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(ATAŞ - the Eurasia Tunnel Operation,
Construction and Investment Inc. Co.)

Eurasia Tunnel Environmental and Social Impact Assessment

Volume I

Non Technical Summary (NTS)

Final Report

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1 INTRODUCTION & BACKGROUND

1.1 BACKGROUND

This document is a Summary of the Final Environmental and Social Impact Assessment (ESIA) Report for a new road tunnel proposed to be constructed in the Istanbul Metropolis, Turkey. The Eurasia Tunnel Project comprises a 5.4 km road tunnel beneath the Bosphorus Strait, between the European and Asian shores of Istanbul, together with the widening of a total of 9.2 km of existing roads on both sides to form the approaches to the tunnel. The Project location is shown in Figure 1-1.

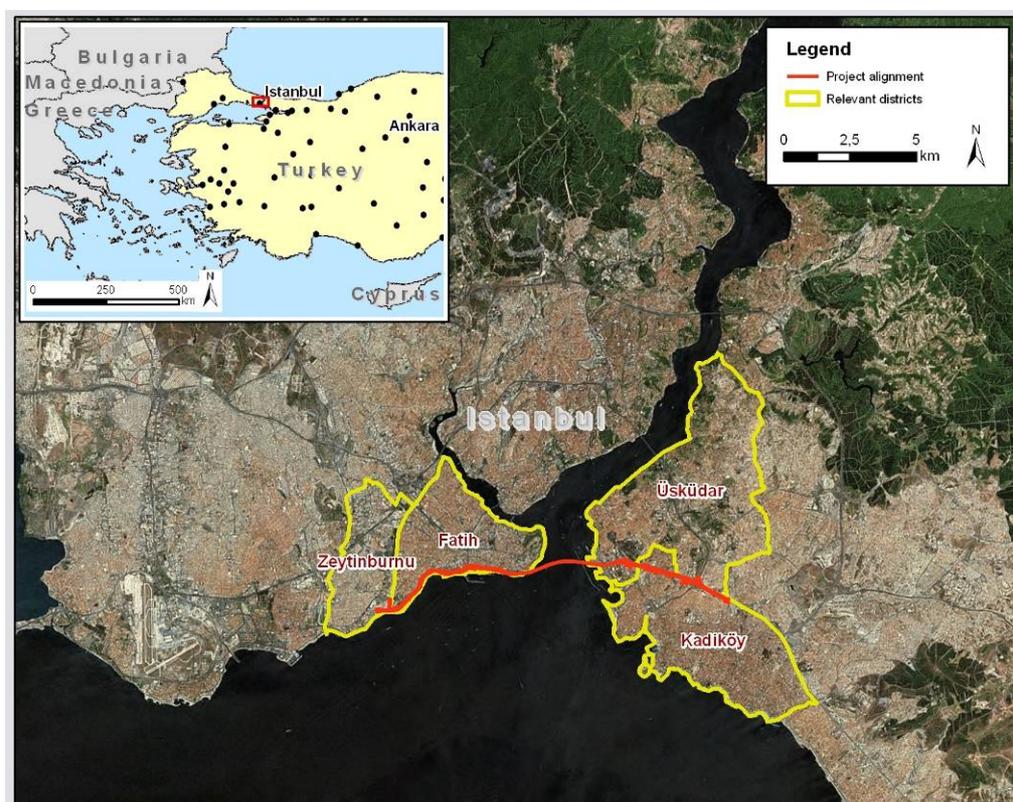


Figure 1-1 *Project Location*

The ESIA is a study into the effects of construction and operation of the Project on the physical, natural, cultural, social and socio-economic environment. The ESIA Report describes the Project and the impacts it is predicted to have on environmental and social conditions and explains how the Project has been designed and how it will be implemented in order to minimise its adverse impacts and maximise its benefits. This document is a summary of the main ESIA Report.

1.2 WHO HAS COMMISSIONED THE ESIA

The ESIA has been commissioned by *Avrasya Tüneli İşletme İnşaat ve Yatırım A.Ş.* (ATAŞ - the Eurasia Tunnel Operation, Construction and Investment Inc. Co.) and undertaken by *Environmental Resources Management (ERM)* and *ELC Consulting and Engineering Group Ltd (ELC)*.

ATAŞ is a consortium of Turkish and Korean companies⁽¹⁾ who have been awarded a contract by the Turkish Ministry of Transport, General Directorate for the Construction of Railways, Seaports and Airports (DLH - Türkiye Cumhuriyeti Ulaştırma Bakanlığı'na bağlı Demiryollar, Limanlar ve Havameydanları İnşaatı Genel Müdürlüğü), to Build, Operate and Transfer (BOT) the Eurasia Tunnel Project. Under the terms of the BOT Contract, ATAŞ will appoint an EPC Contractor to undertake the detailed design and construction of the Project. ATAŞ will then be responsible for operation and maintenance of the tunnel for a period of 25 years, 11 months and 9 days, after which time it will be transferred to DLH.

1.3 THE REQUIREMENT FOR ESIA

In 2007 a Project Information Document ⁽²⁾ was prepared by DLH in accordance with the requirements of the 2003 Turkish EIA Regulation applying at the time ⁽³⁾ and was submitted to the Ministry of Environment and Forests (MOEF - Çevre ve Orman Bakanlığı). On the basis of this submission MOEF concluded that the proposed project was not within the scope of the 2003 EIA Regulation and that EIA was not therefore required. The current relevant legislation is the Environmental Impact Assessment Regulation 2008 ⁽⁴⁾ but the Project is covered by the earlier decision under the 2003 regulation.

In the absence of need for impact assessment under local law, the requirement for this ESIA has arisen as a result of ATAŞ seeking finance from international lenders to support the development of the Project. Most international project finance institutions operate strict procedures for environmental and social due diligence which require the preparation and public disclosure and

⁽¹⁾ ATAŞ is a joint venture of Yapi Merkezi İnşaat ve Sanayi A. Ş. of Istanbul and four Korean companies SK E & C; Samwhan Corporation;; and Hanshin Engineering & Construction), all located in Seoul

⁽²⁾ Ministry of Transportation General, Directorate of Railroads, Ports and Airports Constructions; Bosphorus Crossing Motorway Tunnel Project; *Project Introduction File*; November 2007

⁽³⁾ At that time the current regulation was the EIA Regulation of 16.12.2003 Official Gazette No. 25318

⁽⁴⁾ Environmental Impact Assessment Regulation of 17.07.2008 Official Gazette No. 26939

consultation of an ESIA Report and an accompanying Environmental and Social Management Plan (ESMP), prior to the decision to approve finance for projects. These lenders will typically require the Project to comply with various standards for environmental and social sustainability including:

- The European Bank for Reconstruction and Development (EBRD) Performance Requirements on Environmental and Social standards ⁽¹⁾ ;
- European Investment Bank Statement of Environmental and Social Principles and Standards ⁽²⁾ .
- the International Finance Corporation (IFC) Performance Standards on Social and Environmental Sustainability ⁽³⁾;
- the IFC General Environmental, Health and Safety Guidelines⁽⁴⁾;
- the IFC specific Environmental, Health and Safety Guideline for Toll Roads ⁽⁵⁾;
- the Equator Principles ⁽⁶⁾;
- the OECD Common Approaches ⁽⁷⁾.

The project must also comply with Turkish environmental and social legislation and, as a result of involvement of EBRD and EIB and because Turkey is a candidate for accession to the European Union, to comply with EU Directives on protection of the environment and the community. An overview of applicable laws and standards is provided in Annex C, including national

(1) <http://www.ebrd.com/pages/about/principles/sustainability/standards.shtml>

(2) European Investment Bank 2009; The EIB Statement of Environmental and Social Principles and Standards.

(3) International Finance Corporation; *Performance Standards on Social & Environmental Sustainability*; April 2006. <http://www.ifc.org/ifcext/sustainability.nsf/Content/PerformanceStandards>

(4) International Finance Corporation; *Environmental, Health and Safety Guidelines*; 2007
[http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS/\\$FILE/Final+-+General+EHS+Guidelines.pdf](http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS/$FILE/Final+-+General+EHS+Guidelines.pdf)

(5) International Finance Corporation; *Environmental, Health, and Safety Guidelines for Toll Roads*; April 2007
[http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_TollRoads/\\$FILE/Final+-+Toll+Roads.pdf](http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_TollRoads/$FILE/Final+-+Toll+Roads.pdf)

(6) *The "Equator Principles": A financial industry benchmark for determining, assessing and managing social & environmental risk in project financing*; July 2006; www.equator-principles.com

(7) OECD, Trade And Agriculture Directorate, Trade Committee 2007; Revised Council Recommendation on Common Approaches on the Environment and Officially Supported Export Credits; TAD/ECG(2007)9

legislation regarding expropriation of land and property and international conventions which have been ratified by Turkey.

ESIA PROCESS AND APPROACH TO THE ASSESSMENT

The assessment for the Eurasia Tunnel Project has been undertaken in accordance with the guidelines and procedures noted above. It has followed a systematic process of predicting and evaluating the impacts the Project is expected to have on the physical, natural, cultural, social and socio-economic environment, and identifying measures that the developer is able to take to avoid, reduce, remedy, offset or compensate for adverse impacts, and to provide benefits.

