önce Marmara surları, İstanbul 1953, s. 1

³³ Ksenophon, Anabasis-onbinlerin dönüşü , çev. Tanju Gökçöl, 2.baskı, İstanbul 1998, VII. 1.

³⁴ Edwin A. Grosvenor, Constantinople, vol. I, London 1895, s. 561

³⁵ Cyril Mango, “Constantinople, Monuments of: Walls”, The Oxford dictionary of Byzantium, vol I, New York- Oxford 1991, s. 519

2.1.2

Causes of impacts and damage to sea walls and repairs

Soon after the sea walls were built, a major earthquake damaged them and they were later restored in 447.³⁶ The restoration inscription was visible until mid-19th Century (around Yenikapı) but disappeared since then.³⁷

Earthquakes of 542, 554 and 557 not only damaged parts of the city but sea walls as well.³⁸

During the Arabic sieges of 669 and 675 it is nearly certain that the sea walls were damaged because of the use of large naval power.³⁹

Sea walls were restored by the emperors Tiberios III and Leo III at the end of 7th and at the beginning of the 8th century to counter the threats from the Arabs.⁴⁰

Sea walls have been reinforced as a precaution against the Arabs who laid siege on the city in 717-718.⁴¹

It is understood from the repair works which have been inscribed on the sea walls that, sections of sea walls and some towers collapsed after the earthquake of 740.⁴²

Because of the arctic winter of 763 sections of Black Sea were frozen and large blocks of ice damaged sea walls.⁴³

³⁶ Alexander van Millingen, *The walls of the City and adjoining historical sites*, London 1899, s. 180

³⁷ Patriarch Constantius, *Constantiniade ou description de Constantinople ancienne et moderne*, İstanbul 1846, s. 21

³⁸ Bryon Tsangadas, *The fortifications and defense of Constantinople*, New York 1980, s. 61

³⁹ Necdet Öztürk, "Fetih öncesi İstanbul kuşatmaları", İstanbul Armağanı I Fetih ve Fatih, yay. Mustafa Armağan, İstanbul 1995, s. 39

⁴⁰ Feridun Dirimtekin, *Fetihten önce Marmara surları*, İstanbul 1953, s. 2-3

⁴¹ Wolfgang Müller-Wiener, *İstanbul'un Tarihsel Topografyası: 17. yüzyılın başlarına kadar Byzantion-Konstantinopolis-İstanbul*, çev. Ülker Sayın, İstanbul 2001, s. 312

⁴² Bryon Tsangadas, *The fortifications and defense of Constantinople*, New York 1980, s. 62

⁴³ Alexander van Millingen, *The walls of the City and adjoining historical sites*, London 1899, s. 181

As it is marked by the repair inscriptions on the sea walls, the most extensive repair works were done by the emperor Michael II and his son Theophilus between 829-842.⁴⁴

After a fire in 1024 the walls and towers in the area of Ahırkapı were restored by emperor Basil II.⁴⁵

It was suggested that the sea walls were moved further towards sea in the 11th century⁴⁶ because of siltation in the Mangana area, which could have provided a landing point to the city.

Repair works have been inscribed on sea walls in the area of Narlı kapı in 1164.⁴⁷

Michael VIII not only restored sea walls after re-capturing the city from the 4th Crusaders in 1261 but also intended to move them further into the sea to prevent any landing ground available but he did not manage to relocate the sea wall.⁴⁸

In 1308 a vast restoration was held in the sections which had not been repaired for long time.⁴⁹

On 12 February 1332 a storm caused significant damage to the walls with waves passing over the sea walls and reached far into inland areas.⁵⁰

Important historical details were obtained from a document dated to 1351. According to this, emperor John VI Kantakuzenos ordered the houses built before the sea walls to be pulled down and sea walls raised in height in order

⁴⁴ Clive Foss-David Winfield, *Byzantine fortifications*, Praetoria 1986, s. 70

⁴⁵ Wolfgang Müller-Wiener, *İstanbul'un Tarihsel Topografyası: 17. yüzyılın başlarına kadar Byzantion-Konstantinopolis-İstanbul*, çev. Ülker Sayın, İstanbul 2001, s. 314

⁴⁶ Semavi Eyice, *Tarih Boyunca İstanbul*, İstanbul 2006, s. 44

⁴⁷ Clive Foss-David Winfield, *Byzantine fortifications*, Praetoria 1986, s. 71

⁴⁸ Wolfgang Müller-Wiener, *İstanbul'un Tarihsel Topografyası: 17. yüzyılın başlarına kadar Byzantion-Konstantinopolis-İstanbul*, çev. Ülker Sayın, İstanbul 2001, s. 314

⁴⁹ Clive Foss-David Winfield, *Byzantine fortifications*, Praetoria 1986, s. 72

⁵⁰ Alexander van Millingen, *The walls of the City and adjoining historical sites*, London 1899, s. 190

to remove a possible landing spot to the approaching Genoese.⁵¹ Based on this one might suggest that the points where sea and walls met was silted and squatters settled there.

Two pre-Ottoman repairs, were done by the translator Lukas Notaras (who also served at the Ottoman court, and Serbian ruler George Brankovic). The former was responsible for the restoration of the area between Ahır kapı and Çatladı kapı; the latter restored a tower in 1448 between Kum kapı and Yenikapı. Both have been inscribed on the sea walls.⁵²

After the Ottoman conquest and during the construction of Kadirga harbour, sea walls have been strengthened by the addition of the new towers.⁵³

A decree of Suleiman the Magnificent (dated 1558) informs us about houses in the area of the sea walls and banning them to be closer than 3 metres to the walls.⁵⁴ Despite renewed decrees, houses continued to be built on and next to the city walls. [PHOTOGRAPH 1]

⁵¹ Alexander van Millingen, The walls of the City and adjoining historical sites, London 1899, s. 190

⁵² Alexander van Millingen, The walls of the City and adjoining historical sites, London 1899, s. 192-193

⁵³ Wolfgang Müller-Wiener, İstanbul'un Tarihsel Topografyası: 17. yüzyılın başlarına kadar Byzantion-Konstantinopolis-İstanbul, çev. Ülker Sayın, İstanbul 2001, s. 316

⁵⁴ Ahmed Refik, Onuncu asr-ı hicride İstanbul hayatı (1495-1591), İstanbul 1988, s. 58-59

PHOTOGRAPH 1: Pasquale Sebah 1890



During the reign of Sultan Mehmet IV in 1635 sea walls were restored and whitewashed on both sides.⁵⁵

Houses, built in the silted areas before the walls, were pulled down in 1655 because of a possible Venetian attack and the walls whitewashed in order to make them more glorious.⁵⁶

A French traveller, who spent nine months in the city in 1656, notes that along the sea walls especially where there were small bays there was a fill of land up to fifty steps.⁵⁷

⁵⁵ P. Ğugas İncicyan, 18. Asırda İstanbul, çev. Hrand Andreasyan, İstanbul 1976, s. 6

⁵⁶ P. Ğugas İncicyan, 18. Asırda İstanbul, çev. Hrand Andreasyan, İstanbul 1976, s. 6

⁵⁷ Jean Thevenot, Thevenot Seyahatnamesi, çev. Ali Berktay, İstanbul 2009, s. 47

Another imperial decree concerning the houses along the sea walls dated to 1718 /1719 orders the houses to be 4 metres away from the walls.⁵⁸

In 1722 / 1723 the section between Yalı köşkü and Narlı kapı have been re-erected.⁵⁹

Due to an earthquake three towers of Yedikule collapsed. Most probably sea walls had a damage as well.⁶⁰

In 1776 in Kumkapı area, in 1783 in Bahçekapı area restorations were held.⁶¹

In 1807 sea walls were restored to protect against the English⁶².

During the construction of Rumeli railroad, parts of sea walls in the areas of Çatladı kapı, Kumkapı, Yenikapı and Davutpaşa were destroyed. Destruction continued during the construction of the second railroad in 1910. The gate of Samatya was destroyed in 1913/1914.⁶³ The greatest damage to the city walls at Marmara was caused to the construction by coastal road of Sirkeci-Florya between 1957-1959.⁶⁴

⁵⁸ Ahmed Refik, On ikinci asr-ı hicride İstanbul hayatı (1689-1785), İstanbul 1988, s. 67-68

⁵⁹ Wolfgang Müller-Wiener, İstanbul'un Tarihsel Topografyası: 17. yüzyılın başlarına kadar Byzantion-Konstantinopolis-İstanbul, çev. Ülker Sayın, İstanbul 2001, s. 318

⁶⁰ C.C. Carbognano, 18.yüzyılın sonunda İstanbul, çev. Erendiz Özbayoğlu, İstanbul 1993, s. 40

⁶¹ Wolfgang Müller-Wiener, İstanbul'un Tarihsel Topografyası: 17. yüzyılın başlarına kadar Byzantion-Konstantinopolis-İstanbul, çev. Ülker Sayın, İstanbul 2001, s. 318

⁶² Wolfgang Müller-Wiener, İstanbul'un Tarihsel Topografyası: 17. yüzyılın başlarına kadar Byzantion-Konstantinopolis-İstanbul, çev. Ülker Sayın, İstanbul 2001, s. 318

⁶³ Wolfgang Müller-Wiener, İstanbul'un Tarihsel Topografyası: 17. yüzyılın başlarına kadar Byzantion-Konstantinopolis-İstanbul, çev. Ülker Sayın, İstanbul 2001, s. 318

⁶⁴ " Sirkeci - Florya sahil yolu", Düünden bugüne İstanbul ansiklopedisi, c. VII, İstanbul 1994, s. 12-13

3.1

KAZLIÇEŞME

The fountain, which gave name to the area of Kazlıçeşme (meaning fountain with a goose), was made by a certain Mehmet in the year 1537.⁶⁵

The goose in the fountain is Byzantine and dated to 10th to 11th centuries.⁶⁶ It was removed from its original place and were kept at the local Municipality of Zeytinburnu since 1999. [PHOTOGRAPH 2 a-b]

PHOTOGRAPH 2 a



⁶⁵ Hasan Yelmen, “Kazlıçeşme”, Düünden bugüne İstanbul ansiklopedisi, c. VII, İstanbul 1994, s. 513

⁶⁶ Henry Maguire, “Gardens and parks of Constantinople”, *Dumbarton Oaks Papers* 54 (2000), s. 256

PHOTOGRAPH 2 b



It is believed that prior to the Ottoman conquest, there was a Byzantine park with the name of Aretai.⁶⁷ An important source of 12th century Anna Komnena informs us that there were houses for short term stay built by the emperor Romanos Diogenes.⁶⁸

Much of the coastal area around Kazlıçeşme was infilled in modern times, as it is clearly seen on the aerial photographs of 1946, 1966 and 1982.

[PHOTOGRAPH 3 a-b]

It is known that during the construction of Yedikule Castle by the sultan Mehmet II, the area of Kazlıçeşme was reserved for tanneries and slaughterhouses.⁶⁹

⁶⁷ Henry Maguire, " Gardens and parks of Constantinople", *Dumbarton Oaks Papers* 54 (2000), s. 257

⁶⁸ Anna Komnena, *Alexiad*, çev. Bilge Umar, İstanbul 1996, s. 83

⁶⁹ Necdet Sakaoğlu-Nuri Akbayer, *The thousand year old story of leather in Anatolia*, İstanbul 2002, s. 312

In 17th century tanneries of this area were able to produce shoes and writing material.⁷⁰

According to a 1781/1782 dated Ottoman document, the area of Kazlıçeşme contained approximately 360 tanneries and 33 slaughterhouses.⁷¹

The existence of palace-like buildings in the same area is mentioned in sources from the second half of the 10th century. The park and its contact with hexagonal tower on the walls ⁷² brings to mind the possibility of Mermerkule area.