The overall approach followed is shown schematically in Figure 2-1. Details on each of the individual stages within the ESIA process can be found in Chapter 1 of the main ESIA Report.

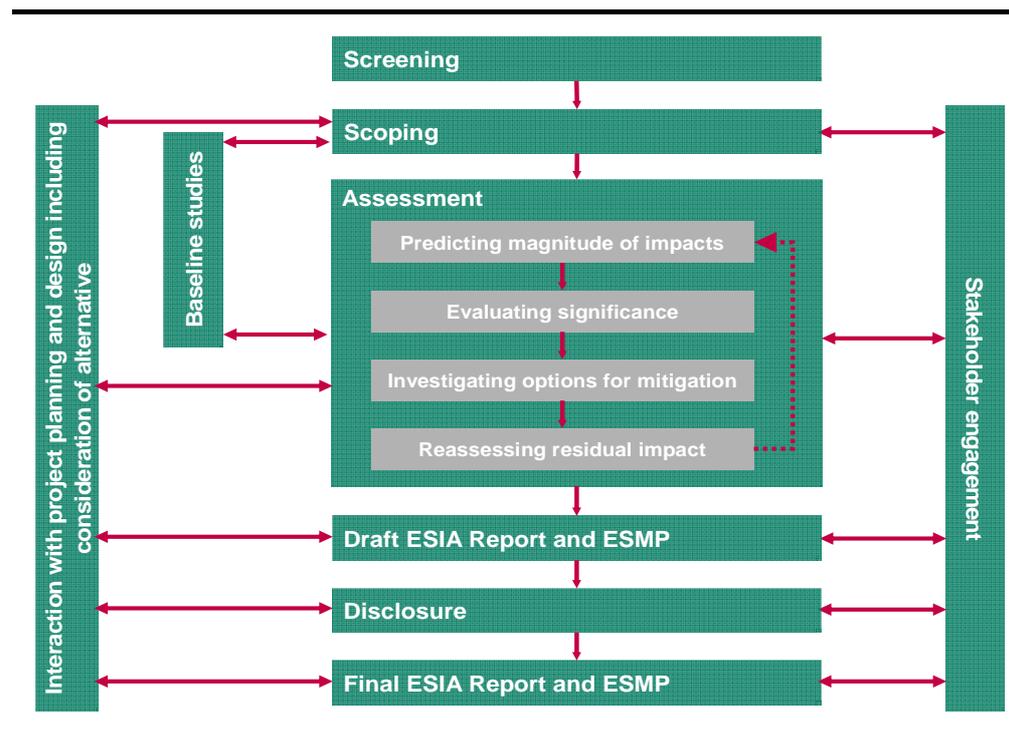


Figure 2-1 ESIA Approach

The Report for which this is the Non Technical Summary is a Final Report of the ESIA Report and includes the Project ESMP.

It is important to note the timeframe within which the ESIA studies were undertaken. The Contract process and the programme for application to Financial Lenders led to production of a first working draft between September 2009 and April 2010.

Some minor amendments have been made since then to address the comments on the 34th World Heritage Council on the status of the Istanbul World Heritage Site (see Chapter 11 in the main ESIA Report). Approval for the Project has also been given by the Preservation Councils, the bodies responsible for protection of the cultural heritage in Turkey, and a programme of public consultations on the Project and the Final Draft ESIA findings has been undertaken to provide potentially affected parties, the public and non-governmental and community-based organisations with an opportunity to comment (see Section 8 for further details).

This Final ESIA has been prepared taking into account the results of consultation and review by lenders and their advisors . Lenders have identified conditions relating to implementation of the Project Environmental and Social Management Plan (see Annex C in the main ESIA Report) and have prepared an action plan with which ATAS must comply to satisfy the terms of the loan agreement.

This Final ESIA and ESMP will continue to be publically available for review throughout the lifetime of the Project and regular reports on progress with implementation will be published.

3 *PROJECT OVERVIEW*

3.1 *NEED FOR THE PROJECT*

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 and businesses in Istanbul. There are more than 1.3 million vehicles circulating in the city on a daily basis. Car-based transport (including taxis and other service vehicles) accounts for over 53% of all journeys in the city and uses over 90% of the road space. 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 Istanbul Transportation Master Plan (ITMP)⁽¹⁾ forecasts continued population growth based on the 2007 land use plan for Istanbul, of over 3% per year, with the population increasing from 11 million in 2005 to more than 20 million in 2023. The number of vehicles is predicted to increase threefold to 4.19 million as passenger car ownership extends to 67% of households. These factors are all predicted to result in a further growth in traffic across the city with the number of Bosphorus crossing trips estimated to increase 1.5 times. The ITMP assumes the Eurasia Tunnel is in place as part of its base case for the future but even with this and the new Marmaray Metro tunnel which is currently under construction, daily demand is predicted to be 120% of available crossing capacity in 2023 and the Master Plan identifies the need for yet another road and rail bridge.

The Eurasia Tunnel is designed to contribute towards alleviating current pressure, providing a third road crossing of the Bosphorus. 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. This should provide substantial economic benefits in improved accessibility, reduced journey times and improved reliability, and lead to an overall reduction in fuel consumption, greenhouse gas and other emissions, and noise.

⁽¹⁾ Japan International Cooperation Agency/IMM; The Study on Integrated Urban Transportation Master Plan for Istanbul Metropolitan Area in the Republic of Turkey; 2008

3.2 PROJECT LOCATION

The Project comprises the upgrading of two existing roads, on the European and Asian sides of Istanbul and construction of a double-deck tunnel under the southern end of the Bosphorus. The length of the Project is approximately 14.6 km and it falls into three main sections shown in Figure 3-1.

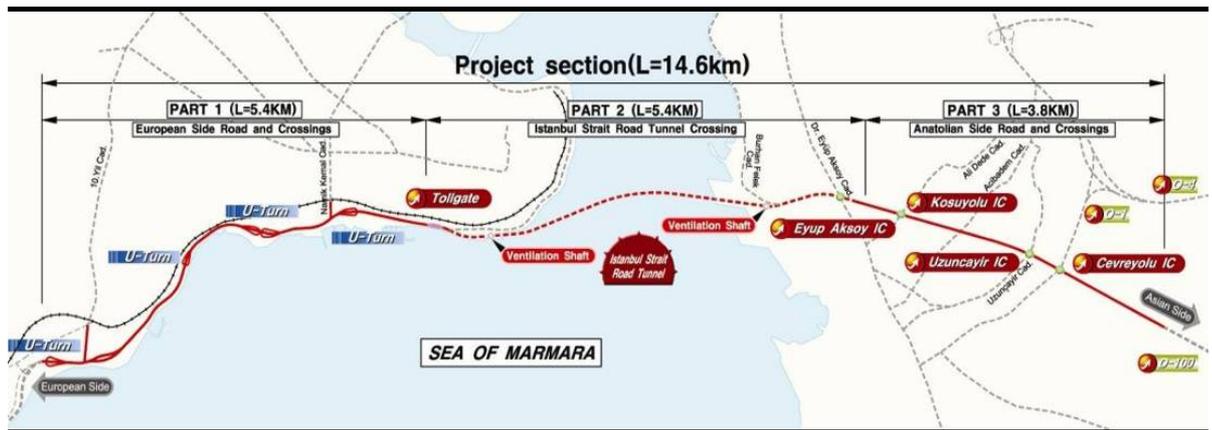


Figure 3-1 Project overview of the three sections

- **Part 1**, on the European side: widening of Kennedy Caddesi from Kazlıçesme to the Bosphorus, from 3x2 lanes to 2x4 lanes, over a length of approximately 5.4 km, including 5 U-turn underpasses and seven pedestrian footbridges.
- **Part 2**, under the Bosphorus: construction of a double-deck tunnel with two lanes at each level over a length of 5.4 km, together with a toll plaza and operations building at the western entrance, and ventilation shafts and electrical buildings at both ends.
- **Part 3**, on the Asian side: widening the existing D100 road leading to the Ankara-Istanbul State Highway at Göztepe, from 2x3 and 2x4 lanes to 2x4 and 2x5 lanes, over a length of approximately 3.8 km, including two interchanges, one underpass, one overpass and three pedestrian footbridges.

The vertical alignment of the tunnel section is shown in Figure 3-2. It can be seen that there are a variety of tunnel construction methods to be used, such as shield tunnel boring machine (TBM), cut and cover and New Austrian Tunnelling Method (NATM) tunnelling.