Over time, the workshops expanded and included different professions and cornered a large area as far as the sea and Yedikule. [DRAWING 1]

⁷⁰ Eremya Çelebi Kömürcüyan, İstanbul tarihi: 17. asırda İstanbul, çev. Hrand D. Andreasyan, İstanbul 1988,s.25

⁷¹ Ahmed Refik, On ikinci asr-ı hicride İstanbul hayatı (1689-1785), İstanbul 1988, s. 230-232

⁷² Henry Maguire, “ Gardens and parks of Constantinople”, Dumbarton Oaks Papers 54 (2000), s. 255-257

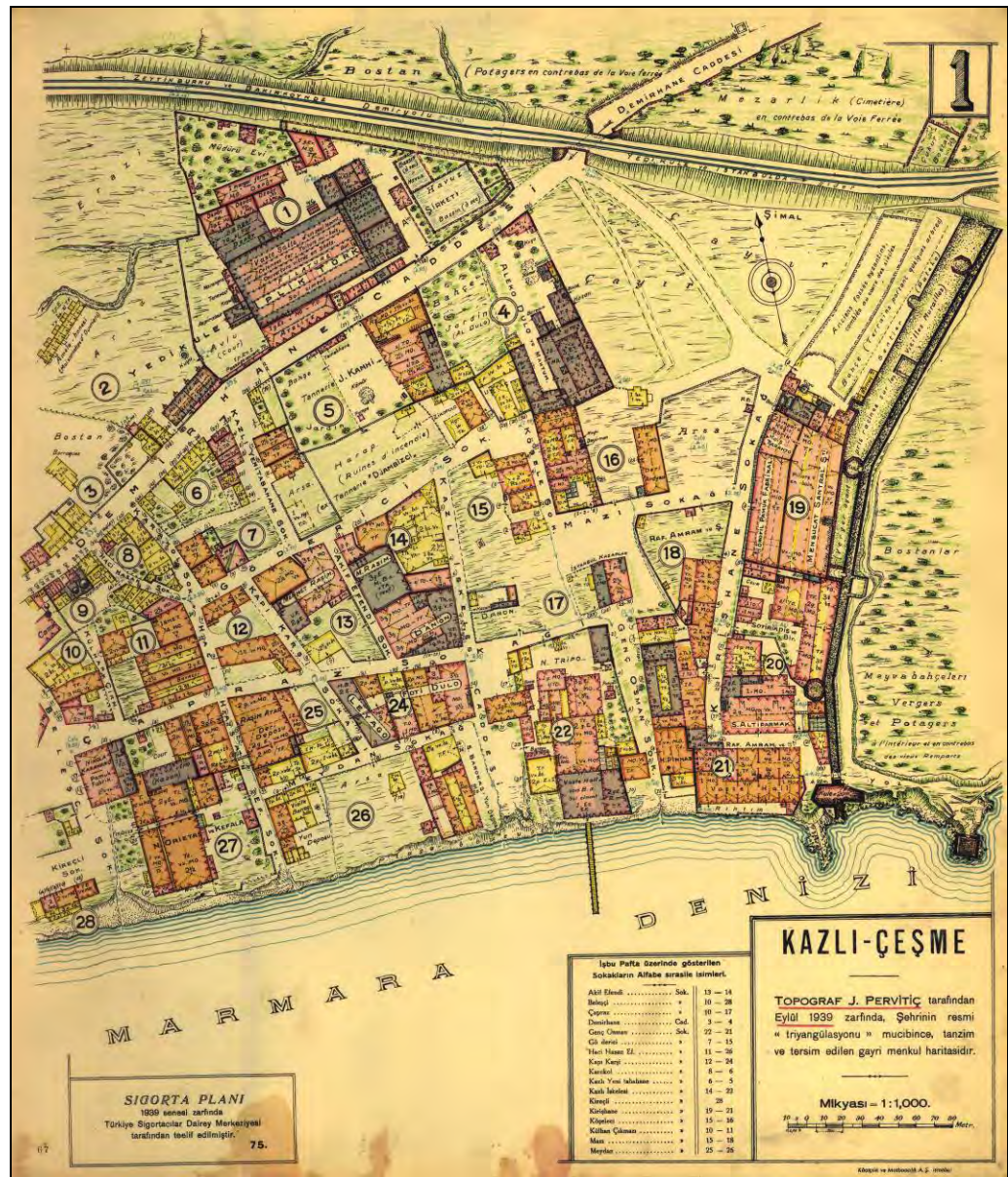
PHOTOGRAPH 3 a



PHOTOGRAPH 3 b



DRAWING 1: Pervititch 1939



In 1993 tanneries and leather workshops relocated away from the area after centuries or being sited in Kazlıçeşme.

In the southwestern part of Kazlıçeşme there was one of the first industrial establishments of the Ottoman empire - an iron furnace - hence the street named after it as Demirhane (house of iron). The factory was partially active

in 1846 and continued its production until early 20th century when it fell into disuse.⁷³

It is considered that this area had an imperial park during the Byzantine empire under the name of “Aretai”.⁷⁴ It was reported by one of the most important sources of 12th century Anna Komnena that emperor Romanos Diogenes had houses built for short stay in this area.⁷⁵

3.2

MERMERKULE

Based on 10th and 12th century sources and, in particular, the connection of park with a hexagonal tower⁷⁶ might be taken as evidence of Mermerkule area.

It was suggested that Mermerkule was a mansion built during the first decade of the 15th century for Kantakuzenos family.⁷⁷ A 19th century photograph [PHOTOGRAPH 4] and map [DRAWING 2] of the same period supports this view.

⁷³ Mücteba İlgürel, “ Zeytinburnu’nda bir demir fabrikası”, Tarih boyunca İstanbul semineri, İstanbul 1989, s. 162-163

⁷⁴ Henry Maguire, “ Gardens and parks of Constantinople”, Dumbarton Oaks Papers 54 (2000), s. 257

⁷⁵ Anna Komnena, Alexiad, çev. Bilge Umar, İstanbul 1996, s. 83

⁷⁶ Henry Maguire, “ Gardens and parks of Constantinople”, Dumbarton Oaks Papers 54 (2000), s. 255-257

⁷⁷ Urs Peschlow, “ Mermerkule: Ein spatbyzantinischer palast in Konstantinopel”, Festschrift für Horst Hallensleben zum 65. Geburtstag, Amsterdam 1995, s. 97

PHOTOGRAPH 4: Gülmez brothers 1890



DRAWING 2: "German Blue's" 1913



Researchers restoring the city walls in the vicinity suggested that, based on the mural techniques, Mermerkule belongs to the Late Byzantine period, namely 14-15th centuries.⁷⁸

It is likely that an earlier structure from the 10th century was almost entirely re-made in the later periods together with the ongoing restorations of the sea walls.

In 17th century between Mermerkule and Narlıkapı there were restaurants on the water.⁷⁹

3.3 *YEDIKULE*

During the construction of a gas factory at the end of 19th century in Yedikule, stamped bricks with the name of emperor Basil I (reigned between 867-886) and some Byzantine structures were found together with the columns scattered along the coast. Basing on these it was suggested that at this spot was the church of Saint Diomedes.⁸⁰

3.4 *KOCA MUSTAFA PAŞA*

Koca Mustafa Paşa, after whom the area is named, started his career in the Ottoman court during the reign of Mehmet II and became the Grand Vizier in 1511. He constructed a complex of buildings including a mosque and a medrese.⁸¹ The mosque of this complex was a former Byzantine church of Hagios Andreas en te krisei of 14th century.⁸²

⁷⁸ Metin Ahunbay-Zeynep Ahunbay, "Recent work on the land walls of Istanbul: Tower 2 to tower 5", *Dumbarton Oaks Papers* 54 (2000), s. 233

⁷⁹ Eremya Çelebi Kömürcüyan, *İstanbul tarihi: 17. asırda İstanbul*, çev. Hrand D. Andreasyan, İstanbul 1988, s. 2

⁸⁰ Alexander van Millingen, *The walls of the City and adjoining historical sites*, London 1899, s. 265

⁸¹ Mehmet Yılmaz, "Mustafa paşa (Koca)", *Yaşamları ve yapıtlarıyla Osmanlılar ansiklopedisi*, 2. baskı İstanbul 2008, c.II, s. 311

⁸² Alexandros G. Paspati, *Byzantinai meletai topografikai kai istorikai meta pleiston eikonon*, İstanbul 1877, s. 318

An Armenian hospital was constructed in 1743 outside the sea walls.⁸³ A church, dedicated to Saint John, (Surp Hovhannes in Armenian) was constructed in 1807.⁸⁴

3.5

SAMATYA

The name of Samatya is derived from Psamathion in Byzantine times, meaning “sandy”.⁸⁵

Another Byzantine neighborhood which was not far from here and also by the sea, Rabdos, is known from the sources until 10th century.⁸⁶ This neighborhood was probably destroyed in one of the earthquakes and that might be the reason for historical sources to contain little information on this area.

Limits of the Constantinian walls are not known, but it is believed that their westward limit was in the area of Isakapısı, around Cerrahpaşa hospital, which was in existence until 1509.⁸⁷

A Byzantine church (whose original name remains unknown) was built at the end of 13th and the 14th centuries.⁸⁸

During the construction of Istanbul University Education and Research hospital in 1960's, a large 'hoard' was discovered. It was not unexpected as this is the area of the palace of Helen, mother of emperor Constantine I (Helenianai).⁸⁹

⁸³ Eremya Çelebi Kömürcüyan, İstanbul tarihi: 17. asırda İstanbul, çev. Hrand D. Andreasyan, İstanbul 1988, s. 70

⁸⁴ Teni Batar, İstanbul Ermeni kiliseleri üzerine bir araştırma ve Narlıkapı Surp Hovhannes Ermeni kilisesi, yayınlanmamış yüksek lisans tezi, İstanbul 2007, s. 55

⁸⁵ “ Samatya “,Dünden bugüne İstanbul ansiklopedisi, c. VI, İstanbul 1994, s. 430

⁸⁶ Albrecht Berger, “ Rabdos mahallesi”, Dünden bugüne İstanbul ansiklopedisi, c. VI, İstanbul 1994, s. 293

⁸⁷ Semavi Eyice, “ İlk kuruluştan Türk devrinin başlarına İstanbul”, İstanbul Armağanı I Fetih ve Fatih, yay. Mustafa Armağan, İstanbul 1995, s. 15

⁸⁸ Thomas F. Mathews, The Byzantine churches of Istanbul: A photographic survey, University Park-London 1976, s. 168

⁸⁹ Albrecht Berger, “ Helenianai sarayı”, Dünden bugüne İstanbul ansiklopedisi, c. IV, İstanbul 1994, s. 47

Substructures related to this palace (hidden under a modern apartment buildings) were discovered during an archaeological survey of 2005 and part of the sewer of the palace were discovered under the road connecting hospital to the coastal road.⁹⁰

3.6

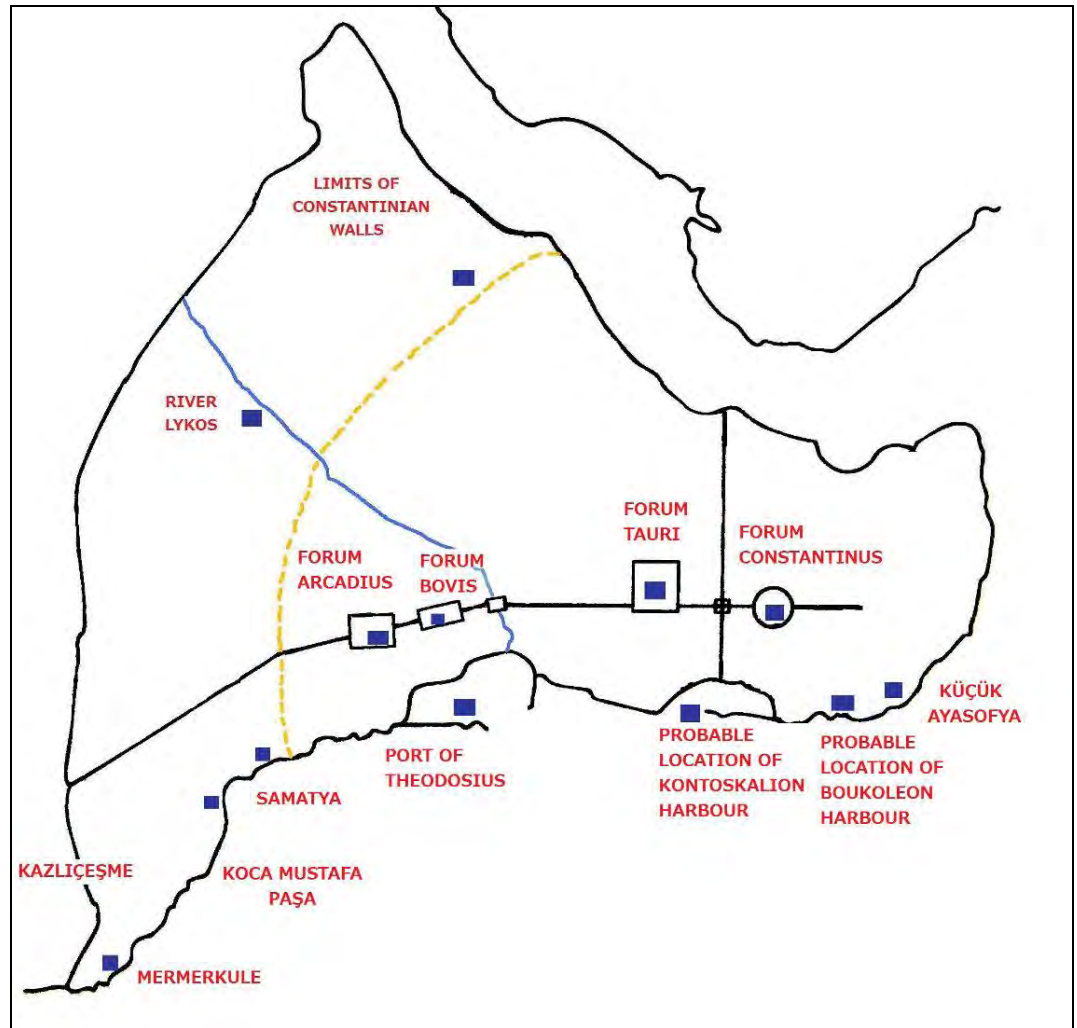
YENIKAPI

A Byzantine gate with an unknown name was widened up during the Ottomans and began to be called as Yenikapı (New Gate).⁹¹ [DRAWING 3]