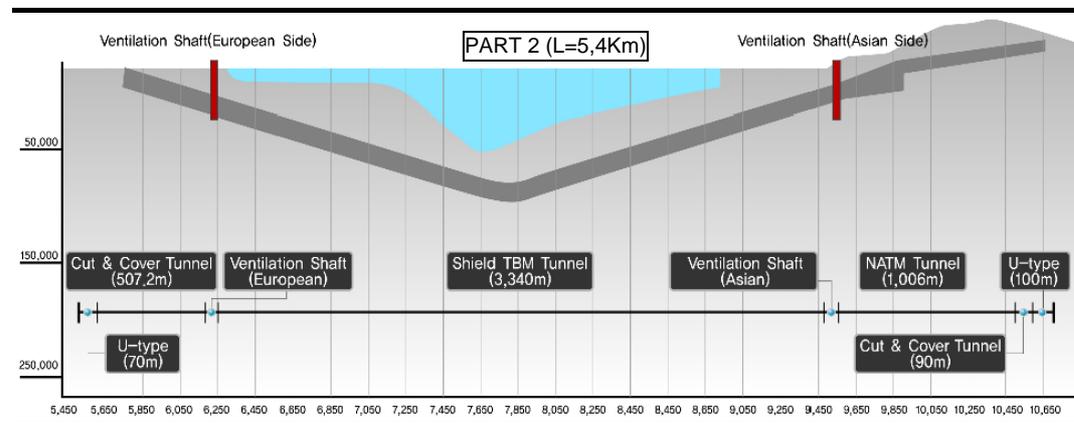


Figure 3-2 Tunnel Vertical Alignment

Traffic through the tunnel will be restricted to cars and minibuses. The speed limit for the whole route will be 80 km/h except in the U-turn underpasses where it will reduce to 40 km/h. There will be no traffic lights or at grade crossings and traffic flow will be continuous.

The toll rate will be 4 USD plus VAT for cars and 6 USD plus VAT for minibuses in each direction. In accordance with the BOT contract the toll level will rise in line with the US Urban Areas Consumer Price Index.

At the present stage of planning it is estimated that the further design and construction of the Project will take approximately 55 months. The period during which ATAS will operate the tunnel then extends for a further 25 years, 11 months and 9 days after which the tunnel will be handed over to DLH. The approach roads will be handed over to the municipality for operation once their construction is complete. The total BOT Contract period is 30 years 6 months and 9 days. The Tunnel is expected to open in 2015.

Traffic flow through the tunnel is estimated to grow from an average daily flow of 80,000 vehicles in the year of opening (2015) to 130,000 in 2023 or soon after, when the tunnel reaches its maximum capacity ⁽¹⁾. This equates to a total annual flow of 47 million crossings in 2023. The traffic will comprise 96% cars and 4% minibuses.

⁽¹⁾ Jacobs Consultancy; Istanbul Strait Road Tunnel Crossing: Traffic and Revenue Analysis Final Report; January 2010

3.3 *PROJECT DEVELOPMENT & ALTERNATIVES CONSIDERED*

A pre-feasibility study for a new road crossing of the Bosphorus was commissioned in 2003, building upon the findings of a Transportation Master Planning Study undertaken by the University of Istanbul for the Municipality in 1997. This concluded that there would be significant environmental, planning and design difficulties with a further bridge crossing and recommended the development of a road tunnel.

A feasibility study⁽¹⁾ was carried out by Nippon Koei Co. Ltd in 2005 which examined route options for a new tunnel crossing. The section of the feasibility study report dealing with the appraisal of alternatives is presented in Annex E in the main ESIA Report. The Project alignment was selected as the preferred route for three key reasons:

- its location in relation to the two existing bridges provides for an even distribution of Bosphorus crossings;
- its short tunnel length results in the lowest capital cost; and
- sufficient space for establishment of the construction sites and operating facilities (toll plaza, operation building) is available.

Environmental and social factors were only briefly considered in the feasibility study and a further review was therefore undertaken as part of the ESIA investigations. The results are also presented in Annex E of the main ESIA Report. This high level appraisal based on the broad corridor alternatives identified in the Feasibility Study supports the selection of the proposed route as the preferred option based on a balance of environmental, social cost and risk factors.

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

SCOPING

Scoping is a key part of the ESIA process (see Figure 2-1). It involves identifying the likely significant impacts of the Project which need to be investigated (the scope) and defining the approach that will be taken to their assessment.

An initial phase of work to develop the scope for the Eurasia Tunnel Project ESIA was undertaken immediately following appointment of the ESIA Team in September 2009. Given the timeframe, the initial scoping was based mainly on the professional experience of the ESIA Team informed by discussions with the wider project team, review of the outline design of the project, and an overview of the environment of the area expected to be influenced by its construction and operation. The first stage involved identifying the components of the Project and the activities involved in its construction and operation and considering how these could be expected to interact with known environmental and social conditions in the vicinity of the Project. This process was guided by reference to relevant international standards, including the IFC Performance Standards, EBRD Performance Requirements (see Section 1.3) and the EU Guidance on EIA Scoping ⁽¹⁾.

A draft Scoping Report was prepared at the end of October 2009 which (amongst other matters) provided an initial qualitative assessment of the potential impacts of the Project and the scope for mitigation. It also identified where impacts were considered likely to be significant, and outlined the investigations that were planned to complete the assessment of these impacts.

The draft Scoping Report was provided to potential Lenders and comments were received on the identification of likely significant impacts and the proposed approach and methods for the assessment.

A short Project Information Document (PID) was also sent to a range of national, provincial and local government authorities with responsibilities relating to environmental and social issues, with a request for comment. A copy of the PID (in Turkish and English) is presented and the recipients are identified and their responses are summarised in Annex G of the main ESIA Report. Neighbourhood leaders along the route were also consulted to check that the ESIA covers any particular issues affecting their areas.

⁽¹⁾ European Commission Guidance on EIA Scoping; June 2001 <http://ec.europa.eu/environment/eia/eia-guidelines/g-scoping-full-text.pdf>

The key impacts which were identified and are addressed in the ESIA are:

- impacts on the historic sites and features of the old city;
- risks of discovery of buried archaeology;
- impacts from increased traffic on noise and air quality;
- disturbance during construction;
- construction pollution;
- construction transport;
- involuntary resettlement;
- management of the construction workforce and worker health and safety; and
- management of accidents and emergencies.

STAKEHOLDER ENGAGEMENT

Good practice in ESIA requires active consultation with relevant regulatory bodies, experts, affected communities and other interested and affected parties. The aim is to inform them about the developing plans and give them an opportunity to express their views on the Project and its impacts, so that these can be taken into account in developing the Project proposals and in assessing and mitigating impacts. Consultation is also invaluable in identifying useful information on the baseline situation and on vulnerable resources and receptors in the study area.

This approach has been followed during this assessment. The following activities have been undertaken prior to, during the ESIA studies and following publication of the draft report.

- DLH has been in regular contact with the Ministry of Culture and Tourism and supporting agencies responsible for cultural heritage interests, in particular, the Istanbul Old City UNESCO World Heritage Site, since the summer of 2008. The Project was presented to them and to the municipality and local district councils at a meeting in March 2009. A range of comments were made, in particular relating to protection of historic interests within the old city, and these have been taken into account in development of the Project and the ESIA study, including recommendations on the scope and approach to the assessment. Information has also been provided to the UNESCO Turkish National Commission for the World Heritage Site although they indicated they would not comment directly but via the Ministry of Culture and Tourism.
- A short Scoping Report was produced by the ESIA Team in October 2009 and was provided to DLH and potential multilateral lenders for comment.
- A Project Information Document was also produced and sent with a covering letter requesting views on the Project and its impacts, to national, provincial and local government authorities. The covering letter also asked for any information which the recipients considered might be relevant to the assessment as a back-up to the baseline data collection exercise already undertaken by the ESIA Team. This was sent in the second week of November 2009. Responses were requested by mid December 2009 but in practice all responses received up to March 2010 were considered. A register of responses received to date is presented in Annex G of the main

ESIA Report and these have been taken into account in conducting the assessment.

- ATAS completed direct consultations with Muhtars (politically non-aligned administrative officers elected by residents) in 25 neighbourhoods along the Project route in December 2010 and January 2011. The main objective was to check that the ESIA had covered the main issues expected to be of concern in their neighborhoods. This was confirmed. The discussions also aimed to ensure that they were aware of the Project in advance of the formal ESIA disclosure (see Section 8) and to establish whether there were any vulnerable groups in the local community requiring special consideration. The Muhtars were generally supportive of the Project seeing benefits for their locality and for Istanbul due to shorter journeys across the Bosphorus. They noted a small population of homeless people in one neighbourhoods on the European Side and gave suggestions on how to communicate with them.
- A wide programme of public consultation on the Project and the ESIA findings was undertaken in March and April 2011. The results were considered by ATAŞ and Lenders and where significant concerns are raised, consideration has been given to amending the Project and the proposed environmental and social mitigation to address these concerns.

A report on consultations has been produced and is available on the Project website. This Final ESIA Report and ESMP have been completed based on the results of the consultations .

6 *SUMMARY OF IMPACTS*

6.1 *LAND USE AND PROPERTY*

6.1.1 *Permanent Impacts*

The implementation of the Project will cause permanent changes in land use and loss of property and other assets caused by occupation of land for the new road, temporary changes in land uses caused by short term occupation of land for construction, and changes in accessibility to existing land uses resulting from the temporary or permanent presence of the Project.

The Project will permanently occupy a total area of approximately 67 ha of which 51 ha is within the existing road corridor. The additional land required by the Project is approximately 16 ha of which approximately 60% is public open space, parks and sports facilities, 23% commercial and industrial areas and markets, 15% harbour and parking, and the remainder includes small parts of several residential and mosque gardens and a cemetery.