⁹⁰ Haluk Çetinkaya, “ İstanbul’ dan arkeolojik iki haber”, Sanat tarihi araştırmaları dergisi 14 (1998), s. 51

⁹¹ Bryon Tsangadas, The fortifications and defense of Constantinople, New York 1980, s. 40

DRAWING 3: Istanbul around the year 1000 (based on Magdalino)



According to an inscription on a gate (which does not exist anymore), sections of the sea walls were restored by the Prefect Constantine in the middle of 5th century.⁹²

⁹² Patriarch Constantius, *Constantiniade ou description de Constantinople ancienne et moderne*, İstanbul 1846, s. 21

3.7

LANGA

The former name of this neighborhood of Langa was probably Vlanga or Ulanka. The name Langa has been known from the sources as early as 12th century.⁹³

The neighborhood was named after the harbour with the name of Kontoskalion. During the Ottoman period vessels which carried sand to this harbour gave name to the gate and the neighborhood, Kumkapı (gate of sand).⁹⁴

According to a document dated to 1585 garbage of the Old and New barracks of the Janissaries were dumped into the sea near Langa and Yenikapı.⁹⁵

3.8

KUMKAPI

In a conflagration of 1652, around 100 shops and 15,000 houses were burnt in Kumkapı and Kadirga harbour.⁹⁶

Another conflagration swept across between Yedikule and Kumkapı destroying approximately 30,000 houses and 8 churches in 1660.⁹⁷

A French traveller, in the second part of the 17th century, described a square tower within the sea roughly 20 metres away from the sea walls called “Belisarios tower”.

⁹³ İlber Ortaylı, “Langa”, *Dünden bugüne İstanbul ansiklopedisi*, c. V, İstanbul 1994, s. 195

⁹⁴ Nur Akın, “Kumkapı”, *Dünden bugüne İstanbul ansiklopedisi*, c. V, İstanbul 1994, s. 120

⁹⁵ Ahmed Refik, *Onuncu asr-ı hicride İstanbul hayatı (1495-1591)*, İstanbul 1988, s. 65

⁹⁶ Alfons Maria Schneider, “Brände in Konstantinopel”, *Byzantinische Zeitschrift* 41 (1941), s. 393

⁹⁷ P. Ğugas İnciyan, *18. Asırda İstanbul*, çev. Hrand Andreasyan, İstanbul 1976, s. 85

Not far from this tower was the harbour used by the emperor Theodosios and his son Arcadios.⁹⁸ The so-called tower of Belisarius was known to the Armenians as the tower of the priest.⁹⁹

It has been reported that the area known as tower of Belisarius was filled with the debris from the construction of the Laleli mosque by Sultan Ahmet III in 1782. The newly reclaimed land was inhabited by the Armenians only.¹⁰⁰

Filling of the areas between Kumkapı and Samatya and by the sea is confirmed by another source from the 17th century.¹⁰¹

The existence of 11 shops belonging to Christian stonemasons in both Kumkapı and Yenikapı might indicate that they were using stones brought from the sea for the new public projects.¹⁰²

Around 4,000 Armenian houses were burnt in the fire of 1778.¹⁰³

In the Great Istanbul fire of 1782 houses, coffee houses and fabric workshops were burnt.¹⁰⁴ These fabric workshops have been in the same area for a long time and numbered approximately 15 in 1729.¹⁰⁵ [PHOTOGRAPH 5]

⁹⁸ Josephus Grelot, İstanbul seyahatnamesi, çev. Maide Selen, İstanbul 1998, s. 67

⁹⁹ Eremya Çelebi Kömürcüyan, İstanbul tarihi: 17. asırda İstanbul, çev. Hrand D. Andreasyan, İstanbul 1988, s.78

¹⁰⁰ P. Ğugas İnciyan, 18. Asırda İstanbul, çev. Hrand Andreasyan, İstanbul 1976, s. 4-5

¹⁰¹ Eremya Çelebi Kömürcüyan, İstanbul tarihi: 17. asırda İstanbul, çev. Hrand D. Andreasyan, İstanbul 1988, s. 78-79

¹⁰² Yay. Ahmet Tabakoğlu, Ahkam defterleri: İstanbul esnaf tarihi (1764-1795), c. I, İstanbul 1998, s. 78-79

¹⁰³ P. Ğugas İnciyan, 18. Asırda İstanbul, çev. Hrand Andreasyan, İstanbul 1976, s. 85

¹⁰⁴ Eremya Çelebi Kömürcüyan, İstanbul tarihi: 17. asırda İstanbul, çev. Hrand D. Andreasyan, İstanbul 1988, s.79

¹⁰⁵ Ahmed Refik, On ikinci asr-ı hicride İstanbul hayatı (1689-1785), İstanbul 1988, s. 104-105

PHOTOGRAPH 5: Gülmez brothers 1890



During the construction of the coastline road in 1956, the mosque of Malkoç Süleyman ağa (built in 17th century and restored in 1886 by Sheikh Ali Hoca) was destroyed.¹⁰⁶

Sea walls were partially destroyed due to dumping of construction, garbage, fire and earthquake debris; construction of the railroad and coastline road.

In the area between Samatya and Langa, there were gardens for growing vegetables until the beginning of 20th century. The coastal area contained many fishermen shelters.¹⁰⁷

Until the second half of 19th century all vessels carrying fruit and vegetables from Asia were anchoring at Yenikapı. The area of Kumkapı was providing the second landing spot and but was also used as a dumping ground.¹⁰⁸

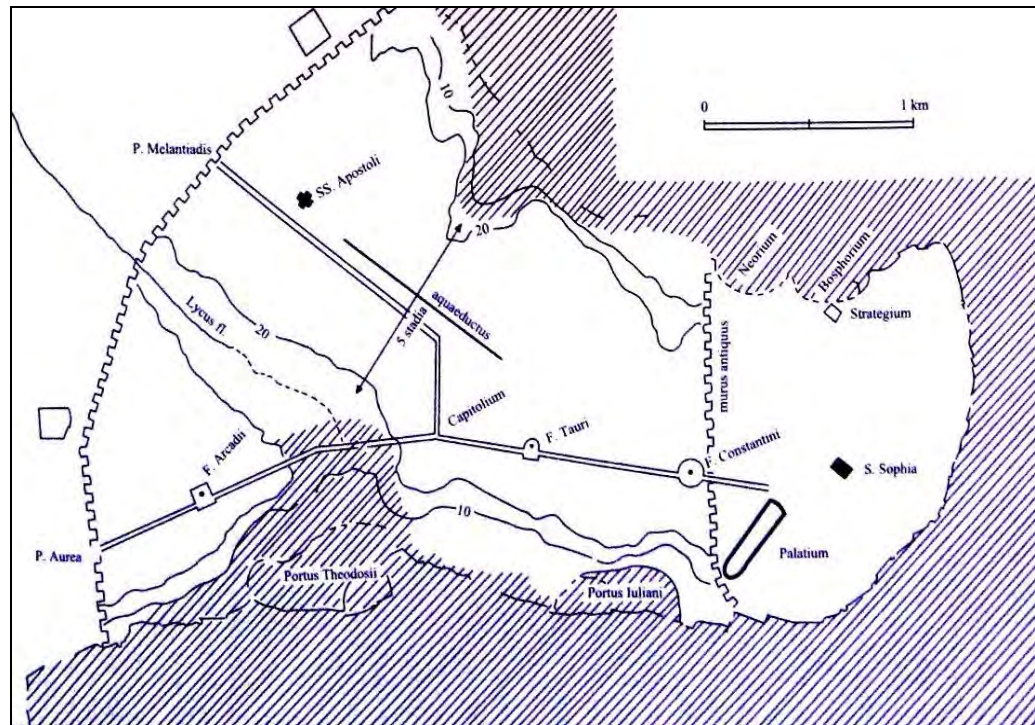
¹⁰⁶ İlber Ortaylı, “ Langa”, Düünden bugüne İstanbul ansiklopedisi, c. V, İstanbul 1994, s. 195

¹⁰⁷ P. Ğugas İncicyan, 18. Asırda İstanbul, çev. Hrand Andreasyan, İstanbul 1976, s. 161

¹⁰⁸ P. Ğugas İncicyan, 18. Asırda İstanbul, çev. Hrand Andreasyan, İstanbul 1976, s. 163

The earliest port on the southern shore of the city was constructed by emperor Julian. [DRAWING 4] It is likely that the already existing pier was enlarged since the emperor issued a decree concerning “facilitating construction activities” in 362. The date of the harbour was 362.¹⁰⁹ A colonnaded street providing access to harbour was also constructed by the same emperor.¹¹⁰

DRAWING 4: 4th century city according to Mango



The likely reason to create two harbours on the southern shore of the city after two centuries of its establishment is probably due to population increase.¹¹¹

Emperor Anastasius, after a fire in 465, added a breakwater and deepened the harbour of Iulianus.¹¹²

¹⁰⁹ Nezahat Baydur, İmparator İulianus, İstanbul 1982, s. 92-93

¹¹⁰ Nezahat Baydur, İmparator İulianus, İstanbul 1982, s. 92

¹¹¹ Cyril Mango, Le developpement urbain de Constantinople (IVe-VIIe siècles), 2. ed. Paris 1990, s. 37-38

¹¹² Wolfgang Müller-Wiener, Bizans'tan Osmanlı'ya İstanbul limanı, çev. Erol Özbek, İstanbul 1998, s. 8

It is known from sources that around the year 425 there was a neighborhood built on a reclaimed land, named Kainopolis, in the west of the harbour of Iulianus.¹¹³

A conflagration in 560 caused significant damage to the harbour.¹¹⁴

After another fire in 561 the harbour was renewed by Emperor Justin II and was named after his wife Sophia. Thus, the harbours of Iulianos and Sophia are the same.¹¹⁵ Probably around this time the harbour was dredged.¹¹⁶

The palace of Emperor Justin II, and two churches dedicated to the Archangel Michael and Saint Thecla respectively were in the vicinity of the harbour.¹¹⁷

Dredging of the harbour of Neorion in 698, located at the mouth of the Golden Horn, indicates that there was a need for new harbours. Soon after dredging, a plague occurred which was taken as a bad omen by the public.¹¹⁸

Harbour of Iulianus became the main one for wholesale trade in 8th-9th centuries.¹¹⁹

It is considered that this harbour was re-named Konstoskalion and became one of the bases for the Byzantine navy.¹²⁰

¹¹³ Cyril Mango, *Le developpement urbain de Constantinople (IVe-VIIe siecles)*, 2. ed. Paris 1990, s. 17-18

¹¹⁴ Alfons Maria Schneider, "Brände in Konstantinopel", *Byzantinische Zeitschrift* 41 (1941), s. 385

¹¹⁵ Albrecht Berger, *Untersuchungen zu den Patria Konstantinopoleos*, Bonn 1988, s. 568-570

¹¹⁶ Albrecht Berger, "Der Langa bostani in Istanbul", *Istanbulur Mitteilungen* 43 (1993), s. 469

¹¹⁷ Paul Magdalino, "Maritime neighborhoods of Constantinople", *Dumbarton Oaks Papers* 54 (2000), s. 213

¹¹⁸ Paul Magdalino, "Maritime neighborhoods of Constantinople", *Dumbarton Oaks Papers* 54 (2000), s. 218

¹¹⁹ Paul Magdalino, "Maritime neighborhoods of Constantinople", *Dumbarton Oaks Papers* 54 (2000), s. 212

¹²⁰ Wolfgang Müller-Wiener, *Bizans'tan Osmanlı'ya İstanbul limanı*, çev. Erol Özbek, İstanbul 1998, s. 9

After re-conquering the city in 1261, Konstoskalion was made the main naval base by Emperor Michael VIII Palaeologos.¹²¹

In 1462 the harbour was known as Kadirga (galley) and a renovation was held under the Ottomans. due to disuse and odour issues, the harbour was filled at the end of 16th century upon the order of the Grand Vizier Sokollu Mehmet paşa, who also had his palace in the area.¹²²

On the reclaimed land as of 1660 gypsies settled on squatter houses.¹²³

A breakwater (added as part of Ottoman renovation) became visible after a fire in 1819.¹²⁴ The breakwater was visible even on the postcards from the beginning of the 20th century along the coast of Kumkapı.

3.10

PORT OF THEODOSIUS

This Port [*DRAWING 4*] was created on the deep bay where River Lykos meets the sea, at the end of 4th century by the emperor Theodosius I, and named after him.¹²⁵

One of the two granaries known from the earlier times (horrea Alexandrina and horreum Theodosianum) was renamed as Lamia, and was still in use in 10th century.¹²⁶

¹²¹ Wolfgang Müller-Wiener, *Bizans'tan Osmanlı'ya İstanbul limanı*, çev. Erol Özbek, İstanbul 1998, s. 30

¹²² Wolfgang Müller-Wiener, *İstanbul'un Tarihsel Topografyası: 17. yüzyılın başlarına kadar Byzantion-Konstantinopolis-İstanbul*, çev. Ülker Sayın, İstanbul 2001, s. 316

¹²³ P. Ğugas İnciyan, *18. Asırda İstanbul*, çev. Hrand Andreasyan, İstanbul 1976, s. 8

¹²⁴ Nur Akın, "Kumkapı", *Dünden bugüne İstanbul ansiklopedisi*, c. V, İstanbul 1994, s. 120

¹²⁵ Wolfgang Müller-Wiener, *Bizans'tan Osmanlı'ya İstanbul limanı*, çev. Erol Özbek, İstanbul 1998, s. 8

¹²⁶ Paul Magdalino, "Maritime neighborhoods of Constantinople", *Dumbarton Oaks Papers* 54 (2000), s. 213

It is suggested that a large part of the harbour was silted but remained partially in use until 13th century.¹²⁷ However, recent archaeological excavations indicate the use of the harbour of Theodosius until 11th century. After 12th century it became a dumping ground.¹²⁸

A very large pile of bones in the harbour was described by travellers as being still visible in the Medieval period. The reason why there were human bones could be explained by the slaughter of the Latins in 1182 after which corpses were dumped. This explains why the existing cemeteries were not used.¹²⁹

3.11 *PORT OF ELEUTHERIOS/KAISARIOS*

The name Eleutheron for this harbour was most probably a result of misleading French sources (Gylles), who was here in the first half of the 16th century. However, this same source was also the first to inform us that the harbour of Eleutheron was in Langa.¹³⁰

It is likely, based on contemporary sources, for the palace and harbour of Eleutheron was located to the east of the harbour of Theodosius.¹³¹

From historical sources, it is known that there was a statue of Eleutherios with a trowel in his hand and a basket on his back on the harbour.¹³²

¹²⁷ Cyril Mango, "The shoreline of Constantinople in the fourth century", Byzantine Constantinople: Monuments, Topography and everyday life papers from the International Workshop held at Boğaziçi University, Istanbul, 7-10 April 1999, Leiden 2001, p. 25

¹²⁸ Sait Başaran, "Demirden yollar ve Marmara kıyısında eski bir liman", Yenikapı'nın eski gemileri, c. I, İstanbul 2007, s. 21

¹²⁹ Paul Magdalino, "Constantinopolitana", Aetos: Studies in honour of Cyril Mango presented to him on April 14 1998, eds. Ihor Sevcenko-Irmgard Hutter, Stuttgart 1998, s. 230-232

¹³⁰ Petrus Gyllius, İstanbul'un tarihi eserleri, çev. Erendiz Özbayoğlu, İstanbul 1997, s. 189

¹³¹ Albrecht Berger, Untersuchungen zu den Patria Konstantinopoleos, Bonn 1988, s. 581-582

¹³² Alexander van Millingen, The walls of the City and adjoining historical sites, London 1899, s. 297

Harbour of Eleutheron was filled with debris brought from the construction of the forum of Theodosius.¹³³

There were mansions of Empress Pulcheria and a noble lady called Arcadia in the area of the harbour of Eleutheron. The House of Lady Arcadia was still in existence in the 8th century and it was neighboring the palace of Empress Irene.¹³⁴

Harbour of Eleutheron most probably began to be known as Kaisarios Harbour after the Medieval period.¹³⁵

3.12

THE PALACE AND HARBOUR OF BOUKOLEON

5th Century sources mention a palace constructed by Emperor Theodosius II in the area. According to other sources, another palace was built at the same area in the third quarter of the 10th century.¹³⁶

The earliest mention of the palace and the harbour is the Book of Ceremonies of Emperor Constantine Porphyrogenitus from the 10th century.¹³⁷

A book written by Anna Comnena in early 12th century indicates that the name of the harbour and the palace is derived from a statue group of an ox and a lion fight.¹³⁸

¹³³ Paul Magdalino, "Maritime neighborhoods of Constantinople", *Dumbarton Oaks Papers* 54 (2000), s. 216

¹³⁴ Paul Magdalino, "Maritime neighborhoods of Constantinople", *Dumbarton Oaks Papers* 54 (2000), s. 216

¹³⁵ Albrecht Berger, *Untersuchungen zu den Patria Konstantinopoleos*, Bonn 1988, s. 581

¹³⁶ Wolfgang Müller-Wiener, *İstanbul'un Tarihsel Topografyası: 17. yüzyılın başlarına kadar Byzantion-Konstantinopolis-İstanbul*, çev. Ülker Sayın, İstanbul 2001, s. 225

¹³⁷ Konstantinus Porphyrogenitii, *De cerimoniis: Aulæ Byzantinae*, ed. B.G. Niebuhr, Bonnae 1829, s. 601

¹³⁸ Anna Komnena, *Alexiad*, çev. Bilge Umar, İstanbul 1996, s. 97

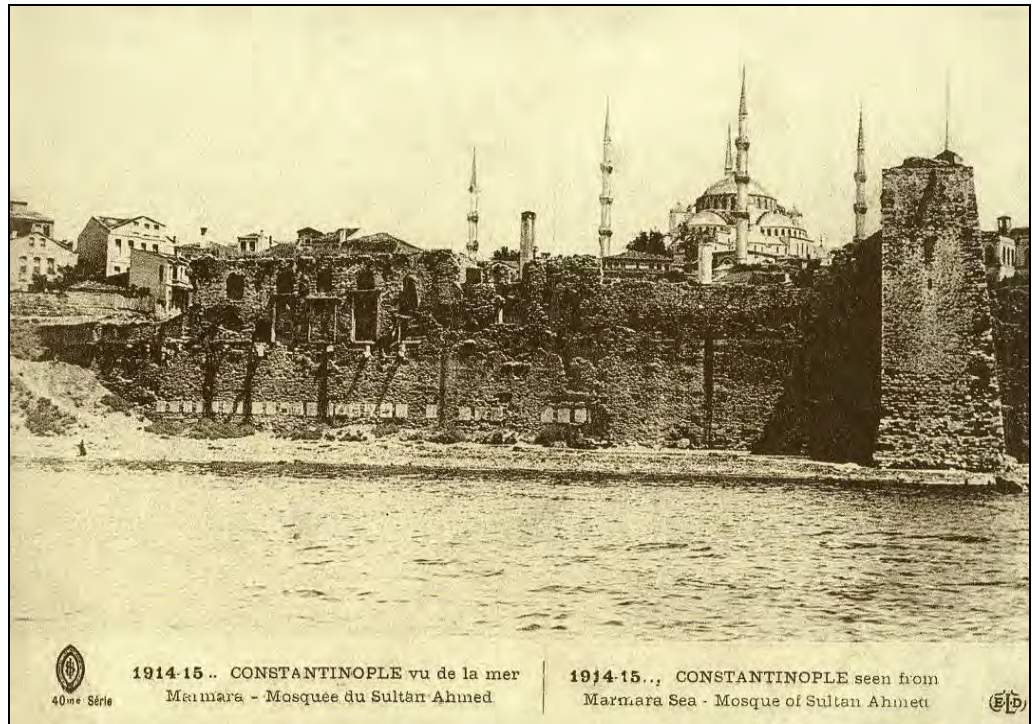
It has been recorded by the 18th and 19th century researchers and travellers that, in addition to the aforementioned statues, there were other statues of marble lions and three-sectioned arched opening on the balcony. These arches were still visible around 1850. [PHOTO 6]

PHOTOGRAPH 6: Pierre Tremaux 1850 photolithograf



In a photograph of 1914 the entire front of the so-called “house of Justinian” is visible. [PHOTO 7]

PHOTOGRAPH 7



It has been suggested that the so-called “House of Justinian” was not built in the 6th century during the reign of that emperor but in 9th century instead.¹³⁹

¹³⁹ G.U.S. Corbett, “ The building to the North of the Boukoleon harbour called the House of Justinian”, The Great Palace of the Byzantine emperors, 2nd report, ed. D. T. Rice, Edinburg 1958, s. 173

Modern impressions of the port and the palace are also available. [DRAWING 5 a-b]

DRAWING 5a: Tayfun Öner-from Byzantium 1200



DRAWING 5b: Tayfun Öner-from Byzantium 1200



The arches have disappeared (due to the construction of the railroad in 1871) and the lion statues were brought to the Istanbul Archaeological Museums.¹⁴⁰

Harbour of Boukoleon was directly attached to the Great Palace. There were also statues of lions, bulls, bears and ostriches before marble steps of the harbour.¹⁴¹

Most likely, these statues were destroyed after the earthquake of 1509. Descriptions provided by Pietro Zen, an Italian envoy, in 1532 where he mentions of lion and bull statues only, would support this view.¹⁴²

In the second half of 13th century the palace was converted into a palace church under the name of Saint Michael during the Latin occupation.¹⁴³

¹⁴⁰ Cyril Mango, "Constantinopolitana", *Jahrbuch des Deutschen Archaeologischen Instituts* 80 (1965), s. 318

¹⁴¹ Bryon Tsangadas, *The fortifications and defense of Constantinople*, New York 1980, s. 54

¹⁴² Alexander van Millingen, *The walls of the City and adjoining historical sites*, London 1899, s. 270

¹⁴³ Wolfgang Müller-Wiener, *İstanbul'un Tarihsel Topografyası: 17. yüzyılın başlarına kadar Byzantion-Konstantinopolis-İstanbul*, çev. Ülker Sayın, İstanbul 2001, s. 227

The palace was abandoned in 14th century.¹⁴⁴

The harbour (only reserved for the use of the Byzantine court) was also the arrival point of foreign dignitaries such as Kılıçaslan II who visited Constantinople in 1162 and Amaury, king of Jerusalem, who arrived in 1171.¹⁴⁵

¹⁴⁴ Wolfgang Müller-Wiener, İstanbul'un Tarihsel Topografyası: 17. yüzyılın başlarına kadar Byzantion-Konstantinopolis-İstanbul, çev. Ülker Sayın, İstanbul 2001, s. 228

¹⁴⁵ Wolfgang Müller-Wiener, Bizans'tan Osmanlı'ya İstanbul limanı, çev. Erol Özbek, İstanbul 1998, s. 188 d.n. 33

Destruction of both palace and the harbour began with the construction of the railroad in 1871, followed by the fire in 3 June 1912¹⁴⁶ completed with the construction of the coastline road in 1957.¹⁴⁷ The harbour of Boukoleon disappeared since then.