The most significant permanent impact on land use and on the people using land will be the loss of public open space, primarily along the European shore. The shoreline is mainly parkland and is intensively used for both formal and informal recreation including shoreline fishing, walking, exercising and cycling. It provides a valuable resource for the city. In total it is estimated that the coastal park will lose about 20% of its area. In the absence of mitigation, the loss of recreational space, sports facilities, children playgrounds and other amenities is considered to be a negative impact of major significance given the importance of the open space and recreational facilities in the densely developed city. Planned mitigation for this impact is described below

Although some land will be taken from the Yenikapi Ferry Terminal, the Balikhan Mosque, and car parks and bus facilities along the Kennedy Caddesi, no significant impacts are expected since the Ferry Terminal and the mosque will still be operational and the car parks and bus facilities will be replaced.

The current boundaries of the land take for the Project include all or at least part of 18 land parcels containing buildings. Three buildings or groups of buildings (a bus shelter, a disused restaurant and a disused petrol station) are located within the Project boundary and will be demolished as a consequence of the Project. The loss of these buildings is not considered to constitute a significant impact for land use or users.

In addition, the route crosses the sites of the Central Wholesale Fish Market and the neighbouring Kumkapi Fish Market, an area of retail fish stalls, small cafés and restaurants located in the coastal park. The Municipality will be relocating the Central Fish Market to a new site in western Istanbul in the near future and it will not therefore be affected in the longer term by operation of the Project. Access to the wholesale market may be affected in the short term, and if so this will be rearranged to enable continued operation during construction of the Project.

The Kumkapi Fish Market will be subject to more impact, with loss of parts of three stalls and small cafes and part of a larger restaurant. The viability of the remaining premises may be affected during construction and/or the long term by restrictions in access and reduction in the attractiveness of the facilities for customers. This impact could be significant as the Kumkapi Fish Market is an attractive and well-used facility within the coastal park. Demolition of parts of the premises would be a minor impact, but if operation of the whole facility is adversely affected by construction, or in the long term because of the proximity of the new road, this would be a major impact. It is not possible to say conclusively whether this will be the case as it will depend on the response of operators and customers, but if it is, mitigation of the impact will be required and planned measures are described below.

The Project may also indirectly result in the acquisition of a number of additional buildings outside the Project footprint as a result of land being taken from their plots. If this is sufficient to make a property no longer viable or attractive for its current owner, the owner may elect to have the whole property acquired for the Project. Potentially affected properties include four residential buildings and three commercial and industrial buildings, mainly affected by slip roads near Göztepe interchange. It is very likely that this landtake can be avoided by minor changes to the design, but if it cannot be avoided and if acquisition by agreement or expropriation is required, this would constitute a negative impact of moderate significance as it will result in the potential displacement of about 64 residents and several small businesses. The majority if not all are understood to be tenants in the properties. This impact is identified as a potential 'worst case' outcome but as noted above it is likely that it can be avoided. If not, it may also be possible for the tenants to remain in the buildings after the change of ownership this reducing the impact.

The Aziz Bayraktar Mosque is also located alongside the slip road at Göztepe and could be affected in the same way. Its loss would constitute a major impact but it should also be possible to avoid this by minor changes to the design.

A café in the Medipol Hospital car park may need to be moved but it should be able to be relocated within the car park. A road-side café close to the proposed location of the Asian ventilation shaft may also be impacted by construction activities. The impacts on these two cafés are considered to be negligible as both can easily be re-established on alternative public land to provide continued operation if needed.

Where possible impacts are identified, ATAŞ will first seek to minimise the area of land take, expropriation and demolition required for the Project during the next stage of more detailed design. As the design is developed it is expected that opportunities will arise to 'fine-tune' the road alignment to reduce the need to acquire land outside the existing road corridor, to reduce the need to take land which would involve demolition or expropriation of buildings, and to keep the need to acquire land to the minimum absolutely necessary for the Project.

Where land or other assets must be acquired ATAŞ will work with DLH and other involved parties including the Treasury and the Municipality, to establish a process that achieves full compliance with international standards. The details will be set out in a Resettlement Action Plan which will be developed and approved by lenders prior to commencement of expropriation.

To assist in this a Resettlement Policy Framework has been developed which identifies how expropriation should be pursued. This is presented in Annex D of the main ESIA. The Resettlement Policy Framework provides for:

- expropriation to be avoided where possible through development of the design;
- establishment of a cut-off date for eligibility for compensation which will be the date of signature of the BOT contract;
- early and ongoing consultation with potentially affected parties and opportunity for participation in planning and implementation;
- seeking voluntary agreement in preference to involuntary expropriation;
- providing financial compensation or compensation in kind to remedy the losses of both owner-occupiers and tenants;
- providing for compensation of informal and illegal occupiers of land and users of assets;

- extending the rights to compensation of non-owners to cover those who occupied or used land up to the date of signature of the BOT contract;
- providing other support to displaced persons to assist them in restoring their livelihoods and standards of living to pre-displacement levels or levels prevailing prior to the beginning of the Project in real terms, and improving them where possible;
- establishing a fair and impartial grievance process accessible to all and ensuring that all parties are aware of this process and of their rights to recourse to the Courts if the grievance process does not resolve the problem;
- monitoring and evaluating the process to ensure it is satisfactorily completed.

Specific measures that are proposed for the properties identified as potentially experiencing significant impact from land acquisition are noted below:

- if relocation of residential or business tenants as a consequence of the Project cannot be avoided by refinement of the design, ATAŞ will supplement the government-led process of expropriation, if necessary, with advice and support to restore the livelihoods of tenants who have difficulty in relocating which will be identified and described in the Resettlement Action Plan;
- ATAŞ will work with the relevant authorities to ensure appropriate relocation is achieved for the mosque if its relocation cannot be avoided;
- at Kumkapi Fish Market, ATAŞ, will work with DLH and the Municipality, to identify a suitable remedy for losses incurred by any operators within the market, either during construction or in the long term, which will be described in the Resettlement Action Plan.

In the coastal park, ATAŞ will seek to compensate for the loss of parkland and amenities by:

- replacing playground equipment and other park facilities (seating etc) which is broken or in poor condition;
- increasing the number and range of facilities available;

- relocating all memorials to be removed as a result of the project in prominent and public locations as close to their original location in the park and providing new information signs (where necessary);
- providing new information signs in the coastal park to inform the local community and visitors of the historical context and archaeological significance of the area. The form and detail of this will be developed in consultation with the Municipality and UNESCO;
- replacing all trees and other planting in to be removed with equivalent replacement areas and planting additional trees and landscaping to provide net gain in biodiversity.

Adoption of good site management within the construction area (keeping the sites clean and tidy, controlling noise and dust, etc) will minimise adverse impact on the amenity of the remaining areas and facilities in the park during construction, including Kumkapi Fish Market if this remains open. If closure of the fish market proves necessary during construction because of reduced access and amenity, ATAS will work with DLH and the Municipality to identify an alternative temporary site.

6.1.2 *Impacts on Access*

In addition to the direct and indirect land use and property impacts summarised above, the Project will also result in changes to the accessibility of land uses adjacent to the project.

The greatest impact will be on access to the public open space and associated recreational, sports and play facilities to the south of Kennedy Caddesi. In particular the Marble Tower will be located on an 'island' between the two carriageways instead of being accessible from the shoreline. The option of including a pedestrian underpass under the southern carriageway is being examined to maintain access to the Marble Tower.

Currently, the shoreline and coastal park south of the route is accessed by three pedestrian footbridges and five signal-controlled at-grade pedestrian crossings. These will be replaced by eight footbridges. On the Asian side there is limited demand for crossing the existing road. There are five existing footbridges and these will all be replaced with upgraded structures. Overall the replacement of older footbridges and at-grade crossings with modern footbridges is considered likely to result in a small perceived loss of accessibility along the route because of the need to use steps and slightly increased walking times. However the removal of at-grade crossings will yield

benefits in terms of improved safety. All footbridges will be replaced before the old structures are removed.

With these measures there is expected to be no adverse impact on the accessibility of the public open space, recreation and other facilities along the shore.

6.1.3 *Temporary Impacts during Construction*

In addition to the permanent occupation and acquisition of land required for the Project, additional land alongside the Project corridor will be used temporarily during construction. There is little scope to mitigate the impact of temporary land take on the European side during construction, but ATAŞ will seek to minimise the period during which any area is made inaccessible and to facilitate access to remaining useable areas.

Access will be maintained to all existing land uses, buildings and facilities along the route during construction. 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 and detours will be clearly signposted. This information will also be freely available on the Project website.

Adoption of good site management within the construction area will minimise adverse impact on the amenity of the remaining areas. Where footbridges providing access to the park are to be removed, replacement structures will be built before the old bridges are demolished. ATAŞ will also seek to re-open any parts of the coastal park as soon as it is safe to do so and will maintain access to the shoreline and fishing ports at all times.

On the Asian side the nature of adjacent land uses means that temporary landtake will have less impact but there will be loss of open green space at the Asian tunnelling compound just east of the port. This is located in a built up area occupied by port, military and educational buildings and its temporary loss is not considered to be significant.

6.2 *RESOURCES AND WASTE*

6.2.1 *Construction*

Materials used during construction mainly comprise ready-mixed concrete, prefabricated concrete tunnel segments, steel, aggregates, asphalt, and specialist materials (grouting, sealants, etc). Given the size of the construction sector in Istanbul it is not expected that any specific facilities for local supply

of materials will need to be developed outside the construction site and all will be supplied from the existing marketplace. Materials will be sourced from licensed quarries and no borrow areas or quarries will be operated by ATAS. There should therefore be no impacts from the extraction of raw materials from new quarries that will be attributable directly to the Project.

Various types of vehicles and machinery typically used during road construction will be needed. These will all be sourced locally from existing suppliers. During the detailed design and procurement stage, the EPC contractor will be responsible for identifying sources for all materials and equipment and will be required to consider environmental impacts in selecting materials to be used on the Project. This will include using less harmful materials where possible, considering the carbon footprint of alternative materials and considering the impacts of extraction, processing and transport.

Tunnelling and, to a lesser extent, widening of the approach roads will generate significant volumes of waste from earthmoving, site clearance, demolition and construction of new structures.

A proportion of the spoil will be re-used within the Project and ATAŞ will look for opportunities to make use of additional material on other construction projects taking place in the region at the same time. Surplus spoil will be exported from the site by road to a disposal site at Şile located approximately 50 km to the north-east of the tunnel entrance on the Asian side. This is a site operated by the Municipality and licensed for disposal of construction spoil. It has ample capacity for the quality of spoil forecast from the Project.

6.2.2 *Operations*

Quantities of materials used and waste generated during operation of the project are expected to be small. Occasional hazardous wastes may arise from maintenance operations, clearance of drainage sumps and clean up of accidental spills. All waste (hazardous and non-hazardous) will be managed in accordance with legal requirements. No significant impact is predicted to arise from resource use or waste disposal during operation.

6.3 *GEOLOGY, SOILS AND CONTAMINATED LAND*

6.3.1 *Seismic Risk*

Istanbul lies on an active seismic zone extending through Java, Myanmar, Himalaya, Iran, Turkey and Greece, where many large earthquakes have

occurred in the past. A significant earthquake event with a moment magnitude of 6.9 to 7.7 is expected for Istanbul in the future (next 30 years).

In addition to the direct damages caused by the shaking, earthquakes also may also give rise to liquefaction of soils and tsunami waves. Liquefaction is a phenomenon in which the strength and stiffness of a soil is reduced by earthquake shaking or other rapid loading which may cause “flowing” of the subsurface. Areas with high liquefaction potential during earthquakes have been identified close to the Project, such as the coastal areas close to the borders between Zeytinburnu and Fatih and Fatih and Eminönü.

Tsunamis waves caused by earthquakes under the Sea of Marmara are expected to be about 4.7 to 5.5 metres along the shores of Istanbul. In the immediate Project area, tsunami waves are estimated to be 1-2 m high.

The Project has been designed, constructed and operated in accordance with good international standards for protection against seismic activity and flooding (including the impacts of sea level rise and storm surges) and as a result, risks should be as low as technically and financially feasible.

6.3.2 *Geological Resources*

Excavation works have the potential to affect geological sites and other features of importance to science and to cause land instability. 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.

6.3.3 *Soils*

The contractors will be required to adopt good construction site practice for protection of soils and to follow IFC EHS Guidelines on Construction Materials Extraction and the IFC EHS Guidelines for Toll Roads. Specific measures for protection of soils, prevention of erosion and appropriate storage and handling of hazardous materials are described in the ESMP.

6.3.4 *Ground Contamination*

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 soil and ground contamination. Areas on the European shoreline which were reclaimed from the sea for road construction between the 1940s and 1960s may also contain contaminated material. If contaminated soils are disturbed they can present

risks to workers, neighbouring land uses and people and the aquatic environment. Procedures will be set up for identifying and dealing with contaminated materials when encountered during construction, including treatment and disposal of contaminated soils. Contaminated material will be contained or remediated on-site or disposed of in an appropriately licensed disposal site.

Operation of a closed drainage system and establishment of emergency response plans to be implemented in the event of spills, fire etc should prevent significant risks of contamination of soils during operation.

Provided that all these mitigation measures are in place no significant impacts related to geology, soils and contaminated land are expected.

6.4

THE WATER ENVIRONMENT

Large construction sites, if not properly managed and operated, can lead to significant impact on surface or groundwater. On the European side, the approach road construction works will be located close to the sea at a distance of 30 m at the closest point. There are no inland surface watercourses in the vicinity of the works on the European side. On the Asian approach road construction will involve the crossing of the Kurbagali Creek at the eastern end of the scheme. Almost all subsurface works associated with major structures on the European side and the tunnel will be carried out beneath the groundwater table.

The main potential source of impact from construction activities will be the discharge of effluent from a temporary treatment plant installed adjacent to the Asian ventilation shaft near Haydarpasa Port. This plant will treat spoil slurry from the tunnel boring machine (TBM). Other sources will include effluents from dewatering of deep excavations, discharges of site run-off potentially contaminated with silt and hazardous materials, discharges at stream crossings, sewage disposal, wheel washing, accidental releases from work sites, and release of specialist chemicals used in tunnelling and grouting. The risk of significant impacts will be reduced through adoption of a range of controls set out in the ESMP.

The scale and nature of the proposed scheme mean that the change in area of impervious surfaces is relatively small and will not significantly increase runoff from the existing road sections during operations. No significant impact on watercourses will occur from structures such as bridges and culverts at road crossing points. All tunnel and underpass sections will be constructed in a watertight manner so that groundwater will not infiltrate into them. As a result groundwater will divert around structures causing localised

changes in groundwater levels and flow. As there are no uses of groundwater in the area, there will be no adverse impacts. Discharge of groundwater into the adjacent coastal waters may alter slightly but this is not predicted to have any adverse effect on the marine environment.

6.5 *AIR QUALITY AND CLIMATIC FACTORS*

6.5.1 *Impacts during operation*

Airborne emissions are generated by combustion of fuel in vehicle engines. The main source of emissions during operation will be from fuel combustion in vehicles approaching and passing through the tunnel. Emissions from vehicles in the tunnel will be collected by the ventilation system and emitted as point sources via the ventilation shafts at each end⁽¹⁾. There will also be an increase in traffic and resulting emissions along the approach roads (Kennedy Caddesi and the D100) and possible further changes on the wider road network around the city as vehicles connect to the tunnel approaches.

Existing air quality monitoring data show some elevated pollutant levels and exceedances of relevant air quality standards. The measured hourly maximum values for nitrogen dioxide (NO₂) and the maximum daily average values for particulate matter (PM₁₀) exceed the 2014 Turkish and IFC and EU standards. Air quality monitoring undertaken for the ESIA also reveals high levels for NO₂ at all sampling locations. This is identified as a regional rather than a local characteristic of current ambient air quality in Istanbul.

In order to predict the impact of the Project on ambient air quality, dispersion modelling was carried out for the Project with the tunnel operating at its maximum flow of 130,000 vehicles per day. Between the opening year of the tunnel, in 2015 and 2023, traffic through the tunnel is forecast to grow from 80,000 to 130,000 vehicles/day. The impact of the Project is assessed by comparison with forecast traffic levels in 2023 without the Project, which are expected to grow significantly irrespective of the Project.

Modelling was undertaken for the main traffic air pollutants: nitrogen dioxide (NO₂) and particulate matter (PM₁₀). NO₂ concentrations from traffic are predicted to exceed relevant standards at short distances from the road as a result of the Project. With a typical 4 lane design thresholds for significant long term impact based on annual average concentrations could be exceeded at up to about 30 m from the roadside in Europe and 60 metres in Asia (actual distances vary along the route depending on local topography and buildings).

⁽¹⁾ There will also be a small amount of emissions released at the tunnel entrances but this will be much smaller and has not been separately assessed.

Short term impacts could occur at slightly greater distances (40-70 metres) when unfavourable meteorological conditions combine with peak traffic flows. Affected areas vary in their land use but some residential areas and a small number of sensitive land uses (hospitals) are located within areas subject to potentially significant increase in air pollution. In each case a narrow strip of residential land varying in width from zero to at most about 75 metres from the roadside will be affected:

- alongside Kennedy Caddesi in Samatya (km 1+700 - 2+600) and the grounds of Samatya Hospital;
- north of Yenikapi ferry terminal and the eastern end of the coastal park (km 3+950 - 4+180);
- next to the D100 near Medopol Hospital; and
- alongside the D100 up to Uzuncayir interchange.

When the area affected and the number of people is taken into account the impact on short term concentrations is judged to be of moderate significance but that on long term levels only minor. It should be noted that standards are likely to continue to be exceeded whether or not the tunnel is built, but the contribution Project-related traffic on the tunnel approaches makes to this exceedance is considered to constitute a significant impact.

In order to mitigate this, ATAŞ will monitor air quality to determine whether ambient air quality standards are being exceeded. If continuous monitoring indicates that concentrations are approaching the limit values, variable message signs will be used to slow traffic to reduce emissions. ATAŞ will also support the reduction of emissions from road traffic by:

- supporting public campaigns on regular vehicle inspections;
- raising awareness regarding the relationship between driving behaviour and emissions through public information (signs leaflets *etc*);
- installing speed control displays to limit speed (notifying drivers that they are exceeding the speed limit);
- using the Project's variable message signs to allow vehicle speeds to be controlled to minimise congestion.