It has been reported that a researchers have been able to obtain cores after two drills in 2002 in the section known as “ the house of Justinian”.¹⁴⁸ These revealed that there were three levels of fills: down to 4 metres, between 4-7 metres, and then between 7-10 metres. The fill-level 7-10 metres contained sand and broken bricks, suggesting that this was the level of the port.¹⁴⁹

3.13

CHURCH OF SS. SERGIUS AND BACCHUS (MOSQUE OF KÜÇÜK AYASOFYA)

Emperor Justinian I had a church dedicated to the Apostles Peter and Paul prior to the construction of Ss Sergius and Bacchus.¹⁵⁰ Construction of the Church of Apostles Peter and Paul probably was between 518-520 before he had any high level titles.¹⁵¹ A letter dated 519 reveals that Justinian asked for some relics from the Pope and that this was granted.¹⁵² Contemporary historian Procopius mentions this church being an oblong basilica.¹⁵³

¹⁴⁶ Alfons Maria Schneider, “Brände in Konstantinopel”, *Byzantinische Zeitschrift* 41 (1941), s. 401

¹⁴⁷ “ Sirkeci-Florya sahil yolu”, *Dünden bugüne İstanbul ansiklopedisi*, c. II, İstanbul 1994, s. 12

¹⁴⁸ Euegenia Bolognesi Recchi Franceschini, “ The monumental itinerary of the Palatine harbour of the Boukoleon”, 22. Araştırma sonuçları toplantısı, c I, Ankara 2004, s. 55

¹⁴⁹ Euegenia Bolognesi Recchi Franceschini, “ The monumental itinerary of the Palatine harbour of the Boukoleon”, 22. Araştırma sonuçları toplantısı, c I, Ankara 2004, s. 56

¹⁵⁰ Procopius, *De aedificiis*, tr. H.B. Dewing, London-Massachusetts 1954, I. iii. 12

¹⁵¹ Thomas F. Matthews, *The Byzantine churches of Istanbul*, University Park-London 1976, s. 242

¹⁵² Cyril Mango, “The church of Saints Sergius and Bacchus at Constantinople and the alleged tradition of octagonal palace churches”, *Jahrbuch der Österreichischen Byzantinistik* 21 (1972), s. 123

¹⁵³ Procopius, *De aedificiis*, tr. H.B. Dewing, London-Massachusetts 1954, I. iv. 6

Justinian lived seven years before becoming Emperor in a palace called Hormisdas, whose name was derived from a Persian prince, who took refuge at the Byzantine court in the 4th century.¹⁵⁴

Upon becoming Emperor he connected this palace to the Great Palace, He also built the Church of Ss Sergius and Bacchus, which had a common entrance with the Church of Apostles Peter and Paul.¹⁵⁵

The Church of Ss Sergius and Bacchus has caused considerable debate regarding its construction and it has been determined that it was not built for the monophysite refugees.¹⁵⁶

The background to dedicating a church to Apostles Peter and Paul is that Emperor Justinian's name was Petrus Sabbatius prior to his ascension to the throne. However there was a different motive for dedicating the church to the Saints Sergius and Bacchus: his maternal uncle and himself were believed to be involved in a plot against the Emperor Anastasius and were saved miraculously by the intervention of the Saints Sergius and Bacchus.¹⁵⁷

Exact location of the Church of Apostles Peter and Paul is not known. But since the Church of Saints Sergius and Bacchus has a set of large arches on its southern wall, this was taken as a sign of a common wall and the church of Peter and Paul should have been at the place where the railroad is today.¹⁵⁸ However, it is rather curious that the Church of Apostles Peter and Paul was destroyed without any remaining evidence.

The Church of Ss Sergius and Bacchus became a pilgrimage site because it housed important relics. After the Ottoman conquest it was converted into a mosque around 1510.¹⁵⁹

¹⁵⁴ Brian Croke, "Justinian, Theodora and the church of Saints Sergius and Bacchus", *Dumbarton Oaks Papers* 60 (2006), s. 29

¹⁵⁵ Procopius, *De aedificiis*, tr. H.B. Dewing, London-Massachusetts 1954, I. iv. 1

¹⁵⁶ Richard Krautheimer, "Again Saints Sergius and Bacchus at Constantinople", *Jahrbuch der Österreichischen Byzantinistik* 23 (1974), s. 252

¹⁵⁷ Alexander van Millingen, *Byzantine churches in Constantinople*, London 1912, s. 64

¹⁵⁸ Thomas F. Matthews, *The Byzantine churches of Istanbul*, University Park-London 1976, s. 242

¹⁵⁹ Wolfgang Müller-Wiener, *İstanbul'un Tarihsel Topografyası: 17. yüzyılın başlarına kadar Byzantion-Konstantinopolis-İstanbul*, çev. Ülker Sayın, İstanbul 2001, s. 182

Recent restorations indicate that there was a fill of around 1 metre from the 17th century inside the building.

Construction of the railroad in 1870-1871 had a very negative impact on the already damaged building.¹⁶⁰ There was a short distance between the building and the sea walls prior to the construction of the railroad. [PHOTO 8]

PHOTOGRAPH 8: Abdullah brothers 1865



The two-stage construction of the railroad (in 1870 and 1910) damaged the building. Construction of the coastal road in 1957 caused the destruction of a medrese and a stable, which were next to the seawalls. [PHOTO 9]

¹⁶⁰ Wolfgang Müller-Wiener, İstanbul'un Tarihsel Topografyası: 17. yüzyılın başlarına kadar Byzantion-Konstantinopolis-İstanbul, çev. Ülker Sayın, İstanbul 2001, s. 182

PHOTOGRAPH 9: Aerial photo 1946



4.1

INTRODUCTION

This section presents information on the archaeological and built heritage of the Asian Side.

There is no known settlement of historical value on the existing coastal road, which was completed in 1956 under the name of London Road and known currently as D 100, which will be part of the forthcoming project.

The only exception is the Byzantine ruins which were discovered in September 2006 during a road-widening construction and dated to the 11th-12th century on the northern section of D 100 road towards the direction of Kadıköy and across Devlet Malzeme Ofisi. [PHOTOGRAPH 1]

Photograph 1

The above mentioned ruins have disappeared since the date of discovery.

Due to this the report concentrates on the ventilation shaft and tunnel construction sites and historical development of the areas where they are located.

Since the Asiatic side tunnel entry and the ventilation shafts are under the jurisdiction of modern Üsküdar, the report below was prepared from the historical and archaeological perspectives of the area.

4.2 *FORMER NAMES OF ÜSKÜDAR: DAMALIS/ KHRYSOPOLIS/ SCUTARI/ ÜSKÜDAR*

The origin of the current name of the neighbourhood Üsküdar is not certain. Former names of the neighbourhood will be studied since they may contribute building up the past of the area with their monuments and history.

The earliest name of the area is Damalis. It has been suggested that it was named after the wife of Chares, admiral of the Athenian fleet which won several sea-battles in the sea of Marmara and laid siege on Byzantion in 409 B.C.E. Because lady Damalis died on the spot where the fleet anchored the area started to be known with her name.

The oldest written source is Anabasis of Xenophon which tells the adventures of the Greek mercenaries as they were returning to their homeland after having participated in a rebellion against the Persian king. The journey began in 401 B.C.E. and a year after they arrived at Khrysopolis, which was across Byzantion, and they stayed a week to sell their booties.

The area was called as Khrysopolis, which means Golden City, in the 5th Century B.C.E. There were two suggestions for the name. First; this was the point of tax collection of the Persians and since they collected taxes in gold it was called as Golden City. Second; it was named after the son of the legendary Greek commander Agamemnon - Khrysos - who died here.

Another name is first mentioned by Villehardouin who came with the 4. Crusaders in 26 June 1203 telling that they landed in the area called Scutari which belonged to the emperor Alexius and camped on the hills of the area.

It has been suggested that the name was derived from skitos (leather) and skutarii (shield bearer) body guards of the emperor since they had their barracks in the area. The name skutariotes was most commonly used by the clergymen between 12-15th centuries. Basing on this it might be suggested that the name Skutari was in use since the 12th century.

The name Skutari was probably corrupted and became Üsküdar in Turkish. There is also an other possibility: the source for the name may be is Eskudar, a mixture of Persian-Turkish meaning Messenger.

The area of Üsküdar played an important role in Roman history since it was the battleground between Constantine I (who would also be the founder of Constantinople) and Licinius. In 324, during this battle, Licinius lost one hundred thousand soldiers (out of one hundred and thirty thousand) as well as the battle.

A small band of Arabs who raided coasts of Mediterranean in 710-711 came as far as Üsküdar.

Located just across Constantinople, Üsküdar has been a strategically the last crossing point. As it was the case during the rebellions of Leo III (who overthrew Theodosius III) in 717 and Basil II (who asked for support from Russians against rebel commander Bardas Phokas) in 988.

In 1077 Nicephoros Botaniates asked for help from Seljuks against rebellious commander Michael Ducas and succeeded in securing his throne. Seljuk leader Süleyman Şah had the control of the entire Kocaeli peninsula and reached as far as Kadıköy and Üsküdar; and even set customs offices along the Anatolian coasts of Byzantine lands.

During the 2nd Crusade, a very large German army under the command of Conrad caused panic around Constantinople during the summer months of 1147. After minor skirmishes, they were expelled and continued their way crossing to Damalis.

In May 1329, Byzantine Emperor Andronicos III crossed to Üsküdar with his army intending to halt the Turkish advance in the western regions of Byzantine empire. Upon the defeat of Pelekanon he barely escaped to Üsküdar and from there to the capital. After this battle towns like Izmit and Iznik were captured by the Ottomans.

Üsküdar was captured in 1352 by the Ottomans during the reign of Sultan Orhan.

In 1411 Ottoman Sultan Çelebi Mehmet signed an agreement with the Byzantine Emperor Manuel I Palaeologos as a precaution against Musa çelebi who declared himself Sultan in Edirne.

4.4 *BYZANTINE BUILDINGS WHOSE PAST EXISTENCE IS KNOWN BUT NO LONGER IN EXISTENCE*

4.4.1 *Monasteries*

Existence of Byzantine monasteries in the area is suggested by historical sources. The latest (most recent) of these monasteries is from the 14th century. There is no certain description of whereabouts of them or a suggestion about it. The oldest of the monasteries is from the 6th century and is called Philippikos. It is known that here was a large palace with the same name attached to it. The monastic settlement continued its existence as late as the 10th century.

4.4.2 *Palaces*

Historian Kömürçüyan in 17th century mentions a hearsay describing a palace of a certain Emperor Constantine in the area of Haydarpaşa.

Quotes from von Hammer Şehsuvaroğlu suggested that the areas of Harem-Salacak were Byzantine summer resorts and there was the palace present called Haraeum and the gardens.

Prior to 1118 (during the reign of Byzantine Emperor Alexios I Komnenos) a certain Kamytzes, who was captured by the Turks, was able to escape and reached the imperial palace at Damalis. From his short description it is understood that there was a Byzantine imperial palace by the sea but it is impossible to locate it.

4.5 *EVIDENCE OF BYZANTINE SETTLEMENT AND EXISTING BYZANTINE BUILDINGS*

4.5.1 *Evidence of a Byzantine settlement*

There is no evidence of Byzantine ruins in the area occupied by the Project. Existence of column shafts and capitals in the cemetery of Karacaahmet (further inland) indicates an early Byzantine settlement. Similar to those are the column shafts and capitals in the mosque and vicinity of Ayazma camii. These were the only architectural fragments from the Byzantine period found until recently.

Recently archaeological excavations as part of Marmaray project were undertaken in Üsküdar. During the excavations minor finds uncovered were

Roman period oil lamps, a few pieces of sculptures, marble column base, shaft and capitals. A Roman vaulted structure most probably part of a canal project was one of the major finds.

4.6 *EXISTING BYZANTINE BUILDING*

A single aisled structure with a single apse in the north with around twenty skeletons buried both underneath the walls and inside the structure was uncovered. Basing on the mural technique it was dated to 11th-12th centuries.

4.7 *AYAZMA-ÜSKÜDAR-KAVAK PALACES/ŞEMSİPAŞA-ŞEREFÂBÂD PALACES/ BARRACKS OF SELIMIYE*

4.7.1 *Ayazma-Üsküdar-Kavak Palaces*

Üsküdar started to develop after the conquest of Constantinople. As a result, this masjids of Salacak and Toygartepe Durbali were built in 1455 followed by the mosques of Hamza Fakih in 1460 and Rum Mehmet paşa in 1471.

Erdoğan mentions the Privy gardens in Üsküdar, based on a 1583 document. He also refers to the existence of a palace between Harem and Salacak during the reign of Sultan Süleyman the Magnificent under architect Sinan. Privy gardens were also praised by the famous traveller Evliya Çelebi.

It is known that the daughter of Sultan Süleyman the Magnificent was staying in a palace located on Sultan Tepesi (Sultan's Hill).

According to a 1656 document the palace in Üsküdar was used as a summer residence.

The palace in the area was called as Üsküdar palace for two centuries which started to be called afterwards as Kavak palace. It is clearly identified in several paintings such as the anonymous 1701, 1746 Guer, pre-1773 Le Rouge and 1787 father-son Basseggio's.

A book dated to 1794 mentioned that the sultan was present in the Kavak palace whenever he was leading his armies against Iran or watching his armies maneuvering.

According to Süheyl Ünver, the right hand side of Harem area was called Kavak and the left hand side of it was called as Üsküdar palace.

In a water distribution map from 1753, the palace of Şerefâbâd was depicted. Construction of the pipe system began in 1718 and when finished, water came out of the sprinklers of the palace. In a map the palace was located in the area of Doğancılar, which is located inland and on top of a hill. Until 1960's, large pieces of walls were visible in the area. Based on these, one may assume that the Palace of Şerefâbâd was, at least partially, on top of a hill.

The Palace was constructed around 1580 by Şemsi paşa and known with the name of the founder for some time. It was also called as Acem kasrı (Persian mansion) since it was acting as the audience hall for the Persian ambassadors. At the beginning of 18th century during the reign of Sultan Ahmed III it was pulled down by the orders of Damat İbrahim paşa and on the very spot a large mansion was constructed. This is the one called as Şerefâbâd.

The Palace must have been destroyed after 1850's. In photographs dated around 1865 there was nothing other than a large pool and a pier. The pier was filled around 1945 and the new coastal road divided the ruins into two. The large pool was filled in by the local municipality at the beginning of 20th century. Filling of the coast is clearly marked in an aerial photograph provided by the Metropolitan Municipality [*PHOTOGRAPH 2*]

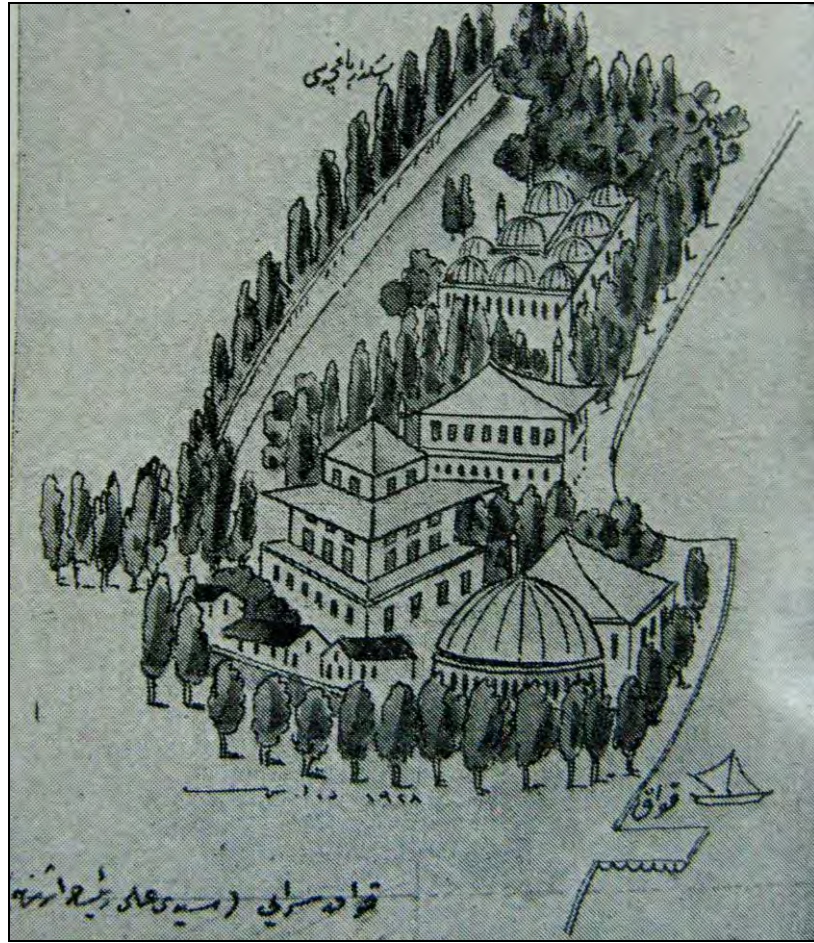
Photograph 2



Mueller-Wiener made use of the descriptions and depictions of the palace and created a plan of the layout.

In a map of Seyyid Ali Reis (Piri Reis), dated to 1544, the location of the palace and separate pavillions by the coast of Üsküdar are clearly seen. [DRAWING 1]

Drawing 1



A copy of this original document in a private collection from the 17th century not only depicts the palace complex together with the Leander's tower but also some other buildings along the coast as well. [DRAWINGS 2 & 3]

Drawing 2



Drawing 3



It is reported by historian K  m  rciyan that in the middle of 17th century around the mosque of   emsi pa  a there were plenty of Jewish houses and tanners. Although the existence of tanners since the end of 16th century was known from documents, it was not known that there were by the sea. This may suggest that there would not be any palace in the vicinity of these tanneries due to unpleasant odours. Details provided by historian   nciyan may assist this historical query. According to him, from 17th century onwards the Kavak palace was not that much in favor and nearly abandoned. As a result of this, some squatter houses and shops then entered the area. A similar situation was experienced at the Topkap   palace. Soon after moving to Dolmabah  e palace in the middle of 19th century, squatter houses were built next to the enclosing wall of the palace of Topkap   (evidence of which remains today).

The Kavak palace had a fire in 1779 and was pulled down upon the orders of Sultan Selim III in 1794.

A document of 30 October 1800 mentions that the area of Kavak Palace is no longer imperial property but instead belongs to the Foundation of Selimiye who built the military barracks. Some marble of the Kavak Palace was moved to the palace of Topkap   and the rest was used in the construction of the barracks.

A detailed study of the sources of the period indicates that   emsipa  a and   eref  b  d Palaces are the same, as are the Ayazma-Kavak and   sk  dar Palaces. Similar to this was experienced at the palace of Topkap  . For public the palace was called as 'zeytunluk saray  ' (olive orchard palace) but on official documents until the beginning of 19th century it was mentioned as 'saray-   cedit-i amire' (new palace).

4.7.3

Barracks of Selimiye

One of the largest standing buildings of the area is the barracks of Selimiye. The construction started in 1800 and since the final delivery account books were dated to 1803, it would be safe to suggest that it was completed at that time.

After the upheaval of Janissaries in 1807 Nizam-   Cedit army (New Order army) was abolished. Barracks of Selimiye (or as it was mentioned in the sources, as barracks of   sk  dar) was intended to be converted and parts of the building complex began to be dismantled so as to pay the debts to local merchants. In 16 November 1808, in another upheaval of the Janissaries, the barracks were burnt down.

Despite being burnt, some secondary buildings remained in use in the new barrack, which was started by the Sultan Mahmut II (soon after abolishing the Janissaries in 1826). The construction came to completion in 1828.

Annex O

Summary of Social Impacts Screening

This Annex is a social impact screening checklist prepared during the scoping stage of the ESIA process in October 2009. The checklist is based on Table 1 of the IFC document, *Good Practice Note: Addressing the Social Dimensions of Private Sector Projects*. The information provided in the checklist was based on the Project information available at that time in the ESIA process and was aimed at identifying potentially significant impacts that should be investigated during the ESIA. It does not represent the final assessment of the impacts of the Project.

Some of the scoping findings in the checklist have been superseded by the findings of the ESIA process reported in Volume II of the ESIA. The mitigation measures identified in the checklist were possible options to be examined if needed. The various mitigation measures identified through the ESIA and presented in the ESMP in Annex D replace the mitigation measures identified in the checklist below.

Summary of Social Impacts Screening Process

Potential Impact	Requires consideration in ESIA ?	Possible options for mitigation if required	Chapter in ESIA Report
Population and demographics			
Temporary and permanent changes in the study area's population due to in-migration	Yes – most of the construction workforce will be sourced from Istanbul so any impacts are likely to be small. No impacts predicted during operation as the project will not result in an increase in the local or regional population.	Some construction workers will be provided with accommodation (including food, accommodation and entertainment). This will be located and managed such that it does not impact on any local communities. Additionally, PS2 and PS4 shall be applied.	12
Changes in the demographic properties of the population in the study area	Yes – may be an increase in the 18 – 45 (approx.) age demographic cohort as a result of the construction workforce (a proportion of which will be accommodated in a construction workers compound).	Some construction workers will be provided with accommodation (including food, accommodation and entertainment). This will be located and managed such that it does not impact on any local communities. Additionally, PS2 and PS4 shall be applied.	12
Seasonal movements in population	No - No seasonal population impacts predicted during operation as the project will not result in an increase in the local or regional population.		-
Economic and employment			
Direct and indirect employment creation (construction and operation) in the study area	Yes – positive impacts expected as construction and operational jobs will be created.	PS2 shall be applied.	12
Direct and indirect loss of existing employment and businesses in the study area	Yes – due to the loss of existing employment and local businesses directly impacted by the alignment.	PS5 shall be applied and this will ensure that any business to be directly impacted and resettled will be financially compensated and an alternative location provided (or financial compensation provided in lieu of this).	12

Potential Impact	Requires consideration in ESIA ?	Possible options for mitigation if required	Chapter in ESIA Report
Wider (regional) economic impacts	Yes – positive impacts expected. The project is expected to increase the overall capacity of the regional road network through the provision of an additional vehicular crossing of the Bosphorus. This will reduce regional economic costs associated with driver delay and traffic congestion.		12
Potential for sourcing local goods and services	Yes – positive impacts expected. The construction of the project will involve the direct purchasing of some local good and services. Given the project's proximity to Istanbul, it is also expected that direct purchasing from the local economy will take place, regardless of any specific commitment to locally source goods and services.	Commitment to procure local good and services to the benefit of the local and regional economy.	5
Economic (fiscal) benefits (including tax and revenue benefits)	Yes – positive impacts expected. The local and regional economy will benefit due to the direct economic activity generated by the construction of the project (employee remuneration; purchase of goods, materials and services etc.) and also the secondary/induced economic activity and also from the subsequent government taxes generated by all direct and induced economic expenditure.		12
Inflationary impacts	No – the project is located in Istanbul which has a large and functioning economy. This project will not lead to any inflationary effects.		-
Competition for economic resources	No – the project, in the context of the Turkish economy (and also that of the Istanbul region), will not result in competition of economic resources nor the diversion of public funds away from other projects.		-

Potential Impact	Requires consideration in ESIA ?	Possible options for mitigation if required	Chapter in ESIA Report
Equitable access to opportunities and accrual of benefits	No – the project will be open (following the provision of the toll fee) to all car and mini-bus users (HGVs will not be permitted) and will provide significant direct journey and time saving benefits to all tunnel users. Additionally, the project will increase the road capacity on the regional road network, providing indirect benefits for all users of the regional road network.		-
Employment conditions			
Compliance with all local and national employment laws and regulations	Yes – the project will fully comply with all local and national employment and labour laws and regulations.	Additionally, PS2 will be applied during the construction and operation of the project.	14
Safe and acceptable physical working conditions (inc. construction and operational H&S and training)	Yes – the project will fully comply with all local and national employment and labour laws and regulations.	Additionally, PS2 will be applied during the construction and operation of the project.	14
Equitable remuneration/income and associated benefits	Yes – PS2 will be applied.	PS2 will be applied.	14
Ethical and fair conditions and terms of employment	Yes – PS2 will be applied.	PS2 will be applied.	14
Acceptable provision and standard of workers accommodation compounds	Yes – PS2 will be applied.	PS2 will be applied.	14
Non use of child labour or forced and bonded employment	No – no child labour or forced or bonded employment will be used.		-
Workers grievance mechanism	Yes – PS2 will be applied.	PS2 will be applied.	14
Natural resource management and access to resources			