The impact generated by the emissions from the ventilation shafts is limited. The contribution of tunnel emissions to the ambient concentrations is unlikely to cause relevant standards to be exceeded beyond 25 m from the centre of

each shaft. Within this area, people are not expected to be continuously present and adverse impacts on health are not therefore predicted. If, however, monitoring indicates that standards are being exceeded, ATAS will look to increasing the ventilation rate from the shafts to improve dispersion and to planting around the shafts to prevent public access to affected areas.

Analysis of the impact of the Project on the wider road network around the approach roads indicates that there will be a mix of increases and decreases in traffic on other local roads but that on balance there will be an overall reduction in exposure of people to traffic air pollution with more roads experiencing reductions in emissions that experience increases.

At a city-wide level, the Project will provide a new, shorter route across the Bosphorus and this will reduce the overall number of vehicle kilometres travelled by traffic in Istanbul and result in a small reduction in the total emissions of traffic generated air pollutants in the City of Istanbul (between 0.3 and 1% depending on the pollutant). This will provide a small but net benefit in reducing the risk of adverse impacts on health and damage to historic buildings from traffic air pollution across the city.

The Project will also provide a benefit in reducing greenhouse gas emissions from traffic in Istanbul by approximately 250 tonnes of carbon dioxide per day or nearly 92,000 tonnes per year. This comprises approximately 0.03% of Turkey's annual carbon dioxide emissions ⁽¹⁾. Although a very small quantity it will contribute towards reducing the risk of climate change.

6.5.2 *Impacts during Construction*

The principal air quality concern during construction will be dust. Impacts arising from dust generation and deposition will be minimized and managed through the use of good construction practices and procedures set out in the ESMP. Dust levels around construction sites will be monitored using dust deposit gauges. Where dust levels exceed 0.35 grams per square metre per month at sensitive areas near the construction sites, ATAS will take additional measures for dust control.

Construction heavy good vehicle traffic and construction equipment will contribute less than 1% to the traffic flow on the European side on average. As a result emissions may temporarily and locally be increased by 5%. The

⁽¹⁾ See annual emissions for 2006 from UN Millennium Development Goals Indicators at <http://mdgs.un.org/unsd/mdg/SeriesDetail.aspx?srid=749&crd^>

impact on ambient air quality will be small. For the Asian side, the projected traffic will have no significant effect on traffic related air quality on the D100 which currently carries 5,000 to 6,000 vehicles per hour.

6.6 NOISE AND VIBRATION

6.6.1 *Impacts during operation*

During operation of the tunnel, traffic flows will increase on the approach roads causing increased sound emissions and additional noise in the neighbourhood. In order to obtain local data for the environmental noise background, a baseline monitoring survey was undertaken at nine locations along the route and in its vicinity in November 2009.

Along Kennedy Caddesi daytime noise levels varied between 64 and 75 dB(A) with the highest value at the Kumkapi Fish Market next to the existing road and the lowest at the proposed location of the ventilation shaft which is more distant from the existing road. Night time levels differed by about 3 dB(A) from the daytime levels, indicating only a limited drop in traffic flow. Daytime measurements along the Asian part of the scheme revealed levels between 76 and 80 dB(A) at the roadside. Night time levels were about 6 to 10 dB(A) less than the daytime means, indicating a more noticeable drop in traffic flow.

Noise modelling was undertaken to determine the impact of the Project. Existing traffic noise exceeds the noise thresholds in IFC General EHS Guidelines for night time (55 dB(A) for noise-sensitive areas and 58 dB(A) for residential areas) close to existing roads and generally affects the first row of buildings facing the road. The propagation of sound into the built-up areas is limited by sound shielding effects from buildings in the first rows and levels at second rows of buildings meet the standard unless there are spaces in the first row buildings enabling the sound wave to propagate through.

The impact of the Project was predicted with the tunnel operating at its maximum flow of 130,000 vehicles per day, and compared with forecasts for traffic in 2003 without the Project. Environmental noise generated by traffic will exceed the Turkish noise limits applicable to sensitive areas close to the approach roads in 2023 both with and without the Project but the Project will cause levels to be more than 3 dB(A) higher than the situation without the Project at some locations. Significant noise impacts are therefore predicted to occur as a result of the Project. Approximately 80 - 100 residential buildings are estimated to be affected.

The Project will lead to a reduction in traffic on Kennedy Caddesi north and east of the tunnel portal and on the main connecting roads along the route on both the European and Asian approaches and these changes will lead to small benefits from reductions in noise along these routes. The installation of noise attenuation equipment in the ventilation shafts means that noise from this source contributes only to minor extent to the Project-related noise.

During the next stage of detailed design further studies will be carried out to confirm predicted noise levels, and mitigation measures will be developed as needed to address the significant noise impacts. These may include use of low-noise road surfacing consisting of a top layer of porous asphalt ('silent pavement') which can reduce the noise by 2 to 4 dB(A) depending on its composition. Where this is not sufficient to achieve the standards further measures will be considered.

Noise barriers are not considered to be feasible on the European approach road because of the parkland nature of the surrounding environment. They would introduce an intrusive feature into the park and into views of the old city from the shore and the sea. They are more feasible on the Asian approach and will be considered here. To achieve the necessary mitigation on the European side and possibly at some locations on the Asian side, consideration may therefore need to be given to insulation of buildings, in particular of hospitals and schools. ATAS will determine what is required at each receptor location to comply with the Turkish standards and meet the IFC 3 dB(A) threshold, and the necessary measures will be designed and implemented during construction of the Project.

ATAS will also perform noise monitoring during the year after opening of the Project to determine whether environmental noise standards are being exceeded. Monitoring locations will be selected at representative buildings along the scheme which are affected by noise. The success of noise mitigation measures and the need for further mitigation will be evaluated from the results of these measurements.

6.6.2 *Impacts during construction*

The Turkish limit for noise from road construction is 75 dB(A). Modelling of potential construction works and activities shows that noise levels at the closest properties will generally be below 75dB(A) and that the standard will not be exceeded more than 30 m from the site boundary. Even for the highest sound power level from cut and cover activities (120 dB(A) at the source) the limit value will not be exceeded at the nearest property. Although the assessment indicates that there are likely to be only minor impacts, a number

of good practice measures will nevertheless be adopted to control and manage noise from construction of the Project and these are set out in the ESMP.

Although the predictions indicate that noise standards will in general be met, the nature of construction activities means that significant noise impacts could occur for short periods at certain locations (hours, days or at most weeks). ATAŞ will ensure that local residents and managers of sensitive facilities are kept advised of planned noisy periods and will respond to any questions or complaints in accordance with the Grievance Procedure established for the project.

Additionally, a monitoring programme will be set up to measure noise levels at the closest sensitive receptors as construction work starts on each new section along the route. If levels at receptors exceed the standards, further measures will be taken to reduce construction noise emissions so that the limit values are met.

6.6.3 *Construction Traffic*

Compared with the current traffic flow of 3,000 to 4,000 light vehicles and about 150 to 300 heavy vehicles per hour on Kennedy Caddesi, the estimated number of construction HGV trips will cause traffic noise to increase by less than 1 dB(A) and there will be no significant noise impact. For the Asian side of the scheme fewer hourly trips will be required and with the higher flow of traffic on the D100 the impact will be less than for the European section.

6.6.4 *Vibration*

Vibration during operation of a road can be caused by heavy duty vehicles passing properties. Since heavy vehicles will not be allowed to use the tunnel, the Project will have no impact during operation.

Vibration annoyance and damage from construction work is most typically associated with percussive piling. Piling in the vicinity of sensitive premises will be carried out using vibration reduced techniques (bored piling or casings driven by torque and hydraulic pressure). Other sources of vibration could include operation of heavy equipment or vehicles. Associated vibration levels are low and will be short-lived but may be perceptible at receptors close to the construction activity.

Tunnelling can give rise to a form of impact similar to vibration known as ground borne noise. This is low frequency noise which can be perceived in buildings above a tunnel in a manner similar to vibration. The land sections of the tunnel are located mostly under parkland or port uses and there are no

sensitive buildings above the route. Some impacts from this source may occur at the Asian part where sensitive buildings are located at the end of the tunnel.

The EPC contractor will be required to monitor vibration in sensitive buildings above the tunnel (hospitals, teaching facilities, historic buildings) to ensure the Turkish requirements regarding vibration are met and if the standards are exceeded measures will be taken to reduce vibration. Relevant locations will be identified by the contractor and discussions held with the relevant parties to ensure construction is managed to avoid adverse effects on use of sensitive equipment.

6.7 *BIODIVERSITY AND NATURE CONSERVATION*

Land will be occupied permanently by the widened approach roads and temporarily during construction. All existing vegetation and habitats within the existing roadside verges, central reservations and intersections will be removed, along with part of the amenity grassland and parkland planting along the coastal park on the European side and at the site of the Asian ventilation shaft. Some areas of grassland and trees on the borders neighbouring properties may also be lost. None of the habitats affected are of nature conservation importance and their loss is not considered to be significant for biodiversity.

Clearance of vegetation for permanent and temporary land take will result in the felling of substantial numbers of trees of varying species, sizes and ages. Out of the total of almost 4,000 trees identified along the route, approximately 1,350 trees on the European side and 400 trees on the Asian side will need to be felled. All these are relatively recently planted, parkland and urban species and several are non-native. Their loss is considered to constitute a minor impact on biodiversity. Their loss will also remove perhaps as much as half of the nesting habitat for common birds in the coastal strip along the European side. This has the potential for moderate impacts on nesting capacity during the breeding season (typically March to August). In a broader regional context this loss is of minor significance as displaced birds are likely to be able to find replacement sites relatively easily.

The location of the tunnel beneath the seabed of the Bosphorus and the absence of any direct construction works in the marine or coastal environment means that there should be no impacts on the Bosphorus Strait Important Bird Area and Key Biodiversity Area.

The construction activities and the changes in traffic during operation are not expected to result in any significant impact on habitats or fauna of conservation importance, especially given the urban nature of the existing

environment and the presence of the existing road. The loss of existing amenity planting and trees will be mitigated, eg by removing vegetation and felling trees where birds may be nesting outside the nesting period (March to August) and by planting replacement trees after construction. With these measures the resulting impact on biodiversity and nature conservation interests is considered to be of minor significance.

6.8 *CULTURAL HERITAGE - ARCHAEOLOGY, BUILT HERITAGE AND LANDSCAPE*

6.8.1 *Implications for the Outstanding Universal Value of the World Heritage Site*

The European part of the Project runs alongside the UNESCO World Heritage Site (WHS) of the Historic Areas of Istanbul, an area of international importance covering the whole of the historic peninsula east of Kazlıçeşme within which are located many features of historic and cultural importance. The WHS is defined as being of *Outstanding Universal Value* (OUV) ⁽¹⁾, that is as being of cultural significance which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity. At present there is no adopted statement on the OUV of the Site but its inscription refers to four criteria:

(i) Represents a masterpiece of human creative genius;

(ii) Exhibits an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town planning or landscape design;

(iii) Bears a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared;

(iv) Is an outstanding example of a type of building or architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history.

In its 34th Meeting (June 2010) the World Heritage Committee referenced in particular the setting of the Süleymaniye Mosque and the overall skyline of the historic peninsula².

Traffic in the WHS

(1) Operational Guidelines for the Implementation of the World Heritage Convention (WHC. 08/01); UNESCO, January 2008.

² Report of the Decisions Adopted by the World Heritage Committee at its 34th Session (Brasilia, 2010) WHC-10/34.COM/20

There is considerable concern regarding the implications for the OUV of the historic peninsula as a result of changes in patterns of traffic movements in and around the World Heritage Site. Traffic modelling undertaken as part of the ESIA shows that the project will generally reduce levels of traffic within the historic peninsula. The Project leads to a reduction in traffic on the section of Kennedy Caddesi to the east of the tunnel portal around Sultan Ahmet (Core Area I of the World Heritage Site), including the Blue Mosque, Hagia Sophia and Topkapi Palace. Morning peak flows are reduced by 28% on the section up to the Galata Bridge and 17% beyond the bridge. There are also significant reductions (ca. 7-10%) on the Galata and Atatürk Bridges across the Golden Horn. There is a small, general reduction in traffic on most minor roads within the peninsula as a result of more traffic using the upgraded coastal road and bypassing the historic peninsula, including in Core Areas II and III of the UNESCO designation (Sulemaniye and Zeyrek).

There will be some increases in traffic on roads running through the old city towards Yenikapi interchange. These are greatest on Adnan Menderes Bulvari and are caused by traffic travelling between the D-100 and the tunnel. Eastbound traffic volumes on the D-100 motorway increase by approximately 8% in the morning peak (much less in the inter-peak period).

Overall, reductions in traffic within the peninsula and in the core areas, especially on the route around the eastern end of the peninsula, are expected to lead to a small positive impact for the old city and the OUV of the World Heritage Site.

Skyline of the WHS

The Project will not impact on the silhouette of the historic peninsula of Istanbul as seen from the Bosphorus. The original proposal envisaged a number of elements which had the potential to cause possible impact on this view but these have all been amended so that no structure exceeds approximately 6 m above existing ground-level. In this way the Project remains below the line of the old sea walls and the city beyond them so that no structure intrudes into the view of the old city. Key design revisions include reducing the height of the Operations Building to a single story structure and the removal of signage on the toll plaza.

Impacts on Other Aspects of OUV

Although there is as yet no adopted Statement of OUV, no significant impacts on the aspects of cultural heritage identified in its inscription criteria are predicted to arise as a result of the Project.

6.8.2 *Archaeology and Historic Structures*

Eleven locations of known or potential importance have been identified within 100 metres of the Project including the City Sea Walls, Mermerkule (the Marble Tower), the Harbour of Theodosius in Yenikapı, and the Church of Ss. Sergius and Bacchus/Mosque of Küçük Ayasofya (Little Hagia Sophia). These are all located on the European side and the assessment therefore focuses on this part of the Project.

With the implementation of mitigation (discussed below), there will be negative impacts of moderate significance on three locations (Marble Tower, Konstoskalion Harbour, and the Palace and Harbour of Boukaleon), negative impacts of minor significance on six locations and the remaining two locations will have no impact. The main concerns are:

- the risk of locating unknown buried archaeology along the route (in particular in areas of excavations for underpasses, the tunnel and ventilation shaft);
- risk of physical damage to historic structures near the route as a result of operation of construction equipment, deposits of materials and general construction activity; and
- risks of vibration from blasting and piling during construction.

These risks will be mitigated by compliance with relevant international standards, including:

- implementation of an archaeological watching brief using a Government-approved archaeologist at Yenikapı and chance finds procedure along the rest of the route during construction;
- complying with relevant national law on the protection of cultural heritage;
- design modifications (to be approved by DLH) to avoid impacting on buried locations of likely archaeological interest and importance; and
- prior consultation with protected area sponsors and managers, local communities and other key stakeholders.

Vibration monitoring and visual inspections of sensitive buildings and historic structures will also be undertaken during the construction phase and construction work will be stopped if specific vibration limits are exceeded.

Blasting and percussive piling near historic structures will not be permitted. Where piling is essential bored piles and casings driven by torque and hydraulic pressure will be used.

6.9 *SOCIO-ECONOMIC IMPACTS*

Istanbul is the largest city in Turkey with a total population in 2007 of 12.5 million. The Istanbul Transport Masterplan forecasts that the population is expected to increase to between 18 and 20 million by 2023. The unemployment rate (2006 data) for Istanbul (11.2%) is greater than the national average (9.9%) but 2009 OECD data ⁽¹⁾ suggest that this will increase to 15.5% in 2010 and then fall slightly to 15.0% in 2011. Istanbul is a highly urbanised, modern and well developed city-region. Employment is dominated by services (57.6%) and industry (41.9%) with agriculture playing a minimal role.

The OECD has identified significant improvements and advancements in the overall health status of Turkey in recent years and Turkey registered one of the greatest gains in life expectancy between 1960 and 2007, with an overall increase in longevity of 23 years, rapidly narrowing the gap with the average across OECD countries. The infant mortality rate in Turkey has fallen significantly over the past few decades, down from about 190 deaths per 1 000 live births in 1960 to 20.7 deaths in 2007. Despite this improvement, the rate of infant mortality in Turkey remains four times higher than the OECD average.

The main socio-economic impacts of this project will be positive and consist of employment creation (direct and indirect), and economic benefits through reduced journey time savings across the city. There may be a small loss of employment through the need to expropriate buildings which currently house small businesses.

6.9.1 *Employment*

It is estimated that a total of approximately 1,800 workers (1640 site workers and labourers, 160 technical and management) will be required for construction of the Project. ATAŞ intends to employ construction workers who are based in Istanbul (and thus have their own accommodation in the city) as far as possible. However, there may be some specialist workers who come from outside Istanbul and some worker accommodation may be required. ATAŞ will rent a compound area at a suitable location outside the city centre and will ensure that an acceptable living environment is provided for workers and the camp is managed so that workers do not create any

⁽¹⁾ OECD Economic Outlook No. 86, November 2009.

problems for people nearby. The location of this camp has yet to be decided but it will be developed and managed in accordance with the provisions of IFC Performance Standard 4: Community Health, Safety and Security and the IFC-EBRD guidance on workers accommodation. A key objective will be to avoid any impact on the adjacent community or on local services, community facilities and businesses. Unnecessary interactions by the workforce with the local community will be minimised.

In addition to the direct employment benefits during construction of the Project, indirect and induced employment benefits will also arise. Available data from various sources suggests that indirect and induced employment could amount to of the order of 190%⁽¹⁾; that is every person year of direct employment will generate an additional 0.9 person years of indirect and induced employment in the economy. The wider economic impact will have a minor and positive impact on levels of unemployment in the city through providing approximately 3,585 temporary jobs or the equivalent of 1,250 full time jobs.

Once operational, the Project will employ approximately 110 people.

6.9.2 *Acquisition of Property*

Development of the Project may result in the acquisition of a small number of tenanted commercial and residential premises. The Project will be designed in order to avoid direct displacement of premises as far as possible through using existing roads and minimising the need for additional land.