Potential Impact	Requires consideration in ESIA ?	Possible options for mitigation if required	Chapter in ESIA Report
Direct land uses changes in the study area	Yes – the project will result in changes to the existing land use patterns both along and immediately adjacent to the alignment.	The design has minimised land take, where possible, and tried to maximise the use of the existing roadway. Any lands to be temporarily required for construction shall be reinstated and returned to their former uses upon completion.	4
Rights and access to land uses in the study area	<p>Yes – the project will require a limitation of access to the various public open spaces and parks (the majority of which are on the European side).</p> <p>The project will also require the permanent expropriation of some of these lands to facilitate the project.</p>	<p>During construction, limited and alternative access will be maintained to the coastal walk on the European side (although much of the public parks will be off-limits to the public for health and safety and also security reasons).</p> <p>PS5 will be applied during the expropriation process. Additionally, there is a commitment to improve the remaining (post-construction) public facilities and recreational infrastructure. Pedestrian access arrangements over the existing roadway will be provided for the new road, thus maintaining access to the public parks and facilities.</p>	4
Access to common natural resources in the study area	No – the project will not impact on the availability and access to common natural resources, given its urban location and the size of the regional Istanbul economy.		-
Resettlement and expropriation			
Direct and indirect resettlement and expropriation of residential populations	Yes – it is possible that some residential land and properties will be expropriated.	Compensation and resettlement will be undertaken in accordance with PS5. A Resettlement Policy Framework will be developed as part of the ESMP setting out how resettlement for permanent acquisition will be managed and mitigated.	4

Potential Impact	Requires consideration in ESIA ?	Possible options for mitigation if required	Chapter in ESIA Report
Direct and indirect resettlement and expropriation of businesses and areas of employment	Yes – the project will require both temporary and permanent land expropriation of businesses and areas of employment. The majority of these lands to be acquired are in public ownership. However, some existing businesses will be expropriated.	PS5 will be applied during the expropriation process. Lands being temporarily acquired (to facilitate construction) will be returned to their former uses post-construction. A Resettlement Policy Framework will be developed as part of the ESMP setting out how resettlement for permanent acquisition will be managed and mitigated.	4
Loss of public and common lands (including access to)	Yes – the project will require both temporary and permanent land expropriation of public and common lands.	During construction, limited and alternative access will be maintained to the coastal walk on the European side (although much of the public parks will be off-limits to the public). There is a commitment to improve the remaining (post-construction) public facilities and recreational infrastructure. Pedestrian access arrangements over the existing roadway will be provided for the new road, thus maintaining access to the public parks and facilities.	4
Social services and infrastructure			
Health and medical facilities	No – the project will not impact on the existing health and medical facilities of the study area or of Istanbul. H&S (including limited medical support facilities) will be provided during the construction process. No permanent population increases will arise from the project so no additional demands on the health infrastructure will arise.		-
Education	No – the project will not result in any permanent population increases so no additional demands on the educational infrastructure will arise.		-

Potential Impact	Requires consideration in ESIA ?	Possible options for mitigation if required	Chapter in ESIA Report
Water	Yes – the project will not result in any permanent population increases so no additional demands on the water infrastructure will arise. However, the construction process will require water and there will also be operational water requirements.	PS3 shall be applied during the construction process. A key source of water will be the TBM but this shall have a water recycling system as part of its operation and this shall recycle a large proportion of water, thereby greatly reducing both water demands and also contaminated water requiring treatment and disposal.	7
Sanitation	Yes – the project will not result in any permanent population increases so no additional demands on the sanitation infrastructure will arise. However, the construction process will require sanitation and there will also be operational sanitation requirements.	PS3 shall be applied during the project.	7
Power	Yes – the project will not result in any permanent population increases so no additional demands on the power infrastructure will arise. However, the construction process will require power and there will also be operational power requirements.	PS3 shall be applied during the project.	2 and 5
Transportation infrastructure	Yes – the project will result in an additional vehicular crossing of the Bosphorus and will also provide greater regional traffic capacity (and reduce congestion on the existing Bosphorus crossings).	Traffic Management Plans will be developed as part of the ESIA process and these will minimise the negative impacts on traffic.	2
Waste management	Yes – the project will not result in any permanent population increases so no additional demands on the waste management infrastructure will arise. However, the construction process will generate construction wastes and there will also be operational waste management to be addressed.	PS3 shall be applied during the project. Construction spoils shall be disposed of in an authorised and licensed municipality facility to the north of Istanbul.	5

Potential Impact	Requires consideration in ESIA ?	Possible options for mitigation if required	Chapter in ESIA Report
Communications infrastructure	Yes – the project will not result in any permanent population increases so no additional demands on the communication infrastructure will arise.		2
Housing	Yes – a temporary workers compound shall be provided during construction but this shall be removed upon completion of the project. Additionally, the project will not result in any permanent population increases so no additional housing demands will arise.	PS 2 shall be applied during construction.	2 and 14
Community facilities (e.g. village halls and community buildings)	No – the project will not be impact on any community facilities (impacts to public parks, open spaces and recreational facilities are addressed below).		-
Religious and places of worship	Yes – the project may impact on some religious structures or places of worship.	Minimise or avoid impacting on such sensitive land uses. Where this is not avoidable, then replacement of these facilities will be undertaken.	4
Recreational and sports facilities	Yes – the project will result in the permanent loss of public open spaces and recreational facilities and there will also be additional and temporary loss of access to public open spaces during construction.	During construction, limited and alternative access will be maintained to the coastal walk on the European side (although much of the public parks will be off-limits to the public). There is a commitment to improve the remaining (post-construction) public facilities and recreational infrastructure. Pedestrian access arrangements over the existing roadway will be provided for the new road, thus maintaining access to the public parks and facilities.	4
Vulnerable groups			
Indigenous peoples	No – there are no indigenous peoples within the study area, which is part of the city of Istanbul.		-

Potential Impact	Requires consideration in ESIA ?	Possible options for mitigation if required	Chapter in ESIA Report
Ethnic or religious minorities	No – there are no ethnic or religious minorities that will be impacted by the project.		-
Women	No – there are specific women populations that will be impacted by the project.		-
Youth and elderly	No – there are no specific youth or elderly populations that will be impacted by the project.		-
Limited mobility	Yes – the project will not negatively impact on any specific population of limited mobility and it is proposed that the project will enhance local accessibility for people of limited mobility. The project will also comply with all relevant mobility legislation and design standards.		4
Land users without formal rights	Yes – there are some illegal and unofficial businesses that will be expropriated as a result of the project. Although these users have – in legal terms – no rights; they shall be treated as having consent regarding use of the lands being expropriated.	PS5 shall be applied.	4

Potential Impact	Requires consideration in ESIA ?	Possible options for mitigation if required	Chapter in ESIA Report
Cultural and built heritage			
Direct and indirect impacts on designated historic buildings and structures	Yes – the project has the potential to directly impact on a number of protected historic structures close to the alignment during both construction and operation. Additionally, indirect effects may arise over a wider area (and thus on more distant protected and historic structures) from changes to the traffic patterns during the construction and operation of the project.	PS8 shall be applied during the construction and operation of the project. In addition, specific constructional and operational monitoring will be undertaken at the protected historic structures. If monitoring determines that direct impacts are arising, remedial action will be undertaken (such as selecting a less harmful construction technique or developing additional structural insulation and protection measures). Consultation with UNESCO and other municipality authorities will be undertaken regarding the construction of the scheme and its design.	11
Direct and indirect impacts on sites of cultural importance	Yes – the project is close to the UNESCO-listed historic peninsula of Istanbul. The potential exists for the project to have both direct and indirect impacts on this internationally important cultural site during construction and operation of the project.	PS8 shall be applied during the construction and operation of the project. Consultation with UNESCO and other municipality authorities will be undertaken regarding the construction of the scheme and its design. Specific measures include the preparation of a set of construction and operational traffic management principles (which will form the basis for a Construction Traffic Management Action Plan and an Operational Traffic Management Plan). A key objective of both of these plans is to reduce the level of traffic in the historic peninsula. Additionally, the construction process will be developed such that it does not impact in anyway on any buildings and structures of historical importance.	11

Potential Impact	Requires consideration in ESIA ?	Possible options for mitigation if required	Chapter in ESIA Report
Direct and indirect impacts on archaeological resources (both known and unknown/potential)	Yes – the project is close to the UNESCO-listed historic peninsula of Istanbul. The potential exists for the project to have both direct and indirect impacts on known and unknown archaeological resources during construction of the project.	PS8 shall be applied during the construction and operation of the project. Consultation with UNESCO and other municipality authorities will be undertaken regarding the potential for impacts on known and unknown archaeological resources. Geophysical studies have been undertaken as part of the ESIA process to provide additional information on the buried archaeological resources. The implementation of PS8 will include a ‘Chance Finds Procedure’.	11
Social and equity issues			
Competition for employment, natural resources (land, water, materials etc.) and access to infrastructure	No – the project will not result in increased competition for employment or materials and resources, given its urban location and the size of the regional Istanbul economy.		-
Differential wage incomes (and other benefits) and wealth accumulation	Yes – the project shall pay fair labour rates and the majority of the workforce will be sourced from Istanbul and the wider region. The project will comply with all national and local labour and employment laws.	PS2 will be applied.	14
Perception of unequal treatment	No – Regarding construction, all national and local labour and employment laws will be complied with. The project will be open (following the provision of the toll fee) to all car and mini-bus users (HGVs will not be permitted) and will provide direct journey and time saving benefits to all direct users. Additionally, the project will increase the road capacity on the regional road network, providing benefits for all users of the road network.		-

Potential Impact	Requires consideration in ESIA ?	Possible options for mitigation if required	Chapter in ESIA Report
Community rivalry, jealousies and tension	No – construction workers will not be sourced from any specific locality or community. The project will be open to all users upon completion (with the payment of the appropriate toll fee).		-
Social conflicts	No – the project will result in regional benefits through the provision of an additional vehicular crossing of the Bosphorus and also provide additional regional road capacity and indirectly reduce congestion on the regional road network.		-
Distribution of and access to the benefits (e.g. employment, revenue, usage, outputs) from the project	No – the project will result in regional benefits through the provision of an additional vehicular crossing of the Bosphorus and also provide additional regional road capacity and reduce congestion on the regional road network. Construction and operational employment will not be confined to any particular ethnic or spatial groups.		-
Lifestyles, culture and identity			
Social cohesion and disruption (separation of families and local communities)	No – the project will not result in any permanent population increases so there will be no impacts to the study area's social cohesion. A construction worker compound will be provided, but this will be carefully managed and monitored and will not impact on the adjacent community. In any case, the majority of workers will be sourced locally (and reside) in Istanbul.		-
Change in production systems and traditional livelihoods	No – the project is not impacting on any agricultural or similar activities.		-

Potential Impact	Requires consideration in ESIA ?	Possible options for mitigation if required	Chapter in ESIA Report
Social ills: alcoholism, drugs, prostitutions, crime, black market activity, HIV/AIDS	No – the project will not result in any permanent population increases so there will be no increase in social ills and problems. A construction worker compound will be provided, but this will be carefully managed and monitored and will not impact on the adjacent community.		-
Socio-economic impacts of the project (both construction and operation)	Yes – The project will result in positive socio-economic impacts for the workforce, the regional economy and wider benefits such as shorter journeys times and reduced traffic congestion.		12
Social and cultural disruption due to population changes (construction and operation)	No – the project will not result in any permanent population increases so there will be no increase in social and cultural disruption. A construction worker compound will be provided, but this will be carefully managed and monitored and will not impact on the adjacent community.		-
Change in relationships between population, demographic, socioeconomic or ethnic groups	No – the project will not result in any permanent population increases so there will be no increase in inter-population and inter-demographic conflicts and changes. A construction worker compound will be provided, but this will be carefully managed and monitored and will not impact on the adjacent community.		-
Disturbance impacts (noise, dust etc.) during construction and operation	Yes – the project will result in disturbance impacts on the local population during construction and operation of the project.	PS1, PS3 and PS4 will be implemented during the construction and operation of the project. An overall ESMP Framework shall be developed and this will outline how all environmental impacts – including those which can impact on the local community – will be discussed.	13