Where displacement cannot be avoided the BOT Contract provides that acquisition and compensation will be undertaken by DLH. ATAŞ will work with DLH to ensure that, as far as possible, acquisition and compensation is undertaken in accordance with the provisions of relevant international standards, and with the Resettlement Policy Framework developed for the Project (see Annex D of the main ESIA). This will include prompt compensation for the loss of assets or access to assets at full replacement cost, assistance to tenants whose homes or premises may be acquired, compensation of business owners for the cost of re-establishing commercial activities elsewhere and also for the net income lost during the period of transition, and compensation for the costs of the transfer and re-installation of plant, machinery or other equipment. ATAŞ and DLH will establish a grievance mechanism consistent with international standards and guidance to

⁽¹⁾ Data developed by the Scottish Government provide employment multipliers for the Construction sector in 2004 of 1.58 for indirect jobs and 1.93 for direct jobs. See <http://www.scotland.gov.uk/Topics/Statistics/Browse/Economy/Input-Output/Downloads>

address specific concerns about compensation and relocation that are raised by displaced persons or businesses, including a recourse mechanism designed to resolve disputes in an impartial manner.

6.9.3 *Wider Economic Impact*

Various studies have reported on the wider economic impact of road construction as summarized by the International Road Federation (IRF) Research Council⁽¹⁾. These sources support the prediction that construction of the Project will yield significant temporary employment and economic benefits in Istanbul and provide a significant boost to the regional construction and supply industry. The provision of on-site catering and welfare facilities for the site and the workforce and the supply of goods and services to the worker camp will provide a small level of benefit to local businesses.

During operation the Project will provide wider regional socio-economic benefits resulting from savings in journey times for business and personal purposes.

The Project is not expected to have any negative micro-economic impacts such as local inflation in prices of good and services.

6.10 *COMMUNITY HEALTH AND SAFETY*

The Project may change the community's exposure to risks and impacts arising from accidents, structural failures, releases of hazardous materials, exposure to diseases, and the activities of personnel. Impacts on the health and safety of the community may also arise during construction as a result of noise, dust and other emissions from earthmoving, blasting, piling, and operation of equipment and vehicles. The operation of the road and tunnel will affect flows of traffic on the approach roads and elsewhere in the city with resulting impacts on related noise and air emissions and road safety which may have impacts on the community health and safety.

A range of measures have been identified to protect the community from any adverse effects during construction (noise, dust and air emissions) and operation. The provision of new grade-separated crossings and access for prams, pushchairs and wheelchairs will reduce risks of road traffic accidents on the approach roads, including risks to vulnerable groups.

⁽¹⁾ The Socio-Economic Benefits of Roads in Europe; International Road Federation (IRF) Research Council; 2007.

Information on proposed construction activities and progress of the construction of the Project will be available on the Project website (www.avrasyatuneli.com) and also through community newsletters and from neighbourhood leaders. In particular, there will be advanced notification of key construction works and activities and information on alternative access and detour arrangements. The Project's grievance process will also be freely available should a member of the local community wish to make a complaint.

Weaknesses in the design of structures and shortcomings during their construction could result in failures of infrastructure and equipment and pose significant risks to the life of the people using the roads, tunnel, bridges and underpasses. The risk of structural failure will increase in the event of natural hazards such as earthquakes and floods. ATAŞ will design, construct and operate the structures (tunnel, roads, bridges, underpasses) in accordance with international, Turkish national and local standards, and will give particular consideration to potential exposure to natural hazards such as earthquakes, tsunamis, floods and storms.

Detailed emergency preparedness and response plans for protection of community health and safety will be prepared, including plans to prevent, prepare for and respond to emergencies affecting road users (vehicles and pedestrians) and the wider community.

All worksites will be secured to protect the public and security staff will work in accordance with the terms of Law no. 5188 on the Private Security Services. Security personnel will be trained in the appropriate use of force should it be required.

6.11 *LABOUR AND WORKING CONDITIONS*

6.11.1 *Working Conditions*

Child labour has been an issue in Turkey. In 1999, child labour accounted for over 10% of the total population aged 6 to 17, the majority in the agricultural sector, however, the child workforce has reduced to almost half in the period 1999 to 2006.

ATAŞ and their subcontractors will not employ any child or forced labour and they will comply fully with the relevant provisions of Turkish law and with International Labour Organisation Conventions on child and forced labour, discrimination, freedom of association and collective bargaining.

ATAŞ will also ensure that a fair and just wage is paid to all construction and operation workers on the Project. The range of employment provided by the

Project and associated income payments are not expected to change the current distribution of level of income levels in Istanbul.

A comprehensive health and safety plan will be developed and implemented to accord with Turkish national requirements and international standards for occupational health and safety.

Any temporary construction worker's accommodation will be designed, constructed and operated in accordance with IFC PS2 and IFC guidance on workers' accommodation. ATAŞ will regularly audit compliance during construction.

6.11.2 *Employment Policy*

The companies within the ATAŞ consortium each have existing policies and procedures within their own organisations on labour and working conditions which generally accord with the standards set out in the IFC PS2 and Turkish laws and regulations. ATAŞ will use these existing policies and procedures as a starting point for creating Project policy and procedures to ensure compliance with national legislation of the Republic of Turkey and relevant international standards.

These policies and procedures will be in place prior to the start of construction activities and hiring of the construction workforce. Compliance will be audited annually under the ESMP and the results of this annual audit made available to any interested party.

7 **PROJECT ENVIRONMENTAL AND SOCIAL MANAGEMENT SYSTEM**

7.1 **ENVIRONMENTAL AND SOCIAL MANAGEMENT SYSTEM**

ATAŞ proposes to manage the environmental, health, safety and social impacts and risks of the Project in accordance with applicable laws and regulations of Turkey and with relevant international standards ⁽¹⁾. The management arrangements will be set out in an Environmental and Social Management System (ESMS) for the Eurasia Tunnel Project which will be designed to comply with the requirements of ISO14001 ⁽²⁾.

Overall responsibility for the ESMS will lie with the Board of ATAŞ, who will establish and maintain an organisational structure that defines roles, responsibilities, and authority to implement the ESMS. This will include the designation of in-house personnel during the different phases of the Project.

Details of all measures planned to avoid, reduce or compensate for adverse environmental and social impacts and to provide benefits where possible are set out in the Environmental and Social Management Plan (ESMP). The ESMP addresses the full life-cycle of the Project from detailed design through to operation for the period of the BOT Contract⁽³⁾. The current ESMP is presented in Annex D of the main ESIA Report. This will be kept up to date as the Project develops to incorporate any new requirements.

7.2 **RESETTLEMENT POLICY FRAMEWORK (RPF)**

A key aspect of the environmental and social management of the Project will be the management of acquisition of land required either temporarily or permanently for construction and operation. This includes land acquired by voluntary agreement, land acquired by involuntary acquisition, and land transferred between public agencies. Expropriation of land and property will be undertaken by DLH. ATAŞ will work with DLH to apply a framework of actions designed to manage this process in accordance with international best

⁽¹⁾ Of particular relevance is the IFC's Policy on Social & Environmental Sustainability, April 2006 and related Performance Standards and Environmental, Health and Safety Guidelines.

⁽²⁾ International Standardisation Organisation; "ISO 14001:2004: Environmental Management Systems _ Requirements with Guidance for Use"

⁽³⁾ Closure and decommissioning are not considered as the tunnel is envisaged to remain in operation for the foreseeable future.

practice⁽¹⁾. The RPF is set out as part of the Project ESMP. This sets out the basis on which land will be acquired and the procedures that will be followed to ensure appropriate treatment of affected parties.

7.3 *GRIEVANCE PROCESS*

A Grievance Process will be set up through which any person or organisation can complain about any aspect of the Project. Full details are provided in the Project Stakeholder Engagement Plan which is available on the Project website (www.avrasyatuneli.com). In summary:

- Every complaint from any external party or worker about any part of the process of the Project implementation will be formally registered as soon as it is received on a Grievance Form and a copy will be given to the person registering the complaint.
- An initial response to all complaints will be made by an appropriate person within ATAS within 5 working days and ATAS will seek to resolve grievances within one month. If this is not possible the complainant will be kept advised of progress on a regular basis.
- Complaints will be tracked through to satisfactory resolution by the Project Environment and Complaints Manager. All actions will be recorded on the Grievance Form until such time as the contact is resolved. The contact will then be recorded in the Grievance Log as closed.

The grievance process will be free, open and accessible to all and grievances will be addressed in a fair and transparent manner. Information about the Grievance Process, who to contact and how, will be available on the Project website (www.avrasyatuneli.com). Contact Points will be posted on staff information boards and on site information boards and will be publicised in Project documents (leaflets, newsletters, public announcement, etc). All workers will be informed of the Grievance Process and new workers will be informed when they join the Project. The Environment and Complaints Manager will have overall responsibility for the Grievance Process throughout the life of the Project, and will ensure that external stakeholders and workers are aware of the process and that any grievances are handled promptly and responded to in an appropriate and timely manner.

⁽¹⁾ As set out in IFC Performance Standard 5: Land Acquisition and Involuntary Resettlement

The Project is now moving forward into detailed design and implementation. ATAS will continue to engage with stakeholders during the next stages and the comment and grievance procedures that have operated during the ESIA consultations will continue to apply. Future plans for continuing stakeholder engagement and the procedures for managing comments and grievances are described in the Project Stakeholder Engagement Plan. This is a live document and will be updated as required during the construction process and the most up to date version will be found on the Project website together with the ESMP at www.avrasyatuneli.com. Other Project information, notification of construction activities and reports on general progress will continue to be available throughout the construction and operation of the Project.