Potential Impact	Requires consideration in ESIA ?	Possible options for mitigation if required	Chapter in ESIA Report
Health and wellbeing			
Changes in nutritional status	No – the project will not result in any permanent population increases so there will be changes in nutritional status. A construction worker compound will be provided, but this will be carefully managed and monitored and will not impact on the adjacent community.		-
Mortality and morbidity levels	No – the project will not result in any permanent population increases so there will be no increase in mortality and morbidity levels. A construction worker compound will be provided, but this will be carefully managed and monitored and will not impact on the adjacent community.		-
HIV/ AIDS, STDS and other communicable diseases	No – the project will not result in any permanent population increases so there will be no increase in communicable diseases. A construction worker compound will be provided, but this will be carefully managed and monitored and will not impact on the adjacent community.		-
Endemic diseases (e.g. malaria, bilharzia, TB etc)	No – the project will not result in any permanent population increases so there will be no increase in endemic diseases. A construction worker compound will be provided, but this will be carefully managed and monitored and will not impact on the adjacent community.		-

Potential Impact	Requires consideration in ESIA ?	Possible options for mitigation if required	Chapter in ESIA Report
Impacts on existing health infrastructure due to in-migration	No – the project will not result in any permanent population increases so there will be no increase in the demands on health infrastructure. A construction worker compound will be provided, but this will be carefully managed and monitored and will not impact on the adjacent community.		-
Health impacts due to the construction and operation of the project (e.g. soil contamination, air pollution etc.)	Yes – the project will result in emissions (principally noise and air quality) to the environment which has the potential to impact on the local community. Excavation of construction material may also uncover contaminated material, also a risk to public health.	PS1, PS3 and PS4 will be implemented during the construction and operation of the project. An overall ESMP Framework shall be developed and this will outline how all environmental impacts – including those which can impact on the local community – will be discussed.	13
Induced and secondary social impacts			
Changes in land values post construction	Yes – the project will provide a significant improvement in transport infrastructure and accessibility in the study area. This is likely to increase land values within the vicinity of the project.	PS5 will be implemented.	4
Changes in local and regional land uses post construction	Yes – the project will not directly change the land uses adjacent to the final alignment (although there will be land uses directly changing as a result of the project). However it is likely that there may be some future land use changes planned by the municipality to reflect the additional crossing of the Bosphorus.		4

Potential Impact	Requires consideration in ESIA ?	Possible options for mitigation if required	Chapter in ESIA Report
Spontaneous settlement (including impacts on existing services and infrastructure)	No – the project will not result in any permanent population increases so there will be no spontaneous settlement. A construction worker compound will be provided, but this will be carefully managed and monitored and will not impact on the adjacent community.		-
Relocation and economic displacement resulting from another project or existing activity (which may interact with this project)	No – the project will not be located in Istanbul and the entire city and region is subject to constant change and ongoing development projects. These will not result in economic or demographic displacement which could impact on the project.		-
Community organisations and consultation			
Local Government capacity (technical and availability)	Yes - The various public authorities (both at a national, regional and local level) are adequately resourced to participate in the ESIA process. Consultation with these authorities has started in October 2009 and a summary of submissions can be found in the main ESIA Report.		3
Community-based organisations to represent the local community	Yes - Public consultation on the draft ESIA will be undertaken and submission invited from any interested groups and organisations.		3
NGOs	Yes - Public consultation on the draft ESIA will be undertaken and submission invited from any interested groups and organisations.		3
Religious and political organisations	Yes - Public consultation on the draft ESIA will be undertaken and submission invited from any interested groups and organisations.		3

Potential Impact	Requires consideration in ESIA ?	Possible options for mitigation if required	Chapter in ESIA Report
Organisational and negotiation skills vacuum	No – the project is located in the city of Istanbul and in an area which is well developed with an urban context and contains no specialist ethnic groups or peoples who are of limited educational ability. There is no organisational or negotiation skills vacuum.	PS1 and PS4 will be implemented.	-

Annex P

Bibliography

BIBLIOGRAPHY

- Altinok and Ersoy, 2000 Altinok, Y., Ersoy, S., 2000. Tsunamis observed on and near the Turkish coast. *Nat. Hazards* 21, 185–205.
- Altinok et al., 2000 Altinok, Y., Yalciner, A.C., Alpar, B., Ersoy, S., 2000. Tarihsel veriler isiginda Marmara Denizinde depresim dalgaları (tsunamiler). III. Ulusal Kiyi Mühendisligi Sempozyumu, TMMOB Insaat Mühendisleri Odai, 5-7 Ekim 2000, Bildiriler Kitabı, Canakkale, pp. 33-44.
- Altinok et al., 2001a Altinok, Y., Ersoy, S., Yalciner, A.C., Alpar, B., Kuran, U., 2001a. Historical tsunamis in the Sea of Marmara. *ITS 2001 Proceedings*, session 4, vol. 4-2, p. 527.
- Altinok et al., 2001b Altinok, Y., Tinti, S., Alpar, B., Yalciner, A.C., Ersoy, S., Bortolucci, E., Armigliato, A., 2001b. The tsunami of August 17, 1999 in Izmit Bay, Turkey. *Nat. Hazards* 24, 133– 146.
- Altinok et al., 2003 Altinok, Y., Alpar, B., Yaltirak, C., 2003. Sarkfy–Mqrefte 1912 earthquake’s tsunami, extension of the associated faulting in the Marmara Sea, Turkey. *J. Seismol.* 7, 329–346.
- Ambraseys and Finkel, 1990 Ambraseys, N.N., Finkel, C.F., 1990. The Marmara Sea earthquake of 1509. *Terra Nova* 2, 167–174.
- Ambraseys and Finkel, 1991 Ambraseys, N.N., and C.F. Finkel, 1991: Long-term Seismicity of Istanbul and the Marmara Sea Region, *Terra Nova*, 3.
- Ambraseys and Jackson, 2000 Ambraseys, N.N., Jackson, J.A., 2000. Seismicity of the Sea of Marmara (Turkey) since 1500. *Geophys. J. Int.* 141, F1– F6.
- Ambraseys, 2002b Ambraseys, N.N., 2002b. Seismic sea-waves in the Marmara Sea region during the last 20 centuries. *J. Seismol.* 6, 571–578.
- BirdGuides Ltd, 2006 The Birds of the Western Palearctic (BWP), electronic versions produced by BirdGuides Ltd and; Oxford University Press, 2006
- Council of Europe, 1979 Council of Europe, Convention on the Conservation of European Wildlife and Natural Habitats, September 19, 1979
- Eken, G., Bozdoğan, M., Isfendiyaroglu, S., Kilic, D.T., Lise, Y. (editors), 2006 Eken, G., Bozdoğan, M., Isfendiyaroglu, S., Kilic, D.T., Lise, Y. (editors): Türkiye’nin Önemli Doğa Alanları (Key Biodiversity Areas of Turkey), Doğa Derneği (Society of Nature), Ankara 2006
- European Bank for Reconstruction and Development (EBRD) Performance Requirements (PR)1 to PR10, June 2010. <http://www.ebrd.com/pages/about/principles/sustainability/standards.shtml>

European Communities, 2001	European Commission Guidance on EIA Scoping; June 2001 http://ec.europa.eu/environment/eia/eia-guidelines/g-scoping-full-text.pdf
International Finance Corporation (IFC), 2003	IFC; Good Practice Note: Addressing the Social Dimensions of Private Sector Projects; December 2003, No. 3
IFC, 2006	IFC; Performance Standards on Social & Environmental Sustainability; April 2006. http://www.ifc.org/ifcext/sustainability.nsf/Content/PerformanceStandards
IFC, 2006	IFC Performance Standard 3: Pollution Prevention and Abatement; April 30, 2006
IFC, 2006	IFC's Policy on Social & Environmental Sustainability, April 30, 2006
IFC, 2007	IFC EHS General Guidelines, April 30, 2007
IFC, 2007	IFC EHS Guidelines for Construction Materials Extraction, April 30, 2007
IFC, 2007	IFC EHS Guidelines for Toll Roads, April 30, 2007
IFC, 2009	IFC Guidance Note: Workers' accommodation: Processes and Standards, August 2009
International Labour Organization (ILO), 2006	The end of child labour within reach, Global report under the Follow-up to the ILO Declaration on Fundamental Principles and Rights at Work, Report of the Director-General, 2006
International Standard Organization (ISO), 2004	ISO 14001:2004 Environmental Management Systems
Jacobs Consultancy, 2010	Jacobs Consultancy; Istanbul Strait Road Tunnel Crossing: Traffic and Revenue Analysis Final Report; January 2010
Jacobs Consultancy, 2010	Jacobs Consultancy: Supporting digital data associated to Traffic and Revenue Analysis Final Report; January 2010.
Japan International Cooperation Agency/ Istanbul Metropolitan Municipality (JICA/IMM), 2008	Japan International Cooperation Agency/Istanbul Metropolitan Municipality (JICA/IMM); The Study on Integrated Urban Transportation Master Plan for Istanbul Metropolitan Area in the Republic of Turkey; 2008
JICA/IMM, 2008	Japan International Cooperation Agency/Istanbul Metropolitan Municipality (JICA/IMM); The Study on A Disaster Prevention / Mitigation Basic Plan in Istanbul including Seismic Microzonation in the

	Republic of Turkey; December 2002
Kuran and Yalciner, 1993	Kuran, U., Yalciner, A.C., 1993. Crack propagations earthquakes and tsunamis in the vicinity of Anatolia. In: Tinti, S. (Ed.), Tsunamis in the World, Advances in Natural and Technological Hazards Research. Kluwer Academic Publisher, Dordrecht, pp. 159– 175.
Levent Akin, 2009	Levent Akin, Working Conditions of the Child Worker in Turkish Labour Law, Employ Respons Rights J, 2009, 21:53–67, Springer Science + Business Media, LLC 2009, published online: 28 January 2009
Nippon Koei Ltd, 2007	Nippon Koei Ltd; Karayolu Boğaz Geçiş Tüneli Fizibilite Çalışması; for Ministry of Transport (Türkiye Cumhuriyeti Ulaştırma Bakanlığı'na); 2007
OYO International Cooperation, 2006	OYO International Cooperation, Report of 12 soil boring log profiles including groundwater table measurements, July 2006
Parsons et al., 2000	Parsons, T., Toda, S., Stein, R.S., Barka, A., Dieterich, J.H, 2000. Heightened Odds of Large Earthquakes Near Istanbul: an Interaction-based Probability Calculation. Science 288, 661-665.
TA Luft	German Technical Guideline on Air ("TA Luft") 2002.
Turkish Government	Turkish Regulation on Control of Excavated Soil, Construction and Debris Wastes of March 18, 2004, No. 25406
Turkish Government	Turkish Solid Waste Control Regulation, published in the Official Gazette on March 14, 1991, No. 20814
Turkish Government	Turkish Hazardous Waste Control Regulation, published March 14, 2005, No. 25755, and amendment published on September 04, 2009, No. 27339
Turkish Government	Turkish Regulation on the General Principles of Waste Management, published on July 05, 2008, No. 26927
Turkish Statistical Institute, 2008	Turkish Statistical Indicators 1923 – 2007; Turkish Statistical Institute, 2008
Yalciner et al., 2002	Yalciner, A.C., Alpar, B., Altinok, Y., Ozbay, I., Imamura, F., 2002. Tsunamis in the Sea of Marmara. historical documents for the past, models for the future. Mar. Geol. 190, 445– 463.
Yaltirak et al., 2000	Yaltirak, C., Alpar, B., Sakinc, M., Yüce, H., 2000. Origin of the Strait of Canakkale (Dardanelles): regional tectonics and the Mediterranean-Marmara incursion. Mar. Geol. 164, 139-156, with erratum 167, 189-190.